Medium, Distraction, and Information Recall:
A Study on the Effectiveness of Print and Online Communication

By

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Abstract

This study examines the potential relationship between medium and multitasking on the effectiveness of retaining information by focusing on print and online journalism, as well as the presence internal and external distractions have on information recall. Sixty-two subjects participated in a thirty-minute study testing information recall between participants who consumed two identical news articles in either a printed or online format and with either the presence or absence of external distracters. After reading the two assigned articles, participants completed two surveys assessing first, their engagement with the internal and external distracters made available to their condition and second, their ability to recall information from the two articles they had just read. It was hypothesized that those in the print conditions would recall higher levels of information than those in the online conditions. It was also hypothesized that those in the online conditions would engage in higher levels of engagement with distractions, and that higher levels of distraction would correspond with lower levels of information recall. Patterns in the results, though often short of statistical significance, indicate that printed newspapers may be more effective than their corresponding online counterparts. Engagement with distracters varied by type, condition, and medium. Though overall, engagement with distraction also appeared to have a negative impact on subjects' ability to recall information, as those in the distraction conditions scored lowest on the information recall test. Ultimately, the study suggests there could be a relationship between medium and the presence of distraction as they effect the ability to recall and retain information.

Introduction

While opinions on the impact vary, it seems clear that for better or worse, the Internet is more than a growing source of information; it is becoming the go-to source of information. Arguably, technology as effective as the Internet in democratizing information has not been seen since Gutenberg's printing press. Yet many associate its rise with the "imminent death" of print and denounce the digital shift as detrimental to society. As the prevalence of online journalism increases, the debate should be taken seriously. One underlying assumption of an independent press (in any form) is that healthy, robust journalism leads to well-informed citizens, which in turn leads to political engagement and a stronger democracy. If the landscape of journalism is experiencing drastic changes, it is crucial to understand what effects such changes might have on citizens' understanding of the news.

The growth of online journalism coincides with growing sociological changes in how individuals work, communicate, and process information. Many feel that society is increasingly tending toward mobility, distraction, fragmented attention, and multitasking. There is much concern in scholarly research and the popular press that as individuals live a world characterized by split-focus, information processing and cognition will be negatively affected. This concern aligns with the attention model designed by Nobel laureate and psychologist Daniel Kahneman (1973), which argues "at any given time, human beings have a limited amount of general attentional capacity that can be allocated to different cognitive tasks. When the total information-processing demands of the set of cognitive tasks being performed …exceed an individual's currently available attentional capacity, performance on one or more current cognitive tasks is degraded" (Armstrong & Chung, 2000, p. 330). It seems possible that if sociological and technological changes are occurring simultaneously, a relationship could exist between the two. In this case, it seems possible there could be a relationship between information processing of the

news, what format news is presented in, and how an individual utilizes that news in conjunction with other tasks or media. The challenge is to determine what the dynamics of such a relationship might be.

From a technological determinist's standpoint, the increased ubiquity of mobile and digital technologies could lead to a more distracted society. Yet a social constructivist might argue a society that values mobility, efficiency, and multitasking would widely adopt and shape information technology to fit these needs. Each seems plausible, but simplistic. The present study seeks a slightly more nuanced, middle ground perspective through the theory of affordances. William Gaver (1991) describes affordances as "the features of technology that make a certain action possible; in a useful definition, they are 'properties of the world defined with respect to people's interaction with it" (p. 80). The theory of affordances provides a useful framework as it accepts the ideas that users shape media use and that a medium's possibilities shape how people are able to use it. While social constructionism underestimates the power of technology and argues all change, adoption, and uses come solely from the user; technological determinism overestimates the power of technology, arguing that users are incapable of shaping technology in any way. Yet the theory of affordances draws from both, emphasizing that technologies come with certain inherent capabilities that users are able to adopt, utilize, or reject, shaping that technology's future. Because of this nuanced perspective, the theory of affordances is particularly useful for the present study, which focuses on both the nature of online and print media, in addition to the ways in which subjects interact with them.

The present study is particularly interested in multitasking as a technological affordance related to cognition and one's ability to retain information. Multitasking is arguably a consciously controlled behavior that can be enabled through uses provided by technology. In this way, multitasking stands apart from unintentional mental states of limited attention. A person

may choose to multitask. Mass media may allow him or her to do so, yet it is unlikely that an individual would intend to be distracted. The present study hypothesizes that the use of a computer provides an unparalleled quantity of simultaneous functions. The sheer number of functions afforded by the computer and the Internet allow for more multitasking opportunities. If an individual values the simultaneous use of those capabilities, and multitasking does negatively affect information recall, then the medium, its use and affordances are part of a complex relationship between media use and cognition. In terms of journalism, if newsgathering is another one of many functions on the Internet, then online journalism is part of this relationship between multitasking and information recall, and has the potential to suffer accordingly.

As will be discussed in the preceding literature review, a host of experiments and studies have been conducted to analyze the effects of different media on information recall. Many comparisons have been drawn between text and broadcast media, and many others between printed text and online textual news. The results of these studies have varied, though in most cases, print newspapers have been found to be the most effective medium for information recall. Yet a complex analysis of what medium is used, how it is used, and the medium's effects has been neglected in much of the scholarly research done on cognition and media studies. Accounting for simultaneous uses of media (i.e. multitasking) and its effects has been equally neglected. Most studies comparing recall of news items have focused on the differences of the media itself (e.g. text versus broadcast), news content or genre (e.g. entertainment versus public affairs), the time spent reading, or the number of articles read. For all the outcry at newspaper's decline and lamenting of society's increased fragmentation, there has been little research done testing the presence of multitasking on news recall across news media.

Thus, it is the purpose of the present study to examine potential differences in information recall between print and online newspapers, while accounting for the variable

distraction, in order to gain a greater understanding of the cognitive processes that affect our understanding of the news.

Literature Review

The Changing Landscape of Journalism

Perhaps the only observation of current news media that can be agreed upon is that the landscape of journalism is changing. A scholar on changes in journalism, Pablo Boczkowski (2004) traces the evolution of print and digital journalism along social, technical, and historical lines. Boczkowski (2004) discusses the digitizing of print newspapers not as a distinctly separate medium, but one that grew out of traditions, as well as a "culture of innovation" in print paper news organizations. Boczkowski posits this "culture of innovation" led to reactionary creations in the digital realm as newsrooms tried to react quickly to the growing use of online media – innovations Boczkowski also argues come with positive changes for the newsroom and newsreader. Yet the shift to online journalism as it currently exists is not as drastic as print advocates indicate, with only 12% direct substitution in 2006 (Ahlers, 2006) and a visible decrease of online newspaper visits (especially among highly educated and middle age respondents) between 2002 and 2005 (De Waal & Schoenbach, 2010). Although, there have been visible increases in the use of online news sites not affiliated with printed newspapers (De Waal & Schoenbach, 2010). However, it is important to note that the academic information available on online newspaper adoption is both out of date and can only represent the time data were collected. The future of online news use will be determined by coming generations who will be much more comfortable with digital technology than many newsreaders today. Indeed, findings have already indicated that print newspaper use has been largely subordinated to online news sites by young people (De Waal & Schoenbach, 2010).

In many ways, the emergence of online news sources comes with more than a change in medium type. With it, come a variety of new affordances and capabilities. For example, Deuze (2003) touches on the proliferation of online news sources, not just in number, but in type and affordance. Deuze reviews four types of online journalism that have emerged (1. mainstream news sites, 2. index and category sites, 3. meta- and comment sites, and 4. share and discussion sites) in conjunction with three different affordances (hypertextuality, interactivity, and multimediality). He recognizes an array of possibilities that come with the various formats and affordances, ranging from emphasis of editorial content to a concentration on connecting with the audience. For example, online news sites fall on a scale from creating content that users can only look at to providing platforms where readers can comment, contribute, or create content themselves. Arguably, letters to the editor and op-ed columns are the only spaces where traditional print media provides such participatory platforms. Yet it is difficult to tell whether new news affordances in the online environment correspond with a richer journalism.

The new and increasing opportunities for engagement have led many critics, scholars, and members of the popular press to praise the emergence of online news media. Dan Gillmor (2006) and Graves (2007) write mainly on the affordances of online news blogs, but their respective works also outline some of the different strengths that online news sources generally provide, such as accountability on the part of journalists when users can easily respond with praise or criticism. Hyperlinking related articles can be used to juxtapose different viewpoints or develop understanding of a topic, adding greater depth and breadth to a newsreader's experience. Their arguments support the idea that the online environment provides a deeper, more elaborate and engaging area with a greater breadth of news than could ever be seen on print, and that this environment will strengthen news media and journalism as whole.

