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The Effects of Online Advertisements and News Images on News Reception

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THE EFFECTS OF ONLINE ADVERTISEMENTS AND NEWS IMAGES

ON NEWS RECEPTION

by

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ABSTRACT
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The news and advertising industries have a symbiotic relationship. News media bring

audiences to advertisers, and advertisers provide the necessary funding for the survival of

the news media. This inseparable relationship between the news and advertising

industries continues to exist in the era of the Internet when various newly developed

techniques are used to attract online newsreaders' attention. This raises the questions of

whether exposure to online news and advertisements simultaneously has a negative

impact on acquiring information from the news and whether the negative impact, if there

is any, can be mitigated by motivating newsreaders to engage in news reading through

including news images that attract newsreaders' attention.

To answer theses question, an online experiment was conducted. It had a 3 (Online

Advertisements: None vs. Static Banners vs. Animated Banners) X 2 (News Images:

None vs. Human Suffering) between-subject design. The findings indicate that online

advertisements may reduce readers' attention to news. Moreover, they suggest that news

images depicting human suffering may mitigate the negative effect of online

advertisements on news processing under some circumstances. Simultaneously

processing news images and online advertisements may also cause cognitive overload that suppresses news processing. This implies that including news images increases knowledge acquisition only to the extent that newsreaders have enough resources available to process the information from news. From practical perspectives, the findings shed light on what news reporters and editors may consider when designing online news websites.

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Chapter 1. Introduction

The cohabitant of news and advertisements, the epitome of commercialization, seems to be ironic considering the normative roles that news media play in a democratic society such as informing citizens and checking the power (Gans, 2003). The advertising comprises the largest revenue of the news media industry (Newspaper Association of America, 2012) without which news organizations may not operate efficiently. This relationship between news and advertisements has been termed as "double market (Croteau & Hoynes, 2006)" which refers to the fact that news organizations draw audiences' attention so that they can sell spots and/or spaces to advertisers.

In recent years, a growing number of people have considered the Internet to be their major source of news. In contrast, the number of subscribers to traditional newspapers have decreased drastically (Pew Research Center, 2011); so has the advertising revenue for the newspaper industry. The decrease in adverting revenue for the industry increases the dependency of online news services on online advertising revenue (Newspaper Association of America, 2012), which perpetuates the symbiotic relationship between the newspaper and advertising industries for audiences' eyeballs in the era of the Internet. This trend can be observed across the globe. For example, online news webpages in South Korea, one of most wired countries in the world, contain 36.2 advertisements per page on average (Heo, 2012.8.10).

For the advertisers, the Internet is a double-edged sword. On one hand, the online environment provides a new opportunity to employ many techniques (with

multi-media capability) that aim to increase the attractiveness and persuasiveness of online advertisements (Faber, Lee, & Nan, 2004; Sundar, Xu, & Dou, 2012). On the other hand, people's tendency to avoid advertisements (Dreze & Hussherr, 2003) casts doubt on the effectiveness of online advertising (Jones, Pentecost, & Requena, 2005; Sundar, Narayan, Obregon, & Uppal, 1998). Because of this, the persuasiveness of online advertisements has been less than promising, which begs the question of how to increase the effectiveness of online advertisements.

To address this question, the advertising industry and academic scholars have developed and tested a variety of techniques that are designed to increase recognition and recall of brands, products, and advertisements messages through drawing the audiences' attention to advertisements (Dreze & Hussherr, 2003; Hsieh & Chen, 2011; Moore, Stammerjohan, & Coulter, 2005; Sundar & Kalyanaraman, 2004). Due to human's sensitivity to moving objects (Franconeri & Simons, 2003), a common way to draw viewers' attention is to use animation. However, online advisements using attention-attracting techniques (e.g., animation) may produce unintended effects on reception of online news (Chan Yun, 2009) because the interface of online news webpages forces readers to process news and advertisements simultaneously. For this reason, it is important to investigate the possible influence of online advertisements on news reception.

