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News Crawls and Audience Retention: A Test of Information Overload in Local Television News Programming

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NEWS CRAWLS AND AUDIENCE RETENTION: A TEST OF INFORMATION OVERLOAD IN LOCAL TELEVISION NEWS PROGRAMMING

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Local television news has played an important role in creating informed and involved citizens. In such a technology-driven society, televised news stations face increased competition from online, on-demand media. In response, stations seek to provide more information using added production elements. A significant concern in the literature is whether information overload occurs when viewers are inundated with an abundance of information and if this impacts long-term retention (LC4MP). This study examines the impact of one type of production element, news crawls, on immediate and long-term audience recall. To conduct this research, participants were exposed to one of three versions of the same newscast: one with no crawls, one embedded with crawls that reinforced the on-screen story, or one with conflicting crawls. Immediate recall was tested using a survey distributed directly after exposure and long-term recall was tested two weeks later using the same survey. Among the results of the study it was found that, overall, students in the reinforcing crawl group had a significantly higher immediate recall rate. Independent demographic variables, as well as their interactive effects with crawl type were also examined. Significant differences in immediate recall scores were found for GPA and viewing frequency independently, as well as the interaction between gender and news crawl type. For long term recall, viewing frequency, class rank, and the interaction between crawl type and class rank provided significant results. Future recommendations in this area include focusing on additional production elements and visual newscast formats, as well as looking specifically at story content and additional demographics to more thoroughly understand how people process local news.

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TABLE OF CONTENTS

Chapter Page

LIST OF TABLES

Table Page

Table Page

CHAPTER 1

THE PROBLEM

Introduction

In a society that is so heavily dependent on media for information, televised news serves as an open window to events and activities going on in the world. Televised news from local stations have been in existence since 1948, when New York City's WPIX broadcast their first newscast (Klingenberg & Krause, 2005). Watching the news helps people to feel like they have a sense of what is occurring in the world internationally, nationally or locally and creates a sense of social belonging (Putnam, 2000). One of the key assumptions of American culture is that television news programming creates a better-informed society. While the news has kept a common aesthetic, with advances in technology, news has started to change.

A major component of being a part of the community is awareness, which is where local news becomes important. For college students, many of whom are in a new location, knowing about local news can help to contribute to a sense of normalcy. After being removed from the social structures they have grown accustomed to during their formative years, the sense of belonging and a sense of community is important for transiting students (Rund, 2002; Ahn, et. al., 2010). This is seen in the rise of student housing that uses living-learning style domiciles for their students that boast increased campus safety and health awareness which contribute to student success (Collegeportraits.org, 2015). A successful student understands that they are a part of the community, which is larger than the campus in many university towns. However, Mindich (2005) worries that that our younger generations are less inclined to research local politics than previous generations, which could impede upon their community awareness.

Olmstead, et al. (2013) found that our information-seeking society still turns to television as its number one resource for news. In a world where information access is instantaneous via the Internet, local news stations have started to add more information to each of their broadcasts in new ways. Pew Research Center found in 2012 that seventy-one percent of Americans watch local news, compared to sixty-five percent who watch network and only thirty-eight percent who watch cable (Potter, et al., 2013). Local news, working many times with restrictive budgets, has worked to increase their reach in many ways. From inserting graphics to on location reports from mobile broadcast units, many news stations are embracing the ability to broadcast from satellite locations to add more legitimacy to their newscasts. Some local stations have taken a cue from national and international news stations and have started adding crawls, or scrolling information, to their screens during their broadcasts.

Does adding this extra information help or hinder those who are viewing the broadcasts? Can adding too much information cause cognitive overload in a world where people are already bombarded with multiple media sources? Moreover, are college students who are watching the news even paying attention to the information presented via crawling text at the bottom of the screen or are they easily influenced by factors associated with the reporter/anchor such as authority level and attractiveness?

This study seeks to explore the use of news crawls in local televised news broadcasts. As a result of the development of electronic information communication technology, people today are exposed to thousands of pieces of visual information - consciously or unconsciously (Itti & Koch, 2000). More specifically, the focus for this study is the college demographic and their conscious and unconscious-viewing habits in regards to local news broadcasts. Students viewed news broadcasts without crawls, with reinforcing crawls, and with conflicting crawls. In this

study, the differences in information retention between these three types of broadcasts were explored.

Statement of the Problem

To understand the context of this study and, moreover, the context of information overload in relation to local news broadcasts and their use of news crawls, this research will explore past studies, demographics and psychographics, and local news as a whole. Together, these pieces create an informed outline by which this study has been developed.

Past Studies

Fruttaldo (2014) describes television news embedded news crawls as a new hybrid form of media. He calls news crawls the "predecessor to Twitter" and agrees with other research that their purpose is to give viewers the most amount of information in the shortest amount of time (p. 85). He claims that news crawls are a part of a converging media genre for which our technology-driven society yearns. While his research is a work in progress, it is the most recent to date that looks specifically at news crawls.

Since September 11th, 2001, when the news crawl reappeared as a significant form of information dissemination, there has been little research of how the crawl information has affected audiences. Michael Keefe-Feldman's thesis (2007) focuses on this issue in regards to national news. He found that there is a negative correlation between viewer comprehensions of the main story information when a news ticker is present. His results also show that many people watch the news to become better informed and while this goal is achieved, it is only at low levels. This information can be roughly translated to viewers of local news, but cannot be generalized to encompass the televised local news use of news crawls in its entirety.

Research focusing on the effects of graphics and information processing by Fox, et. al (2004) found that graphics, not specifically crawls, enhanced information retention as measured by encoding for younger viewers but not for older viewers. The experiment conducted using the Limited Capacity Model of Motivated Mediated Messaging as a theoretical construct, measured information retention of two groups, undergraduate students from a large Midwestern University and 44 adults age 28-80 recruited from local churches in a Midwestern community. While this study used a technologically intensive approach, measuring tonic skin conductance levels and heart rate data in addition to recognition and cued recall, both the cued recall method he used and research results inform the current study.

Other researchers have used eye-tracking technology as a way to measure the behavioral effects of news crawls (Josephson & Holmes, 2006; Matsukawa, et al., 2009; Rodrigues, et al. 2012). Findings show that production elements in a newscast capture the attention of the audience when they are conflicting with the main story. As a result, when tested, participants recalled less information from the newscast when graphics were present. According to participants in all three of these studies, they become overwhelmed when the layout of a newscast is too cluttered with information.

Demographics and Psychographics

Demographics and psychographics of the traditional viewer are changing. Looking past the traditional viewer, the typical college student brings an enhanced view of the media and immediate information needs. Their reliance on and ownership of mobile devices such as smart phones and tablet computers, creates a change in how they access information. While this study focuses on local televised newscasts, the information from these newscasts, including video and external content, is available via the mobile devices, which creates a set of obstacles for media

producers. In a world of technology, people are inundated with more and more information each day. Their demographic and psychographic tendencies are important to note when looking at how a person views the news.

Local news stations are competing with other media vehicles now more than ever. Potter, et al. (2013) reports that the number of local television news viewers under the age of 30 has decreased significantly in the past 10 years. It is suggested that this steady decrease will continue as on-demand technology progresses. Olmstead, et al. (2013) found that on-line news sources are comprised of even smaller news sites and most are under six years old. Fifty-three percent of the micro-news sites he investigated focused on local news. Local news stations have turned to flashy graphics, music, and news crawls as a means for providing more entertainment and information to this younger audience. As Fruttaldo (2014) would argue, this "mimicking" of Internet characteristics in local newscasts shows evidence of media convergence.

How people process information can vary in many ways depending on the audience. When it comes to news crawls, there are issues with information overload that come into play. Individuals' reading levels, vision, and their ability to dual code information are issues that must be explored to decide if news crawls are a helpful addition or a hindrance to processing the information. As the limited number of studies on news crawls have pointed out, the cluttered screens are actually overwhelming to viewers, and can also affect their ability to comprehend the content.

Local News

Being connected to the community is important to engaging students and fostering a positive "town-gown" relationship. The more local television news a person watches, the more inclined they are to contribute to and converse about their local community (Mindich, 2005; Putnam, 2000). This idea is what Woodstock (2014) calls the news-democracy narrative (p. 835).

While news has no singular definition, it is characterized across the literature to unite, inform, and entertain its viewers. However, Olmstead, et al. (2014) reports that heavy viewers of local news still watch, on average, eleven more minutes of cable news over local news. For this reason, local news stations are constantly competing for viewership. It is the responsibility of gatekeepers to choose the stories that will affect the viewers the most, resulting in a longer, more loyal viewership. The perceived solution, again, is to provide as much information as possible. One way to deliver more news is the news crawl.

Purpose of the Study

The purpose of this study is to look at news crawls and begin to deconstruct their usefulness. This study seeks to analyze the effect that media elements have on audience retention and comprehension of information. Specifically, the study utilizes a post-test only experiment that uses news crawls (the scrolling information ribbon on the bottom of a newscast) as a stimulus to further understand if certain characteristics of added production elements distract, reinforce, or have no effect on a college audience's retention of local news.

The literature shows a lack of research in this area. Virtually no research specifically addresses local newscasts and their use of news crawls. Using Information Overload Theory as a foundation, this study seeks to understand how audiences are processing the excess of infor-

mation that is provided to them during a newscast. Further, because little research has been conducted on news crawls, in general, this study uses literature related to Dual-Coding and Cognitive Load Theory in the context of multi-media embedded with on-screen text. This helped the researcher to understand how an individual processes information presented in this fashion. Finally, because Information Overload Theory only discusses comprehension, the Limited Capacity Model of Motivated Mediated Message provided insight on how individuals retain information to which they are exposed.

Research Questions & Hypotheses

The purpose of study is to investigate whether the additional content provided by local news crawls facilitates information retention and recall or if there is reduced comprehension suggesting that information overload is occurring. To test this, an experiment was conducted using three different versions of a local newscast: one with no crawls, one with reinforcing crawls, and one with conflicting crawls. A local newscast was obtained from Youngstown, Ohio to ensure that students were unlikely to be familiar with the content. The researcher embedded news crawls that contained bits of information from stories that were featured in the newscast. The newscast with reinforcing crawls were headline type crawls that gave a quick overview of the story, omitting many details. The conflicting newscast used the same news crawls as the reinforcing newscast, but they were rearranged so they were not related to the story that was being presented at the time. Because the original newscast did not have embedded news crawls, it was used for the "no crawl" version of the newscast.

Five liberal studies courses were chosen as a target to solicit students, and 60 subjects participated in the study. A demographic survey collected basic information about the sample and was later used to determine if there were differences based on the audience's age, gender,

GPA, class rank, level of news motivation, and college of enrollment mid-sized western Pennsylvania University. After viewing the local newscast, students were administered a paper-based multiple-choice survey to test immediate comprehension and recall. Two weeks later, the students were sent an online version multiple choice survey to test long term retention.

To determine if reinforcing information adds to comprehension and if conflicting information adds or detracts from memory retention, three research questions were asked. The first research question broadly looks at whether the existence and type of news crawls affected immediate recall and long-term retention. The second question looks more specifically at demographics to see if they impact immediate recall and long-term information retention regardless of crawl type. Finally, the third research question looks specifically at crawl type and demographics together, and their possible interactive impact on immediate recall and long-term retention.

RQ1: Does the existence and type of news crawl affect immediate and long term info retention?

H1.1: There is no significant difference in immediate information recall between subjects receiving no crawls, reinforcing crawls, and conflicting crawls.

H1.2: There is no significant difference in long-term retention of information between subjects receiving no crawls, reinforcing crawls, and conflicting crawls.

RQ2: How do the demographics of the subjects affect immediate recall and long term retention regardless of news crawl type?

H2.1: There is no significant difference in immediate recall based on gender.

H2.2: There is no significant difference in immediate recall based on age.

H2.3: There is no significant difference in immediate recall based on GPA.

H2.4: There is no significant difference in immediate recall based on class rank.

H2.5: There is no significant difference in immediate recall based on College.

H2.6: There is no significant difference in immediate recall based on viewing frequency of local TV news.

H2.7: There is no significant difference in immediate recall based on level of interest in local TV news.

H2.8: There is no significant difference in immediate recall based on news motivation score.

H2.9: There is no significant difference in long-term retention based on gender.

H2.10: There is no significant difference in long-term retention based on age.

H2.11: There is no significant difference in long-term retention based on GPA.

H2.12: There is no significant difference in long-term retention based on class rank.

H2.13: There is no significant difference in long-term retention based on College.

H2.14: There is no significant difference in long-term retention based on viewing frequency of local TV news.

H2.15: There is no significant difference in long-term retention based on level of interest in local TV news.

H2.16: There is no significant difference in long-term retention based on news motivation score.

R3: Is there a difference in immediate and long-term retention based on demographics and crawl type?

H3.1: There is no significant difference in immediate recall based on gender and crawl type.

H3.2: There is no significant difference in immediate recall based on age and crawl type.

H3.3: There is no significant difference in immediate recall based on GPA and crawl type.

H3.4: There is no significant difference in immediate recall based on class rank and crawl type.

H3.5: There is no significant difference in immediate recall based on College and crawl type.

H3.6: There is no significant difference in immediate recall based on viewing frequency of local TV news and crawl type.

H3.7: There is no significant difference in immediate recall based on level of interest in local TV news and crawl type.

H3.8: There is no significant difference in immediate recall based on news motivation score and crawl type.

H3.9: There is no significant difference in long-term retention based on gender and crawl type.

H3.10: There is no significant difference in long-term retention based on age and crawl type.

H3.11: There is no significant difference in long-term retention based on GPA and crawl type.

H3.12: There is no significant difference in long-term retention based on class rank and crawl type.

H3.13: There is no significant difference in long-term retention based on College and crawl type.

H3.14: There is no significant difference in long-term retention based on viewing frequency of local TV news and crawl type.

H3.15: There is no significant difference in long-term retention based on level of interest in local TV news and crawl type.

H3.16: There is no significant difference in long-term recall based on news motivation score and crawl type.

Definition of Terms

The following items have been defined to ensure understanding of the study.

Local News

News coverage in a local context; produced and broadcast by a local news station.

On-Screen Story

The anchor or reporter story in a newscast that is being delivered/shown at a particular time. This is both audible and visual to the audience at that time.

News Crawls

The scrolling information ribbon that appears at the bottom portion of a televised newscast.

Conflicting News Crawls

A news crawl that highlights information other than what the "on-screen story" is presenting.

Reinforcing News Crawls

A news crawl that highlights information presented by the "on-screen story."

Viewing Frequency

Considers the number of times a subject views local news in an average week. It is measured on a 5-point Likert scale and ranges from never to more than five times

Level of Interest

A 3-point Likert scale that determines an individual's enjoyment and feelings towards local news. Ranges from not interested to extremely interested.

Motivation

The likelihood an individual is to seek local television news measured by a 4-point Likert scale. Motivation uses a combination of Viewing Frequency and Level of Interest and ranges from extremely likely to not likely at all.

Immediate Recall

The ability for a person to answer questions on content they were recently exposed to; measures comprehension.

Long Term Retention

The ability for a person to answer questions on content they were exposed to two weeks earlier.

Delimitations and Limitations

This study took place at a mid-sized state funded university with a primarily undergraduate focus. The university's enrollment was approximately 15,000 students at the time of the study. Enrollment characteristics range widely in terms of socio-economic and demographic groups. Fifteen percent of students are minority groups and fifty-five percent are female. In Pennsylvania, where the study was conducted, approximately sixteen percent of students are minorities and about half are females.

Additionally, the term "local" refers to newscasts that are targeted to an audience in the immediate area. This study looked specifically at the production aspects of a local newscast, rather than referring to the audience as a local audience. A local newscast from the area was not used because of the possibility that the sample would be exposed to the news content prior to the study or be familiar with the location or areas discussed. It was more important to the researcher that the audience was unfamiliar with the information to avoid influencing the potential recall ability.

Lastly, the researcher is not a professional news crawl generator. The researcher watched many newscasts with news crawls to ensure that the color, font, size, and speed of the crawl were

realistic. Incorporating a person who is a professional news crawl generator into future studies will be considered.

CHAPTER 2

REVIEW OF THE LITERATURE

"We bombard people with sensation. That substitutes for thinking."

— Ray Bradbury, *Fahrenheit 451*

Television News

News and Its Impact on American Society

Before 1837, information was spread by the printing press, mail carriers, railroads and word of mouth, making all news very isolated within the particular community that it originated. By the time news information was spread, the chance that it was essentially "old news" was very likely. This made it practically impossible to have news that was relatable and able to affect the masses. Cupp (2011) provides an introduction to the evolving influence journalism had on our society in the preface of Tuggle, et al. (2011)'s collaborative handbook, *Broadcast News Handbook Forth Edition: Writing, Reporting, & Producing in a Converging Media World.*

The potential impact of news on society changed significantly when Morse invented the telegraph in 1837. This was the first medium to give humanity the ability to rapidly share information from town to town, region to region, and eventually, overseas. Wars were no longer a distant event that could hardly be influenced by the homeland. A Commander in Chief obtained the ability to directly communicate with those on the front line; families could be updated more efficiently; and overall, messages were more quickly sent and received. It was also during this period when photography began to develop; influencing the world of journalism immensely. America was directly exposed to the wartime carnage from a second hand perspective in 1862 when Matthew Brady sent a photograph of a corps from the Civil War. This was unique to anything America had been exposed to in past…and it brought the war into our own "territory."

While its impact is hard for one to imagine in the Internet society we live in today, it was a significant period in time (Cupp, 2011).

The telegraph evolved to Marconi's radio waves within approximately sixty years, setting the precedent for how quickly technology would quickly evolve over the next century (Barboutis, 2013). Pittsburgh, Pennsylvania was the first town to send a voice broadcast in 1901. It was 15 years later when inventor and futurist David Sarnoff's controversial article appeared in the hands of thousands of academics, proposing the radio's ability to provide news information for those across the world (Sarnoff, 1936). In the early 1920s he presented the first consumer radio, dubbed the *radiola*, which gave America the gift that he proposed years earlier. The tradition of gathering around the radio for daily news, and even entertainment, began during this time; bringing both government and Hollywood into the living rooms of millions of Americans.

As the radio evolved, Americans' suspicious feelings of government and politics decreased. In fact, the radio gave President Roosevelt the ability to speak directly to tuned-in Americans, who were looking for comfort during the Great Depression. Radio news not only brought people together, but it humanized the elite and included the common person, adding a truly democratizing element to our society (Cupp, 2011).

World War II delayed the progression of the television, but once it was commercialized, television essentially became a part of the American family. For instance, when President Kennedy was assassinated in 1963, people gathered around the television to watch the news, mourning together as a nation (Bodroghkozy, 2013). Near the end of the decade, when Neil Armstrong landed on the moon, the same Americans gathered around television news to celebrate the progress of our nation (Cupp, 2011). Television news began to symbolize our culture, as well as change our culture entirely. For everyday news; however, the majority of people still relied on

newspapers as the most trustworthy source for information (Mayer, 1993). Interestingly enough, this trust shifted from television to newspapers in 1963 when newscasts expanded from fifteen to thirty minutes (Webster, 1984). CBS, NBC, and ABC set the national broadcast agenda. This changed in 1980 when Ted Turner presented us with the first cable news station, CNN, which took Americans overseas unlike ever before (Cupp, 2011).

Quick History of Local TV News

The lack of documentation makes it difficult to concisely illustrate the history of local television news. While adapted from print and radio, the first local television newscast was produced by WPIX in New York City in 1948, utilizing a fifteen-minute "talking head" block format (Klinenberg & Krause, 2005; Hinds, 1993). Television's original purpose could be described as a public relations service to promote the larger networks and parent companies in the cities they were housed (Rose, 1979). However, local television news proved that the purpose of news was not only to inform, but to unite a community, as well.

It was not until the 1960's and 70's, that local television news was economically supported and more time was devoted to truly localizing the content (Allen, 2001). This has been referred to as the "light bulb theory;" the epiphany news producers had when they realized the potential to make money on local news programing (Hinds, 1995, p. 7-8). Demand for local news content increased, as did the advertising dollars that sustained it. This ultimately led to commercializing the news media outlet as well as increasing the market competition. The number of local news stations consistently continued to double in numbers until the dawn of the Internet age, playing synchronously during the 7:00 AM, Noon, 5:00 PM, and 11:00 PM time slots (Webster, 1983).

At the outset, local news station producers recognized the audience's need and want to be able to identify with the on-air personalities (Rose, 1975). The vibe and interaction on-air also affected the believability and credibility of the newscast, as well (Bracken, 2006). A station's aesthetics were the second component to come into play. The use of music and visuals added to the entertainment component of this informative media giving it a Hollywood feel. B-roll footage, voice overs, alternative lighting, and related capabilities began to appear around 1965, providing the station with a more realistic way to tell a story (Hinds, 1993). Evidence of the aforementioned trend can be viewed in any local newscast today.