On the other hand, there are many critics, scholars and members of the popular press who deeply oppose the emergence of computer-mediated, online news sources. In *Republic.com 2.0*, Cass Sunstein (2007) describes many potential downfalls of online news that he believes will ultimately harm journalism. For example, Sunstein believes the loss of editors' gatekeeping roles may erode a shared news experience and prevent readers from learning important information. The Internet is also plagued by misinformation that is often difficult to distinguish from the truth (Sunstein, 2007). Yet Sunstein's biggest concern is that news readers will develop a tendency to become isolated in their own news interests and block themselves from important information, turning news sources into sounding boards for their own ideas. Considering the findings of Salwen et al. (2005) in which 91% of participants reported using online sources to go "directly to news of interest," and 68% reported an online preference for "having interests reflected on news sites," Sunstein's concerns do not appear unfounded. In her review of several quantitative studies examining why individuals choose to use online news sources, An Nguyen (2010) found that convenience features were generally cited most often as the reason to adopt the technology. If convenience and news filtering options are the primary reasons for utilizing online news, readers could be subjecting themselves to shorter and more limited types of stories and perspectives.

Debate aside, neither Deuze, Gillmore, or Sunstein's arguments have the quantitative evidence of experimental, academic research. Much of their supporting arguments are based on theory and observation. Examining the positive and negative aspects of various news formats is helpful in understanding potential differences, but none of the above speaks to the actual effectiveness of news media with regard to information recall. It is clear through their observations that the changing landscape of journalism should be examined. Yet without an understanding of how effective news media are at their purpose of informing readers, the positives and/or negatives of news media formats cannot be truly assessed.

News and the Ability to Recall Information

Despite numerous studies examining news media format and information recall, a comprehensive review of the literature shows a wide-range of conclusions. There does not appear to be a consensus on whether print, computer-mediated, or broadcast media are more effective. Rather, the current body of research results arrives at very different conclusions.

An abundant number of studies have found advantages to computer-mediated, online news. Based on the affordance of website interactivity, Tremayne and Dunwoody (2001) found that interactively-designed websites produced more cognitive elaboration, greater interactive behavior, as well as greater total recall of information. As website development and design become more advanced, Tremayne and Dunwoody's findings suggest great possibilities for information retention in online news formats. On the other hand, Berry (2001) did not find a significant difference in comprehension or recall between plain and multimedia web site designs. Another online affordances study found that computer-mediated reading provides readers with increased opportunity for elaboration, which may lead to greater comprehension of material compared to print (Reinking, 1988). All these results suggest that even with the existence of other computer functions, the affordances of online technology provide uses that could strengthen news depth and information retention in ways traditional print cannot.

Other research suggests that like the changing landscape of journalism, changes have been occurring in how much benefit users get out of news media depending on their exposure to a given technology. A cross-cultural news study conducted by DeFleur and Facorro (1993) in Spain and the United States found that print news had the highest proportion of information recall in both cultures, but online news was least effective in Spain and second-most effective in America. While the study does show more supporting evidence for printed news, the difference of online news retention across cultures is compelling. At the time of the study, the United States

had a much higher adoption rate of computers than Spain. Recall from online news sources could improve over time as the technology becomes more common and users are more comfortable with it. Work is also being done on the potential for tablet personal computers to provide the benefits of both print and online formats to foster a greater computer-mediated news source (Choi, Jin, Cameron, & Fidler, 2009).

Contrary to the Sunstein's (2007) argument that online news sources facilitate trivial information selection by users, D'Haenens, Jankowski, and Heuvelman's (2004) analysis of content selection found print newspaper readers consumed more sports news and online readers consumed more international news. Their research gives quantitative evidence that online news sources are just as effective as print newspapers in terms of information recall. It also combats the arguments that a loss of gatekeeping roles online will lead to poor news selection choices on the part of readers.

While there is research that supports online news as an equally effective, if not more powerful information tool, a greater number of studies support what Furnham and Gunter (1989) refer to as the "primacy of print." One study suggests that website affordances of elaboration and linking have little or no effect on information processing; in fact, unlinked web pages (i.e. those most resembling traditional print) led to significantly higher scores of public affairs knowledge (Eveland, Marton, & Seo, 2004). These results undercut the assertion of online news advocates that opportunities for elaboration online lead to greater knowledge acquisition.

Other cross-format studies have found text-based news to facilitate greater information recall. In their study comparing audience recall of news story detail when presented in newspaper, computer, telvision, and radio formats, DeFleur, Davenport, Cronin, and DeFleur (1992) found the newspaper medium was most effective in all cases, though the computer-mediated format was found to be second best. Wicks and Drew (1991) also found text formats

(as opposed to broadcast) to be most effective for individuals to both recall news items and make inferences about news content. Though online news was not included (and can be considered a text format), Furnham and Gunter (1989) and Booth (1971) found printed news stories corresponded to higher levels of information recall when compared to broadcast (i.e. television and radio) formats.

Tewksbury and Althaus (2000) focused on the shift in gatekeeping roles as newspapers move online. The researchers theorized that when readers have greater control over choosing their own content, they may learn less about national, international, and political news. In a direct comparison between print and online formats of the New York Times, Tewksbury and Althaus found that online readers of the newspaper did in fact read less stories of national, international, or political significance. Interestingly, there were significant differences in the *types* of articles readers were able to recall across the two formats. A significantly larger proportion of print readers were able to recall public affairs news (especially with regard to politics), while a larger proportion of online readers recalled news in other sections such as business. Print readers were also better able to recognize news stories of high, middle, and low profiles than online readers. Their data indicate that user interest and control could be detrimental if online news readers neglect stories about public affairs.

Sharing concerns with Sunstein over the affordance of online newspapers to allow for greater user control over content selection, Schoenbach, De Waal, & Lauf (2005) tested their hypothesis that printed newspapers are more effective than online newspapers at widening reader agenda. Their results were complicated, but revealed an important mediating variable: education. Both print and online newspapers were capable of bringing agenda diversity to readers. Yet the widening agenda effects of online newspapers was only extended to the most highly educated readers. Print, on the other hand, was equal in its distribution of new issue awareness. Contrary

to advocates of the ability to elaborate information online, Shoenbach, De Wall, & Lauf's (2005) research suggests that print news fosters a greater breadth of information and widens readers' agenda through exposure to unanticipated stories.

Sundar and Bellur (2009) contest the notion that new news media is received passively by examining information processing from a biological standpoint. Their research examined brain waves during the use of interactive and non-interactive online news sources. While participants did in fact interact more with the interactive news, the study also showed users paid more attention to traditional, non-interactive sources. The study suggests that while users may be interested in new, online media, they are not focusing on it, despite its engagement. Similarly, Sundar (2000) tested five different online website conditions: text-only; text and pictures; text and audio; text, pictures, and audio; and finally, one with text, pictures, and video. Post-exposure recall suggests that while pictures and audio provide significant responses, their improvement of memory is only visible for advertisements. When it came to recall of news content, multimedia offerings actually hindered memory. Video in particular appeared especially advantageous to advertising recall, and especially detrimental to recall of news items. Both studies suggest that while multimedia or interactive features may engage readers, this engagement is not correlated with higher levels of information retention. The effectiveness of the text-only stories may be because the simpler, print format emphasizes the information without presenting engaging, yet distracting elements that could mitigate focus on the actual news.

The research of Eveland and Dunwoody (2002) examined *why* recent studies have shown greater proportions of learning on the Internet by testing for possible mediating variables. They determined that online learning works because user control allows the reader to set his or her own pace. However, they also found significantly higher levels of knowledge acquisition in the print group when compared to online readers who engaged in "selective scanning," an indicator

of unfocused attention. Moreover, the negative effects of selective scanning were more powerful than any positive effects of online elaboration, indicating an affordance for additional distraction online can hinder information retention. The research also suggests that any positive affordances of online news (e.g. elaboration) are subordinate to the negative impact distraction has on information processing.

As stated earlier, the body of research on news media and information recall contradicts itself frequently. The complexity of the the data and results is unsurprising. There are many elements at work when examining both media studies and information processessing. So although studies such as the cross-cultural examination of DeFleur and Facorro (1993) provide encouragement for the future of online news media, the amount of research advocating the primacy of print suggest that, at least for the time being, traditional print sources may be a more effective means for readers to recall information.

Hypothesis 1: Consumption of printed news will lead to higher levels of information recall than exposure to online news.

The Cognitive Process: Its Mechanisms, Limitations, and Obstructions

The studies comparing news medium and information recall were built on an assumption that medium type could relate to differences in cognition or information processing. While this is often the framework for media effects studies, most scholarly work on cognition is notably separate from that on the media. Literature reviews may overlap, but few media studies account for and test various elements of cognition in experimental design – unless that cognition is a direct effect from the media stimuli. Since the present study is as interested in the capacity limits on cognition as it is news media formats, a review of scholarly work on the cognitive process is a

necessary step in understanding the relationship between news media format, information retention and the presence of distraction on the mental processes that affect recall.