Indeed, prior studies have indicated that online advertisements can influence one's reactions to news. For example, one study suggests that online advertisements may influence the perception of news worthiness of news reports among people who are less accustomed to the Internet (H. Yang & Oliver, 2004).

Newsreaders' interpretation of news also might be affected by the nature of advertisement placed with news article (Kim, 2012). Nonetheless, no studies, to the best of my knowledge, have directly tested whether online advertisements influence news processing. To fill in this gap, this thesis explores the effect of simultaneous exposure to news and online banner advertisements[1]—the most typical type of online advertisements— on acquisition of information from news. To acquire information from news, one needs to allocate cognitive resources to process the news (Grabe, Kamhawi, & Yegiyan, 2009). But online banner advertisements might drain readers' mental resources necessary for processing the news. This should be particularly true if the banner advertisements are animated because animation demands more attention (Yoo & Kim, 2005; Yoo, Kim, & Stout, 2004).

Moreover, this thesis also considers the effect of news images on news processing. Photographic images are prevalently used in news to provide a vivid description of what the news reports (Zillmann & Brosius, 2000). According to research into the effects of news images on selective exposure, including images that attract readers' attention in a news article may motivate the readers to carefully process the story (Knobloch, Hastall, Zillmann, & Callison, 2003; Sargent, 2007; Zillmann, Knobloch, & Yu, 2001). The finding suggests that certain news images may protect readers from the influence of distracting online advertisements by maintaining the readers' attention to the news and engaging them in a deeper processing of news.

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[1] Online banner advertisements refer to a box-shaped graphical advertisement embedded into a website that typically includes a combination of static and/or animated image and text (Interactive Advertising Beureau, 2012)

Taken together, this thesis explores the effect of online advertisements and news images on news processing. Specifically, it focuses on the influences of online banner advertisements and news images on acquisition of information from news. Online advertisements may interfere with the role that news media play in informing citizens, but certain news images might mitigate the distracting effect of the advertisements. Given that the formation of public opinion is heavily affected by the information acquired from news media (Zaller, 1992; Zaller & Feldman, 1992), it is important to understand under what circumstances online news may or may not be able to effectively relay important information to the public. The findings of this thesis will contribute to that understanding.

Chapter 2. Literature Review

Limited Cognitive Resources and Human Information Processing

People need to make sufficient effort to read and understand news. Failing to do so may make them less likely to acquire information from the news, which may happen to readers of online news because the news is juxtaposed with a variety of information that stimulates readers' sensory receptors for attention. When people clicked a link to news on a website, the news does not come alone. Even if online advertisements are taken off the table, other information will be accompanied with the selected news. Links to relevant and/or recommend articles and constantly updating tweet feeds are among the information that constantly asks newsreaders for their attention.

Processing news simultaneously with such information may impose a burden on readers (Geissler, Zinkhan, & Watson, 2006) and makes online news websites a less effective medium for news than the traditional media (Grabe et al., 2009; Tewksbury & Althaus, 2000; J. Yang & Grabe, 2011). Consistent with this reasoning, studies have shown that people who read news online acquire less information than do those who read hard copies of newspapers (Tewksbury & Althaus, 2000). Such pattern is more conspicuous among people with lower levels of education who presumably have less cognitive ability to process information than those with higher levels of education (J. Yang & Grabe, 2011).

A possible explanation for why online news websites make it harder for readers to acquire information can be found in the nature of human information processing. People have a limited amount of cognitive resources to use at a given

time (Fiske & Taylor, 2008; Kahneman, 1973). Processing information needs voluntary and/or involuntary investment of a certain amount of cognitive resources from one's reservoir. When processing a set of information demanding more cognitive resources than available, the information under processing may not receive full attention. This may cause erroneous performance in information processing, making people less likely to remember the whole or a part of information they have received (Lang, 2000).