News-Democracy Narrative

Understanding the importance of local news cannot be achieved without unveiling the dominant narrative regarding news and politics. The *news-democracy* narrative holds that news consumption positively correlates with citizen knowledge and civic engagement (Woodstock, 2014, p. 835). Accordingly, *citizenship,* then, is measured by level of news information consumption (Mindich, 2005; Putnam, 2000). For example, the more local television news a person watches, the more inclined they are to contribute to and converse about their local community. Likewise, increased exposure to news media is correlated with increased political knowledge, participation, and efficacy (Kenski & Stroud, 2006). This is further justified by the findings in a study conducted by Boyd, et al. (2011), who looked at news media use as a predictor for civic engagement for teenagers in 8th, 9th, and 10th grade. They found that the more a teen engages in interpersonal communication with parents regarding news, the higher levels of teen civic duty and participation, civic efficacy, and neighborhood socialization. Likewise, a study conducted by Erenaite, et al. (2012) used a similar approach to look at the influence adolescent peers had on each other's level of future civic engagement. Discussion with the students found that the more

their peers approved of being socially involved in the community, the more likely a teen will agree to future civic engagement. It can be concluded, then, that for news media to thrive, adult and peer influences must encourage adolescents to participate in it.

While the term "news" does not have a singular, concrete definition, it is agreed upon across the literature that the purpose of news is to help society make informed decisions (Keller & Hawkins, 2009). Producers of news, or gatekeepers, are thought to contribute to not only educating society but forming both an individual's and public opinion at large (Carey, 2001; Zeiler, 2004; Tuggle, et al., 2011). Therefore, they cast themselves in a role with many responsibilities to the people they serve. It is the responsibility of the citizens, then, to choose which media they utilize in both educating themselves and forming opinions.

Modern Local Television News

The economic decline in 2008 forced several local news stations to close, but because most were/are affiliates of cable networks, many local stations still thrive today. The cable networks are called "parent organizations," and feed most of the programming to each station through satellite or digital file transfers. For example, the station used in this study is an affiliate of, and therefore supported by, the National Broadcasting Company (NBC). However, WFMJ produces their local news programming specifically for the Youngstown, Ohio area. Most local news stations also offer an interactive webpage. This, in some way, adds to the competition for a television audience.

As could be expected, the "on-demand" Internet society we live in today has forced the television industry to share its news consuming audience, causing a decline in television viewership. However, the Pew Research Journalism Project reports that the majority of American's are still relying on television for news at home, with 71% of the audience tuning into local news

(Olmstead, et al., 2013). In fact, studies have concluded that most American consumers would prefer to get health-related information from news media sources rather than confiding in health professionals such as physicians, dieticians, or nurses (Borra, et al., 1998; Fleming, et al., 2006). A common theme in the literature suggests that our current society relies heavily on the news for information that affects their everyday lives.

Future generations are of concern to news researchers. According to Potter, et al. (2013), the under 30 year old news audience, who have essentially grown up in this "on-demand" society, dropped 14% from 2006 to 2012. Future news consuming generations are seeking information rather than waiting for it to arrive. A possible solution is to provide more information to the audience. This can be done through including additional visual production elements, which can be presented in the form of video, photographs, and graphics. Video includes b-roll, reporter packages, live streaming, interviews, and even super-imposing multiple screens with additional reporters. Photographs can be supplemented for b-roll video or even serve as over-the-shoulder images to help illustrate a short story. Graphics come in several forms, the most common being the weather graphic. Graphics are also frequently used when numbers and statistics are included in a story to help the audience visual their significance. Additional information during a newscast can also be presented in the form of a news crawl, i.e. the graphics that appear as a scrolling ribbon at the bottom of a screen.

News Crawls

History and Purpose of News Crawls

For as long as it has had the ability, the television industry has utilized graphics to present information, entertain the audience, and distinguish themselves from other stations. The steady presentation of text on screen first appeared in the form of a stock ticker by the Financial News

Network in the 1980s (Sella, 2001). Stations began to use "bugs" (a logo) in the corner of the screen in 1991, to help viewers distinguish stations from one another (McClellan & Kershbaumer, 2001). Since then, stations have also used the bottom half of the screen to display promotional "teasers" for upcoming programming, sports news, or other items (Finley, 2011). Regardless of the reason, graphics, as an added production element in news, can serve a monetary purpose because they are often sponsored by advertisers (Pank, 2007). There is no doubt that extra information on a screen appeals to younger generations who are familiar and accustomed to extra stimuli, and who are also the target for the majority of advertising (Rutenberg, 2001).

While commonly recognized as a phenomena in cable news, the news crawl is frequently seen in local newscasts. Documentation of the local news crawl in academia is sparse, but the industry frequently questions its legitimacy and purpose (Romano, 2002; Strauss, 2002; Consoli, 2009; Poniewozik, 2010). In terms of cable news, Blackmon, et al. (2004) conducted a content analysis of three 24-hour news stations and found that news crawls primarily highlight hard news stories, leading them to believe that the crawl's content is purposively placed, in other words, agenda setting was present.

The most commonly noted instance of the news crawl in television was during the morning of the September 11th, 2001 terrorist attacks. Prior to this tragic event, the news crawl was only rarely utilized (aside from sports and stock tickers), and when it was, it contained information on breaking news events (Sella, 2001). Because of their rare nature, the crawl was associated with urgency and emergency. However, it is now commonly observed as a way to feed additional news to the viewers, whether it reinforces the main, anchor-fed story, or it is of a completely different topic (Keefe-Feldman, 2007). Still, even in its current state of normalcy, Rodrigues, et al. (2012) notes that from an audience point of view, the news crawl remains the most

attention grabbing production element of a newscast. Using the number of fixation points and fixation times as measures, Rodrigues, et al. (2012) found that the movement of a crawl effects the visual behavior of the audience twice as much as the lower third and over-the-shoulder graphic.

From an information processing perspective news crawls, when they are used to reinforce on-screen stories, should appeal to three types of audience members: those who absorb information better visually, those who prefer audible information, and those who seek both audible and visual information (Mayer, et al., 2001).

News and News Crawl Research

A review of the literature shows that the vast majority of research on television news focused on content rather than its effects on audience recall and retention due to delivery and form through local television news. Grabe and her colleagues are of the few to have looked at delivery and its impact on the audience (Grabe, et al., 2000; 2001; 2003). Their extensive research yields that there are three types of sensationalism (arousal) regarding news: news content, news form, and news production elements (Hendricks-Vattehen, et al., 2006). While the third category, news production elements, highlights packaging and editing techniques, the news crawl element seems to have been overlooked. However, these studies have shown that news content already compartmentalized as "sensational" (i.e. crime, violence, natural disasters) accompanied with sensational delivery will result in cognitive overload (Grabe, et al., 2000; 2003; Lang et al., 1999). Consequently, the audience is overwhelmed by the massive amounts of stimuli and unable to store and retrieve information. Furthermore are the results from a study conducted by Ardac and Unal (2008), who aimed to investigate the effects of short-text (synonymous to news crawls) and whole-text versions of instructional material. Results yielded that while there were no significant

differences between the lengths of on-screen text, learners who represented a population with high memory capabilities were able to retain information better than learners with low memory capabilities. Therefore, the ability to retain text-on screen information depends, to a degree, on the characteristics of the individual learner.

Other research has used a dissimilar approach to investigate news delivery, looking at the audience's perception of image quality (Bracken, 2005; 2006). Focusing strictly on high definition, Bracken found that an audience's perception of local television news is highly impacted by image quality, not only in terms of content, but also concerning the perception of anchors. Results show that news delivery through high-definition is perceived as more credible than that of standard definition (Bracken, 2006). Again, no evidence of the added production element, news crawls, was included to understand credibility of a newscast.

Eye tracking studies have been conducted to understand which part of the television news screen is paid the most attention to by the audience (Matsukawa, et al. 2009; Josephson and Holmes, 2006). Joesphson and Holmes (2006) approached the topic using a similar approach as the current study, utilizing graphics (crawls) that reinforced and conflicted with the main story. Their results show that the lower-third crawl dominated the audience's attention over the main, anchor-fed story. They also reported that the audience considered the newscast with crawls with conflicting content as cluttered. These findings were further confirmed by a study conducted in Japan, which looked at viewer comprehension between newscasts with and without crawls. A post-test survey was given to the sample, and the researchers found that those who had reinforcing crawls answered more questions correctly (Matsukawa, et al., 2009). However, long-term audience information retention was not tested in this study.

In terms of new media, Fruttaldo (2014) currently views national newscasts embedded with crawls as an entirely new genre of news because of the younger cohort's familiarity with the act of seeking news through web-based platforms. He refers to this genre as the "hybridization between television and web contents" and is presently investigating the phenomena of colonized media. However, local news is not his targeted mediated delivery system, nor is he actively testing audience comprehension and retention.

Closely related to Fruttaldo's work in progress, as well as the current study, is a thesis written by Keefe-Feldman (2007). Using Information Overload Theory and Uses Gratification Theory as a basis for his investigation, Keefe-Feldman sought to understand the overall effects of cable news crawls on our society. To do so, he used a three-pronged approach and divided his research into sub-studies: a content analysis of cable news crawls, a survey to understand why people watch cable news, and an experiment to understand the effects of the news crawls on the audience.

The overall purpose of Keefe-Feldman's content analysis was to understand the function of the news crawl. Aspects he looked at included number of stories included in the crawl, time spent on each story in the news crawl, the story's relation to the anchor-fed "main story," level of story repetition during a newscast, the differences/similarities of news crawls across cable news channels, and the speed of the news crawls.

Keefe-Feldman used six hours of cable news footage from CNN (CNN Newsroom), Fox (Fox News Live), and MSNBC (MSNBC Live). He chose to record the newscasts on January 25, 2007 from 9:00 AM to 11:00 AM because they all aired regularly during this two-hour time slot, and because this ensured the news stations would be airing the same news content. Keefe-Feldman coded the information from the crawls as their "related" or "unrelated" to the main story and

kept count of how many time each news crawl story was presented. If the news crawl story was counted multiple times, it was coded as "repeat." It is important to note what Keefe-Feldman considered an individual news crawl story. Each individual news crawl story had the criteria of presenting information on the same topic, regardless of the length. Therefore, one news crawl story may have contained three sentences while others only used one sentences.

Keefe-Feldman found that CNN presented 224 news crawl stories, FOX presented 167, and MSNBC presented 157. In terms of the news crawl story's relation to the main story, Keefe-Feldman's results showed that the majority of the content was unrelated. Therefore, the audience of each station was consistently presented with two separate stories during their viewing experience. Interestingly, he also found the style of news crawl stories varied immensely across networks. CNN used more of a narrative style, which gave fuller sentences, unlike the "headline" style of news crawl MSNBC and Fox featured, which uses choppy sentences and fewer details.

As far as repetition of news crawl stories, Keefe-Feldman found that MSNBC continually repeated its stories with an average of 11.25 news crawl repetitions per ten minutes, or a 86% repetition level throughout the newscast. It is noted that a clear news crawl "cycle" was present, which was observed to restart approximately every ten minutes. This would certainly correlate with the high news crawl story repetition level found above. Fox news used a similar cycle pattern, while CNN did not restart its news crawl cycle until approximately halfway through the entire newscast. The speed of news crawls across networks was very similar with the crawl's speed averaging at 5.8 seconds. This was measured by observing the time it took for a letter to appear and then disappear from the screen.

Overall, Keefe-Feldman found more similarities than dissimilarities between news channels. However, this is not necessarily a good thing considering his main finding was that the majority of news crawls continuously repeated information unrelated to the main story. What can be derived from these findings, then, is that the purpose of the news crawl is to feed the audience more information rather than to reinforce and help them comprehend the information in the main story.

The second part of Keefe-Feldman's study was to understand the underlying goal of a cable news viewing audience. The two possibilities that he presents are to be educated/informed or to be entertained. He also aimed to understand the habits of cable news viewers, as well as their feelings towards the news crawl. The findings from this sub-study are said to determine if using aspects of learning theory and information processing are relevant to understanding the overall effects of cable news crawls on an audience. In order to do so, Keefe-Feldman employs a survey based on uses and gratification theory.

Using a convenience sample of 149 community members, Keefe-Feldman distributed an online survey and found that 66.6% of respondents watch cable television news to remain informed. Interestingly, the younger portion of the sample claimed to have feelings of being overwhelmed by the amount of news media they are exposed to on a daily basis. This same group, those 30 and under, found the news crawl to be "an unhelpful distraction that hinders [their] ability to concentrate on the main broadcast story" (p. 47). This was dissimilar from those in the study who were above the age of 31, who rated their feelings towards the amount of news media they are exposed on a daily basis as satisfactory. This group considered the news crawl to be both "help and informative" (p. 47). This is significant because we can assume that individual,

underlying motivational characteristics play a significant role in how a person feels about the news, as well as the added production element of news crawls.

The last part of this study concentrated on cable news crawl's effect on comprehension levels of the cable news audience. Using a somewhat similar technique to this current study (three versions: reinforcing, conflicting, and no crawls), Keefe-Feldman used two versions; one with news crawls and one with a black bar to hide the crawls from the viewers. Keefe-Feldman isolated his experiment to focus on the impact of news crawl on comprehension of the main story but did not identify the level of reinforcing and conflicting content of the crawls against the main story. However, because of the results from the content analysis, it can be assumed that the majority of the crawl content was conflicting.

Using solely Fox News, the cable news environment, Keefe-Feldman exposed a sample of 40 college students to a ten-minute clip of one of the two versions. They were then presented with a series of open-ended questions to test their comprehension of the viewing content. His results yielded that those in the non-crawl group answered, on average, provided one more correct answer (4.3) than the group who viewed the newscast with the crawl (3.2). From this, Keefe-Feldman concludes that news crawls provide audience members with the feeling of being overloaded with information. However, members from both groups answered a relatively low number of answers correctly. It is important to note that Keefe-Feldman's experiment was to serve as a pilot study for future research.

While the concept of Keefe-Feldman's study is similar to that of the present one, there are major differences that should be acknowledged. The most important of these is the audience and origin of newscast. Keefe-Feldman looked at national cable news and viewers of cable

news, while the present study took a local perspective. It can be assumed that the local cable audience is more attuned to a local newscast because it is designed to inform them with information closer to them in proximity. In addition to this, the design of this experiment utilizes three versions of one local newscast - news crawls with information that strictly reinforces the main story content, news crawls that conflict with the main story content, and a newscast with no news crawl. This helps to isolate the type of crawl and its effects on the audience. It should also be acknowledged that rather than presenting no crawl; Keefe-Feldman's study utilized a black bar to cover the news crawl. This could have been distracting the audience away from the main story.

In terms of the post-test evaluations, the current study looked at immediate comprehension and long-term retention of information. Keefe-Feldman did not test further than immediate recall of information from the main story. This relates to the big difference between the experiments. Keefe-Feldman asked ten open-ended questions that related to the main story only. The present study utilized information from both the news crawls and the main story to test the level of impact of the news crawls on the audience. Questions are standard multiple-choice questions to cue the viewer rather than giving them the opportunity to not answer at all.

Examination of Theoretical Constructs

Information Processing

Individuals must develop ways to cope with the massive amounts of information that surrounds us every day. Kosicki and McLeod (1990) call these tactics, "information processing strategies" (p. 73). Fleming, et al. (2006) builds upon this idea by highlighting the assumptions of this perspective. First, people, at their core, are information processing beings, and do so to make sense of the media messages that shape our world. Second, these information processing

tactics are not unique to the individual. Society, at large, use synonymous tactics to both process and make sense of information (p. 794).

Lindsay and Norman (1972) illustrate the basic process of absorbing and storing information as a three dimensional process. First, a person is exposed to a particular set of information. They then choose to ignore or absorb the information, for which the latter is otherwise known as processing to the working memory. This information is then transferred from the working memory to the long-term memory where accumulated knowledge lives. When cued, information can be retrieved from the long-term memory providing substance for recalling information.

Kosicki and McLeod's research focuses on two types of information processing practices amongst the American society: active reflection (Eveland, et al. 1998) and elaborative processing (Eveland, 2001; 2002). Using both of these tactics, it is argued in the literature that the higher level of motivation one has to make sense of news information, the better they will comprehend and retain it (Fleming, et al., 2006; Eveland, McLeod, & Horowitz, 1998; Eveland, 2002; Eveland & McLeod, 1995). This idea is rooted in the findings of Gantz (1978), whose hypotheses utilize motivational learning as a foundation. Overall, Gantz found that the greater dominance of information-acquisitions motivations for viewing the news led to the greater amount of news information immediately recalled by the viewer.

To compensate for the lack of literature investigating the local television news crawl and audience retention, we now turn to the effects of on-screen text in multimedia learning environments. Multiple modes of information in media have shown to improve audience retention, particularly when delivered in an audio-visual mode, rather than solely as visual (Ardac & Unal, 2008). This can closely relate to the design of a newscast, which features the audio-visual mode

of communication. Delving deeper into dual-coding theory (Paivio, 1990) and cognitive load theory (Jeung, et al., 1997) can explain this phenomenon further.

Dual-Coding Theory

Baddely and Hitch (1974) renamed our short-term memory as "working memory," and identified it to have several systems that would process information to the long-term memory. The working memory also makes it possible for us to immediately recall information from these systems. These include the central executive, visio-spatial sketchpad, phonological loop, phonological store, and articulatory process control systems. When information is initially sent from the sensory memory to the working memory, the central executive allocates it to a specific system. Relating specifically to theme text-on-screen information processing, the visual text would be allocated to the visuo-spatial sketchpad and then interpreted.

According to Paivio (1990), when a consumer or learner is exposed to multi-media information, it is received, processed, and stored both visually and aurally. Both the visual and aural system can operate independently but more significantly, when they operate together, we can dual code information-ultimately giving us the ability to fully understanding our environment as a whole (Ardac, 2008).

However, and in terms of on-screen text, video, and audio, learning could actually become hindered. Using the term "redundancy effect," Mayer, et al. (2001) explains that sometimes less information gives greater results. In an experiment using four versions of one instructional module, Mayer and his colleagues found that excessive on-screen information actually overloads the sensory channels of the learner, making it harder for them to process visual information through the visuo-spatial sketchpad. Results showed that overload did not only occur with random bits of conflicting information, but also reinforcing information.

Cognitive Load Theory

Cognitive Load Theory (Sweller, 1988; 1994) holds that working memory has a limited capacity that can only process seven pieces of information at a time; therefore, the memory must create schemas to organize information to be stored in the long-term memory. Chen, et al. (2012) explains the three types of cognitive load, the first being intrinsic load. This type of information is the fundamental learning material, therefore it requires the learner to be deeply involved in the processing procedure. It is easy for the learner to become overloaded with information with this type of cognitive load. Extraneous cognitive load is the static that comes between the learner and the intrinsic cognitive load, or learning material, due to inadequate delivery methods. Germane cognitive load are the aids that function to help the learner store information into the long-term memory. Chen, et al. continues to explain that "good" instructional material is designed to minimize extraneous cognitive load and maximize germane cognitive load. However, all three types must stay within the limits of what the working memory can process, otherwise, cognitive overload will occur. It is easy for a learner to become cognitively overloaded simply because information retrieval can become exhausting in an educational atmosphere or in general.

The problem with both of these theories, in reference to this current study, is that they do not specifically focus on mediated messaging nor do they consider sensory memory (immediate memory). Therefore, this literature review will refer to Information Overload Theory using the Limited Capacity Model for Mediated Message Processing as a tool to understand how consumers retain information and cope in a society that is so dense with information.

Information Overload Theory

One of the side effects of this mass amount of information is that it may effect individuals in a negative way, causing what has been coined as information overload. At large, information

overload occurs when the amount of information available outweighs the consumer's ability to be able to attentively process and retrieve it from working memory resulting in anxiety and frustration. This is not to be confused with cognitive load theory which fails to incorporate sensory memory.

Futurist Alvin Toffler was the first to define the overwhelming feeling of media content as *information overload* in 1970. He used it to correlate excessive amounts of information with cognitive and sensory exploitation (York, 2013). Hargittai, et al. (2012) highlights four underlying structural conditions of overload:

1. Time Sensitivity: a limitation of time for reviewing available information;
2. Decision Requirement: time constraints placed on the individual on actual decision-making; critical decisions, in particular;
3. Structure of information: the abundance of information may be overshadowed by the way the information is presented, therefore making the audience unable to understand the priority of information within the message; and
4. Quality of information: most literature focuses on the fact that our society is overwhelmed with inadequate information that overshadows factual information that affects our society at large. We see examples of this in news media when comparing soft news (entertainment pieces, otherwise known as "fluff" pieces) and hard news (information that affects our society at large, such as politics, government, healthcare, crime, etc.) (p. 162).

While its presence is often overlooked, one of the most dominating assumptions in information overload literature is that of the passive audience. Only a few studies have actually used the perception of the audience as a variable (i.e. Holton & Chyi, 2012). However, especially in

today's information-seeking society, one could argue that we have gained control over the content we consume. Not only in the context of the Internet but even in television news, we are given several options when it comes to seeking news information. A similar question was recently addressed in a study that used news enjoyment as a variable to test information overload (York, 2013). Results show a positive correlation between high levels of news enjoyment and low feelings of information overload. It can be assumed that the more a person seeks out and enjoys news, the less overloaded they will feel, regardless of the amount of stimuli presented. In a similar study conducted by Holton and Chyi (2012), results yielded a negative correlation between the audience's perception of overload and television, which is thought to be a contained medium. Ellis (2012) summarizes this article by using the term "news junkie." The more a person seeks out the news, the less likely they are to feel overwhelmed by it. Therefore, consumer motivation becomes a factor. Following this same idea in the field of education are results found by Chen, Pederson, and Murphy (2012). They discovered that in an online learning environment, students felt less overwhelmed by the massive amounts of information if they took the time to recognize and manage information overload. In their mixed methods study, involving twelve graduate students, the researchers found that intrinsic motivations are what drive an individual to select which information they use and which they disregard.