Marois and Ivanoff (2005) examined capacity limits on cognition in regard to visual short-term memory. Their research indicates that cognition is subject to the rate of information retrieval and the amount of information presented. More importantly, fragmented attention was determined to interfere with memory performance above all other factors. Neuroimaging research by Foerde, Knowlton, and Poldrack (2006) provide biological evidence that when individuals are placed in multitasking conditions, accuracy is largely unaffected, but learning is hampered. Since accuracy may not suffer, this could explain why many people believe themselves to be adept multitaskers. However, their results show the process of knowledge acquisition may be degraded. Both studies give biological, quantitative support to Kahneman's (1973) capacity interference model.

On the other hand, some scholarly research indicates the presence of multiple tasks on cognition does negatively affect accurate performance of tasks. In multiple studies assessing task-switching performance, participants' responses were slower and more wrought with errors. Even when subjects were given preparation time in between, the detrimental effects that multiple tasks had on cognition were not eliminated (Monsell, 2003; Wylie & Allport, 2000). Similarly, Ophir, Nass, & Wagner (2009) found that participants identified as heavy multitaskers were more vulnerable to distraction by irrelevant stimuli and more inadequate than light multitaskers at switching tasks. Though the performance tasks in both studies were not measures of information recall, the experiments reveal that multitasking does negatively impact cognition.

Scholarly evidence indicating negative effects of multitasking on cognition is especially relevant to the present study since so many newsreaders have indicated a preference for online news sources specifically because it allows them to multitask. In her review of a

Washintonpost.com study conducted by Nielsen/NetRatings, Nguyen (2010) reports 70% of users say they choose the Internet because it allows them to multitask. In her own experiment, Nguyen found multitasking to be the second most appreciated feature of online news, falling short only to the immediacy the Internet provides. Similarly, Salwen et al. (2005) report around 68% of users go to online news sources over traditional media because it exposes them to news while they are doing other things online. In other words, studies show that multitasking and/or distracting elements negatively affect cognition; and at the same time research examining reader behavior shows the act of reading online news corresponds with high levels of multitasking and likely distraction.

Hypothesis 2: Online newsreaders will engage in higher levels of multitasking compared to those who read print news.

Multitasking could lead to more than shifts in information retention - some believe multitasking could alter the information itself. Clifford Nass (2010) believes multitasking will eventually lead to news content changes, as journalists will have to adapt to an audience that requires more repetition and cues. In Morris and Forgette's (2007) study on television news, "news grazers" (those who flipped between news channels) appeared significantly less apt to follow news about international affairs, local government or figures and events in Washington. Furthermore, political knowledge was negatively correlated with increased levels of "grazing." Morris and Forgette's research relates to the present study in its interest with interest-based, small bit news consumption and its connection to developing habits Nass fears will alter the news itself.

While the research of Armstrong and Chung (2000) focuses on background television and reading memory, their findings show the detrimental effects of distraction on information retention. Subjects who were allowed to read in silence performed significantly better than those

who read with television in the background. Armstrong and Chung connect their results to what they refer to as "capacity interference," which impedes the initial comprehension of information and can also interfere with the coding of that information into memory. Based on the attention model by Kahneman (1973), capacity interference describes a vulnerability readers face when attempting to process multiple tasks or combat distraction while reading. Once the processing demands overload readers' limited attention capacities, task performance suffers. Based on other research such as the work of Eveland and Dunwoody (2002) and Sundar (2000), the presence of distraction in online environments does more than impact cognition as it relates to task performance. The affordances in the online news environment may affect cognition the the point that it hampers information recall and ultimately, knowledge acquisition.

Hypothesis 3: Higher levels of multitasking will lead to lower levels of news recall.

Methodology

There are two key purposes to the present study: One is to examine retention of information presented in two separate news formats- print and online. Another is to account for distracters that could lead to split focus and/or multitasking and to examine how the presence of distractions may affect information retention. All participants (N=62) were exposed to the same two news articles; though half was randomly assigned to a print newspaper version, while the other half was randomly assigned to a computer-mediated, online version. Half of the participants (from both the print and online groups) were placed under conditions where engagement with other items was possible. The participants were given a total of twenty minutes to complete their reading of the assigned articles. After the exposure, all participants filled out two paper questionnaires. One questionnaire was designed to evaluate the level of distraction prompted by the media and/or the presence of physical distracters. The second questionnaire was designed to measure recall of the news content participants were assigned to read.

Participants

Sixty-two undergraduate students (N= 62) enrolled in classes at the University of Michigan, Ann Arbor participated in the experiment. Of these, twenty-one were male and forty-one were female. Roughly half of the participants were selected from the Communication Studies Participant Pool, where subjects received credit for participating. All other participants were selected using a snowball, friend-of-friend approach, where subjects received a small $10 compensation for their participation in the study. All subjects were randomly assigned to one of two formats: print or computer-mediated, and one of two environmental conditions: presence of external distracters or absence of external distracters. All sixty-two signed an informed consent form before the experiment was conducted and were debriefed on the purpose of the study at the session's conclusion.

Stimulus Materials

Two selected news articles were chosen from the print and online versions of *The New York Times* and *USA Today*. The sampling of articles was geared toward selecting news items that were not of particular interest to a specific community, and represent instead average news accounts unlikely to provoke strong emotional reactions. Stories without extensive previous coverage were selected, so that participants would be unlikely to have seen the information from other news sources. In addition, to prevent against unwanted content-related effects from a single news story, two articles of similar length were selected (DeFleur, Davenport, Cronin, & DeFleur, 1992). The textual content of the news articles across the two formats (i.e. print and online) was essentially identical. See Appendix 5 for content details.

Additional stimuli materials were presented in the form of physical "distracters" as a measure of the mediating variable distraction. Five distracter items were randomly assigned to

half of all subjects and placed within reach of the news materials. Items consisted of two puzzle books, a Rubik's cube, a magazine, and a deck of cards. Attempts were made to keep all physical distracters gender-neutral, so that no one item would skew results by presenting greater appeal to a certain portion of participants.

Treatment Conditions

In total, the experiment consisted of four separate treatment conditions: Online Distraction (Group 1), Online No Distraction (Group 2), Print Distraction (Group 3), and Print No Distraction (Group 4). Each participant was exposed to two news articles in a single format. The print conditions consisted of the two news articles presented in a printed newspaper format with the newspapers presented in their entirety (i.e. not just the pages containing the articles). The online conditions consisted of the two computer-mediated articles presented by open links in two online browser tabs. In order to control for the effects of the hypothesized moderating variable distraction, half of the participants were randomly assigned to distraction conditions and half were not. The distraction conditions consisted of half of both print and online conditions. The distraction conditions included placement of the five pre-determined items at the table of each participant. The non-distraction groups were assigned to the remaining half of both print and online conditions, leaving non-distraction participants only in reach of either the newspaper or desktop computer, respectively, without the presence of any pre-placed distracters.

Procedure

The experiment was conducted in small groups of the total sixty-two participants. Distribution within the various groups was relatively equal. Sixteen participants were in the Online Distraction condition (N_1=16) and fifteen participants were in the Online No Distraction condition (N_2=15). Similarly, seventeen participants were in the Print Distraction condition

(N_3=17) and fourteen participants were in the Print No Distraction condition (N_4=14). Groups met in a testing facility equipped with computers, Internet access, tables, as well as the provided distracters for those in the distraction conditions. Once participants had arrived at the testing facility, they completed an informed consent form (see Appendix 3) and were told they would be reading two pre-selected news articles. All participants were informed they would have a total of twenty minutes to complete the assigned readings. Participants in all conditions were informed that they would be asked to recall as many details as possible. Once the allotted reading time was over, participants were required to either log off of the computers or return the newspapers so the news content was no longer visible. The participants were then given a single questionnaire with questions designed to assess their involvement with the distracters within the news formats (e.g. other functions/applications of the medium) and outside of them (e.g. any of the pre-placed physical distractors) as a measure of participants' level of multitasking while completing the readings. Upon completion, the questionnaire was collected. The participants' information retention was then tested by a second questionnaire composed of fifteen multiple-choice items designed to assess the recall of the news information they had just consumed. Once a subjects' participation was over, he or she was given a debriefing form describing past findings and the study's purpose (see Appendix 4).