In terms of online news reading, structural features of online news other than the content may demand an extra amount of cognitive resources on top of the resources necessary for processing the news. One's ability to acquire information from news might be substantially undermined if the amount of cognitive resources necessary for processing information other than the news increases. Information that did not receive a sufficient amount of attention is less likely to be remembered (Grabe et al., 2009; Wise, Eckler, Kononova, & Littau, 2009).

The limited capacity model of mediated messages helps to explain the effect of insufficient allocation of cognitive resources on news processing. The model lays out the underlying mechanism of how people attend, store, and retrieve a piece of information. Although the model was originally propounded to understand the underlying mechanism of processing TV messages (Lang, 2000), some studies have extended the model to understand the processing of other types of messages including online news and online banner advertisements (Lang, Borse, Wise, & David, 2002; Sundar & Kalyanaraman, 2004; Wise, Bolls, & Schaefer, 2008).

Specifically, the limited capacity model posits that human information processing subsumes three simultaneously occurring sub-processes. Each of these sub-processes takes part in how people attend, store, and retrieve a piece of information when they are exposed to mediated messages (Lang, 2000). First, the encoding process concerns the selection of a bit of information among myriad of stimuli into working memory where the information is temporarily stored. Second, the information in the working memory goes through the association process in which incoming information is connected with information stored in one's memory (storage). Third, the retrieval is a process in which stored information is reactivated and enters into working memory. Each of these processes simultaneously demands a certain amount of cognitive resources to complete (Lang, 2000, pp. 47-51).

When the cognitive demands of processing incoming information exceed available cognitive resources at a given time, cognitive overload occurs and incoming information is not thoroughly processed. In such a case, the performance of one or more of the three sub-processes of information processing might be suppressed due to insufficient allocation of cognitive resources (Lang, 2006). For example, the exceeding cognitive demand might suppress the retrieval process but not the storing process. As a result, people might successfully retrieve a piece of information from a news article later to answer a question with a cue that helps them to recall the information. But the same people might not be able to answer a question that provides no cue because the information is not solidly stored in long-term memory due to the lack of cognitive resources for fully

processing the information (Lang, 2000). Hence, learning information from reading news may rely heavily on the amount of mental resources available (Grabe, Zhou, Lang, & Bolls, 2000; Wise et al., 2008; Wise et al., 2009).

Allocation of cognitive resources occurs through two routes that are driven by different locus of control in selecting information (Folk, Remington, & Johnston, 1992; Lang, 2000). The top-down (i.e. conscious or controlled) process is triggered by one's goals. When this process is activated, people consciously direct their attention to information that meets their goals (Lang, 2006). In terms of online news reading, the goal, assumingly, is to acquire information from a news article and understand the issue under discussion. Driven by this goal, people should intentionally direct their attention to the news article to gather information.

The bottom-up (i.e. automatic) process, on the other hand, concerns unconscious allocation of mental efforts to process information (Folk et al., 1992; Franconeri & Simons, 2003). The bottom-up process is activated by stimuli that induce automatic allocation of cognitive resources to information that calls for attention. For example, people tend to automatically direct their attention to incoming information that is suddenly and/or unexpectedly moving, changing, or emerging. Studies have shown that the characteristics of an object— such as including on/offset (Diao & Sundar, 2004), movement (Franconeri & Simons, 2003; Sundar & Kalyanaraman, 2004) and distinction from surroundings (Hsieh & Chen, 2011)—may induce people to allocate their attention to the object and translate the object into a mental representation (Lang, 2000).

People's reactions to information that leads to an involuntary allocation of cognitive resources are referred to as orienting responses (Lang, 2000, 2006). When engaging in orienting responses, people automatically allocate their cognitive resources to process information that attracts their attention. For example, an ambulance that suddenly turns on its siren and starts running down the street may draw people's attention. People may start thinking about what is going on. In other words, the suddenly turned on siren causes people to involuntarily allocate their cognitive resources to process information related to it. This automatic allocation of cognitive resources to information unrelated to one's goal may reduce cognitive resources available for completing intended tasks (Lang et al., 2002).