From this perspective of the literature, the audience is certainly an active one. Jacoby (1984) reinforces this statement by pointing out the fact that consumers, in everyday life, use numerous information overload strategies to choose which information influences their decision-making. The act of *choosing*, in itself, is an active process, leaving the audience to be anything but passive. Williamson and Eaker (2012) found that information overload is closely correlated to demographics, specifically age, gender, and education. Qihao, et al. (2014) found that while

audiences are considered active, young women and those who indicate a higher household income are more likely to experience information overload when encountered with Internet news media (p. 709). Unfortunately, neither of these studies incorporate televised news in their results.

Information overload theory, while it has many aliases, has been used extensively in a myriad of media-related studies, all of which seem to frame the development of new technology as having a negative impact on our society. The printing press, telegraph, radio, television, and now the Internet, have all been blamed with flooding media consumers with an overabundance of information, ultimately clouding their ability to make rational decisions (Ellison, 2006). Many scholars point out their peers' ability to reincarnate the idea of information overload, yet no studies have specifically looked at how information overload is affecting local communities via local television news. Even further, few studies look at information overload and the added production elements within news media: i.e. news crawls. Reverting back to the four underlying structural conditions of information overload that were noted by Hargittai, et al. (2012), news crawls seem to be the perfect specimen for examining information overload theory.

The closest media to news crawls that illustrate information overload and news crawls can be found in the educational field. Mayer, et al. (2001) takes an education approach to understand information overload by using the context of educational platforms. They apply the "redundancy effect" to a series of instructional modules to understand whether students comprehend and retain information more effectively using multi-modal platforms. They found that students who were presented with a video embedded with text were less likely to succeed than those who received no on-screen text. Therefore, the added production element of news crawls could be thought to distract viewers from comprehending news information.

Nonetheless, Jacoby (1984) calls for scholars to focus less on the overload and more on which information consumers actively turn to when making decisions. His research depends on the idea of 'high selective consumers' who will stop exposing themselves to information prior to overload occurring. This idea can further be investigated by feeding the local television news consumer a newscast with the option of selecting the main (anchor or reporter-fed) story, embedded with either conflicting and reinforcing news crawls, to see how each affect their comprehension and retention of news information.

Limited Capacity Model for Motivated Mediated Message Processing

Along the same lines of the previously mentioned theories, The Limited Capacity Model for Motivated Mediated Message Processing (LC4MP) (Lang, 2000; 2006) focuses on how mediated content effect the cognitive process. However, the missing elements of the aforementioned studies using information overload theory is audience *retention* levels when they are given an overabundance of information to consume. Additionally, none of the literature considers local news media as a direct variable. This issue can be addressed by focusing on the assumptions outlined by Lang as they relate to local news media.

In most studies conducted involving news media and possible knowledge outcome, Lang is regularly used to understand how the human brain codes, stores, and retrieves news information (Wichmann, 2009). As information overload theory typically regards the audience as passive, the LC4MP assumes the news consuming audience to have limited cognitive capacities. It is when these capacities are presented with a surplus of news information that they experience information overload (Opgenhaffen & d'Haenens, 2011).

The LC4MP is a flexible theory that can be applied to any type of *medium*, *content*, and *message goal*; the variables the theory focuses on. Different variations of these variables will determine how a message is encoded, stored, and retrieved by the viewer, as well as their personal feelings towards a message. Fulton (2014) outlines the theory's five major assumptions: 1.) People are limited capacity processors; 2.) People have two underlying motivational systems: approach and avoidance systems; 3.) Mediated messages are redundant in format and presented to stimulate multiple senses; 4.) Human cognition is a dynamic, ever-evolving process; 5.) Communication is an interaction that is continuous and interactive. These assumptions should be taken into consideration during creation of a mediated message (p. 33).

According to the LC4MP, there are three cognitive sub-processes that should also be taken into consideration: encoding, storing, and retrieving. These stages of the cognitive process constantly occur, and simultaneously to one another. The first is encoding, which happens when the media consumer creates a mental depiction of a stimulus. Lang (2006) describes this as, "the process of selecting information from the environment for further processing" (p. 59). Moreover, she stresses that when a person is exposed to a stimulus, it is not possible to create an exact replica of that stimulus. A person must choose which information to replicate and the rest is forgotten and lost.

During the encoding process, Lang identifies three types of stimuli that a person can be exposed to. The first is novel stimuli or those that create a change in an environment, therefore drawing attention to itself. In the context of a local newscast, an example of a novel stimulus is a news crawl that begins to scroll at the bottom of the screen. It would draw the attention of the viewer because the scrolling representation of information would change the original environment. The second type of stimuli is *signal stimuli*, or those that are identified by an individual to

represent important information. Again, in the context of news, this could be a "breaking news report." The last type is primary motivational stimuli, which represent survival and include sex, food, and danger. This can relate to "hard" news stories that focus on crime, medical discoveries, illness, government, and so on.

Both novel and primary motivational stimuli are universal to all people, while signal stimuli are specific to the individual and culture (Fulton, 2014). However, stimuli can also be learned based off positive and negative consequences. What can be drawn from the encoding process is that elements of an environment, in this case a mediated environment, are encoded when narrow cognitive resources are assigned to them. The act of and encoding can be measured by video recognition, for example, as the previously mentioned eye-tracking studies did. If a person notices an environmental change in a video, it is clear that they have allocated resources to that particular stimulus.

The second sub-process is storage, where the recently encoded information is linked to previously stored information (Baddeley, 1990). The linkage between the new and old information creates a mental representation that is then stored in the long-term memory. However, the act of encoding does not promise proper storage because only a few resources are allocated to storage (Lang, et al., 1999). Lang (2006) argues that motivation is a factor that determines what information will be stored. Fulton (2014) uses cued recall surveys as a measure for immediate storage.

The last sub-process outline in the LC4MP is retrieval. This stage involves recovering previously stored information from the long-term memory. Resources, either controlled or automatic, are required in order for this process to occur. Lang (2006) describes the memory as being

made up of pieces of information that are linked together. When one piece of information is activated, it signals other pieces of information that are closely related. Therefore, when a new piece of information is encoded, activation spreads leading to the "ongoing concurrent retrieval of information related to the topic of the message" (p.61). Like encoding and storage, the ability to retrieve information depends on the amount of resources allocated to it. Free recall measures, such as open-ended surveys, are used to measure retrieval.

Lang (2006) describes these processes as occurring concurrently and incessantly when an individual is engaged in active media use. Allocation of automatic and controlled resources depends upon the individual's goals, content of the message, and the structure of the message. All resources; however, are drawn from the same fix pool of limited resources (Lang et al., 1999). Where resources go also depends on the time demand of the messages. For example, if a stimulus is only presented for a short period, then encoding will receive more resources and storage will be given less. This can be illustrated by news crawls which an audience is only exposed to for as long as it scrolls on the bottom of a newscast. According to LC4MP, the viewer would use more resources encoding the text from the crawl, a little on retrieval of past information, but even less on storage. The content of the crawl will have been attended to and encoded but cannot be retrieved because it was inadequately stored. This is an example of when information overload is said to occur.

Returning to audience motivation, both the appetitive and aversive systems also influence how resources are allocated. While the aversive systems help protect an individual from danger, according to the LC4MP, a major goal of the appetitive activation is the intake of information or as much stimuli from an environment as possible. The more arousing a stimulus is, the more resources that will be automatically allocated to encoding and storage. Newscasts embedded with

news crawls are considered a multi-modal platform and both visually and aurally arousing to the audience (Opgenhaffen & d'Haenens, 2011). Because of this mix-modality, the audience will automatically dual-code the information, and if the information is reinforcing and redundant, it will be "double learned" (Paivio, 1986). In this case, the news crawl will act as an extra retrieval cue, and the information will be properly stored and easily retrieved by the audience.

Thus, according to the LC4MP, when creating mediated messages, creators should consider the structure, content, and motivation of the individuals whom they wish to target. Lang (2006) uses this theoretical approach to devise these questions: "1.) What is the message goal?; 2.) Who is in the target market?; 3.)What medium will carry the message; and 4.) What is the motivational and personal relevance of the main information in the message for the majority of people in the target audience?" (p. 63). If the message, or news crawl, is created with these questions in mind, the information from the crawls will be properly encoded, stored, and retrieved. This is even more likely to happen, according to dual-coding theory, if the information presented in the crawl is reinforcing and redundant to what the audience is hearing the anchor or reporter is telling them.

Conclusion

The current study utilizes Information Overload Theory as a foundation to understand how news crawls embedded in local newscasts effect a viewer's recall and retention of news content. This study includes news crawls with both information that reinforces and conflicts with the main, on-screen story being read by the anchor.

With such little research done in this area, applying Cognitive Load and Dual-Coding Theory is necessary to understand how a person processes multi-media that uses text-on screen as an educational tool. Lastly, because retention is not a component of Information Overload

Theory, the Limited Capacity Model of Motivated Mediated Message Processing is applied to understand this long-term effect.

CHAPTER 3

METHODS

Introduction

One of the key assumptions of American culture is that television news programming creates a better-informed society. Partly as a result of this perspective, as well as the competition for ratings, the news industry attempts to feed as much information as possible to the viewers. New technologies provide the ability to incorporate added production elements, such as news crawls. However, it can be argued that this influx of news can lead to information overload for the audience. As detailed in chapter 1, this study investigated if the use of such news crawls in local news programming contributes to improved retention of information or overloads news consumers with too much content—hindering the ability to retain local news information.

To test the effectiveness of news crawls, a quantitative study using a post-test only experiment was used. A sample of undergraduate students was divided into three groups that viewed a broadcast with no crawls, reinforcing, or conflicting crawls. Students took a post-test immediate after viewing the newscast to test short-term recall and two weeks later to test long-term retention.

Development of the Materials

Stimuli

The first step in the research process was identifying the specific newscast that would serve as the stimuli for the experiment. The criteria for the newscast were that it had to 1.) be professionally produced and broadcast; 2.) not be from a television market that included the university's or major catchment areas from which it attracts students; 3.) have a large local news focus;

4.) have no crawls at the time of broadcast, and 5.) be a standard half hour newscast including commercials.

A thirty-minute newscast from Youngstown, Ohio, WFMJ, fit the aforementioned criteria and was obtained through a contact at the station. Permission was granted by the station to use the newscast in the current experiment transcribed by the researcher. A transcription of the newscast, which originally aired on November 12, 2014, can be found in Appendix A. After the newscast was transcribed, the text for the news crawls was developed drawing on the information presented in the story. The text for the crawls only included the most prominent information from the story using a "headline approach" (Tuggle, Carr, & Huffman, 2004). A list of the news crawls can be found along with the transcriptions in Appendix A.

The original newscast had no crawls. News crawls were added to the original newscast (the control) to create two different versions with news crawls: reinforcing and conflicting. The reinforcing news crawls were superimposed onto the stories which they summarized, creating Treatment A. Treatment B, the news cast with conflicting crawls, used the same crawls as Treatment A but the crawls were rearranged so that they did not match the main story.

Data Collection

One demographic and two identical post-test surveys were used to collect the data for this study. The demographic data included items such as gender, GPA, class rank, and news preferences. The full demographic survey can be found in Appendix B. The post-test survey included twenty multiple-choice questions that asked specific information from the newscast. The post-test survey can be found in Appendix C. Faculty from the Communications Media Department and doctoral students in the Communications Media and Instructional Technology program at

IUP checked for compatibility between the news crawl stimuli and the tests to assure face validity.

Sampling Procedure

The research was conducted at mid-sized western Pennsylvania University in the Pennsylvania State System for Higher Education. To obtain a more varied sample, this research drew from students enrolled in liberal studies courses across several disciplines. The targeted courses were Political Science 101: World Politics, Geological Science 101: The Dynamic Earth, Communications Media 101: Communications Media in American Society, COMM 230: Global Media and Communication, and COMM 325: Women and Media. These liberal studies courses serve students in a wide range of disciplines and ranging from the freshmen through the senior year. Selecting courses from different colleges also ensured that there would be less potential bias of the sample based on student majors.

Once the courses were identified, the researcher contacted the instructors through the university's e-mail system. The script for the email can be found in Appendix D. Permission was obtained from five instructors who, in total, taught eight sections of the aforementioned courses. A date and time was arranged for the researcher to attend class and solicit volunteers for the experiment. The script for the visit to the classes can be found in Appendix E. All students were then given sign-up sheets to fill out to complete if they decided to participate in the experiment. The sign-up sheet included an overview of the study and collected basic information: their name, email address, and course number. If students did not want to participate, they were instructed to hand in the sheet without filling in their information. Students were informed that if they completed all three phases of the study (the demographic, viewing and post-test I, and post-test

II) they would be entered in to a raffle for a prize. Any questions the students had were addressed at this time.

A reasonable size sample was obtained with 60 students participating drawn from across the eight course sections. Directly after the sign-up sheets were turned in, the participants were contacted by email and asked to complete the demographic survey and select times they would participate in the viewing portion of the experiment. As previously mentioned, the text for this survey can be found in Appendix C. Fifty-nine students completed the second survey. Based on the information provided in the demographic survey, subjects were then assigned to one of three experimental groups using a matching technique (Treatment A, Treatment B, and Control). This ensured that the groups would be distributed on a relatively even basis considering age, GPA, gender, and college so that the sample would not be skewed. One group had 19 students, while the other two groups had 20.

Experimental Process

During the period from March 23 to 30, 2015, participants reported to the designated lab during their assigned time. Upon arrival, each student was asked to sign the informed consent and provided with a copy to keep for their records. Each participant was assigned to a computer station where they viewed their newscast based on their sample group (Treatment A, Treatment B, or Control). Once they finished the newscast, participants were given a paper-based survey (Post Test I) asking them specific questions about the content from the newscast. When the participant completed the survey, it was reviewed and graded by the researcher, as well as assigned a unique code to match with the second post-test survey. Once all of the information was entered into an Excel spreadsheet and verified, the surveys were then destroyed.

Two weeks later, an email was sent to each participant with a link to the online second post-test survey to test their long term recall and retention of the newscast content. The survey was administered using Qualtrics. Students who did not respond in four days were sent a follow up email, which again, included the Qualtrics survey link. Second and third reminders were sent at approximately four-day intervals. Once subjects completed all phases of the experiment, all of the information from the demographic, post-test I and post-test II surveys were compiled into a single data set for analysis and hypothesis testing.

Data Analysis

Once the data was compiled, the news motivation score, a four-point ordinal scale, was created based on the questions from the demographic survey dealing with a subject's interest in local news (item 9) and local news viewing frequency (item 8). Data was analyzed using SPSS 22. For the univariate analyses (RQ1 and RQ 2), a Levene's test for homogeneity of variances was used to determine if a general ANOVA F-test or a Welch's F would be appropriate. For the factorial analyses (RQ3), the SPSS general linear model factorial analysis was used.

Confidentiality and Treatment of Subjects and Data

Student responses to the first survey, which collected demographic information, and the Post-Test II survey on long-term recall, were downloaded from Qualtrics into an Excel spreadsheet. Information from the second survey, Post-Test I, was collected through a paper-based survey immediately after each participant viewed the newscast. Each subject was assigned a unique number to align the data from the three surveys. The collected data was entered into an Excel spreadsheet. Once all the data was collected, aligned and verified, information that identified the

individual subjects and the mapping of subject to ID number were destroyed. All data was collected and stored according to Institutional Review Board's subject and data protection policies.

CHAPTER 4

FINDINGS

Introduction

In this study, the effects of news crawls on immediate and long-term retention of local television news were examined. Three types of newscasts were utilized: one with no news crawls, one with reinforcing news crawls, and one with conflicting news crawls. From the literature review, it is apparent that our society is inundated with mediated information. Whether the added production element of news crawls hinders or aids in the ability to retain news information is the purpose of this study. Information Overload Theory (Jacoby, Speller, & Berning, 1974) and the Limited Capacity Model for Motivated Mediated Messaging (Lang, 2000) both serve as a foundation for this study. To test the effects of news crawls, a post-test only experiment was utilized in which two post-tests surveys measured retention rates among the sample.

The Stimulus

As detailed in Chapter 3, several factors played a role in choosing a newscast to serve as the stimulus. The newscast had to: 1.) be professionally produced and broadcast; 2.) be from outside the immediate areas from which major numbers of students at Indiana University of Pennsylvania are drawn; 3.) have a large local news focus; 4.) have no crawls at the time of broadcast, and 5.) have an air time of approximately thirty-minutes including commercials. Once the newscast was obtained, two additional versions of the newscast were created: one with reinforcing news crawls and one with conflicting news crawls. As depicted in Table 1 below, the newscast with no crawls served as the control, while the altered newscasts served as Treatment A and B.

Table 1

Description of the Stimuli

Group	Newscast
Control	No Crawls
Treatment A	Reinforcing Crawls
Treatment B	Conflicting Crawls

Profile of the Sample

Using convenience sampling, the subjects were drawn from students in the various Spring 2015 Liberal Studies courses as outlined in Table 2 below. These students were selected with the assumption that they do not possess significant news media production experience. To recruit these subjects, instructors were contacted by the researcher through email requesting permission to visit their courses. If permission was granted, the researcher visited the classes to solicit volunteers for the study. Initially, 128 students volunteered for the study. However, only 60 completed the demographic survey and viewing portion with the immediate post-test survey, and 59 of these also did the two-week post-test survey.

Using a matching technique, the subjects' demographic surveys were used to cluster them into three groups. The researcher roughly focused on gender and GPA to ensure a balanced design. Students were grouped as they reported to the experimental site in a campus computer lab where they were provided with headphones to view their assigned newscast. However, all demographics were considered for each of the research questions and the following tables illustrate how each group was comprised based on the subjects' demographics.

While GEOS 1 had the largest target population of 41.2%, the Communications Media courses as a cluster were the largest of the sample (75%). Twenty-five percent of the remaining sample was comprised of PLSC 1 (12%) and GEOS 1 (13%). In general, fourteen percent of the targeted population completed all three phases of the study, leaving a sample of 60 participants.

Table 2

Courses Where Subjects Were Recruited

Course	Title	# of Sections	# Enrolled	% of Enrolled	# in Sample	% of Sample
COMM 1	Communications Media in American Society	2	139	16.4%	27	45%
GEOS 1	The Dynamic Earth	2	350	41.2%	8	13%
PLSC 1	World Politics	5	255	30.0%	7	12%
COMM 2	Global Media and Communication	1	56	6.6%	8	13%
COMM 3	Women in Media	1	50	5.9%	10	17%
	Totals	11	850	100.0%	60	100%

As hoped, the gender division among the sample was about even, with 29 female and 31 male participants. Because gender was a variable considered to balance groups, the researcher roughly attempted to evenly distribute men and women across the three groups. Table 3 illustrates the division of gender among groups. Hypotheses 2.1 and 3.9 look specifically at how gender affected immediate recall and long-term retention of the newscasts. Hypotheses 3.1 and 3.9 delve deeper by exploring the effects of gender based on newscast treatment.

Table 3

Gender and Newscast Treatment

Gender		No Crawls	Reinforcing	Conflicting	Total
Female	#	11	8	10	29
	%	55%	40%	50%	48%
Male	#	9	12	10	31
	%	45%	60%	50%	52%
Total	#	20	20	20	60
	%	100%	100%	100%	100%

Table 4 shows the distribution of ages among the three groups. This study included students between the ages of 18-22. The majority of students were 20 years or older (77%) with age 20 actually having the highest participation rate over the other ages (30%). Age was not a factor

considered while grouping the students, but the 19 and 22 year olds were the closest groups to being evenly distributed. Hypotheses 2.2 and 3.2 specifically look at how age influenced immediate recall and long-term retention of the newscasts. Hypotheses 2.8 and 3.8 incorporate the effect based on treatment group.

Table 4

Age and Newscast Treatment

Age		No Crawls	Reinforcing	Conflicting	Total
18	#	1	0	0	1
	%	5%	0%	0%	2%
19	#	5	4	4	13
	%	25%	20%	20%	21%
20	#	2	10	6	18
	%	10%	50%	30%	30%
21	#	8	2	6	16
	%	40%	10%	30%	27%
22	#	4	4	4	12
	%	20%	20%	20%	20%
Total	#	20	20	20	60
	%	100%	100%	100%	100%

Hypotheses 2.3 and 3.3 look at how GPA impacted the immediate recall and long-term retention of the newscasts. How the type of newscast, in addition to GPA, impacted immediate recall and long-term retention is explained further in Hypotheses 2.9 and 3.9 Distribution of GPAs among the three newscast types is illustrated in Table 5. No students with a GPA lower than 2.00 chose to participate in the study, while only five percent of the sample had a GPA between 2.00 and 2.49. The majority of the students, eighty percent or forty-eight students, had a GPA of 3.00 or higher.