Moderating Variable: Measuring Engagement with Distracters

A questionnaire was distributed asking participants to report how many of the distracter items (i.e. the physical items such as magazines placed in the vicinity) they picked up and/or engaged with. The amount of engagement with distracters was designed to measure the level of multitasking that occurred while participants completed the readings, as the items all presented other activities for the participants to engage in simultaneously. For those in the online

conditions, the questionnaire included items asking if the participants opened any other computer applications, any additional tabs or links, or any other filing systems. The questionnaire also included additional items asking whether subjects in all conditions browsed or read material from other sections within newspapers or news sites. Participants were scored first on the number of external items they engaged with, and second on the number of activities they engaged with from within the medium to which they were assigned. See Appendix 1 for details.

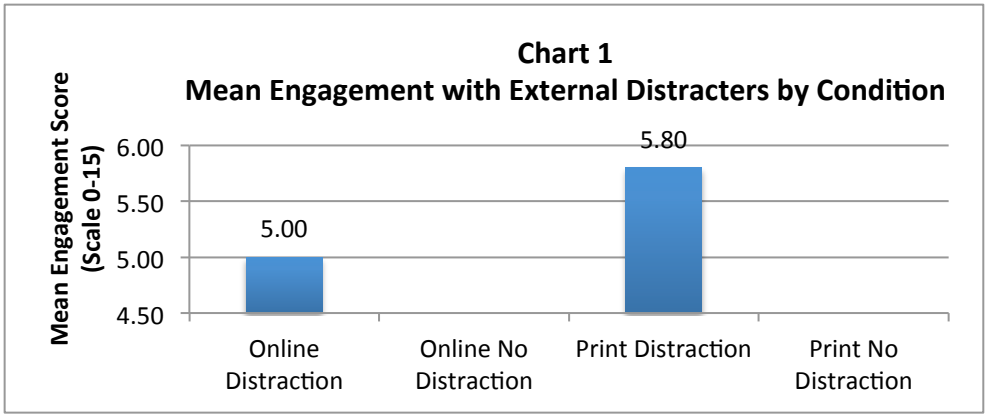
Dependent Variable: Measuring Recall

After the allotted reading time, a fifteen-question multiple choice test was distributed. Each question contained four possible choices with only one correct answer. The subjects could earn up to fifteen points. The final score for information recall was the percentage of correctly answered questions, giving the measure a range of 0-100. See Appendix 2 for details.

Results

When it came to engagement with physical distractors for those in the distraction conditions, those in the Print Distraction condition interacted slightly more (M_3=5.80, SD_3=3.49) with the physical objects than those in the Online Distraction condition (M_1=5.00, SD_1=2.53). Though in both cases, responses varied widely, with the sum of engagement ranging from 1-10 in Online Distraction and from 0-13 for Print Distraction participants (on a 0-15 scale). See Chart 1 for details. The amount of writing participants read outside the assigned articles was generally very low (M_1=1.31, SD_1=1.25, M_2= 0.65, SD_2=1.06, M_3= 0.73, SD_3= 0.96, M_4= 0.93, SD_4= 0.83). It was clear that participants did not read additional information from the newspaper or news web sites, and instead, generally stuck to the two articles alone. However, when compared to the internal distracters (other content, material, or functions of the medium), participants engaged more with the physical external distracters. These results, along with the internal

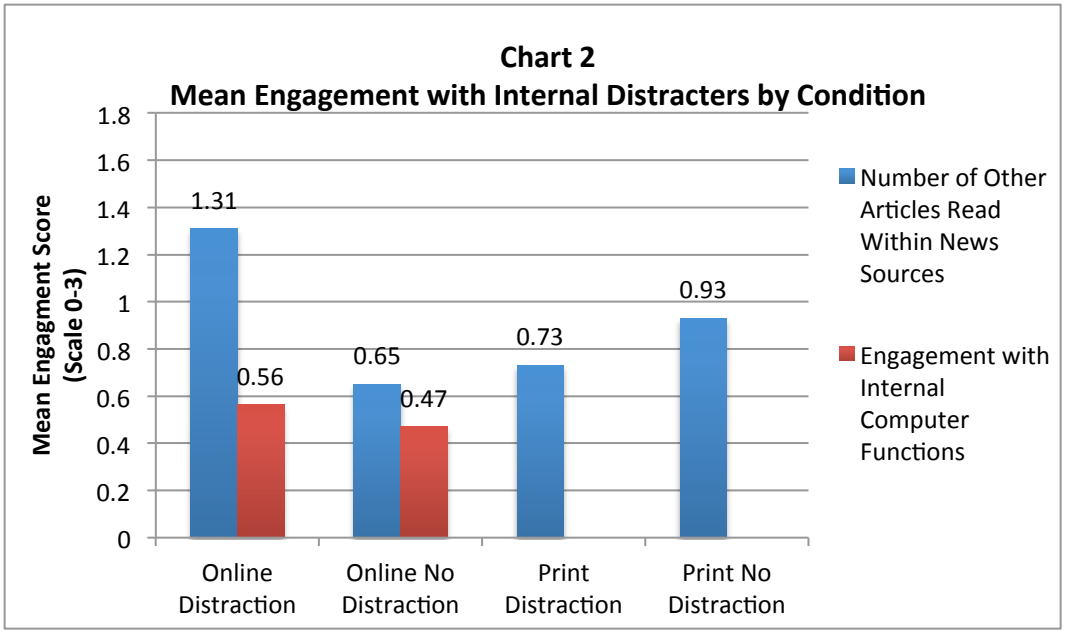
engagement results below, do not support and in fact go against Hypothesis 2, which anticipated higher levels of multitasking for those in the online conditions.



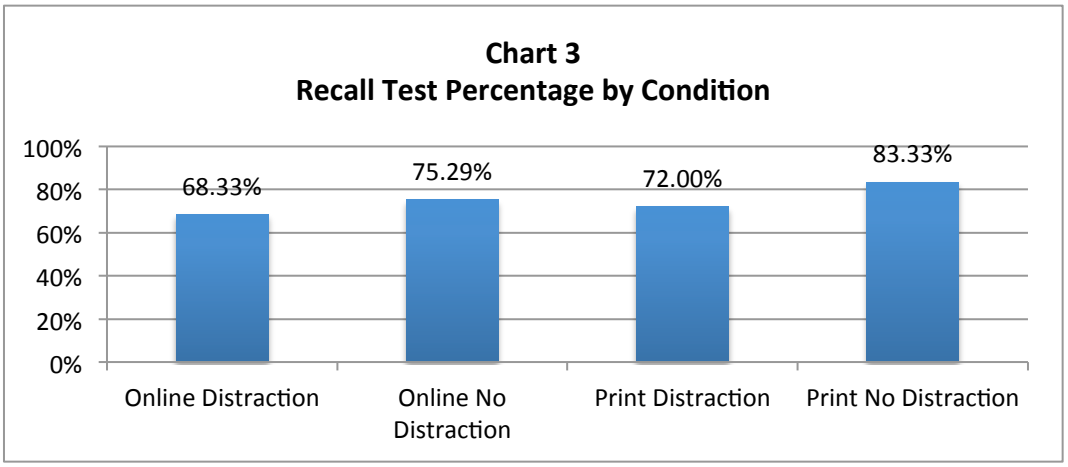
For those in the online conditions, engagement with internal functions of the computer medium was also very low (see Chart 2 for details). Very few participants opened links from within the news article webpages (M_1= 0.63, SD_1= 0.89, M_2= 0.41, SD_2= 0.80). Similarly, participants in the online conditions were equally low in opening links or tabs unrelated to the newspaper (i.e. links that participants intentionally typed in and opened themselves) (M_1= 0.50, SD_1= 0.89, M_2= 0.53, SD_2= 0.80), with the vast majority not opening a single external tab or link (68.8% and 64.7% in Groups 1 and 2 scored 0 respectively).

When it came to participants' engagement with various distracters, test scores did appear to suffer the higher one's engagement score was. There was a significant negative correlation between test percentage and engagement with physical distracters, indicating that the more a participant engaged with the physical objects around the desk, the lower their test score was (r = -0.27, p= 0.04). There was also a negative correlation between the amount a participant engaged in internal distracters (e.g. opening tabs, reading other news articles, etc.) and test score (r=-0.02, p=0.87), though the correlation was very slight and not statistically significant. Yet when analyzed by internal distracters that in no way related to the content/space of the news page (e.g.