Indeed, research has indicated that involuntary shift of attention to stimuli that are irrelevant to one's goal may interfere with the completion of an intended task through increasing cognitive load (Folk et al., 1992). Applying the finding to the context of this study suggests that exposure to online advertisements might hinder one's ability to process and acquire information from news. This is because one's cognitive resources available to process the news (the intended task) might decrease due to involuntary, maybe even undesired, allocation of attention to information irrelevant to the news (i.e., online advertisements). To illustrate the point, imagine that a man named Jake is sitting on a bench and reading news. A street vendor shows up and attempts to sell hotdogs to people by shouting aloud how delicious and inexpensive his hotdogs are. Despite Jake's

intention to focus on news reading, he cannot help but be distracted by the vendor. As a result, he might not able to read the news thoroughly.

In the analogy of the present thesis, online advertisements function as a street vendor who constantly demands newsreaders' attention. For this reason, when juxtaposed with news, advertisements may repetitively call for automatic allocation of cognitive resources. The automatic allocation of cognitive resources to online advertisements may interfere with news reading (the intended task), making the information from the news harder to recognize and/or remember later.

Effects of Online Banner Advertisements on News Processing

When it comes to advertising, the Internet has some advantages over traditional media such as television and newspapers. For example, television as an advertising medium does not allow advertisers to present advertisements along with media content except for a few cases such as sporting events where audiences are exposed to advertisements and content at the same time (Chowdhury, Finn, & Olsen, 2007). Most exposure to advertisements happens during commercial breaks, making it harder for advertisements to keep the audience's attention. Although paper-based media such as newspapers and magazines expose readers to news and advertisements at the same time, they have their own inherent shortcomings. The print media make it impossible to use multi-media techniques that provide richer advertising experiences (Faber et al., 2004).

The Internet has the potential to address the aforementioned problems of traditional media. It allows advertisers to not only create advertisements using multi-media techniques but also juxtapose advertisements with media content

(Geissler et al., 2006; Hsieh & Chen, 2011), making exposure to advertisements harder to avoid except when ad-blocking software is used. Hence simultaneously processing advertisements and news may frequently occur during online news reading.

Attracting newsreaders' attention is *raison d'être* of online advertisements. Online advertisements use a variety of techniques to draw attention, improve recall and spur instant behaviors (Ha, 2008). Given that the advertisements demand a certain amount of cognitive resources (Diao & Sundar, 2004; Lang et al., 2002; Sundar & Kalyanaraman, 2004), the simultaneous processing of news and the advertisements may prevent readers from allocating a sufficient amount of cognitive resources to news processing (Lang, 2000). The more cognitive resources that the advertisements demand, the fewer resources left for a proper processing of the news due to the drained reservoir of cognitive resources. Consequently, online newsreaders whose attentions are drawn to advertisements may become disengaged with news and use fewer cognitive resources to process the news. The information processed with insufficient amount of cognitive resources may not be properly attended, stored and later remembered (Lang, 2000, 2006). Hence, the success of news processing might be affected by the amount of cognitive resources involuntarily allocated to process advertisements at a given moment.

Reading online news with the presence of online advertisements that continuously demand attentions might make it harder to digest the news. Specifically, online banner advertisements, one of most common types of online

advertisements and the focus of the current thesis, may induce involuntary allocation of cognitive resources to process the advertisements (Lang et al., 2002). In other words, online banner advertisements that attract attention from readers may induce involuntary investment of a good chunk of cognitive resource to processing the advertisements. Such allocation may leave fewer mental resources for processing news.

The influences of online banner advertisements on news processing are expected to be more prominent when people simultaneously process news with animated banner advertisements as opposed to non-animated banner advertisements. Animated banner advertisements—which consist of a set of still images that are programmed to give audiences the illusion of moving objects (Interactive Advertising Beureau, 2012)—may affect news processing more than static banner advertisements because of the human tendency of paying more attention to moving objects than to static objects (Franconeri & Simons, 2003; Lang et al., 2002; Sundar & Kalyanaraman, 2004). Indeed, studies have shown that, compared to static banner advertisements, animated banner advertisements can more effectively increase advertising recognition and recall due to their greater capability of grabbing attention (Li & Bukovac, 1999; Yoo et al., 2004). This indicates that animated banner advertisements may interfere more with online news processing than static banner advertisements because the former may drain a greater amount of cognitive resources of newsreaders (Lang et al., 2002; Sundar & Kalyanaraman, 2004), leaving fewer amounts of cognitive resources for news processing.