Table 5

GPA and Newscast Treatment

GPA		No Crawls	Reinforcing	Conflicting	Total
Under 2.00	#	0	0	0	0
	%	0	0%	0%	0%
2.00-2.49	#	2	0	1	3
	%	10%	0%	5%	5%
2.50-2.99	#	3	3	3	9
	%	15%	15%	15%	15%
3.00-3.49	#	630%	9%	10	25
	%		45%	50%	42%
3.50 or Higher	#	9	8	6	23
	%	45%	40%	30%	38%
Total	#	20	20	20	60
	%	100%	100%	100%	100%

Table 6 represents a breakdown of the sample's class rank. Approximately thirty-four percent of the sample consisted of freshman or sophomores, while sixty-six percent were juniors and seniors. More specifically, seniors were the largest group of participants with a thirty-eight percent participation rate. Hypotheses 2.4 and 3.4 investigate the impact of class rank on immediate recall and long-term retention, while Hypotheses 2.10 and 3.10 consider class rank and treatment.

Table 6

Class Rank and Newscast Treatment

Class Rank		No Crawls	Reinforcing	Conflicting	Total
Freshman	#	3	2	2	7
0-30 credits	%	15%	10%	10%	12%
Sophomore	#	4	6	3	13
30-59 credits	%	20%	30%	15%	22%
Junior	#	4	7	6	17
60-89 credits	%	20%	35%	30%	28%
Senior	#	9	5	9	23
90+ credits	%	45%	25%	45%	38%
Total	#	20	20	20	60
	%	100%	100%	100%	100%

Students were recruited from eleven sections of five liberal studies courses. Table 7 presents the distribution of subjects by college of major. Forty percent of the sample was recruited from Education with departments ranging from Communications Media to Counseling. Considering that four of the courses visited to solicit students were Communications Media courses (COMM 1, Sections 001 and 003, COMM 2, and COMM 3) this number is of no surprise. The second largest group of participants came from Health and Human Services. Students identified themselves mostly as criminology students and were solicited from four sections of a political science liberal studies course. While the other four colleges had only a small representation, the goal of soliciting students from a variety of backgrounds was obtained. Hypotheses 2.5 and 3.5 consider College as a possible variable that may impact immediate recall and long-term retention of news information. Further, Hypotheses 2.11 and 3.11 consider the possibility of college and treatment group.

Table 7

College and Newscast Treatment

College		No Crawls	Reinforcing	Conflicting	Total
Business	#	1	1	3	5
	%	5%	5%	15%	8%
Education	#	10	9	5	24
	%	50%	45%	25%	40%
Fine Arts	#	0	0%	1	1
	%	0%		5%	2%
Health & Human Services	#	6	7	8	21
	%	30%	35%	40%	35%
Humanities & Social Science	#	1	3	2	6
	%	5%	15%	10%	10%
Science & Mathematics	#	2	0	1	3
	%	10%	0%	5%	5%
Total	#	20	20	20	60
	%	100%	100%	100%	100%

Perhaps one of the more interesting variables considered in this research study, local television news viewing habits, was collected based on a weekly habits. Surprisingly, 30.5% of the sample reported that they do not watch local television news. Another 35.6% reported that they watch local television news less than once a week, while 27.1% watch it 1 to 3 times a week. A mere 6.8% of students watch it 4-5 times a week, and no students reported watching it more than five times a week. This variable is considered in hypotheses 2.6 and 3.6, and hypotheses 2.12 and 3.12 look at this variable while considering the treatment or control.

Table 8

Weekly Local TV News Viewing and Newscast Treatment

TV News Viewing Frequency		No Crawls	Reinforcing	Conflicting	Total
Do Not Watch	#	5	8	6	19
	%	25%	40%	30%	32%
Less than Once a Week	#	7	8	6	21
	%	35%	40%	30%	35%
1-3 Times a Week	#	6	4	6	16
	%	30%	20%	30%	27%
4-5 Times a Week	#	2	0	2	4
	%	10%	0%	10%	7%
More than 5 Times a Week	#	0	0	0	0
	%	0%	0%	0%	0%
Total	#	20	20	20	60
	%	100%	100%	100%	100%

The subjects' interest in local television news was also collected. The majority of students rated themselves as "somewhat interested" in news (78%) while a little less than 17% of the sample were not interested at all. Only 5% of students rated themselves as very interested. Hypotheses 2.7 and 2.14 consider level of interest and Hypotheses 3.7 and 3.14 delve deeper, considering the assigned treatment group.

Table 9

Weekly Local TV News Interest Level and Newscast Treatment

TV News Interest Level		No Crawls	Reinforcing	Conflicting	Total
Not Interested	#	3	4	3	10
	%	15%	20%	15%	17%
Somewhat Interested	#	14	16	17	47
	%	70%	80%	85%	78%
Very Interested	#	3	0	0	3
	%	15%	0%	0%	5%
Total	#	20	20	20	60
	%	100%	100%	100%	100%

Motivation was calculated by combining "level of interest" and "viewing frequency." Each reported value was divided by the number of available options, i.e. interest levels were divided by three and viewing frequency was divided by four. These values were added together and divided by two to calculate the motivation measure. Table 10 illustrates the sample's level of motivation, in terms of percentage.

Table 10

Percent of Motivation and Newscast Treatment

TV News Motivation Level		No Crawls	Reinforcing	Conflicting	Total
Less than 39 %	#	3	4	3	10
	%	15%	20%	15%	17%
40 – 59%	#	9	12	9	30
	%	45%	60%	45%	50%
60 – 79%	#	5	4	8	17
	%	25%	20%	40%	28%
Above 80%	#	3	0	0	3
	%	15%	0%	0%	5%
Total	#	20	20	20	60
	%	100%	100%	100%	100%

Statistical Techniques

The first research question examined whether the existence of news crawls had any impact on the audience's immediate and long-term information retention. This involved looking at the variability of scores between the group that viewed a newscast with no news crawls, the group that was exposed to reinforcing news crawls, and the group that viewed the newscast with conflicting news crawls. The first hypothesis specifically tested the immediate post-test scores, while the second hypothesis looks directly at the long-term retention scores.

The second research question investigated how demographics impacted the sample's ability to retain information in the newscasts regardless of the crawl type. The hypothesis tests each of the eight independent demographic variables in isolation to the two dependent variables, immediate and long-term recall.

For the analyses in RQ1 and RQ2, a one-way ANOVA was run using SPSS Version 22. The scores for both immediate and long-term retention were measured using ratio data. Each score was based on 18 points; the number of questions on the recall surveys. Because the ANOVA test assumes the homogeneity of variances between groups, Levene's statistic was used to assess each hypothesis for RQ1 and RQ2. For all of the one-way ANOVAs, the Levene test was not significant and a standard F-value from ANOVA could be used. If the Levene statistic had indicated a problem, then a Welch's F would have been substituted.

Hypotheses in RQ3 were tested using factorial analyses in SPSS and also included calculating the Levene's statistic. This question aimed to examine the interaction effects by pairing each of the demographics with the crawl type to both immediate and long-term retention. Note that while the Levene statistic was included in these analysis, the factorial analysis calculation in SPSS adjusts for any problem with the homogeneity of variances. Thus, the Levene statistic is

presented for information only (Leech, et. al., 2011; Norusis, 2008). It should be noted that none of the 16 Levene's tests produced a significant result.

Results

RQ1: Does the existence and type of news crawl affect immediate and long-term information retention?

The first research question focuses on the overall impact of news crawls on both immediate and long-term information retention, regardless of the participants' demographic variables. The performance of those in each of the three groups (those exposed to no crawls, reinforcing crawls, and conflicting crawls) were measured using an 18-point post-test only survey immediately after viewing the newscast and again two weeks later.

H1.1: There is no significant difference in immediate information recall between subjects receiving no crawls, reinforcing crawls, and conflicting crawls.

Table 11

Crawl Type and Immediate Information Recall

Crawl Type	N	Mean	Std. Dev.	Std. Error	F-value	Sign
None	20	11.200	2.462	.551	3.455	.038
Reinforcing	20	12.600	2.458	.549		
Conflicting	20	10.450	2.929	.655	df=2,57	
Total	60	11.417	2.732	.353		

Note. Levene's = .300 (df= 2,57) p = .742

The first hypothesis investigates the impact of news crawls on immediate retention.. Levene's test was not significant, therefore an F-test was used for the ANOVA. As can be observed in Table 11, the F-value showed a significant difference between the three groups, indicating that the type of news crawl did affect the immediate recall. Those exposed to the newscast embedded with reinforcing crawls had the highest level of immediate recall, while the conflicting news crawl group scored the lowest.

H1.2: There is no significant difference in long-term information retention between subjects receiving no crawls, reinforcing crawls, and conflicting crawls.

Unlike the immediate recall levels, there was no significant difference between the long-term retention scores of the three groups. However, the group exposed to reinforcing news crawls still had the highest level of recall. It is interesting to note that the conflicting crawl group scored higher than the no crawl group. It could be assumed that the extra information from the crawls positively influenced the viewers' abilities to remember information regardless of whether it was conflicting with its corresponding main story.

Table 12

Crawl Type and Long-Term Information Retention

Crawl Type	N	Mean	Std. Dev.	Std. Error	F-value	Sign
None	20	9.000	1.9735	.4413	1.772	
Reinforcing	19	10.263	1.7270	.3962		
Conflicting	20	9.750	2.5314	.5660	df=2,56	.179
Total	59	9.661	2.1384	.2784		

Note. Levene's = 2.327 (df= 2,56) p = .107

RQ2: How do the demographics of the subjects affect immediate recall and long-term retention regardless of news crawl type?

The second research question looks at the impact of demographics on the retention of immediate and long-term retention, regardless of the news crawl type. Hypotheses 2.1 – 2.8 focus on each of the eight demographics and immediate recall. Hypotheses 2.9 – 2.16 look specifically at long-term retention scores for these demographic items. As previously stated, each score was graded out of 18 points and the raw numerical data was used in analysis. The sample's ability to immediately recall information presented in the newscast was tested through a survey distributed directly after their exposure to the newscast. For each hypothesis, the Levene's test was used to

test the homogeneity of variances between groups. As none of the Levene's tests reported significant results, the ANOVA F-value was used to determine the significance levels for each inquiry.

H2.1: There is no significant difference in immediate recall based on gender.

The purpose of the first hypothesis was to explore how men and women processed the information presented in the newscasts. As can be seen in Table 13, the F-value reported no significant difference in terms of gender. However, the data shows that women have a higher level of immediate recall than men. While not significant, one point on the average score is notable.

Table 13

Immediate Recall by Gender – ANOVA

Dependent Variable	Gender	N	Mean	Std Dev	Std Err	F-value	Significance
Immediate Recall	Male	31	10.903	2.4947	.4481	2.315 Df=1,58	.134
	Female	29	11.966	2.9091	.5402		
	Total	60	11.417	2.7327	.3528		

Note. Levene's = .145 (df=1,58) p = .705

H2.2: There is no significant difference in immediate recall based on age.

Hypothesis 2.2 considers how age affected the subject's ability to immediately recall information. Table 14 illustrates that no significant difference was found. However, while not statistically significant, some degree of a pattern can be observed--the older the students were, the lower the recall levels reported. Even excluding the 18 year old that participated, the 19 year olds reported an 11.846 while the 22 year olds scored a mean average of 10.833. Further investigation based on class rank, which normally approximates age differences, can be viewed in hypothesis 2.4.

Table 14

Immediate Recall by Age – ANOVA

Dependent Variable	Age	N	Mean	Std Dev	Std Err	F-value	Signifi-cance
Immediate Recall	18	1	15.000			.816 df=4,55	.521
	19	13	11.846	2.9678	.8231		
	20	18	11.722	2.6525	.6252		
	21	16	10.938	2.5682	.6421		
	22	12	10.833	2.8868	.8333		
	Total	60	11.417	2.7327	.3528		

Note. Levene's = .498 (df=3.55) p = .685

H2.3: There is no significant difference in immediate recall based on GPA.

The third demographic variable examined how academic performance influenced immediate recall. Using GPA as an index, a significant difference is demonstrated by the F-value in Table 15. The results show that the higher the GPA, the higher the immediate recall level. The students with a GPA of 3.5 or above ranked significantly higher (12.9) than students with a 2.00 – 2.49 (9.0). Furthermore, an increase in recall was seen consistent with the increase in GPA.

Table 15

Immediate Recall by GPA

Dependent Variable	GPA	N	Mean	Std Dev	Std Err	F-value	Signifi-cance
Immediate Recall	Under 2.00					5.807 df=3,56	.002
	2.00-2.49	3	9.000	3.6056	2.0817		
	2.50-2.99	9	9.556	2.0683	.6894		
	3.00-3.49	25	11.000	2.6771	.5354		
	3.50 +	23	12.913	2.1724	.4530		
	Total	60	11.417	2.7327	.3528		

Note. Levene's = 1.043 (df=3.56) p = .381

H2.4: There is no significant difference in immediate recall based on class rank.

The next demographic variable looked at whether class rank played a role in immediate recall. The F-test revealed that there was no significant difference based on rank. As with age (H2.2), while the pattern was not statistically significant, Table 16 reveals that scores decreased as class rank increased. Not only did seniors score the lowest (11.941), there was a large drop in score from juniors (10.652). However, the pattern is not as clear as with age. The large number of seniors drawn from Liberal Studies courses, primarily target to first and second year students, suggests caution in interpreting the data,

Table 16

Immediate Recall by Class Rank

Dependent Variable	Rank	N	Mean	Std Dev	Std Err	F-value	Significance
Immediate Recall	Freshman	7	11.714	3.5923	1.3578	5.985 df=3,56	.407
	Sophomore	13	11.923	2.9286	.8123		
	Junior	17	11.941	1.9834	.4810		
	Senior	23	10.652	2.8221	.5885		
	Total	60	11.417	2.7327	.3528		

Note. Levene's = 1.865 (df=3.56) p = .146

H2.5: There is no significant difference in immediate recall based on College.

Immediate recall based on College was the fifth demographic variable investigated. While no significant difference was present, the means clearly vary depending on College. Business students scored the lowest immediate recall level with a mean score of 9.8, while both Humanities & Social Sciences, and Sciences & Math both scored the highest levels of 12.5 points. It can be questioned as to whether the content of the news crawls and newscasts played a role in these results. This area could be investigated in future studies.

Table 17

Immediate Recall by College

Dependent Variable	College	N	Mean	Std Dev	Std Err	F-value	Significance
Immediate Recall	Business	5	9.800	3.3466	1.4967	.861 df=5,54	.513
	Education	24	11.708	2.6618	.5433		
	Fine Arts	1	12.000				
	Health & Human Services	20	10.900	2.7511	.6152		
	Humanities & Social Sciences	4	12.500	2.8868	1.4434		
	Sciences and Math	6	12.500	2.5100	1.0247		
	Total	60	11.417	2.7327	.3528		

Note. Levene's = .161 (df=4.52) p = .957

H2.6: There is no significant difference in immediate recall based on viewing frequency.

Hypothesis 2.6 looks at the impact on immediate recall based on how often a student watches the local news per week. Results were not reported as significant but, as viewed in Table 18, those who watched news less than once a week had the highest immediate recall rate (12.048), while those who reported not watching the news at all followed closely behind (11.632). While this will be further discussed at the end of this chapter, information overload could play an instrumental role in these results.

Table 18

Immediate Recall and Viewing Frequency

Dependent Variable	Watch per Week	N	Mean	Std Dev	Std Err	F-value	Signifi-cance
Immediate Recall	Do Not	19	11.632	3.0770	.7059	1.097 df=3,56	.358
	Less than 1	21	12.048	2.4794	.5411		
	1-3	16	10.500	2.5298	.6325		
	3-5	4	10.750	2.9861	1.4930		
	Total	60	11.417	2.7327	.3528		

Note. Levene's = 1.143 (df=3.56) p = .340

H2.7: There is no significant difference in immediate recall based on level of interest in news.

The sixth demographic variable considers student's level of interest in local news. As reported in Table 19, there was no significant difference found between interest and immediate recall. The group that reported themselves as "somewhat interested" scored the highest recall level (11.596 points), with the "very interested" group ranking as second highest (11.000 points), and "no interest" as the lowest (10.700 points). However, this could be an anomaly considering that 78.33% of the sample classified themselves as "somewhat interested."

Table 19

Immediate Recall and Interest Level

Dependent Variable	Level of Interest	N	Mean	Std Dev	Std Err	F-value	Signifi-cance
Immediate Recall	None	10	10.700	3.1990	1.0116	.471 df=2,57	.627
	Somewhat	47	11.596	2.7160	.3962		
	Very	3	11.000	1.0000	.5774		
	Total	60	11.417	2.7327	.3528		

Note. Levene's = 1.953 (df=2,57) p = .151

H2.8: There is no significant difference in immediate recall based on motivation.

As the literature suggests, motivation is a possible factor in how a person copes with mediated information overload. To measure motivation levels, the interest level and viewing frequency variables were combined to create an index that ranges from low to very high. The F-value in Table 20 reports no significance between motivation and immediate recall, yet those who ranked as "moderately motivated" scored the highest. As mentioned in hypothesis 2.6, information overload could be an impacting factor on these results. Subjects with a moderate motivation level show some degree of attention and familiarity without the possible impact of overload from significant watching. In a sense, they may be allocating lesser amount of memory resources to previously stored news information volume while still having a memory structure for news, thus creating fewer constraints on immediately recall information. This will be further discussed in Chapter 5.

Table 20

Immediate Recall and Motivation

Dependent Variable	Motivation Index	N	Mean	Std Dev	Std Err	F-value	Significance
Immediate Recall	Low	10	10.700	3.1990	1.0116	1.909 df=3,56	.139
	Moderate	30	12.233	2.5282	.4616		
	High	17	10.471	2.7413	.6649		
	Very High	3	11.000	1.0000	.5774		
	Total	60	11.417	2.7327	.3528		

Note. Levene's = 1.355 (df=3.56) p = .266

H2.9: There is no significant difference in long-term retention based on gender.

Cycling back to the first demographic variable considered, hypothesis 2.9 aims to investigate the relationship between gender and long-term retention. An F-value reports that there is no significant difference between men and women which is expected looking at the similar scores between the two groups. Men did score better than women but only by about 0.100 points.

Table 21

Long-Term Recall by Gender

Dependent Variable	Gender	N	Mean	Std Dev	Std Err	F-value	Signifi-cance
Long-Term Recall	Male	31	9.742	2.1287	.3823	.092 Df=1,57	.763
	Female	28	9.571	2.1846	.4129		
	Total	59	9.661	2.1384	.2784		

Note. Levene's = .007 (df=1,57) p = .932

H2.10: There is no significant difference in long-term retention based on age.

Table 22 presents how age impacted the long-term retention scores among the sample. The F-value reports no significant finding but the pattern from the youngest to oldest categories stagger among one another. The 22 year olds scored the highest with a 10-point mean average, while the 18 year olds scored the lowest (8 points). The scores seem to increase from 18 to 20 year olds, but then drop again at the 21 year olds. Regardless, the scores do not vary enough to see a significant pattern by age.

Table 22

Long-Term Recall and Age

Dependent Variable	Age	N	Mean	Std Dev	Std Err	F-value	Signifi-cance
Long-Term Recall	18	1	8.000			.224 df=4,54	.924
	19	13	9.615	2.1031	.5833		
	20	17	9.647	2.2344	.5419		
	21	16	9.563	2.4757	.6189		
	22	12	10.000	1.8091	.5222		
	Total	59	9.661	2.1384	.2784		

Note. Levene's = .649 (df=3.54) p = .587

H2.11: There is no significant difference in long-term retention based on GPA.

Like hypothesis 2.3, hypothesis 2.11 considers whether academic performance impacts the ability to retain and recall information in a long-term fashion. While the F-value is 2.710, no significant differences are found between the GPA categories. Interestingly, a steady rise from

the 2.00 – 2.48 category to the 3.50 and above category is observed in Table 23 below. There is approximately a one point increase between the categories, implying that the higher a student's GPA, the higher their ability to recall information in a long-term sense. However, the relatively high variability of scores seen in the standard deviation, within groups overrides any possible differences across GPA categories.

Table 23

Long-Term Recall and GPA

Dependent Variable	GPA	N	Mean	Std Dev	Std Err	F-value	Significance
Long-Term Recall	Under 2.00					2.710 df=3,55	.054
	2.00-2.49	3	7.333	1.1547	.6667		
	2.50-2.99	9	8.778	1.8559	.6186		
	3.00-3.49	24	9.625	2.4462	.4993		
	3.50 +	23	10.348	1.6951	.3535		
	Total	59	9.661	2.1384	.2784		

Note. Levene's = .997 (df=3.55) p = .401

H2.12: There is no significant difference in long-term retention based on class rank.

Table 24 below shows the distribution of long-term recall as classified by the class rank categories. No significant difference was found between the categories and the means stagger rather than increase or decrease by rank. Freshman and juniors scored the highest recall levels, followed by seniors and then sophomores.

Table 24

Long-Term Recall and Class Rank

Dependent Variable	Rank	N	Mean	Std Dev	Std Err	F-value	Significance
Long-Term Recall	Freshman	7	10.143	2.0354	.7693	2.157 df=3,55	.103
	Sophomore	12	8.333	2.2293	.6435		
	Junior	17	10.176	1.6672	.4043		
	Senior	23	9.826	2.2694	.4732		
	Total	59	9.661	2.1384	.2784		

Note. Levene's = .667 (df=3.55) p = .576

H2.13: There is no significant difference in long-term retention based on College.

The next demographic variable examined in terms of long-term recall is College. According to the F value in Table 25 below, there is no significant difference between the different colleges and their students' abilities to recall long-term information. Humanities & Social Sciences ranked the highest with an 11 point mean average with Business, Education, Health & Human Services, and Sciences & Math following closely behind. Fine Arts, with only a six-points mean average, scored the lowest, but also only had one participant representing this group.