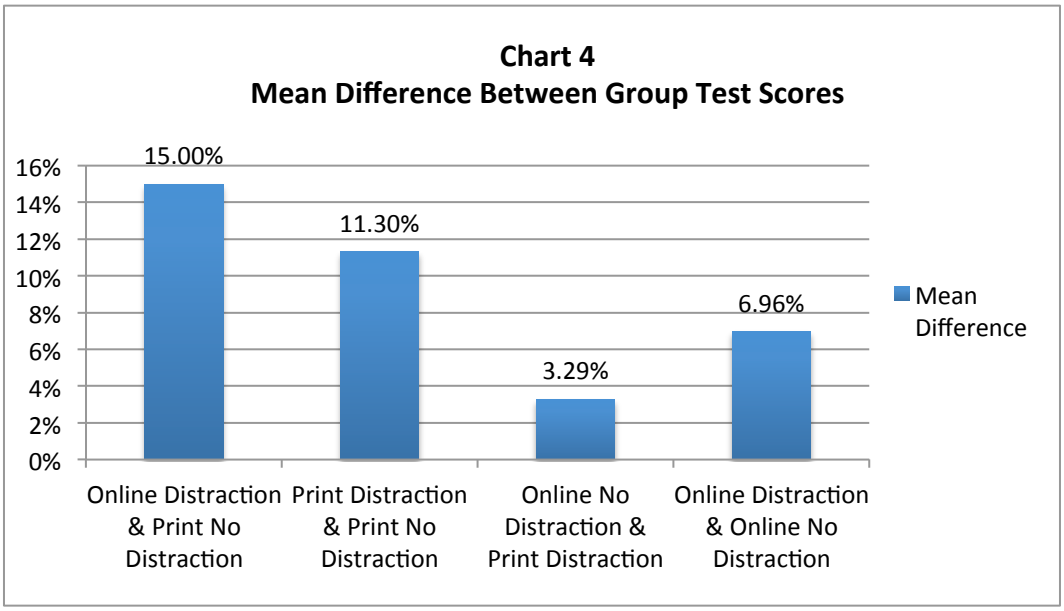
opening applications or tabs not from within the news site/paper itself), the negative correlation was greater and with results approaching significance (r= -0.19, p=0.14). These negative correlations lend support to Hypothesis 3, which projected higher levels of multitasking would correspond with lower levels of information recall.



Average recall test percentages by group revealed further differences in the amount of information retained between the different conditions and lend support to Hypothesis 1, which anticipated consumption of print news would correspond with higher levels of information recall compared to consumption of online news. On average, those in the Print No Distraction scored highest ($M_4 = 0.83$, $SD_4 = 0.14$) while those in the Online Distraction condition scored lowest ($M_1 = 0.68$, $SD_1 = 0.15$). The Online No Distraction and Print Distraction conditions fell relatively in between ($M_2 = 0.75$, $SD_2 = 0.16$, $M_3 = 0.72$, $SD_3 = 0.17$). See Chart 3 for details.



In a one-way ANOVA analysis of test percentages by group, there appeared to be significant differences at the 90% significant level ($F= 2.55$, $p = 0.07$). The greatest difference between conditions was seen between those in the Online Distraction and Print No Distraction conditions with a mean difference of 15% (where those in the Print No Distraction condition scored higher) ($p=0.05$). The Print Distraction and Print No Distraction conditions had a mean difference of 11.33% (where those in the Print No Distraction condition scored higher once again) with statistics that approached significance (considering the small sample size, I take some liberty with interpreting marginal significance) ($p=0.21$). The greatest similarities in recall score were seen between Online No Distraction and Print Distraction conditions, with a mean difference of only 3.29% (with Online No Distraction scoring higher) ($p= 0.30$). Both of the online conditions were also very similar with a mean difference of 6.96% ($p= 0.57$), where Online No Distraction scored highest. See Chart 4 for Details.



Discussion

While most tests were not statistically significant, a small sample size provided limited power to achieve it. Thus, I interpret the patterns in the findings as meaningful even when significance is only marginal. The patterns indicated by the results did coincide with the projection of two out of the three hypotheses. The prediction that those who consumed printed news would retain higher levels of information than those who consumed online news (H1) was partially supported by the average recall test scores between groups. The Print No Distraction condition scored highest, and the Print Distraction condition, though only the third highest score, was still higher than the Online Distraction condition. Similar trends were seen in the anticipated direction of Hypothesis 3, that higher levels of multitasking would lead to lower levels of news recall. In a comparison of test scores, those in both distraction conditions scored lowest while the non-distraction groups scored highest. When looking at Hypotheses 1 and 3 together, there is a striking 20% difference between the average scores of those in the Print No Distraction and Online Distraction conditions. In both cases, trends indicate that the online format was less effective for participants' recall of information. Trends also indicate that the presence of external

distracters is detrimental to information recall and that the potential for multitasking impedes the ability to focus and complete a task (in this case, the recall test) with accuracy.

Perhaps most interesting about the negative relationship between distraction and information recall the results suggest is the relatively low amount of engagement with distracters overall. Yet still, those in the distracter conditions scored lowest. When comparing the distraction conditions directly, those in the print condition engaged more in physical distracters while those in the online condition engaged more with internal distracters. Thus, it appeared that, unlike the prediction in Hypothesis 2, engagement levels with distracter varied by medium and actually tended to coincide with the type of medium being used. Those reading physical, tangible texts via newspaper were more susceptible to engagement with the other physical objects around them. On the other hand, those reading articles on the computer where the news writing was held strictly within the screen were more susceptible to engagement with other pieces of writing within the digital screen as well. In fact, those in the Online Distraction condition read more pieces of writing from within the news webpages and engaged with more internal functions than any other condition. These trends could suggest that while distraction may lead to multitasking that negatively affects information recall, individuals may focus within the medium or type of medium (physical versus digital) in use at any given time.

As mentioned in the above literature review, the work of DeFleur and Facorro (1993) suggests that the recall from news sources is partially dependent on cultural norms, adoption rates, and comfort-level for a given technology. The difference in recall between the United States and Spain in their study indicates that information recall from online news sources could also improve over time. Yet the present study's results coincide with the larger body of research supporting, at least for now, the primacy of print as the most effective news format for

information retention. More importantly, the negative impact of multitasking and distraction on information retention seen in the present study also suggest that concerns over our increasingly fragmented, split-focus society may not be unfounded.

The present study's findings, in conjunction with similar scholarly findings, could indicate that more resources should go toward maintaining print newspapers. As newspaper struggle to find a business model that is viable in the digital age, encouragement should be given toward improving online formats and protecting print papers for those who want to read them. Because if the present study's results reflect reality, the ability of citizens to retain important information about their communities, their nation, and the larger world could be negatively impacted by online formats and/or the presence of distraction online when consuming news. Beyond newsmakers, newsreaders should also be informed of the possible differences in information retention seen between news medium and multitasking. More discussion of results like these and other studies will help newsreaders make smart decisions about their news consumption habits. Putting this information in the hands of the consumer is one more step toward a stronger democracy, as it will encourage citizens to take the steps they need to better inform themselves. Furthermore, more scholarly work needs to be done examining whether the capacity to multitask online is a factor in lower level recalls, in addition to other possible explanations. The more we understand the circumstances that will best allow newsreaders to be informed, the more work can be done to improve all current forms of journalistic distribution.

The present study also has implications beyond journalism. Print and online media are sources of all kinds of information and if the suggested relationship between medium, multitasking, and information retention holds true in other circumstances, other areas such as education could suffer. As educators increasingly rely on computers as a tool to distribute

information to students, work should be done to help determine the best possible circumstances for students to retain information. Like newspapers, information in the classroom must be protected and preserved so that students' learning is unhampered, as effective learning at the university can lead to greater developments in a variety of fields.

Similarly, employers and employees should be aware of the negative impact multitasking and distraction has on information retention and the ability to perform tasks accurately. Employers may want to reconsider what the best settings are for an efficient, productive, work environment, one that encourages learning and accuracy on the job. Perhaps certain work computers should have limited capabilities and eliminate functions that would not improve on-site work. Similarly, employees, students, or other workers should be informed of the detrimental impact engagement with distraction and multitasking has on performance so that workers may improve the work they do, thereby fostering their potential for growth within their careers.

The study did contain certain limitations that could have affected the results and any implications that can be drawn from them. For starters, the overall sample size of 62 participants is relatively low for a four condition study. Each condition had less than twenty participants each, making it very difficult to achieve statistical significance or generalize results to a larger population. Because of the low sample size, and the fact that few statistics were statistically significant, most of the results of the study are inconclusive. While the results do indicate trends that fit within the larger body of research, they may not be very telling of relationships between medium, distraction, and information recall on their own.