Consistent with this reading, research into the effects of animated images on information processing suggests that animated banner advertisements may interfere with news processing more than static banner advertisements. Specifically, the research shows that animated images may obstruct effectiveness of information search (Burke, Hornof, Nilsen, & Gorman, 2005; Zhang, 2000). The finding implies that the cognitive load imposed by the processing of animation might damage the proficiency of processing other information because processing animation reduces available mental resources for other behaviors (Zhang, 2000). Applying this notion to the context of this study indicates that online animated banner advertisement may increase the amount of involuntary cognitive investments on advertisement processing, which, in turn, reduce available mental resources for processing online news. The fewer cognitive resources available for processing the news, the harder it becomes to acquire information from the news.

The magnitude of the negative impact of online banner advertisements on news processing should increase as the cognitive demands of online banner advertisement increase. Hence, compared to reading online news without any advertisement, reading news simultaneously with advertisements may lead to poorer recognition and recall of information from the news. Moreover, the influences of online banner advertisements on news processing will become more evident when the advertisements are animated because animated advertisements demand a greater amount of cognitive resources to process. Therefore, reading news together with animated online banner advertisements should result in poorer

recognition and recall of the information from the news than does reading news with static online banner advertisements.

Effect of News Images on Selective Exposure

The famous saying "a picture is worth thousand words" may manifest an important role that photographs play in news reporting. Photographic images are often used to provide a vivid portrayal of a given issue (Zillmann & Brosius, 2000). News images not only bring in a vivid description of an issue but also influence issue interpretations. For example, a study found that, compared to reading news without a photographic image depicting a roller coaster accident, exposure to news with the image increased assessment of risk (Zillmann, Gibson, & Sargent, 1999).

Beyond this, news images can also affect news reception. For example, research has shown that images depicting suffering people and/or imminent threats may motivate readers to engage in the news article (accompanied by the images) and facilitate deeper processing of the article (Gibson & Zillmann, 2000; Knobloch et al., 2003; Sargent, 2007; Zillmann et al., 2001). As a result, news image may affect the amount of attention that banner advertisements receive. For example, a study found that respondents were less likely to direct their attention to banner advertisements when a website contains a picture than when it does not (Hsieh & Chen, 2011). These findings suggest that the effects of online advertisements on news processing may be affected by the presence and/or the nature of news images. When news images successfully motivate newsreaders to

engage in the news, the possible influences of online advertisements on news processing might be undermined.

Consistent with this notion, a study showed that news images that portraying people in agony might motivate people to selectively process the news associated with the images (Zillmann et al., 2001). Specifically, the study found that participants exposed to an article with a picture of a person in a dangerous situation or suffering from physical harms spent more time reading the article compared to those who read a news article with a different picture that poses no imminent threats or such. The finding was successfully replicated using different media including the Internet (Knobloch et al., 2003; Sargent, 2007; Zillmann et al., 2001).

The findings of studies reported above suggest that including news images may make newsreaders to engage in news readings because the attention drawn to news images may be translated into thorough processing of the news associated with the images. Therefore, reading online news with images that draw attentions from newsreaders may make them less susceptible to the potential negative impact of online banner advertisement on news processing.

Rationale and Hypotheses

People have a limited amount of cognitive resources at a given time. The amount of cognitive resources available for processing online news influences the effectiveness of information acquisition from the news. The fewer cognitive resources available, the less information one will acquire from reading online news due to the insufficient investment of cognitive resources. Given that online

banner advertisements have the potential to cause readers to automatic allocation of cognitive resources to process the advertisements, online banner advertisements should interfere with processing and acquiring information from online news.