Table 25

Long-term Recall and College

Dependent Variable	College	N	Mean	Std Dev	Std Err	F-value	Significance
Long-Term Recall	Business	5	9.600	2.9665	1.3266	.895 df=5,53	.491
	Education	23	9.609	2.0832	.4344		
	Fine Arts	1	6.000				
	Health & Human Services	20	9.650	2.2542	.5041		
	Humanities & Social Sciences	4	11.000	1.6330	.8165		
	Sciences and Math	6	9.667	1.3663	.5578		
	Total	59	9.661	2.1384	.2784		

Note. Levene's = 1.168 (df=4.53) p = .335

H2.14: There is no significant difference in long-term retention based on viewing frequency.

Table 26 represents a significant difference in results between groups by considering the viewing frequency categories and long-term recall mean scores by group. Both the "less than 1 time per week" and "3-5 times per week" categories scored higher than the other categories, with "less than 1 time a week" scoring the highest by .619. There are two elements that can be observed from these results. On one end of the spectrum, when a person watches news on a regular basis (3-5 times per week) they are less likely to become overwhelmed with information while processing information because of their familiarity with the structure of news content. Subsequently, when a person is not a regular news viewer they have the ability to quickly sort through resources allocated to news information and recall the survey information efficiently. Their "library" of news information was devoted strictly to the news content used in this study.

Table 26

Long-Term Recall and Viewing Frequency

Dependent Variable	Watch per Week	N	Mean	Std Dev	Std Err	F-value	Significance
Long-Term Recall	Do Not	18	8.500	1.9778	.4662	3.648 df=3,55	.018
	Less than 1	21	10.619	1.8296	.3993		
	1-3	16	9.625	2.1252	.5313		
	3-5	4	10.000	2.5820	1.2910		
	Total	59	9.661	2.1384	.2784		

Note. Levene's = .277 (df=3.55) p = .842

H2.15: There is no significant difference in long-term retention based on level of interest in news.

With a .091 significance level, the relationship between interest level and long-term retention is close, but not significant. Interestingly, the group of individuals that considered themselves "very interested" in local news scored the lowest, with a 7.667-point mean average. The highest scoring group was "somewhat interested" which scored over two-points higher with a 9.957 mean average. As discussed in hypothesis 2.7, the participation rate in each group could be a confounding variable in these results.

Table 27

Long-Term Recall and Interest Level

Dependent Variable	Level of Interest	N	Mean	Std Dev	Std Err	F-value	Significance
Long-Term Recall	None	10	8.900	2.0248	.6403	2.500 df=2,56	.091
	Somewhat	46	9.957	2.0865	.3076		
	Very	3	7.667	2.3094	1.3333		
	Total	59	9.661	2.1384	.2784		

Note. Levene's = .058 (df=2,56) p = .944

H2.16: There is no significant difference in long-term retention based on motivation.

The last demographic variable considered in conjunction with long-term retention is motivation. As previously mentioned, motivation is a composite index of reported interest levels and viewing frequency. Table 4.28 shows an F-value that represents no significant difference between groups. However, those who were rated as "highly motivated" ranked the highest (10.059 points), while "very highly motivated" scored the lowest (7.667 points). The difference in group size could explain these results, with few in the "very high" category and a 14 person difference between these two groups.

Table 28

Long-Term Recall and Motivation

Dependent Variable	Motivation Index	N	Mean	Std Dev	Std Err	F-value	Signifi-cance
Long-Term Recall	Low	10	8.900	2.0248	.6403	1.860 df=3,55	.186
	Moderate	29	9.897	2.1769	.4042		
	High	17	10.059	1.9834	.4810		
	Very High	3	7.667	2.3094	1.3333		
	Total	59	9.661	2.1384	.2784		

Note. Levene's = .072 (df=3.55) p = .975

Impact of Demographic Variables on Immediate and Long-term Recall

The purpose of RQ2 was to gain insight on how the independent demographic variables impacted the subjects' ability to recall information presented in the newscast in both the short-term and long-term. Each demographic variable was examined independently without consider-ing their possible interactive impact with the type of news crawls. The information presented in Table 29 summarizes the connection between the demographic variables, viewed in isolation, to both immediate and long-term recall

With respect to immediate recall, GPA was the only demographic variable that produced significant results. Evidence found in Hypothesis 2.3 suggested that the higher the students' aca-demic performance, the better they performed at recalling information immediately after viewing the newscast. GPA; however, did not continue to play a strong role in long-term retention.

It can also be seen in Table 18 that viewing frequency was the only demographic variable to produce significant results regarding long-term recall. As discussed in Hypothesis 2.14, both the "less than 1 time per week" and "3-5 times per week" categories scored higher than other groups. It is possible that signs of information overload theory and LC4MP are evident in these cases. On one hand, those who watch "less than 1 time per week" may be less overwhelmed with mediated news information. This would enable them to properly allocate memory resources to

recalling this information rather than trying to fit the new information into an already extensive array of news that was being constantly updated.

In contrast, it could be argued that with those who chose "3-5 times per week," may have more refined memory structures for local news. As a result, they would be more resilient to information overload. Those in the "1-3 times per week category may have more news memory but it may be less structured resulting in less ability to store and recall new information than those with more or less news exposure.

Table 29

Research Question 2 Summary Table- Significance Levels

Demographic	Immediate	Long-Term
Gender	.134	.763
Age	.521	.924
GPA	**.002 ***	.054
Rank	.407	.103
College	.513	.491
Viewing	.358	**.018 ***
Interest	.627	.091
Motivation Index	.139	.186

***Significance Level Found**

RQ3: Is there a difference in immediate and long-term retention based on demographics and crawl type?

The third research question delves deeper into this issue by incorporating crawl type. Hypotheses 3.1 – 3.8 analyze the immediate scores, while 3.9 – 3.16 use the long-term retention scores. Again, both the immediate and long-term post-tests were graded out of 18 points. The long-term test was distributed two weeks after the sample's exposure to their assigned news cast and news crawls. A series of factorial analyses are presented to investigate the interaction effects, if any, between the types of news crawls and eight demographic variables.

H3:1: There is no significant difference in immediate recall based on gender and crawl type.

While there was no significance difference in H 2.1 in terms of gender and short-term retention, the calculation used during the factorial analyses does show a significant difference as can be seen in Table 31. This is seen in terms of gender and crawl type alone, as well as in the interaction between the two variables.

Looking at Table 30, it is clear that women who viewed the newscasts with no crawls and reinforcing crawls scored a mean average higher than men. However, men who viewed the conflicting newscast scored approximately 1.5-points higher than women. Overall, and as results show in Hypotheses 2.1, women scored higher than men. Additionally, it is important to note that those who viewed the reinforcing newscast scored higher than the other two groups, with the conflicting group scoring the lowest.

Table 30

Immediate Recall by Gender and Crawl Type

Crawl Type	Gender	Mean	Std. Deviation	N	Std. Error
No Crawl	Male	9.333	1.9365	9	0.645
	Female	12.727	1.6787	11	0.506
	Total	11.200	2.4623	20	0.551
Reinforcing	Male	11.917	2.3916	12	0.690
	Female	13.625	2.3261	8	0.822
	Total	12.600	2.4581	20	0.550
Conflicting	Male	11.100	2.5582	10	0.809
	Female	9.800	3.2592	10	1.031
	Total	10.450	2.9285	20	0.655
Total	Male	10.903	2.4947	31	0.448
	Female	11.966	2.9091	29	0.540
	Total	11.417	2.7327	60	0.353

Note. Levene's = .145 (df=1,58) p = .705

Table 31

Factorial Analysis of Immediate Recall by Gender and Crawl Type

Variable	Type III Sum of Squares	Degrees of Freedom	Mean Square	F-Value	Sig.	Partial Eta Square
Corrected Model	127.110a	5	25.422	4.379	.002	.289
Intercept	7688.268	1	7688.268	1324.407	.000	.961
Crawl Type	56.837	2	28.418	4.895	.011	.153
Gender	23.687	1	23.687	4.080	.048	.070
Crawl Type and Gender	56.273	2	28.137	4.847	.012	.152
Error	313.473	54	5.805			
Total	8261.000	60				
Corrected Total	440.583	59				

Note. R Squared = .289 (Adjusted R Squared =.223)

H3.2: There is no significant difference in immediate recall based on age and crawl type.

The overall total results in Table 32 reinforce Hypothesis 2.2 that illustrated an apparent decline in scores as the participants rose in age. However, like Hypotheses 2.2, no significant differences were found individually for crawl type and the age categories, nor was there a significant interaction effect between crawl type and age, as observed in Table 33.

Table 32

Immediate Recall by Age and Crawl Type

Crawl Type	Age	Mean	Std. Deviation	N	Std. Error
No Crawl	18	15.000		1	
	19	12.800	2.7749	5	1.241
	20	9.500	.7071	2	0.500
	21	10.875	2.2952	8	0.811
	22	9.750	1.2583	4	0.629
	Total	11.200	2.4623	20	0.551
Reinforcing	18	0.000	0.0000	0	
	19	12.500	3.1091	4	1.555
	20	12.900	2.3781	10	0.752
	21	11.500	3.5355	2	2.500
	22	12.500	2.5166	4	1.258
	Total	12.600	2.4581	20	0.550
Conflicting	18	0.000	0.000	0.000	
	19	10.000	2.9439	4	1.472
	20	10.500	2.6646	6	1.088
	21	10.833	3.1252	6	1.276
	22	10.250	4.1130	4	2.056
	Total	10.450	2.9285	20	0.655
Total	18	15.000		1	0.000
	19	11.846	2.9678	13	0.823
	20	11.722	2.6525	18	0.625
	21	10.938	2.5682	16	0.642
	22	10.833	2.8868	12	0.833
	Total	11.417	2.7327	60	0.353

Note. Levene's = .823 (df=12, 47) p = .626

Table 33

Factorial Analysis of Immediate Recall by Age and Crawl Type

Variable	Type III Sum of Squares	Degrees of Freedom	Mean Square	F-Value	Sign	Partial Eta Square
Corrected Model	95.175[a]	12	7.931	1.079	.399	.216
Intercept	4029.603	1	4029.603	548.311	.000	.921
Crawl Type	34.257	2	17.129	2.331	.108	.090
Age	23.158	4	5.789	.788	.539	.063
Crawl Type and Age	25.522	6	4.254	.579	.745	.069
Error	345.408	47	7.349			
Total	8261.000	60				
Corrected Total	440.583	59				

Note. R Squared = .216 (Adjusted R Squared =.016)

H3.3: There is no significant difference in immediate recall based on GPA and crawl type.

The results of the factorial analysis displayed in Table 35 show significant differences for GPA and crawl types independently. However, there are no significant findings for the interaction between the two variables. Coinciding with the previous hypotheses, Table 23 shows that the group who viewed the newscast with reinforcing crawls scored the highest overall mean average. Additionally, the total results in Table 34 show that the scores increase as the subjects' GPA increases, as illustrated in Hypotheses 2.3. The only exception is the conflicting crawls in the 2.00-2.49 GPA range. However, only one person was in this category which can distort the pattern.

Table 34

Immediate Recall by GPA and Crawl Type

Crawl Type	GPA	Mean	Std. Deviation	N	Std. Error
No Crawl	Under 2.00	0	0	0	
	2.00-2.49	7.000	1.4142	2	1.000
	2.50-2.99	9.667	.5774	3	0.333
	3.00-3.49	10.333	1.3663	6	0.558
	3.50 or Higher	13.222	1.5635	9	0.521
	Total	11.200	2.4623	20	0.551
Reinforcing	Under 2.00	0	0	0	
	2.00-2.49	0.000	0.0000	0	
	2.50-2.99	10.667	2.0817	3	1.202
	3.00-3.49	12.778	2.5386	9	0.846
	3.50 or Higher	13.125	2.4165	8	0.854
	Total	12.600	2.4581	20	0.550
Conflicting	Under 2.00	0	0	0	
	2.00-2.49	13.000		1	0.000
	2.50-2.99	8.333	2.8868	3	1.667
	3.00-3.49	9.800	2.6998	10	0.854
	3.50 or Higher	12.167	2.7869	6	1.138
	Total	10.450	2.9285	20	0.655
Total	Under 2.00	0	0	0	
	2.00-2.49	9.000	3.6056	3	2.082
	2.50-2.99	9.556	2.0683	9	0.689
	3.00-3.49	11.000	2.6771	25	0.535
	3.50 or Higher	12.913	2.1724	23	0.453
	Total	11.417	2.7327	60	0.353

Note. Levene's = 1.378 (df=10, 49) p = .218

Table 35

Factorial Analysis of Immediate Recall by GPA and Crawl Type

Variable	Type III Sum of Squares	Degrees of Freedom	Mean Square	F-Value	Sign	Partial Eta Square
Corrected Model	186.831a	10	18.683	3.608	.001	.424
Intercept	3729.315	1	3729.315	720.136	.000	.936
Crawl Type	29.932	2	14.966	2.890	.065	.106
GPA	82.969	3	27.656	5.341	.003	.246
Crawl Type and GPA	45.300	5	9.060	1.750	.141	.151
Error	253.753	49	5.179			
Total	8261.000	60				
Corrected Total	440.583	59				

Note. R Squared = .424 (Adjusted R Squared =.307)

H3.4: There is no significant difference in immediate recall based on class rank and crawl type.

The results shown in Table 37 show no significant findings regarding the interaction between class rank and crawl type, nor class rank alone. However, a significant difference was found for crawl type independently. This result comes of no surprise because of the pattern found in the previous hypothesis for class rank in Hypothesis 1.2. It should be noted that as in Hypothesis 2.4, the freshman scored the overall highest mean average, while the seniors scored the lowest.

Table 36

Immediate Recall by Class Rank and Crawl Type

Crawl Type	Class Rank	Mean	Std. Deviation	N	Std. Error
No Crawl	Freshman	12.000	3.4641	3	2.000
	Sophomore	13.250	2.3629	4	1.181
	Junior	10.750	1.7078	4	0.854
	Senior	10.222	2.1667	9	0.722
	Total	11.200	2.4623	20	0.551
Reinforcing	Freshman	15.000	1.4142	2	1.000
	Sophomore	12.333	2.8048	6	1.145
	Junior	12.143	2.3401	7	0.884
	Senior	12.600	2.6077	5	1.166
	Total	12.600	2.4581	20	0.550
Conflicting	Freshman	8.000	1.4142	2	1.000
	Sophomore	9.333	3.0551	3	1.764
	Junior	12.500	1.6432	6	0.671
	Senior	10.000	3.2787	9	1.093
	Total	10.450	2.9285	20	0.655
Total	Freshman	11.714	3.5923	7	1.358
	Sophomore	11.923	2.9286	13	0.812
	Junior	11.941	1.9834	17	0.481
	Senior	10.652	2.8221	23	0.588
	Total	11.417	2.7327	60	0.353

Note. Levene's = .682 (df=11, 48) p = .748

Table 37

Factorial Analysis of Immediate Recall by Class Rank and Crawl Type

Variable	Type III Sum of Squares	Degrees of Free-dom	Mean Square	F-Value	Sign	Partial Eta Square
Corrected Model	131.971[a]	11	11.997	1.866	.068	.300
Intercept	6225.085	1	6225.085	968.217	.000	.953
Crawl Type	70.681	2	35.340	5.497	.007	.186
Class Rank	8.175	3	2.725	.424	.737	.026
Crawl Type and Class Rank	72.010	6	12.002	1.867	.106	.189
Error	308.613	48	6.429			
Total	8261.000	60				
Corrected Total	440.583	59				

Note. R Squared = .300 (Adjusted R Squared =.139)

H3.5: There is no significant difference in immediate recall based on College and-crawl type.

Table 39 shows no significant findings in respect to College and crawl type individually, nor in the interaction between the two variables. It should be noted, however, that the small sub-sample sizes can create potential statistical issues. As a result, further research with a broader mix of students is recommended to test how students studying different subject areas processed the subject specific content presented in the newscast.

Table 38

Immediate Recall by College and Crawl Type

Crawl Type	College	Mean	Std. Deviation	N	Std. Error
No Crawl	Business	14.000		1	0.000
	Education	10.100	2.4698	10	0.781
	Fine Arts	0	0	0	
	Health & Human Serv.	11.200	1.3038	5	0.583
	Hum & Soc Sci-ences	0	0	0	0
	Natural Sci & Math	13.250	2.3629	4	1.181
	Total	11.200	2.4623	20	0.551
Reinforcing	Business	12.000		1	0.000
	Education	13.222	2.2791	9	0.760
	Fine Arts	0	0	0	0
	Health & Human Serv.	12.000	2.6458	7	1.000
	Hum & Soc Sci-ences	12.333	3.5119	3	2.028
	Natural Sci & Math	0	0	0	0
	Total	12.600	2.4581	20	0.550
Conflicting	Business	7.667	2.0817	3	1.202
	Education	12.200	2.1679	5	0.970
	Fine Arts	12.000		1	0.000
	Health & Human Serv	9.750	3.2842	8	1.161
	Hum & Soc Sci-ences	13.000		1	0.000
	Natural Sci & Math	11.000	2.8284	2	2.000
	Total	10.450	2.9285	20	0.655
Total	Business	9.800	3.3466	5	1.497
	Education	11.708	2.6618	24	0.543
	Fine Arts	12.000		1	0.000
	Health & Human Serv.	10.900	2.7511	20	0.615
	Hum & Soc Sci-ences	12.500	2.8868	4	1.443
	Natural Sci & Math	12.500	2.5100	6	1.025
	Total	11.417	2.7327	60	0.353

Note. Levene's = 1.006 (df=13, 46) p = .461

Table 39

Factorial Analysis of Immediate Recall by College and Crawl Type

Variable	Type III Sum of Squares	Degrees of Free-dom	Mean Square	F-Value	Sign	Partial Eta Square
Corrected Model	142.944a	13	10.996	1.699	.093	.324
Intercept	3602.481	1	3602.481	556.762	.000	.924
Crawl Type	24.855	2	12.427	1.921	.158	.077
College	22.270	5	4.454	.688	.635	.070
Crawl Type and College	63.581	6	10.597	1.638	.158	.176
Error	297.639	46	6.470			
Total	8261.000	60				
Corrected Total	440.583	59				

Note. R Squared = .324 (Adjusted R Squared =.134)

H3.6: There is no significant difference in immediate recall based on viewing frequency and crawl type.

While the ANOVA calculated in Hypothesis 2.6 yielded no significant relationship between viewing frequency and long-term retention, the results from the factorial analysis presented in Table 4.41 do show that there is a significant interaction between viewing frequency and crawl type. A breakdown of these result can be further explored by looking at Table 40.

For the group exposed to the newscast with no crawls, those who watch local news 4-5 times per week scored the highest while “less than 1 time per week” followed closely behind. Moving along to the reinforcing group, those who “do not watch” the local news scored much higher than more frequent viewers. Lastly, those who claimed to watch the news “less than 1 time per week” scored the highest in the conflicting group. Closely mirroring previous results related to viewing frequency, it is clear here that the less a person watched the news the higher the mean scores resulted, except for in the no crawl group. Referring to information overload and LC4MP, those who view the news less regularly have more resources available to allocate to the

news information that they processed during this study. Therefore, it was easier for these participants to sort through their previously stored news information.

Table 40

Immediate Recall by Viewing Frequency and Crawl Type

Crawl Type	Frequency	Mean	Std. Deviation	N	Std. Error
No Crawl	Do Not Watch	9.200	1.3038	5	0.583
	Less than Once a Week	12.571	2.0702	7	0.782
	1-3 Times a Week	10.667	2.8048	6	1.145
	4-5 Times a Week	13.000	1.4142	2	1.000
	More than 5 Times a Week	0	0	0	0
	Total	11.200	2.4623	20	0.551
Reinforcing	Do Not Watch	13.875	2.5319	8	0.895
	Less than Once a Week	12.250	2.0529	8	0.726
	1-3 Times a Week	10.750	2.0616	4	1.031
	4-5 Times a Week	0	0	0	0
	More than 5 Times a Week	0	0	0	0
	Total	12.600	2.4581	20	0.550
Conflicting	Do Not Watch	10.667	2.9439	6	1.202
	Less than Once a Week	11.167	3.4881	6	1.424
	1-3 Times a Week	10.167	2.9269	6	1.195
	4-5 Times a Week	8.500	2.1213	2	1.500
	More than 5 Times a Week	0	0	0	0
	Total	10.450	2.9285	20	0.655
Total	Do Not Watch	11.632	3.0770	19	0.706
	Less than Once a Week	12.048	2.4794	21	0.541
	1-3 Times a Week	10.500	2.5298	16	0.632
	4-5 Times a Week	10.750	2.9861	4	1.493
	More than 5 Times a Week	0	0	0	0
	Total	11.417	2.7327	60	0.353

Note. Levene's = .645 (df=10, 49) p = .768

Table 41

Factorial Analysis of Immediate Recall by Viewing Frequency and Crawl Type

Variable	Type III Sum of Squares	Degrees of Free-dom	Mean Square	F-Value	Sign	Partial Eta Square
Corrected Model	128.111[a]	10	12.811	2.009	.053	.291
Intercept	5256.382	1	5256.382	824.273	.000	.944
Crawl Type	41.092	2	20.546	3.222	.048	.116
Frequency	19.243	3	6.414	1.006	.398	.058
Crawl Type and Fre-quency	64.756	5	12.951	2.031	.091	.172
Error	312.473	49	6.377			
Total	8261.000	60				
Corrected Total	440.583	59				

Note. R Squared = .291 (Adjusted R Squared =.146)

H3.7: There is no significant difference in immediate recall based on interest level and crawl type.