Other limitations are simply part of the nature of experimental design, but include problems worth mentioning, especially given the focus of this study. The constructed experimental setting and presence of other participants could have hindered behavior that would

otherwise more closely resemble reality. For the online groups in particular, engagement with internal distracters was limited compared to the possibilities one's own computer offers in terms of number of applications, content in filing systems, and comfort of use. For example, the survey assessing engagement with distracters for the online groups did ask whether participants opened any filing systems on the computers, and that item was eventually thrown out because 100% of participants responded with a score of 0. Not a single person opened any files on the experimental computers, though one could speculate this might not be the case if the participants were at home using their own computers. In other words, there were limitations to the amount one could engage in internal distracters within the experimental setting. As mentioned above, though the experimental room had dividers around each individual workspace, the presence of others may have inhibited participants from engaging in distracters that would lead to tasks other than those assigned. The potential inhibition to engage with distracters also applies to those in the print conditions, since most experimental sessions had more than one participant in the lab at a given time.

A more sophisticated assessment of distraction as a measure of multitasking would also be a great asset to future research on the subject. The difficulty in quantifying, measuring, and coding the internal and external engagement with distracters in the present study could have altered the results in some way that disguises the true reality. A greater time limit for study sessions in the future might also help get a greater measure of distraction, since the twenty-minute reading time may have made participants feel they had to rush in reading the assigned articles and had no time to engage in the objects or articles around them.

Overall**,** the present study's results, though not entirely conclusive, follow the trend set by other researchers. It appears that the presence of distraction is detrimental to information recall

of news items. At this point in time it also appears that online forms of communication may be less effective than printed communication in allowing readers to recall information accurately. Yet more work remains to be done in examining the relationships between medium, distraction, and information recall, especially as the landscape of journalism (and printed communication in general) evolves in the digital age. The promise of a journalism that better informs its readers depends on it.

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Appendix 1A **Print with Distraction**

The following questions will ask you to recall your interaction with particular objects in the room. Please try your best to answer as accurately and honestly as possible.

There were five items placed within reach of your desk: a magazine, two books of word puzzles, a Rubik's cube, and a deck of cards. The following questions are designed to estimate your use of the five objects. Please circle the appropriate response.

1. How many of the five items did you
    a. Look at (specifically notice or observe)

        0 1 2 3 4 5

    b. Pick up

        0 1 2 3 4 5

    c. Engage with (for example, did you read anything in the magazine, fill in any of the word puzzles, attempt to solve the Rubik's cube, etc).

        0 1 2 3 4 5

2. a. How many articles, ads, or other pieces of writing did you read in the newspapers **other than** the articles assigned to you?

    0 1 2 3+

    b. If your answer above was 1 or greater, please indicate where the other articles you read were located. **Circle all that apply.**

    On the same page as an assigned article

    On a page opposite an assigned article

    In a different section of the newspaper

Appendix 1B **Print without Distraction**

The following questions will ask you to recall your interaction with particular objects in the room. Please try as best you can to answer as accurately and honestly as possible. Circle the appropriate responses.

1. How many articles, ads, or other pieces of writing did you read in the newspapers **other than** the articles assigned to you?

   0 1 2 3+

2. If your answer above was 1 or greater, please indicate where the other articles you read were located. **Circle all that apply.**

   On the same page as an assigned article

   On a page opposite an assigned article

   In a different section of the newspaper

Appendix 1C **Online with Distraction**

The following questions will ask you to recall your interaction with particular objects in the room. Please try as best you can to answer as accurately and honestly as possible.

There were five items placed within reach of your desk: a magazine, two books of word puzzles, a Rubik's cube, and a deck of cards. The following questions are designed to estimate your use of the five objects. Please circle the appropriate response.

1. How many of the five items did you
   a. Look at (specifically notice or observe)

      0 1 2 3 4 5

   b. Pick up

      0 1 2 3 4 5

   c. Engage with (for example, did you read anything in the magazine, fill in any of the word puzzles, attempt to solve the Rubik's cube, etc).

      0 1 2 3 4 5

2. When the session began, the only application running on the computer was an Internet browser open to the three selected news articles. While you were reading the assigned articles, how many other links or browser tabs did you open **from within** the newspaper website?

   0 1 2 3+

   b. While you were reading the assigned articles, how many links or tabs did you open that **were *not* within** the assigned newspaper webpages? In other words, how many times did you type in a link or open a separate tab to browse on your own?

   0 1 2 3+

3. While you were reading the assigned articles, how many other computer applications (e.g. games, music players, word processors, etc.) did you open and run?

   0 1 2 3+

4. While you were reading the assigned articles, how many files or filing systems did you open from within the computer?

   0 1 2 3+

5. How many articles, ads, or other pieces of writing did you read from the newspapers websites **other than** the articles assigned to you?

   0 1 2 3+

6. If you answered 1 or greater to the above question, please indicate where the other articles you read were located. **Circle all that apply.**

   On the same page as an assigned article

   From a link on the same page as an assigned article

   From browsing the newspaper website

Appendix 1D **Online without Distraction**

The following questions will ask you to recall your interaction with particular objects in the room. Please try as best you can to answer as accurately and honestly as possible.

1. When the session began, the only application running on the computer was an Internet browser open to the three selected news articles. While you were reading the assigned articles, how many other links or browser tabs did you open **from within** the newspaper website?

   0 1 2 3+

   b. While you were reading the assigned articles, how many links or tabs did you open that **were *not* within** the assigned newspaper webpages? In other words, how many times did you type in a link or open a separate tab to browse on your own?

   0 1 2 3+

2. While you were reading the assigned articles, how many other computer applications (e.g. games, music players, word processors, etc.) did you open and run?

   0 1 2 3+

3. While you were reading the assigned articles, how many files or filing systems did you open from within the computer?

   0 1 2 3+

4. How many articles, ads, or other pieces of writing did you read from the newspapers websites **other than** the articles assigned to you?

   0 1 2 3+

5. If you answered 1 or greater to the above question, please indicate where the other articles you read were located. **Circle all that apply.**

   On the same page as an assigned article

   From a link on the same page as an assigned article

   From browsing the newspaper website

Appendix 2 **Information Recall Items**

Below is a series of multiple-choice questions designed to assess how much information you retained from the three articles you just read. Please try your best to remember as much as possible from the three readings and respond accordingly. All your responses are confidential and cannot be traced to your name, U-M ID number, or any other identifying information. Please circle the letter of your answer.

A. "History Museum Sells a Piece of Its Past, Reviving a Debate"

1. What newspaper was this published in?
    a. The New York Times
    b. The Detroit Free Press
    c. The Washington Post
    d. USA Today
2. What museum was the article mainly about?
    a. The National Academy Museum
    b. The Philadelphia Art and History Museum
    c. The Philadelphia History Museum
    d. The Gregory Kleiber Museum of Art History, Philadelphia
3. There was a Raphaelle Peale piece sold in the auction which many regret being sold. What was it of?
    a. a dog
    b. a fish
    c. a portrait of a man
    d. a bowl of fruit
4. Which of the following was **not** one of the committees imposing standards and regulations on the museum?
    a. The Association of Art Museum Directors
    b. The American Association of Museums
    c. The American Association for State and Local History
    d. The Association of Art History and Artifacts
5. What is the art world term for selling collections?
    a. redistributing
    b. delineating
    c. deaccessioning
    d. deallocating
6. Which of the following is considered the best/most acceptable reason for selling collections?
    a. preservation
    b. renovation
    c. reselection
    d. viability
7. In general, art and objects are supposed to be sold only to
    a. individual proprietors
    b. finance acquisitions

c. local museums approved by the American Association for State and Local History
d. recognized museums

B. "This Smart Mama Didn't Come to Play"

1. What newspaper was this published in?
    a. The New York Times
    b. The Detroit Free Press
    c. The Washington Post
    d. USA Today
2. How much does Jennifer Taggart charge per toy test?
    a. $10
    b. whatever a parent is willing contribute
    c. $1
    d. $5
3. Which job has Jennifer Taggart **not** had?
    a. environmental lawyer
    b. health inspector
    c. engineer
    d. none of the above
4. The handheld XRF gun is capable of…
    a. detecting heavy metals
    b. detecting poisonous gases
    c. testing velocity
    d. measuring radioactive materials
5. Which of the following can the XRF gun detect?
    a. lead
    b. cadmium'
    c. all of the above
    d. none of the above
6. Josie Maran's makeup line claimed it was…
    a. all natural
    b. USDA organic
    c. toxin free
    d. petrochemical free
7. What product did Taggart successfully have recalled?
    a. Josie Maran's makeup line
    b. holiday lights
    c. toy Shrek glasses
    d. automatic dish soap
8. In June, Taggart blogged for the entire month investigating a new _____ per day.
    a. "natural" product
    b. children's toy
    c. cosmetic product
    d. household cleaning supply

Appendix 3 **Informed Consent Form**

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734.764.0420

Informed Consent Form

I am conducting a study to investigate the relationship between newspaper medium and information recall, in order to better understand what conditions lead to effective journalism. You will be asked to read two news articles, which you will have plenty of time to complete and browse any other news items that catch your interest. I hope that you feel comfortable and can act as naturally as possible. Once the reading time has run out, you will be asked to complete two questionnaires. The first is designed to assess your engagement with the news sources and your reading environment. The second is designed to test the information you retained. I am not interested in the responses of a single individual, but rather, overall trends. All your responses will be kept confidential. Any responses you provide will not be linked to your name, student ID, or other identifying information. You will receive one half hour credit for your participation from the Communication Studies Department Participant Pool.