Table 43 illustrates significant findings concerning the differences between crawl type groups; a result that has been consistent throughout this analysis. However, neither the interest level nor the interaction between interest level and crawl type showed significance levels. Table 42 illustrates the results found in Hypotheses 2.7, in which the "somewhat interested" category scored the highest across groups. The large sub-sample size of this group should be accounted for, as the majority of participants rated themselves as "somewhat interested." These results yield an area of research that should be further investigated.

Table 42

Immediate Recall by Interest Level and Crawl Type

Crawl Type	Interest Level	Mean	Std. Deviation	N	Std. Error
No Crawl	Not Interested	9.667	2.0817	3	1.202
	Somewhat	11.571	2.7094	14	0.724
	Very	11.000	1.0000	3	0.577
	Total	11.200	2.4623	20	0.551
Reinforcing	Not Interested	12.500	3.5119	4	1.756
	Somewhat	12.625	2.2767	16	0.569
	Very	0	0	0	0
	Total	12.600	2.4581	20	0.550
Conflicting	Not Interested	9.333	3.5119	3	2.028
	Somewhat	10.647	2.8927	17	0.702
	Very	0	0	0	0
	Total	10.450	2.9285	20	0.655
Total	Not Interested	10.700	3.1990	10	1.012
	Somewhat	11.596	2.7160	47	0.396
	Very	11.000	1.0000	3	0.577
	Total	11.417	2.7327	60	0.353

Note. Levene's = 1.081 (df=6, 53) p = .386

Table 43

Factorial Analysis of Immediate Recall by Interest Level and Crawl Type

Variable	Type III Sum of Squares	Degrees of Free-dom	Mean Square	F-Value	Sign	Partial Eta Square
Corrected Model	61.189[a]	6	10.198	1.425	.223	.139
Intercept	3352.752	1	3352.752	468.367	.000	.898
Crawl Type	42.014	2	21.007	2.935	.062	.100
Interest Level	10.077	2	5.038	.704	.499	.026
Crawl Type and Interest	4.717	2	2.358	.329	.721	.012
Error	379.394	53	7.158			
Total	8261.000	60				
Corrected Total	440.583	59				

Note. R Squared = .139 (Adjusted R Squared =.041)

H3.8: There is no significant difference in immediate recall based on motivation and crawl type.

As discussed in RQ 2, the motivation index was calculated by combining interest level and frequency to create a scale that could measure the subjects' motivation for viewing local news. Delving into Table 45, no significant differences were found on behalf of motivation and news crawls independently, or for an interaction between the two variables. Looking at overall totals in Table 44 shows that the group who ranked as "moderately motivated" scored the highest across the three groups. Interestingly, the lowest scoring rank was "high motivation" in both groups exposed to crawls, regardless of whether they were the reinforcing or conflicting crawl type.

Table 44

Immediate Recall by Motivation and Crawl Type

Crawl Type	Motivation	Mean	Std. Deviation	N	Std. Error
No Crawl	Low	9.667	2.0817	3	1.202
	Moderate	11.667	2.4495	9	0.816
	High	11.400	3.4351	5	1.536
	Very High	11.000	1.0000	3	0.577
	Total	11.200	2.4623	20	0.551
Reinforcing	Low	12.500	3.5119	4	1.756
	Moderate	13.250	2.0505	12	0.592
	High	10.750	2.0616	4	1.031
	Very High	0	0	0	0
	Total	12.600	2.4581	20	0.550
Conflicting	Low	9.333	3.5119	3	2.028
	Moderate	11.444	2.9627	9	0.988
	High	9.750	2.7124	8	0.959
	Very High	0	0	0	0
	Total	10.450	2.9285	20	0.655
Total	Low	10.700	3.1990	10	1.012
	Moderate	12.233	2.5282	30	0.462
	High	10.471	2.7413	17	0.665
	Very High	11.000	1.0000	3	0.577
	Total	11.417	2.7327	60	0.353

Note. Levene's = .976 (df=9, 50) p = .471

Table 45

Factorial Analysis of Immediate Recall by Motivation and Crawl Type

Variable	Type III Sum of Squares	Degrees of Free-dom	Mean Square	F-Value	Sign	Partial Eta Square
Corrected Model	92.328[a]	9	10.259	1.473	.184	.210
Intercept	4857.565	1	4857.565	697.414	.000	.933
Crawl Type	31.535	2	15.767	2.264	.115	.083
Motivation	32.592	3	10.864	1.560	.211	.086
Crawl Type and Motiv.	14.060	4	3.515	.505	.732	.039
Error	348.256	50	6.965			
Total	8261.000	60				
Corrected Total	440.583	59				

Note. R Squared = .210 (Adjusted R Squared =.067)

H3.9: There is no significant difference in long-term retention based on gender and crawl type.

As viewed in Table 31, no significant differences were found for the variables crawl type and gender individually, nor in the interaction effect between the two variables. However, the data in Table 46 suggests that women, as in the short-term recall investigated in Hypotheses 3.1, tended to score higher in the no crawl and reinforcing groups. Likewise, men continued to score higher in the conflicting group. Therefore, it may be that women are processing information differently than men in multimedia environments. Future research can be done to test and understand these phenomena. This will be discussed further in Chapter 5.

Table 46

Long-Term Retention by Gender and Crawl Type

Crawl Type	Gender	Mean	Std. Deviation	N	Std. Error
No Crawl	Male	8.889	1.6915	9	0.564
	Female	9.091	2.2563	11	0.680
	Total	9.000	1.9735	20	0.441
Reinforcing	Male	10.167	1.8990	12	0.548
	Female	10.429	1.5119	7	0.571
	Total	10.263	1.7270	19	0.396
Conflicting	Male	10.000	2.6667	10	0.843
	Female	9.500	2.5055	10	0.792
	Total	9.750	2.5314	20	0.566
Total	Male	9.742	2.1287	31	0.382
	Female	9.571	2.1846	28	0.413
	Total	9.661	2.1384	59	0.278

Note. Levene's= 1.042(df=5, 53) p = .403

Table 47

Factorial Analysis of Long-Term Retention by Gender and Crawl Type

Variable	Type III Sum of Squares	Degrees of Free-dom	Mean Square	F-Value	Sign	Partial Eta Square
Corrected Model	17.541[a]	5	3.508	.751	.589	.066
Intercept	5368.756	1	5368.756	1148.842	.000	.956
Crawl Type	16.242	2	8.121	1.738	.186	.062
Gender	.002	1	.002	.000	.983	.000
Crawl Type and Gender	1.747	2	.874	.187	.830	.007
Error	247.679	53	4.673			
Total	5772.000	59				
Corrected Total	265.220	58				

Note. R Squared = .066 (Adjusted R Squared = -.022)

H3.10: There is no significant difference in long-term retention based on age and crawl type.

Table 49 shows no significant findings in the interaction between age and crawl type or in these variables independently. While there is no concurrent pattern between the age groups, it is obvious in Table 48 that in each group one age stood out significantly from the rest. In the no

crawl group, the 19 year olds scored the highest mean average, while they scored the lowest in both the reinforcing and conflicting groups. The 21 year olds had the highest score in the reinforcing group, who scored about .75 points higher than the 22 year olds. However, the 22 year olds scored the highest in the conflicting group and in the overall total.

Table 48

Long-Term Retention by Age and Crawl Type

Crawl Type	Age	Mean	Std. Deviation	N	Std. Error
No Crawl	18	8.000		1	0
	19	10.600	1.517	5	0.678
	20	7.000	1.414	2	1
	21	9.000	2.138	8	0.756
	22	8.250	1.500	4	0.750
	Total	9.000	1.974	20	0.441
Reinforcing	18	0	0	0	0
	19	9.500	3.109	4	1.555
	20	10.111	1.054	9	0.351
	21	11.500	.707	2	0.500
	22	10.750	1.708	4	0.854
	Total	10.263	1.727	19	0.396
Conflicting	18	0	0	0	0
	19	8.500	1.291	4	0.646
	20	9.833	3.251	6	1.327
	21	9.667	3.141	6	1.282
	22	11.000	.817	4	0.409
	Total	9.750	2.531	20	0.566
Total	18	8.000		1	0
	19	9.615	2.103	13	0.583
	20	9.647	2.234	17	0.542
	21	9.563	2.476	16	0.619
	22	10.000	1.809	12	0.522
	Total	9.661	2.138	59	0.278

Note. Levene's = 2.005 (df=12, 46) p = .046

Table 49

Factorial Analysis of Long-Term Retention by Age and Crawl Type

Variable	Type III Sum of Squares	Degrees of Free-dom	Mean Square	F-Value	Sign	Partial Eta Square
Corrected Model	58.965[a]	12	4.914	1.096	.386	.222
Intercept	2651.785	1	2651.785	591.413	.000	.928
Crawl Type	22.843	2	11.421	2.547	.089	.100
Age	9.471	4	2.368	.528	.716	.044
Crawl Type and Age	39.142	6	6.524	1.455	.215	.160
Error	206.256	46	4.484			
Total	5772.000	59				
Corrected Total	265.220	58				

Note. R Squared = .222 (Adjusted R Squared =.019)

H3.11: There is no significant difference in long-term retention based on GPA and crawl type.

It can be determined by looking at the overall total scores in Table 50 that there is a steady increase in long-term retention as GPA becomes higher. More specifically this is true with each group, except in reinforcing, where the students with a GPA between 3.0 – 3.49 scored the highest average mean. However, the results in Table 51 show that the differences in scores between groups are not strong enough to be significant when considering GPA, crawl type or the interaction between the variables.

Table 50

Long-Term Retention by GPA and Crawl Type

Crawl Type	GPA	Mean	Std. Deviation	N	Std. Error
No Crawl	Under 2.00	0	0	0	0
	2.00-2.49	7.000	1.4142	2	1.000
	2.50-2.99	7.667	1.5275	3	0.882
	3.00-3.49	8.333	1.7512	6	0.715
	3.50 or Higher	10.333	1.5811	9	0.527
	Total	9.000	1.9735	20	0.441
Reinforcing	Under 2.00	0	0	0	0
	2.00-2.49	0	0	0	0
	2.50-2.99	9.667	1.1547	3	0.667
	3.00-3.49	10.500	2.4495	8	0.866
	3.50 or Higher	10.250	1.0351	8	0.366
	Total	10.263	1.7270	19	0.396
Conflicting	Under 2.00			0	
	2.00-2.49	8	1	0	
	2.50-2.99	9.000	2.6458	3	1.528
	3.00-3.49	9.700	2.6687	10	0.844
	3.50 or Higher	10.500	2.6646	6	1.088
	Total	9.750	2.5314	20	0.566
Total	Under 2.00	0	0	0	0
	2.00-2.49	7.333	1.1547	3	0.667
	2.50-2.99	8.778	1.8559	9	0.619
	3.00-3.49	9.625	2.4462	24	0.499
	3.50 or Higher	10.348	1.6951	23	0.353
	Total	9.661	2.1384	59	0.278

Table 51

Factorial Analysis of Long-Term Retention by GPA and Crawl Type

Variable	Type III Sum of Squares	Degrees of Freedom	Mean Square	F-Value	Sign	Partial Eta Square
Corrected Model	57.454[a]	10	5.745	1.327	.243	.217
Intercept	2581.699	1	2581.699	596.445	.000	.926
Crawl Type	13.393	2	6.696	1.547	.223	.061
GPA	27.442	3	9.147	2.113	.111	.117
Crawl Type and GPA	11.117	5	2.223	.514	.765	.051
Error	207.768	48	4.328			
Total	5772.000	59				
Corrected Total	265.220	58				

Note. R Squared = .217 (Adjusted R Squared =.053)

H3.12: There is no significant difference in long-term retention based on class rank and crawl type.

Results of the factorial analysis presented in Table 53 shows no significant results in terms of crawl type. However, a significant difference was found in terms of class rank and the interaction between class rank and crawl type. Table 52 shows how the results in scores vary. In the no crawl group, freshman scored the highest, while seniors scored the lowest. In the group exposed to reinforcing crawls, the seniors improved by approximately three-points but the freshman continued to score the highest by 0.100 points. However, in the conflicting group, freshman scored about 2.5-points lower than the seniors.

Table 52

Long-Term Retention by Class Rank and Crawl Type

Crawl Type	Class Rank	Mean	Std. Deviation	N	Std. Error
No Crawl	Freshman	10.667	2.0817	3	1.202
	Sophomore	8.750	2.2174	4	1.109
	Junior	9.750	1.7078	4	0.854
	Senior	8.222	1.7873	9	0.596
	Total	9.000	1.9735	20	0.441
Reinforcing	Freshman	11.500	.7071	2	0.500
	Sophomore	9.000	2.5495	5	1.140
	Junior	10.000	.8165	7	0.309
	Senior	11.400	1.1402	5	0.510
	Total	10.263	1.7270	19	0.396
Conflicting	Freshman	8.000	1.4142	2	1.000
	Sophomore	6.667	1.1547	3	0.667
	Junior	10.667	2.4221	6	0.989
	Senior	10.556	2.2973	9	0.766
	Total	9.750	2.5314	20	0.566
Total	Freshman	10.143	2.0354	7	0.769
	Sophomore	8.333	2.2293	12	0.644
	Junior	10.176	1.6672	17	0.404
	Senior	9.826	2.2694	23	0.473
	Total	9.661	2.1384	59	0.278

Note. Levene's = .878 (df=11, 47) p = .567

Table 53

Factorial Analysis of Long-Term Retention by Class Rank and Crawl Type

Variable	Type III Sum of Squares	Degrees of Free-dom	Mean Square	F-Value	Sign	Partial Eta Square
Corrected Model	95.576a	11	8.689	2.407	.018	.360
Intercept	4281.521	1	4281.521	1186.196	.000	.962
Crawl Type	18.504	2	9.252	2.563	.088	.098
Class Rank	34.691	3	11.564	3.204	.032	.170
Crawl Type and Class Rank	50.220	6	8.370	2.319	.048	.228
Error	169.644	47	3.609			
Total	5772.000	59				
Corrected Total	265.220	58				

Note. R Squared = .360 (Adjusted R Squared =.211)

H3.13: There is no significant difference in long-term retention based on College and crawl type.

No significant findings were found concerning long-term recall, College, crawl type, or their interaction, as illustrated in Table 55. In reference to the no crawl group, Business scored the highest, but the lack of participants in this sub-group should be noted. In the reinforcing group, Business, and Humanities & Social Sciences tied with the highest scores, while Humanities & Social Sciences also scored the highest in the conflicting group. Overall, as displayed at the bottom of Table 54, Humanities & Social Sciences scored the highest overall average mean, while Business scored the lowest. The number of participants in each sub-group should be considered as the numbers vary between Colleges with Education having the highest number of participants.

Table 54

Long-Term Retention by College and Crawl Type

Crawl Type	College	Mean	Std. Deviation	N	Std. Error
No Crawl	Business	13.000		1	0.000
	Education	8.400	1.7764	10	0.562
	Fine Arts	0	0	0	0
	Health & Human Serv	8.800	2.1679	5	0.970
	Hum & Soc Sciences	0	0	0	0
	Natural Sci & Math	9.750	1.2583	4	0.629
	Total	9.000	1.9735	20	0.441
Reinforcing	Business	11.000		1	0.000
	Education	10.375	1.1877	8	0.420
	Fine Arts	0	0	0	0
	Health & Human Serv	9.714	2.2887	7	0.865
	Hum & Soc Sciences	11.000	2.0000	3	1.155
	Natural Sci & Math	0	0	0	0
	Total	10.263	1.7270	19	0.396
Conflicting	Business	8.000	2.6458	3	1.528
	Education	10.800	2.7749	5	1.241
	Fine Arts	6.000		1	0.000
	Health & Human Serv	10.125	2.4165	8	0.854
	Hum & Soc Sciences	11.000		1	0.000
	Natural Sci & Math	9.500	2.1213	2	1.500
	Total	9.750	2.5314	20	0.566
Total	Business	9.600	2.9665	5	1.327
	Education	9.609	2.0832	23	0.434
	Fine Arts	6.000		1	0.000
	Health & Human Serv	9.650	2.2542	20	0.504
	Hum & Soc Sciences	11.000	1.6330	4	0.816
	Natural Sci & Math	9.667	1.3663	6	0.558
	Total	9.661	2.1384	59	0.278

Note. Levene's = .932 (df=13, 45) p = .529

Table 55

Factorial Analysis of Long-Term Retention by College and Crawl Type

Variable	Type III Sum of Squares	Degrees of Free-dom	Mean Square	F-Value	Sign	Partial Eta Square
Corrected Model	73.792a	13	5.676	1.334	.230	.278
Intercept	2373.826	1	2373.826	558.026	.000	.925
Crawl Type	1.592	2	.796	.187	.830	.008
College	20.091	5	4.018	.945	.462	.095
Crawl Type and College	38.883	6	6.481	1.523	.192	.169
Error	191.429	45	4.254			
Total	5772.000	59				
Corrected Total	265.220	58				

Note. R Squared = .278 (Adjusted R Squared =.70)

H3.14: There is no significant difference in long-term retention based on viewing frequency and crawl type.

While the results in provided in Table 57 show no significant difference in groups in terms of crawl type or the interaction of crawl type and viewing frequency, view frequency alone does appear to have a significant result. Table 56 delves deeper into this discovery.

Looking at the results in Table 31, it is clear that no participants acknowledged that they watch local news more than five times per week, making the 3-5 times per week option the category that can be considered "most frequent." Looking specifically at the no crawl group, participants who watched the news the most frequently scored the highest on the long-term recall test. In both the reinforcing and conflicting groups, those who chose the "less than once a week" option scored the highest. As suggested in Hypothesis 3.6, these results could be a product of information overload. Those who exposed themselves to a lesser amount of news information were able to recall news information presented in this study rather than have to sort through other news information they had watched around the same time period. This is discussed further in Chapter 5.

Table 56

Long-Term Retention by Viewing Frequency and Crawl Type

Crawl Type	Viewing Frequency	Mean	Std. Deviation	N	Std. Error
No Crawl	Do Not Watch	7.800	1.7889	5	0.800
	Less than Once a Week	9.714	1.4960	7	0.565
	1-3 Times a Week	8.500	1.9748	6	0.806
	3-5 Times a Week	11.000	2.8284	2	2.000
	More than 5 Times a Week	0	0	0	0
	Total	9.000	1.9735	20	0.441
Reinforcing	Do Not Watch	9.571	2.1492	7	0.812
	Less than Once a Week	10.750	1.5811	8	0.559
	1-3 Times a Week	10.500	1.0000	4	0.500
	4-5 Times a Week	0	0	0	0
	More than 5 Times a Week	0	0	0	0
	Total	10.263	1.7270	19	0.396
Conflicting	Do Not Watch	7.833	1.6021	6	0.654
	Less than Once a Week	11.500	2.2583	6	0.922
	1-3 Times a Week	10.167	2.5626	6	1.046
	4-5 Times a Week	9.000	2.8284	2	2.000
	More than 5 Times a Week	0	0	0	0
	Total	9.750	2.5314	20	0.566
Total	Do Not Watch	8.500	1.9778	18	0.466
	Less than Once a Week	10.619	1.8296	21	0.399
	1-3 Times a Week	9.625	2.1252	16	0.531
	4-5 Times a Week	10.000	2.5820	4	1.291
	More than 5 Times a Week	0	0	0	0
	Total	9.661	2.1384	59	0.278

Note. Levene's = .407 (df=10,48) p = .937

Table 57

Factorial Analysis of Long-Term Retention by Viewing Frequency and Crawl Type

Variable	Type III Sum of Squares	Degrees of Freedom	Mean Square	F-Value	Sign	Partial Eta Square
Corrected Model	84.111a	10	8.411	2.229	.032	.317
Intercept	3922.592	1	3922.592	1039.616	.000	.956
Crawl Type	13.261	2	6.631	1.757	.183	.068
Viewing Frequency	50.180	3	16.727	4.433	.008	.217
Crawl Type and Viewing Frequency	20.873	5	4.175	1.106	.369	.103
Error	181.110	48	3.773			
Total	5772.000	59				
Corrected Total	265.220	58				

Note. R Squared = .317 (Adjusted R Squared =.175)

H3.15: There is no significant difference in long-term retention based on interest level and crawl type.

As the results in Hypothesis 3.7 provided, in reference to immediate recall, interest level, crawl type, and the interaction between the two had an impact on long-term recall. These results are detailed in Table 59. Table 58 shows the distribution of scores across categories.

As in Hypotheses 3.7 on immediate recall, participants who rated themselves as "somewhat interested" also scored the highest across groups on long-term retention. In the no crawl group, "very interested" scored the lowest. There were no "very interested" participants in the reinforcing or conflicting groups, leaving the "not interested" participants as the lowest scorers. As previously mentioned in Hypothesis 3.7, the majority of participants remained neutral regarding their interests in local news by rating themselves as "somewhat interested." This anomaly meant most of the subjects were in the "somewhat interested" category and this may have skewed the result. Therefore, further research is warranted regarding the impact of interest in local news on their ability to remember the content presented.

Table 58

Long-term Retention by Interest Level and Crawl Type

Crawl Type	Interest Level	Mean	Std. Deviation	N	Std. Error
No Crawl	Not Interested	9.000	1.0000	3	0.577
	Somewhat	9.286	2.0542	14	0.549
	Very	7.667	2.3094	3	1.333
	Total	9.000	1.9735	20	0.441
Reinforcing	Not Interested	8.500	2.3805	4	1.190
	Somewhat	10.733	1.2228	15	0.316
	Very	0	0	0	0
	Total	10.263	1.7270	19	0.396
Conflicting	Not Interested	9.333	2.8868	3	1.667
	Somewhat	9.824	2.5553	17	0.620
	Very	0	0	0	0
	Total	9.750	2.5314	20	0.566
Total	Not Interested	8.900	2.0248	10	0.640
	Somewhat	9.957	2.0865	46	0.308
	Very	7.667	2.3094	3	1.333
	Total	9.661	2.1384	59	0.278

Note. Levene's = 1.780 (df=6 , 52) p = .122

Table 59

Factorial Analysis of Immediate Recall by Interest Level and Crawl Type

Variable	Type III Sum of Squares	Degrees of Free-dom	Mean Square	F-Value	Sign	Partial Eta Square
Corrected Model	38.626a	6	6.438	1.477	.204	.146
Intercept	2233.891	1	2233.891	512.644	.000	.908
Crawl Type	1.447	2	.723	.166	.847	.006
Interest Level	16.123	2	8.061	1.850	.167	.066
Crawl Type and Interest	6.643	2	3.321	.762	.472	.028
Error	226.594	52	4.358			
Total	5772.000	59				
Corrected Total	265.220	58				

Note. R Squared = .146 (Adjusted R Squared = .047)

H3.16: There is no significant difference in long-term retention based on motivation and crawl type

As presented in Table 61, neither variable nor their interaction provided significant results in the factorial analysis. This could be expected considering the lack of significant results regarding the variables in the previous two Hypotheses (3.15 – 16), from which the motivation index is produced. It appears in most cases, as shown in Table 60, that those who rate as moderately to highly motivated scored higher than those who had low or very high motivation. This is interesting considering information overload, which claims that exposing ourselves to too much is a bad thing (i.e. high motivation), while on the other hand, having low motivation could result in the feeling of being overwhelmed with information structures. This will be discussed further in Chapter 5.

Table 60

Immediate Recall by Motivation and Crawl Type

Crawl Type	Motivation	Mean	Std. Deviation	N	Std. Error
No Crawl	Low	9.000	1.0000	3	0.577
	Moderate	8.889	2.0883	9	0.696
	High	10.000	2.0000	5	0.894
	Very High	7.667	2.3094	3	1.333
	Total	9.000	1.9735	20	0.441
Reinforcing	Low	8.500	2.3805	4	1.190
	Moderate	10.818	1.3280	11	0.400
	High	10.500	1.0000	4	0.500
	Very High	0	0	0	0
	Total	10.263	1.7270	19	0.396
Conflicting	Low	9.333	2.8868	3	1.667
	Moderate	9.778	2.7739	9	0.925
	High	9.875	2.4749	8	0.875
	Very High	0	0	0	0
	Total	9.750	2.5314	20	0.566
Total	Less than 39%	8.900	2.0248	10	0.640
	40% – 59%	9.897	2.1769	29	0.404
	60% - 79%	10.059	1.9834	17	0.481
	Above 80%	7.667	2.3094	3	1.333
	Total	9.661	2.1384	59	0.278

Note. Levene's = 1.272 (df=9, 49) p = .276

Table 61

Factorial Analysis of Immediate Recall by Motivation and Crawl Type

Variable	Type III Sum of Squares	Degrees of Free-dom	Mean Square	F-Value	Sign	Partial Eta Square
Corrected Model	42.931a	9	4.770	1.051	.414	.162
Intercept	3433.067	1	3433.067	756.763	.000	.939
Crawl Type	3.022	2	1.511	.333	.718	.013
Motivation	16.560	3	5.520	1.217	.314	.069
Crawl Type and Motiv.	10.325	4	2.581	.569	.686	.044
Error	222.289	49	4.537			
Total	5772.000	59				
Corrected Total	265.220	58				

Note. R Squared = .162 (Adjusted R Squared = .008)

Summary of Interactive Effects

RQ3 took one step further by investigating how the possible interaction between crawl type and demographics impacted the participants' abilities to recall information immediately and in the long-term. The purpose here was go beyond exploring the mere presence of news crawls, and look specifically at the type of news crawls, if any. To reiterate on how the stimuli differentiated from one another, one version of the newscast had no news crawls at all, one version had news crawls that reinforced what they main story was presenting, and one version conflicted (had different topics and information) than what the main story presented.

When looking at the "immediate" column in Table 62, both gender and viewing frequency produced significant results. Beginning with gender, in Hypothesis 3.1 it was discovered that women scored higher than men in the no crawl and reinforcing groups, but lower than men in the conflicting group. From this, it may be that men and women may process new information differently when confronted with multimedia. Further research could give insight on how to create multimedia that will appeal more to either gender.

Moving on to viewing frequency, it was explained in Hypothesis 3.6 that in both groups with crawls, those who claimed to watch little or no news scored higher than those who watched more local news per week. From this assessment, it is appears that the less a person watches the news, the more easily they could recall the information long-term presented to them in the newscast. It should be noted that the small sub-sample sizes could skew these results. This is a direction research should certainly look towards in the future. These findings raise interesting questions about familiarity versus overload in news retention and the possible explanatory power of the Information Overload and the LC4MP approaches.

Significant results in the long-term revolve around the demographic variable that measures the participants' experience in higher education, "class rank." It was found that freshman scored higher than seniors in both the no crawl and reinforcing crawl groups, but scored approximately 2.5-points lower than seniors in the conflicting category. As discussed in Hypothesis 3.12, further research should be conducting to investigate how information is processed by those who have more experience in an advanced educational environments (i.e. a classroom) compared to those with little experience. Perhaps seniors are more comfortable in situations where they are expected to multi-task and/or rapidly process and remember multiple pieces of information related to different courses, while freshman are not. This will be further discussed in Chapter 5.

Table 62

Research Question 3 Summary Table- Significance Level of Interactive Effects

IV 1	IV 2 Demographic	Immediate	Long-Term
Crawl Type	Gender	**.012***	.830
Crawl Type	Age	.745	.215
Crawl Type	GPA	.141	.765
Crawl Type	Rank	.106	**.048***
Crawl Type	College	.158	.192
Crawl Type	Viewing	**.091***	.369
Crawl Type	Interest	.721	. 472
Crawl Type	Motivation Index	.732	.686

***Significant Results Found**

Conclusion

The purpose of this study was to understand the impact that news crawls have on short and long-term recall. This chapter outlined the results of this investigation, which were calculated in three phases using a series of ANOVAs and factorial analyses. The first research question sought to find if there was an overall relationship between news crawls and immediate and

long-term recall. As illustrated in Hypotheses 1.1 and 1.2, news crawls significantly impact immediate recall but significant findings were not found for long-term retention of information.

The second research question looked at the individual impact of demographic factors on immediate and long-term recall. The eight demographics used were gender, age, GPA, class rank, College, interest level, viewing frequency, and motivation level. Significant results found were that GPA had an impact on immediate recall, while viewing frequency influenced the long-term recall.

The third research question looked at this topic through a closer lens by incorporating the interaction between crawl type and demographic factors. Significant results were found with gender and viewing frequency in the short term, and class rank in the long-term showing interaction effects with crawl types. Results and implications from the three research questions will be examined further in Chapter 5.

CHAPTER 5

DISCUSSION AND RECOMMENDATIONS

Introduction

The news crawl is an area of televised news that has received little attention in academia, particularly in the area of local news. In an attempt to address this deficiency, this specific study on news crawls focused on understand their impact on viewer immediate and long-term retention. Three different versions of the same newscast were utilized in an experimental procedure that exposed participants to either the original newscast with no news crawls, or one of two altered versions which were embedded with reinforcing or conflicting news crawls. Participants were solicited from liberal studies courses at a mid-sized western Pennsylvania university. Sixty students began the study and 59 students completed all three phases of the study, which began with a demographic survey, the viewing of the newscast, and two post-test surveys. Directly after exposure to the stimuli, subjects' were given an immediate post-test to gauge their immediate recall. Sixty subjects completed this stage. Two weeks later the same post-test was distributed to test long-term recall with 59 subjects completing this survey. The findings were presented in Chapter 4.

The research questions, at a glance, focused on the overall impact of news crawls on immediate and long-term recall, then looked more closely by independently examining the eight demographic variables (gender, age, GPA, class rank, College, interest level, viewing frequency, and motivation level). Lastly, the interaction effects between demographics in conjunction with the three versions of stimuli were studied.

Information Overload, a theory that has been revisited at the birth of every new medium, was used as a foundation for illustrating the overwhelming experience a crowded television

screen can give to the viewers. The Limited Capacity Model for Motivated Mediated Messaging was used to understand how people process the massive amounts of information they are exposed to through media. In conjunction, both theories were relevant to this study as they considered the viewers rather than the medium itself.

Discussion

Independent Variables: News Crawl Type

As a starting point, the overall impact of news crawls on immediate and long-term recall was examined. As discussed previously, participants were randomly assigned to one of three groups in which they viewed one of three versions of a newscast: either the original with no crawls, a version embedded with reinforcing crawls, or one with conflicting news crawls.

Keefe-Feldman (2007) conducted a similar experiment, which was part of a larger tri-fold experiment to understand the news crawl in cable television. Using only two stimulus in his study, one with news crawls and one without, Keefe-Feldman found that the non-crawl group scored a mean average 1-point higher than the crawl group. While the types of crawls (conflicting or reinforcing) presented to the audience were not identified, he concluded that news crawls must inhibit the viewers' abilities to be able to immediately recall information; a product of information overload.

The current study, however, found that the group who was presented with a newscast embedded with reinforcing news crawls scored higher in the immediate recall survey than the group with no news crawls and conflicting crawls. Additionally, the scores of the three groups were distinctive, enough to some extent, to be deemed significantly different using the F-test from ANOVA. This contradicts the "redundancy effect" (Mayer, et al., 2001) as well as the behav-

iorial studies (Josephson & Holmes, 2006; Matsukawa, et al., 2009; Rodrigues, et al. 2012) presented in Chapter 2, which, in general, state that less is more. The findings here question when information overload comes into play. Unlike Mayer's study, the introduction of a reinforcing, second stimuli actually increased recall.

Other results found in the study, on the other hand, do support information overload theory. First, to continue with the immediate post-test results, the group that viewed the newscast with conflicting news crawls scored the lowest of the three groups. It can be assumed that the added text on screen actually inhibited the viewers from being able to recall the majority of the information, even in an immediate period. Rather than solely focusing on either the main story or the news crawl, the combination of these two sources, main story and conflicting crawl, distracted the viewers enough to potentially overload the subject's ability to process information. This impact actually resulted in lower immediate recall scores for those viewing the conflicting news crawls than those receiving no crawls. This suggests that if news crawls are not going to reinforce the information presented in the newscast then they should not be present as they negatively impact recall. .

Secondly, no significant results were found between the three groups based on long-term recall, which also provides insight to the LC4MP. It can be said that in a long-term sense, news crawls have no significant impact on whether or not viewers will remember the information presented. It should be noted that while the scores were similar, reinforcing still scored the highest, while conflicting scored the lowest. Keefe-Feldman's study did not test beyond immediate recall, so no comparisons to his study can be made at this time.

Independent Variables: Demographics

A second element in the study was to understand if demographic variables played a role in how news is processed and remembered. To reiterate the demographic variables used in the study; gender, age, GPA, class rank, College, interest level, viewing frequency, and motivation level were first independently tested, and then tested in conjunction with crawl type to understand the overall impact of news crawls on the audience.

Gender. According to past studies, women are more likely to become overwhelmed with information than men (Qihao, et al., 2014; Williamson & Eaker, 2012). The current student; however, found that, in general, women scored higher than men on the immediate recall survey, while men scored higher on the long-term survey. While neither of these results were significant, it suggests that men and women may be processing news information differently. Further, when incorporating crawl type into the equation, a significant difference was found in immediate recall. Hypothesis 3.1 illustrated that women scored higher than men when presented with newscasts with either no crawls or embedded with reinforcing crawls, but lower than men when confronted with conflicting crawls. The significant results did not translate to long-term recall, however, men still continued to score lower than women in the no crawl and reinforcing groups, but higher in the conflicting group.

Age. The next demographic looked at was age, for which no significant results were found in this study. Students, ages 18-22, were used to illustrate the age range of traditional college students. This was based on the results from Potter, Matsa, and Mitchell (2013), who found that younger generations are turning to on-demand news sources rather than traditional news sources. From their findings it can be assumed that to compete with Internet news, which makes

it possible to view multiple stories on one webpage, local television stations are providing multiple stories simultaneously as well. One method here is the news crawl. Interestingly, in the looking at immediate recall and age independently, scores decreased, as the students got older, which contradicts the findings of Qihao, et al. (2014). This could mean that younger students, who as time goes on are becoming more comfortable with rapidly transmitted information, can encode, store, and recall information more efficiently than older students. While this may seem like a stretch, the quick evolution of technology and its impact on the mental processing of humans is an area only beginning to be discovered. Regardless, these results are not seen again in the long-term, nor when broken down by crawl type. No true pattern could be found regarding age.

GPA. The participants' academic performance was measured using their overall grade point average. Looking at both immediate and long-term recall, a steady increase in scores is observed as the GPA levels increased. However, the pattern is statistically significant only with immediate recall not long-term retention. When considering academic performance, it could be assume that a student's overall cognitive ability is being measured. However, it could also be questioned as to whether these students have developed what Kosicki and McLeod (1990) call information processing strategies. These strategies provide them with a strong sense of how to cope with massive amounts of information, which would make them better students overall and increase news information retention (Opgenhaffen & d'Haenens, 2011; Fleming, 2006). As suggested by Lang (2006), this would also allow students to more properly allocate and organize limited resources to their so-called library of stored information as well as recall it.

Class rank. Qihao, et al. (2014) attempted to find evidence correlating education level and information overload; however, none was found. In the current study, class rank was used as a demographic to investigate how a participant's experience in higher education affected their

ability to recall information. Interestingly, class rank alone did not impact immediate or long-term recall. In combination with crawl type, it did have a statistically significant impact on long-term recall. However, the impact was not as expected. Long-term recall did not increase directly with class rank and seniors never scored the highest of the four categories. Therefore, more experience in higher education (more classes, more knowledge learned, more content exposed to) does not impact how students process local news. There is some impact of educational level coming into play here but additional research is needed to determine the factors involved.

College. The next demographic variable considered is College. In the particular University utilized for this study, there are six separate colleges which house an array of majors. In short, these Colleges are Business, Education, Fine Arts, Health & Human Services, Humanities & Social Sciences, and Natural Sciences & Mathematics. The reasoning behind using College as a variable was to try to gain insight as to whether students from various fields of study processed news content differently. No findings regarding College were found to be significant. This could perhaps be an artifact of the varied sub-sample sizes across categories. Additionally, further study into the content of specific stories and their relationship to discipline areas would be useful. Would education majors be more attuned to stories on school financing or curriculum? Would criminology or health science students recall more from crime and health stories respectively? This would give insight as to whether students processed information they were studying and/or were interested in differently than areas or topics with which they were not familiar.

Viewing frequency. Ellis (2012), in reference to information overload, explains that people who actively seek massive amounts of news information are less likely to become overwhelmed by it. Interestingly in the current study, significant results were found in the factorial

analysis regarding viewing frequency, which could be comparable to what Ellis considers actively seeking. Results showed two separate phenomena. First, in the no crawl group, those who watched more news scored higher than those who watched less news. Secondly, in both groups embedded with news crawls, those who watched less news scored higher than those who viewed more news. One conclusion drawn from these results are that while people may actively seek news, the added element of text-on-screen could overwhelm them with information, ultimately inhibiting them from successfully processing the news. Another assessment could be that those who watch less televised news have a higher tolerance for multiple media news because they use Internet as a primary source. This should certainly be an area for future research. A third assumption, in reference to LC4MP, could be concluded that the participants who scored higher, who happened to also watch less news, may have less resources already allocated to news information, which would have provided them the ability to allocate them at the time of this study or in the limited amount of news watching they do.

Interest level. The variable of interest level was employed in Keefe-Feldman's (2007) survey results which allowed participants to choose their reasoning behind watching news. In his study, the majority of answers generally revolved around interest (i.e. entertainment, to remain informed, etc.). However, the majority of students in this current study rated themselves as only "somewhat interested," inherently making them the most frequent scoring category. Future research should be done in which more categories are provided to the participants. In this study, no significant patterns were found in immediate or long-term recall based on interest or the interaction effect of interest and crawl type.

Motivation. The literature suggests that individuals who have are more motivated to make sense of news information, the better they will retain and ultimately recall it (Fleming, et

al., 2006; Eveland, McLeod, & Horowitz, 1998; Eveland, 2002; Eveland & McLeod, 1995). However, no motivation index could be found in the literature to study this concept. Thus, the researcher in the current study created a motivation index based on viewing frequency and interest levels. The basic concept is that the more a person exposes themselves to the news, the more interested they must be, and in turn motivated to understand. However, no significant results were found regarding motivation.

Limitations

While this study produced significant results worth noting, there were some limitations to the study overall that should be considered. First, while the sample size was acceptable for an experiment, a larger sample size would have been desirable. The smaller samples resulted in some sub-group sizes having limited or no participants, leaving those categories unrepresented. For instance, there was one 18 year-old and only one student from the College of Fine Arts. Additionally, the small sample size meant some hypotheses were dominated by a few categories as was seen with interest level. The majority of students rated themselves as "somewhat interested" in news, resulting in a majority of subjects in one category. Expanding the sample to more classes and even multiple universities could help address this issue.

A second set of limitations involve the stimuli. The original newscast, WFMJ, was from an NBC affiliate in Youngstown, Ohio. While the newscast did meet the requirements for the study, it was not local news to the sample. The demographic survey did not include "hometown" as a variable so it is possible some subjects were familiar with the area. However, the university draws few students from that region so possible contamination is minimized. One potential solu-

tion to avoid prior familiarity would be creating an original newscast. This would make it possible to have more control over the content of the stories, ordering of the stories, technical and production aspects, etc.

Other future studies may want to address prior exposure directly. Such a study would consider "hometown" information. A possible project is using hometown newscasts to see if prior knowledge or familiarity impact recall.

This particular study used three versions of only one newscast. Additional studies using multiple newscasts should also be considered. This would help limit any confounding variables in regards to story delivery. Story delivery include many components such as the type (anchor-read/reader, package/field report, voice-over, etc.), content of the stories, the newswriting aspect of the stories, etc.

The news crawls used in the experiment had a very limited amount of information and were created by the researcher. While the researcher has a solid knowledge base of the news industry and video production, she is not a professional news crawl generator. Using professionally generated news crawls could create more "industry-standard" crawls and eliminate any inconsistencies that may have been a factor in the study.

The post-test surveys should also be mentioned as a possible limitation. The first post-test was a paper-based survey distributed immediately after exposure to the stimuli. The long-term recall survey was distributed online using Qualtrics. While only one participant did not complete the final survey, the change from paper to online format may have impacted processing and recall. Additionally, if students had a preference for web-based or paper-based instruments, this could have been an issue that influenced the results. However, the potential for increased response and convenience factors indicated the combination of paper and online instruments was

the most viable option. With 59 of the 60 subjects who saw the stimulus also completing the post-test survey, the value of this approach is demonstrated. However, other options may also be worth exploring.

Recommendations for Future Research

From chapter 4 and earlier in this chapter, there a many different areas that researchers could explore in the future based on the methodology and findings of this study. Starting chronologically with Hypothesis 2.5, college or academic discipline in conjunction with the content of the newscast should be considered. It may have been possible that the educational background and interest of the participants played a role in which information was paid attention to and/or retained. In a similar manner, hometown and prior familiarity with a particular region could be explored. A content analysis of the newscast prior to conducting the experiment may be useful to help ascertain discipline or locational factors. This would, in turn, impact the newscasts selected and/or the content of the news crawls.

As mentioned in Hypothesis 3.7, expanding the sample size to gain a deeper insight on interest levels of the participants is an area that should be considered in future researcher. The lack of participants in categories other than "somewhat interested" raised some concern in the current study. Future studies could measure interest levels through multiple variables and possibly refined measurement scales such as a feeling thermometer. Another aspect would be to look specifically by looking at levels of interest in various news stories (crime, weather, sports, etc.).

Further investigation of the findings on gender in Hypothesis 3.9 should also be considered. It was found that women scored higher than men in the no crawl and reinforcing groups in both long term and short term. In contrast, women scored lower than men in the conflicting crawl

groups. Results from further inquiry could give insight on how men and women react to and process information in a multimedia environment. This would not only be useful in the news industry but in any field that uses multimedia learning as a platform.