Though there are no anticipated risks or discomforts for this study, if you feel uncomfortable at any point or wish to withdraw from participating, you are free to do so without penalty. You may also skip any questions you are uncomfortable answering. Participation in this study is completely voluntary. If you do choose to continue, please read the following information and indicate you are willing to participate, and that you understand and agree with the statements by signing your name below. You will be given a copy of this consent form for your records. Thank you for your time and consideration of my research.

I hereby consent to participate in this experiment. I have been informed of the purposes and procedures involved, to the extent that they can be explained in advance. I understand that my participation is voluntary and that I am free to withdraw from participating at any time during the experiment without penalty. I understand that I may skip any questions I do not feel comfortable answering. I also understand that my responses will be kept confidential and if I have any questions or comments regarding any aspect of the experiment I should content the Project Supervisor, Kristen Bialik, or Professor Scott Campbell, Faculty Advisor from the contact information listed above.

Print Name_____Date_____Signature_____

If you would like additional information about your rights as a research participant, please direct any questions or comments to kebialik@umich.edu

Appendix 4 **Debriefing Form**

The purpose of this form is to provide you with additional information about the experiment you participated in for credit. A copy of this debriefing form is available to all participants.

The experiment was designed to analyze the effects of both medium type and distraction on information recall for news items. More specifically, I was interested in examining whether online versions of newspapers led to lower levels of information recall from news articles when compared to print newspaper recall, and whether one's engagement with distracting variables strengthened this relationship.

Previous research on information retention has generally focused on differences between mediums, though with mixed results. Tremayne and Dunwoody (2001) found that interactively-designed websites produced more cognitive elaboration, greater interactive behavior, as well as greater total recall of information. Yet in a study comparing information recall of news presented in newspaper, computer, telvision, and radio formats, DeFleur, Davenport, Cronin, & DeFleur (1992) found the newspaper medium was most effective in all cases (though the computer-mediated format was found to be second best). The research of Eveland and Dunwoody (2002) determined that online learning can work because readers can set their own pace. Yet they found significantly higher levels of knowledge recall in the print group compared to online readers who engaged in "selective scanning." The negative effects caused by selective scanning were more powerful than any positive effects of online elaboration, indicating that online formats may foster increased distraction which could hinder information retention. Overall, little work has been done to examine why differences in medium may result in information recall differences. My research examines the engagement with distracters across online and print media as a moderating variable, in hopes of developing a more comprehensive understanding of the processes involved in the relationship between news medium and information retention.

Thank you for your participation in this study. Your responses will help develop a greater understanding of the complex relationship between medium, distraction, cognition, and information recall. If you have any questions about this area of research of this particular research project, please feel free to contact me: Kristen Bialik, kebialik@umich.edu, (906) 399-6445. For further information consult:

DeFleur, M. L., Davenport, L., Cronin, M., & DeFleur, M. (1992). Audience recall of news stories presented by newspaper, computer, television, and radio. *Journalism Quarterly , 69* (4), 1010-1022.

Eveland, W. P., & Dunwoody, S. (2002). An investigation of elaboration and selective scanning as mediators of learning from the web versus print. *Journal of Broadcasting & Electronic Media , 46* (1), 34-53.

Tremayne, M., & Dunwoody, S. (2001). Interactivity, information processing, and learning on the world wide web. *Science Communication , 23* (2), 111-134.

If you would like additional information about your rights as a research participant, please direct any questions or concerns to kebialik@umich.edu

Appendix 5a **Stimulus Material A**

The New York Times: "Museum Sells Pieces of Its Past, Reviving a Debate"
By: Robin Pogrebin
Published: Monday, December 5, 2010

PHILADELPHIA — A galloping horse weather vane sold for about $20,000, and the cigar store Indians brought in more than $1 million. A Thomas Sully oil painting of Andrew Jackson netted $80,500, and a still life by Raphaelle Peale, part of the family that put portraiture in this city on the map, was auctioned at Christie's for $842,500.

The Philadelphia History Museum at the Atwater Kent has 100,000 pieces in its storage rooms, including a taxidermied Philly, the dog that accompanied local troops overseas in World War I.
These were just a few of more than 2,000 items quietly sold by the Philadelphia History Museum over the last several years, all part of an effort to cull its collection of 100,000 artifacts and raise money for a $5.8 million renovation of its 1826 building.

In doing so the museum stepped into the quicksand of murky rules, guidelines and ethical strictures meant to discourage museums everywhere from selling collections to pay bills. It is one of the hottest issues in the museum world today. With budgets shrinking in a bad economy, the pressure to generate revenue is growing along with fears that museums are squandering public trusts meant to preserve the artifacts of the past for future generations.

The National Academy Museum in New York, Fisk University and Brandeis have all recently drawn fire — and even sanctions — for selling or planning to sell artworks, and none of them sold as many works as the museum here.

In general art and objects are supposed to be sold only to finance acquisitions, though different museums are governed by different standards. Art museums, regulated by a formal code of the Association of Art Museum Directors, may not sell work for any other reason.

As a history museum, though, this institution — formally called the Philadelphia History Museum at the Atwater Kent — is subject to separate, less stringent guidelines put forward by other associations. So museum officials say the installation of new carpet, paint and lighting were all legitimate expenses to be paid from the proceeds under the guidelines of the American Association of Museums, which say that sales can be used for the "direct care" of a collection. Adding to the confusion, there is a third set of standards maintained by the American Association for State and Local History permitting proceeds to go toward the "preservation" of a collection, a similarly broad term.

The New York State legislature, confronting this maze of precepts, recently considered passing a law that would make selling collections — the art world term is deaccessioning — to pay operating expenses illegal. It never made it to the Assembly floor because museums opposed it.

Some museum professionals say that having differing guidelines for art and history museums only fosters confusion at a time when finding any means of raising money is especially appealing.

"This rapidly becomes a slippery slope," said Derick Dreher, the director of the Rosenbach Museum & Library in Philadelphia. "What museum director wouldn't be tempted to say that air-conditioning is absolutely crucial for care of collections? Heating, humidification and dehumidification, similarly. But if

we go down this road, we end up paying our gas, electric and water bills — classic operations costs — with deaccessioning proceeds."

But, some argue, museums sometimes have to pare down their collections to remain viable. "Museums really cannot continue to accumulate and accumulate and accumulate ad infinitum," said Janet C. Marstine, founding director of the Insitute of Musuem Ethics at Seton Hall University and now a lecturer and program director at the University of Leicester. "What does one do with former acquisitions policies that did not make sense, or not having an acquisitions policy, or having so many objects they can't care for or don't really fit within their purpose?"

The Philadelphia History Museum, which has been closed for nearly two years for renovations, hopes to finance the completion of the project — about $1.5 million — from the sale of "an artifact" it would not identify. It views its sales as falling within the history museum guidelines.

"We view the entire reconstruction project as preserving and caring for our largest artifact, the building," said Gregory J. Kleiber, the museum's treasurer, "and making possible the display and conservation under museum-appropriate conditions of the other pieces of our collection."

The state and local history association — which serves nearly 4,000 institutions — said that history museums resist easy definition and therefore make rigid regulation difficult. "History artifacts include everything from locomotives to artwork — it's a very broad type of collection — so it's really hard to set one ethics statement that covers the kaleidoscopic nature of the history collections," said Terry Davis, the association's president. "We intentionally leave our policies — our ethics statement — rather loose. Our belief is a board should take the ethics statement and make thoughtful decisions about what's best for the care of their collections."

Ford W. Bell, the president of the American Association of Museums, acknowledged that his group's policy was "less clear" than the one governing art museums, and that whether or not a history museum's sales fit within the guidelines "is somewhat subjective."

"In general, we hope that museums will not use the collections as an asset to support the operations of the museum or things that are not directed to collections' care or buying new objects," Mr. Bell said.

In selling items, the Philadelphia History Museum's officials say they are trying to maintain their collections responsibly within limited storage capacity and to keep the institution focused on its core purpose. In addition to large-ticket items, the museum has sold relatively minor pieces, like two wooden 19th-century rocking chairs (one in need of caning), which together brought $35, and assorted lithographs of New York City from the mid-19th century, which went for $12.50. Some objects have been given to other institutions.

"We've collected a lot of things over the years, many of which have very little to do with our mission as a history museum," said Mr. Kleiber, the treasurer, who was president of the museum from September 2007 to September 2010.

"We want to continue the process, to continue looking at what doesn't fit our needs and move forward," he added. "We were very conscious when we started the process that this sort of thing raises eyebrows. We feel we've been very careful and very thoughtful about the entire thing."

The history museum initially said it had no record of how many items it had sold, how much the sales had brought in or where the proceeds had been directed. "I'm sure there are records around," Mr. Kleiber said. "I'm not sure I've seen them."

The museum later acknowledged that between 2003 and 2009 it sold 2,595 items at Philadelphia-area auction houses, earning a total of about $115,000. Another 64 items — some of which were transferred to the museum in 2001 by the Historical Society of Pennsylvania, which shared in the proceeds — were auctioned at Christie's, bringing in $3.4 million. The museum has sold "mountains of stuff," Mr. Kleiber said, but much of it is only "little bits of paper, odd bits of this and little bits of that."

Some museum professionals say the institution should have been more transparent about its sales, explaining what it was selling and why.

"I wish some of these things were staying here and wish there had been a greater opportunity for local museums to purchase them," said Page Talbott, a trustee of the Historical Society of Pennsylvania. "There wasn't time built into it, to have a conversation about it. The sale had already been planned and catalogs printed."

Others say the scope of the sales is troubling. "The motivation appears to be liquidation, rather than preserving the embedded knowledge and experience that these artifacts bring," said Kenneth Finkel, lecturer in American studies at Temple University who briefly served as deputy director of the museum. "Decisions made by donors and curators and libraries become the legacy. And the decision to deaccession stupidly is also a legacy."

Many of the more prominent works sold were paintings done by members of the Peale family, whose most famous member, Charles Willson Peale, is viewed as the founder of America's first major museum, which operated in Philadelphia in the 1800s. "There is nothing that's more centrally Philadelphian than the Peale family," said Mr. Dreher of the Rosenbach museum. "Though I respect the museum's right to act as it did, it's taking away the opportunity for the public in and around Philadelphia to be enlightened by these works, and now one of the best stories can't be told because it's gone."

Mr. Kleiber said that making sales more public is "something we'll consider."

Regarding the Raphaelle Peale still life, one of the more valuable items sold at Christie's, Mr. Kleiber said: "The Peale we felt was very much outside the mission. We're a history museum, not an art museum. It's a picture of a fish."

A version of this article appeared in print on December 6, 2010, on page A1 of the New York edition.

Appendix 5b **Stimulus Material B**

USA Today: “Smart Mama Jennifer Taggart Aims to get the Lead out of Toys”
By: Liz Szabo
Published: Monday, December 5, 2010

Stop by Jennifer Taggart's Southern California home, and you're likely to find her kids conducting a hands-on science experiment. In other words, making a mess.
Taggart has been known to fill a plastic kiddie pool with balls, bird seed or even whipped cream, all for the benefit of her two curious children, ages 5 and 7. She doesn't fuss if the kids want to slather each other with homemade paint on the floor of her breakfast nook.

With her soft voice and relaxed attitude toward creative chaos, she might not sound like a woman warrior.

Her weapon of choice? A handheld X-ray fluorescence analyzer — or XRF gun, for short. It's about the size of a supermarket scanner but powerful enough to detect heavy metals such as lead.

The environmental lawyer, former engineer and self-described geek aims the gun at her children's toys, at Christmas and throughout the year.

In May, Taggart turned the device, and her encyclopedic knowledge of toxic chemicals and environmental law, on a set of Shrek glasses from McDonald's, coveted by her 7-year-old son. Her tests showed the glasses were contaminated with cadmium, a heavy metal listed as a probable human carcinogen by the Environmental Protection Agency.

Taggart and another activist reported their results to the Consumer Product Safety Commission. A week later, McDonald's recalled 12 million Shrek glasses.

Taggart, 42, belongs to a small army of "mom bloggers" concerned about kids' exposure to toxic chemicals, who share ways that parents can protect their families, says Mike Schade of the Center for Health, Environment and Justice, a Virginia-based advocacy group.

But he says Taggart, whose website is called thesmartmama.com, stands out from the crowd because of her success in getting products recalled — and pushing companies to live up to their advertising.

"Parents across the country really owe her a debt of gratitude for uncovering these unnecessary toxic hazards," Schade says. "She does a fantastic job distilling complex scientific information. and giving simple steps that ordinary families can take."

Parents need to know

Taggart says she doesn't think new legislation and regulations always help. But as a mother, she wants labels to be clearer and products to be safer.

"I want people to be informed, so they can make informed choices," she says.

And her gun is for hire.

In addition to practicing environmental law at a Los Angeles firm, Taggart operates a side business, testing toys for other concerned parents. At $5 a toy, her fees help pay for the lease on her XRF gun, which sells for $20,000 to $40,000.

Taggart's environmentalism began in childhood, when she campaigned to save the whales. But she became more aware of environmental threats in her home in 2002, when pregnant with her first child. Frustrated with the lack of information on product labels, she began calling manufacturers and pressing them for details.

"After you have a kid, everything changes," Taggart says. "Everything becomes about protecting the world for this one little person."

Many parents share Taggart's concerns. "The toy recalls in 2007 really woke up millions of Americans, especially moms," Schade says.

The Consumer Product Safety Commission's Scott Wolfson says the federal agency has a "great deal of respect" for Taggart's "professionalism" in reporting her findings about the McDonald's glasses.

"Everybody along the way, from Jennifer to McDonald's to CPSC, really did what was needed to make sure that children are protected," he says.

Additional testing has shown that the amount of cadmium in the Shrek glasses is too low to cause harm, says Wolfson, noting that the glasses would not have been recalled today. But he says his agency, with 510 employees, does rely on "citizen activists" for help.

And activists say there are still lots of troubles with toys.

A new report from healthystuff.org, produced by the Michigan-based Ecology Center, found high cadmium levels in 48% of toys tested and 78% were made with PVC, or polyvinyl chloride, which is often contaminated with lead.

Taking claims seriously

One of Taggart's favorite targets is "greenwashing" by companies that claim their products are greener or safer than they really are.

In June, for example, she tackled a claim a day about supposedly "natural" products — a new one each day of the month. Her first report took on Josie Maran Cosmetics, led by the supermodel and Dancing With the Starscontestant, which markets its makeup as "luxury with a conscience."

As Taggart often points out online, there is no federal organic standard for beauty products and household cleaners. So anyone can stick the labels "organic" or "natural" on products, no matter how they're made, she says.

Makers of beauty products and household cleaners often seek her out, she says, hoping to win her endorsement.

These same marketers generally stop returning her calls, though, when Taggart — sounding more like a chemist than a soccer mom — grills them about their ingredients.

She challenged Josie Maran's company to live up to its advertising, which claimed that its products were "petrochemical-free." After scrutinizing the ingredient list, however, Taggart found that some of them were made with petroleum. "While I can't say whether or not the products are safe, I can say that many of the products are not free of petrochemicals as advertised," Taggart wrote on her blog.

In September, Maran wrote back in an e-mail, thanking Taggart for alerting her to the problem, pledging to stop making the "petrochemical-free" claim.

"It's so important that there are people asking the tough questions and holding companies accountable," Maran tells USA TODAY. "Everyone deserves to know what they're putting on their bodies, and these activists have the power to bring oversights to light and help make the industry as a whole more honest and responsible."

Readers of Taggart's website — she counts about 4,000 weekly readers, although some topics have drawn many times more — say they're glad she takes on issues like these.

Joanna Runciman of Vancouver, British Columbia, describes her as "bold" and "honest."

"She is not afraid to tell it how it is — that is, 'this product is toxic and here is why,' " Runciman says.

Not everyone is thrilled

And while Taggart tries to be environmentally aware — buying mostly organic food, growing some of her own vegetables, turning down her thermostat to save electricity — she doesn't claim to be greener than thou.

In a pinch, Taggart admits, she takes the kids for an occasional quick meal at McDonald's, and she says her guilty pleasure is Coca-Cola.

Her husband mostly supports her environment efforts, she says, "but he has drawn the line at some things," Taggart says. "I ruined several loads of dishes trying to make my own automatic dishwashing soap."

Her husband, also an engineer, now insists that they buy dishwashing soap at the store.

He also provides moral support when Taggart's blogs inspire hate mail.

She says death threats were posted on her website after the Shrek recall.

"People said that I was the equivalent of a helicopter parent, that all attorneys should die," Taggart says. "It was frustrating and disheartening. My husband says it goes with the territory."