In addition to areas related to the hypotheses, future research could be done regarding the newscast itself. Looking at how elements such as the layout and format of graphics on the screen, the aesthetics of the set and graphics, and the speed and placement of news crawls impact audience recall are all directions for future studies. As previously mentioned, the crawls utilized in this study were created using a headline approach. Research should be conducted to investigate if expanding the content in the news crawls to using a more formal structure impacts recall.

Also, research should not be limited to news crawls alone. There are other methods that news stations use to feed additional information to the viewers, such as full-screen information graphics and whether stories that featured embedded full-screen information graphics impact the viewer's recall of those stories.

Finally, rather than consider the newscast as an entity, studies could be conducted focusing on stories as individual stimuli. This would narrow the results far more specifically to the content of the news crawl, story/message, and order of the stories, rather than the newscast as a whole. Possible results would provide a more in depth understanding of which areas and elements of the newscast are remembered by the audience.

Conclusion

This study investigated the impact of news crawls on immediate and long-term recall of the audience, and as serves a foundation for conducting future research. While little research has been done on news crawls, results from this study are the beginning of a line of research that can

more specifically focus on news crawls in the local news context. As mediated messaging continues to expand and transform with technology, so will how people in the audience process and retain it. Local news will always serve as a gateway to becoming an informed citizen and future research in this area will enlighten stations on how to communicate information to, rather than overload, those who wish to remain knowledgeable and involved.

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APPENDIX A

TRANSCRIPTION OF NEWSCAST/LIST OF CRAWLS

Story 1: Family arrives at high school in Youngstown to find that their daughter had been hit and killed by school bus this afternoon. Students reported that a student freshman girl had been running down a steep hill in front of the school and fell into the path of the bus on East High Ave. An ambulance was called but it was too late; the young girl had died at the scene. It happened just as school had been let out just after 3:00 PM. The scene was taped off for hours as investigators tried to find out just how it all happened. It does appear to be just a tragic accident. School administrators say they are preparing for a very difficult day for all the students at school and tomorrow. One family member had to be taken away from scene because she was so distraught. No word on her condition at this hour.

Reinforcing Crawl: Youngstown teen killed in school bus accident. Girl's distraught relative taken to hospital by ambulance

Conflicting Crawl: 85-year old Mary Ulam crosses zip lining off her bucket list thanks to Shepherd of the Valley's Dream Team.

Story 2: Hazmat crews spent hours isolating a letter that contained a suspicious powder at American Business Center Inc. on South Ave. The FBI will analyze the powder tomorrow. Meanwhile, police are looking for the person who sent it. 11 people had to stay behind doors bound by police tape for approximately 2 hours Wednesday afternoon at ABC Inc. Around 1 PM a manager opened an envelope to find a white powder. He and another employee were directly exposed. They contacted the company's owner, Robert Wagner, who had been away from the office. Interview: "And I said, 'don't do anything; call the police right away; and I'm really concerned about the employees because we're a big family here. 3 customers were among the 11 people waiting for Hazmat crews, shortly after 3 PM nine people including the customers were looked over by paramedics and allowed to leave. The two remaining employees had to stay for decontamination and were then transported to St. Elizabeth's hospital. Interview with Mark Pitzer: "Hose them down with warm water and a mild soap and then we'll put them in a something or other suit to try and isolate them and then we can transport them to the hospital for evaluation." Wagner alleges the letter came from an employee that he recently fired. Wagner: "Very scary- I've been in busy 23 years and I've had people come and go sometimes good employees and things like that and I've remained friends with them over the years and I've never had anything like this happen." Pitzer: "He lives in Warren and police are trying to make contact with him that this time." Hazmat will make a quick test on the powder and the FBI will take it for further analysis on Thursday.

Reinforcing Crawl: 11 employees at ABC, Inc., exposed to suspicious white powder. Hazmat crew cleans-up. Police are looking for suspect.

Conflicting Crawl: 2014 Project Feed Our Valley looking for food donations. More information at wfmj.com

Story 3: Trumbell County Children Services is leading this investigation and tonight they're not commenting on the case. We're told by a relative that the girl is now in the care of an immediate

family member. So far no charges will be filed against the mother as investigators say they're trying to do what's in the best interest of this girl moving forward. Massucci: "Sometimes criminal charges aren't the best option. I believe the family is probably the most important part of this and then bringing them back together and doing what they're supposed to be doing as a family. That's the best way to go." The 15 year old girl was found inside this home near Route 422. She was left here to stay with a family friend and inside police describe it as filthy. The girl appeared to be covered in feces and apparently hadn't bathed for some time. She told police that her mother was gone for a month but her mother disputes that claim. The girl also failed to return to school 2 years ago when she would have been going into the 9th grade. Warren superintendent says a district liaison made multiple attempts to her last address that appeared to be vacant. Chiaro "We seem to hit dead ends repeatedly throughout the situation. We've made a number of contacts not only up through the juvenile system but also different times throughout the year." Chiaro says the district was not able to file truancy charges without a known address and he insists that the district followed all internal and external protocols in locating her. Investigation is ongoing and police plan to question the girl to determine any further action.

Reinforcing Crawl: Trumbell County teen abandoned by mother living in hazardous conditions in home along Route 422. Children Services investigating.

Conflicting Crawl: Investigators report an increase in real-time, crime scene social media posts made by on-lookers. Experts caution to consider ethics involved.

Story 4: Youngstown firefighters opposed to a city proposal to reduce staff marched to city hall. Firefighters who belong to IAF local 312 marched from firehouse 1 to Youngstown city hall. March is in response to the city's plan to reduce the manpower in the department.

Reinforcing Crawl: Youngstown firefighters threatened with staff reduction. IAF Local 312 responds with march to city hall.

Conflicting Crawl: Youngstown teen killed in school bus accident. Girl's distraught relative taken to hospital by ambulance.

Story 5: Controversy across Ohio as the state board of education looks at changing rules. Music, the arts, and physical education are all considered part of a well-rounded education for children, but the teachers union and some parents fear proposed state changes put those programs in jeopardy. The state board of education may end the student to teacher ratio for elementary art, music, physical education, counselors, librarians, nurses, social workers, and visiting teachers. Austintown Superintendent explains the formula. Colaluca: "For us we have 5,000 kids so we would need to at least have 5 of each category in the district." Both he and Kurt Baker the Superintendent at Jackson-Milton SD say the changes would give some financially strapped districts flexibility with limited funds. Baker: "I think a school looking at that would be someone that has not passed the levy and is really hurting for funds." But local superintendents would believe that would be a last stop for most districts. The proposal was met with outrage but some school board members who walked out of Tuesday's meeting in Columbus, with the public comment section was moved from the beginning to the end of the meeting. If state board members approve of those recommendations, those changes must still go before a joint house senate committee before going back to the board for final approval.

Reinforcing Crawl: State Board of Education proposes a reduction in physical education, art, music, and support personal. Joint House Senate will make final approval.

Conflicting Crawl: Veteran Harry Meshel remembers fallen heroes of WWII. Meshel served in Pacific Campaign during WW II.

Story 6: In 2013 the Second Harvest Food Bank distributed more than 9 million pounds of food in the tri county area. This wouldn't be possible without the valley's generosity that's why we're asking you to help with Project Feed Our Valley. Food bank is looking for boxed stuffing, frozen turkeys, instant mashed potatoes, gravy mix, canned vegetables, and canned yams. For information go to wfmj.com.

Reinforcing Crawl: 2014 Project Feed Our Valley looking for food donations. More information at wfmj.com

Conflicting Crawl: 11 employees at ABC, Inc., exposed to suspicious white powder. Hazmat crew cleans-up. Police are looking for suspect.

COMMERCIAL BREAK

Story 7: During tragic accidents there are often onlookers but Mahoney County Coroner's office say some people cross the line. I spoke of with a deputy who took his concern of "death in the digital age" to a coroners meeting. The coroner's office noticed a disturbing behavior this summer, when a woman was hit by a car and killed outside of the Cornersburg Sparkle Market. Friends and family of the investigator on scene were texting him. They were asking if what they saw on Facebook was true. "It was unbelievable to the friends and family of the investigator that stuff right there in real time at the scene, meaning pictures of body, were being posted to social media." Dr. Joseph Orr wants people to respect another person's tragedy, but he and other experts admit there is an element of human nature that compels people to look. "Often times it appears that people are being thoughtless or don't have any values when they're doing these things, but often times we're just displaying a fear of what we don't know and what we can't control." Experts want to remind people there is still proper etiquette to follow. First of all think of how you would feel if you or a family member were at the other side of the camera. "In order to scatter the crowd, one trick is to point the camera back at those looky-loos and boy-oh-boy they run for cover." A telltale sign, they know they're crossing the line. Orr and Attuci agree, leave the photography to professionals. "Somebody else's tragedy to get your 15 minutes of fame because of that… you know it's wrong, I know it's wrong, we all know that's over the boundary." However, a YSU Associate Professor points out that amateur photos and videos can help police solve crimes. He tells his students to think about what professionals show. "If you've never seen those types of images in the newspaper, or on television what have you- I mean real images, not Hollywood- what have you, then you shouldn't take them and post them." Even with ever changing tech an age old lesson rings true—respecting your neighbor. In an instantaneous world, Dr. Aducci doesn't think that people think about how this affects others.

Reinforcing Crawl: Investigators report an increase in real-time, crime scene social media posts made by on-lookers. Experts caution to consider ethics involved.

Conflicting Crawl: Youngstown firefighters threatened with staff reduction. IAF Local 312 responds with march to city hall.

Story 8: At 90 years old, Harry Meshel is considered part of the greatest generation. This WWII V has earned his medals as a Navy Seabees, but he says the term *hero* is reserved for those who gave every ounce of what they had for this country. "The people who deserve the tribute mostly today is not of those who are still here, it is those who didn't make it. What else can you say?" As the list of surviving WWII Veterans dwindles every day, Meshel says its critical to remember what they sacrificed for our freedoms. Freedoms so often we take for granted. "As they say, they came they conquered, they went they went and they were gone in some cases. Some folks didn't come back. The last ones will tell you they were heroes." Meshel served in the Pacific where he captured a Japanese Soldier and 70 years later has the prisoner's flag, gun, and blood soaked waste band wrap. For Meshel it was just the beginning of decades of service to country, and service to the people. "And in our case it was three brothers went in and three brothers came home."

Reinforcing Crawl: Veteran Harry Meshel remembers fallen heroes of WWII. Meshel served in Pacific Campaign during WW II.

Conflicting Crawl: Trumbell County teen abandoned by mother living in hazardous conditions in home along Route 422. Children Services investigating.

Story 9: 85 year old Mary Ulam of Niles has officially crossed zip-lining off her bucket list. This is Ulum zip-lining through the trees in Oberlin, OH. Her dream was made possible by Shepherd of the Valley's Dream Team. She told her next adventure is to travel to Alaska. Way to go.

Reinforcing Crawl: 85-year old Mary Ulam crosses zip lining off her bucket list thanks to Shepherd of the Valley's Dream Team.

Conflicting Crawl: State Board of Education proposes a reduction in physical education, art, music, and support personal. Joint House Senate will make final approval.

APPENDIX B

DEMOGRAPHIC AND SCHEDULING SURVEY

Question 1- Thank you again for participating in this important dissertation research. The purpose of this study is to look at local television news and audience retention of information. Your participation is voluntary and individual responses will be kept confidential. You will be assigned a tracking number and when all phases of the experiment are completed, all names will be deleted from our records. There are no known risks if you decide to participate in this research study, nor are there any costs for participating in the study. If at any time you do not wish to continue the experiment, you may discontinue your participation by placing any materials at the instructor station and leaving the experiment site. If you do not choose to continue participation, your responses and information will be excluded from the study.

This portion of the study will take approximately 45 minutes of your time and will involve watching one thirty-minute newscast and responding to a series of questions afterwards. After viewing the newscast, you will be presented with a paper-based survey related to the information included in the newscast. Approximately two weeks after today's portion of the study, you will be contacted via email and asked to respond to a second survey that is online. If you complete the demographic survey, the viewing portion with the survey and a second survey you will be entered to win an electronic tablet device. In addition, your instructor may have agreed to use this research as a bonus point opportunity for your course. If so, I will collect this information when you sign the informed consent prior to completing the viewing portion of this study.

If at any time during the course of this research new information is presented to the researcher which may impact your willingness to participate, you will be informed. If you have any questions, please see the contact information of the principal investigator below.

This project has been approved by the Indiana University of Pennsylvania Institutional Review Board for the Protection of Human Subjects (Phone 724.357.7730).

I have read the informed consent above and agree to participate in this research.
Agree (1)
Disagree (2)

Question 2-
What gender do you identify with?
Male (1)
Female (2)

Question 3-
What is your age?
Under 18 (1)- If a participant selects this response, they will receive a message thanking them and the survey will end. They will not be included in this study.
18 (2)
19 (3)
20 (4)
21 (5)
22 (6)

23 or older (7)- If a participant selects this response, they will receive a message thanking them and the survey will end. They will not be included in this study.

Question 4-
In which class did you hear about this study?
COMM 101: Communications in American Society (1)
GEOS 101: The Dynamic Earth (2)
POLI SCI 101: World Politics (3)
COMM 230: Global Media and Communication (4)
COMM 325: Women In Media (5)

Question 5-
What is your major? _____

Question 6-
What is your academic classification?
Freshman (30 earned credits or less) (1)
Sophomore (30-59 earned credits) (2)
Junior (60-89 earned credits) (3)
Senior (90 earned credits or more) (4)

Question 7-
What is your approximate Grade Point Average (GPA) ?
Under 2.0 (1)
2.0 – 2.49 (2)
2.5 – 2.99 (3)
3.0 – 3.49 (4)
3.5 or Higher (5)

Question 8-
In an average week, how often do you watch the local news?
Do not watch local news (1)
Less than once a week (2)
One to three times a week (3)
Four to five times a week (4)
More than five times a week (5)

Question 9-
What would you rate as your level of interest in the local news?
Not interested (1)
Somewhat interested (2)
Very interested (3)

Question 10-
Please provide the following information. This will be used for scheduling and assigning you with a confidential identification code.
First Name
Last Name
IUP Email Address

Question 11-
Please choose at least one of the following dates and times for viewing the newscast portion of this study. This will take approximately 45 minutes.

Thank you for taking the time to fill out this survey! I will be in contact with you within the next week to remind you of your assigned time. Again, all of your answers are confidential; however, if you wish to discontinue your participation in this study, any information you have provided will be eliminated.

APPENDIX C

POST-TEST SURVEY

Thank you for taking the time to participate in this dissertation research. Your participation is voluntary and all of your responses and individual information will be kept confidential. If at any time you would like to discontinue your participation in this study, please close the web browser. If you do choose to discontinue, all of your responses will be eliminated. This research project has been approved by the Indiana University of Pennsylvania Institutional Review Board for the Protection of Human Subjects. They can be contacted at 724-357-7730.

Question 1-
What was involved in the tragic accident that resulted in the death of a Youngstown teen?
A jeep (1)
A school bus (2)
A motorcycle (3)
Another student (4)3 ya

Question 2-
What was the teen doing at the time of the accident?
Going for a run (1)
Walking home from school (2)
Texting (3)
Walking her dog (4)

Question 3-
How many employees were exposed to the suspicious white powder sent to ABC Inc.?
12 (1)
13 (2)
11 (3)
10 (4)

Question 4-
Who is the suspect in the "white powder incident" at ABC Inc.?
A former employee (1)
It is unknown (2)
A current employee (3)
A competing company (4)

Question 5-
Approximately how long has it been since the abandoned teen in Trumbell County was last seen in school?
4 years (1)
3 years (2)
2 years (3)
1 year (4)

Question 6-
Where was the abandoned teen found living in Trumbell County?
Route 286 (1)

Route 421 (2)
Route 28 (3)
Route 422 (4)

Question 7-
Which fire hall did firefighters from IAF 321 march from?
Firehouse 1 (1)
Firehouse 2 (2)
Firehouse 1A (3)
Firehouse 2B (4)

Question 8-
What was the reason for IAF 321 march to city hall?
A lack of resources (1)
A staff reduction (2)
A cut in pay (3)
Lack of union support (4)

Question 9-
Which of the following program personnel are in jeopardy of being cut from the Ohio school system?
Mathematics (1)
Science (2)
Creative Writing (3)
Physical Education (4)

Question 10-
Which committee will make final approval of the program personnel cut?
The State Education Committee (1)
The School Board (2)
The Teacher's Union (3)
A joint House-Senate Committee (4)

Question 11-
How much food did The Second Harvest Food Bank distribute in 2013?
7 million pounds (1)
8 million pounds (2)
9 million pounds (3)
10 million pounds (4)

Question 12-
What is the community service project that The Second Harvest Food Bank holds each year?
Project Feed Our Valley (1)
Project Feed Our People (2)
Project Feeding America (3)
Project Second Harvest (4)

Question 13-
Which of the following is a positive aspect of citizen's posting real-time tragic events on social media?

It helps people to find out if their family is involved (1)
It can help police solve crimes (2)
It prompts people to lock their doors (3)
It helps get the news to the public more quickly (4)

Question 14-
What do experts caution of on-lookers in real-time tragic events?
To consider if their families were involved (1)
To consider the jobs of journalists on the scene (2)
To consider the jobs of investigators on the scene (3)
To consider ethics involved (4)

Question 15-
Who does Veteran Henry Meshel consider the true heroes of WWII?
The Prisoners of War (1)
The American civilians (2)
Those who died fighting (3)
Those who survived the war (4)

Question 16-
Which campaign did Veteran Meshel serve during WWII?
The Pacific Campaign (1)
The Atlantic Campaign (2)
The Double V Campaign (3)
The Air Campaign (4)

Question 17-
What is 85 year-old Mary Ulam's next adventure to cross off her bucket list after zip-lining?
To visit Alaska
To sky dive
To bungee jump
To visit Australia

Question 18-
What is the organization that helped 85 year-old Mary Ulam cross zipling off her bucket list?
Shepherd of the Valley's Bucketlist Team
Shepherd of the Valley's Dream Team
Shepherd of the Valley's Zip-lining Team
Shepherd of the Valley's Team of Dreams

Thank you for taking the time to participate in this study! You will receive an email within the next two weeks with the follow-up survey.

APPENDIX D

CALL FOR PARTICIPATING COURSES (TO PROFESSORS)

Hello!

My name is Brittany Pavolik and I am a Ph.D. Candidate and Teaching Associate in the Communications Media Department. I am currently working with my Dissertation Chairperson, Dr. Mark Piwinsky, to recruit students for my dissertation research and we are hoping that you will be able to provide some assistance!

My dissertation topic focuses on local television news and audience retention of information. I am planning to conduct my experiment at the beginning of Spring 2015 semester, that of which will consist of asking students to watch a 30-minute newscast and complete 3 surveys. The first will be a demographic survey, the second survey will be distributed directly after the newscast is viewed, and the third will be distributed via email 2 weeks later.

Would you be willing to include my dissertation research as a bonus opportunity in your course? If you have any questions or concerns please feel free to email me, Dr. Piwinsky, or contact me via cellphone: 724-840-7520. I look forward to hearing from you!

Thank you for your time,

Brittany Pavolik, M.A. (Principal Investigator)
Teaching Associate, Communications Media
Doctoral Candidate, Communications Media and Instructional Technology
121A Stouffer Hall
Indiana University of Pennsylvania
b.l.pavolik@iup.edu (724-357-2492)

Dr. Mark Piwinsky (Co-Investigator/Advisor)
Chairperson and Professor, Communications Media
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Indiana University of Pennsylvania
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This project has been approved by the Indiana University of Pennsylvania Institutional Review Board for the Protection of Human Subjects (Phone 724.357.7730).

ATTACHMENT E

IN-CLASS CALL FOR PARTICIPANTS SCRIPT

Hello everyone!

My name is Brittany Pavolik and I'm a Teaching Associate in the Communications Media Department. I teach courses in Advanced Video Production, Broadcast News Writing and the Broadcast News Process. I am also a Ph.D. student in the Communications Media and Instructional Technology program. I am currently working on my dissertation and need your help!

My dissertation is about local television news and audience retention of information. I'm looking for students who will watch one short thirty-minute newscast and answer two questionnaires regarding the newscast they watched. All I need, in total, is about one hour of your time.

First, if you are willing to participate, please complete the sign-up sheet that you have received and place them in the box provided. If you do not wish to participate, just place the blank sheet in the box.

For those who agree to participate, you'll receive an email from me after this class. If you choose to participate, there is a link in the email that you will click. The link will take you to Qualtrics where you will answer a few demographic questions and select a time to come watch the newscast in Stouffer Hall. The viewing portion will take approximately 30 minutes of your time. After watching the newscast, you will be asked to respond to a paper based survey related to the information included in the newscast.

Approximately two weeks after watching the newscast you will be contacted via email and asked to respond online to a second survey.

If you complete the demographic survey, the viewing portion with the survey and a second survey you will be entered to win an electronic tablet device. Also, there will be drinks and snacks provided at the experiment site.

Your participation is voluntary. Individual responses will be kept confidential and will not be tied with any identifying information. You participation will have no impact on your grade or your standing in the course or your Department. You may also withdraw from the study at any time.

This project has been approved by the Indiana University of Pennsylvania's Institutional Review Board for the Projection of Human Subjects. They can be contacted at 724-357-7730. If you have any questions regarding this study, I would be happy to address them now or you can email me at flbr@iup.edu or reach me by phone at 724-357-2492.

Thank you for your time!