H1: Compared to reading news without online banner advertisements, reading news with online banner advertisements will negatively affect (a) recognition, (b) cued-recall, and (c) free-recall of information from the news.

The influence of banner advertisements on news processing may become more evident as the demand of cognitive resources to process the advertisements increase. Given that animated advertisements require more cognitive resources to process than static advertisements, the detrimental effect of online advertisements on news processing should be stronger when the advertisements use animated as opposed to static images.

H2: The negative impacts of online banner advertisements on (a) recognition, (b) cued-recall, and (c) free-recall of information from news will be more evident when the advertisements are animated than when they are static.

Some news images—such as those portraying human suffering or imminent threats—can motivate readers to process the news associated with the images. When news includes such images, it should attract more attention from readers and make them more likely to process information from news in a thorough manner. Therefore, reading news with images that attract newsreaders

attention will motivate newsreaders to engage in news processing and make them less susceptible to the influences of online advertisements and acquire more information from the news.

H3: Compared to news without an image, that with an image that attracts readers' attention should increase (a) recognition, (b) cued-recall, and (c) free-recall of information from the news.

Including news images that attract attention from reader may mitigate the negative influences of advertisements, if any, on knowledge acquisition from the news because such news images may help readers stay focused on the news. Therefore, negative influences of advertisements on knowledge acquisition would be more evident when reading news without the news image than reading news with the image.

H4: News images that attract attention from readers would mitigate negative influence of online advertisements on news processing such that the influences of advertisements on knowledge acquisition will be more evident when people read news without a news image than when they read news with the news image.

Chapter 3. Method

Research Design

An online experiment was conducted to test whether simultaneous processing of online advertisements and news affect acquisition of information from the news. The study had a 2 (News Images: None vs. With a News Image × 3 (Online Advertisements: None vs. Static Banners vs. Animated Banners) between-subject design (See Table 1).

Table 1. Experimental Design of the Study

	None	Static Banners	Animated Banners
Without a News Image	Condition 1	Condition 2	Condition 3
With a News Image	Condition 4	Condition 5	Condition 6

Procedure

Students in communication courses were invited to participate in the study in exchange for extra credit. A recruitment email including the link to the study webpage was sent to the students. After following the link to the study webpage, students were given information about the study and decided whether they wanted to participate or not. Those who gave informed consent were, then, randomly assigned to one of six conditions.

All subjects were asked to read a news article about the imminent food crisis in Africa at their own pace. The time spent reading the article was measured in an unobtrusive manner. After reading the news, they answered a battery of

filter questions irrelevant to the purpose of the current thesis, which were followed by measures of recognition, cued-recall, and free-recall of the news and online advertisements. Inserting the filter questions between news reading and tests of news recognition and recall enabled me to test the effect of simultaneously processing news and advertisements on long-term memory of information from the news (Parker, Buckley, & Dagnall, 2009).

This study used three measures (recognition, cued-recall and free recall tests) to capture the amount of information acquired from the news and advertisements because the three measures have different levels of difficulties and indicate different amount of cognitive resources invested in information processing (Lang, 2000, 2006).

First, the free-recall test is the hardest among the three memory measures because it requires a person to answer a question without providing any cues that help the person remember the answer. Hence, compared to information used to complete cued-recall and recognition tests, that retrieved to answer free-recall questions should have been processed using a greater amount of cognitive resources. The cued-recall test is easier than the free-recall test, but is harder than the recognition test. Cued-recall test asks a person to provide the correct answer for a question while providing cues that help people recall information. With a cue that stimulates a person's memory, a piece of information processed with fewer amount of cognitive resources can be recalled. Recognition test is the easiest measure among the three. Given that recognition tests provide multiple choices that help a person to choose correct information, a person who did not

invest lots of cognitive resources to process information may still recognize the information.

Experimental Stimuli

The experimental stimuli comprised three components: a news article, a photo depicting human suffering, and two banner advertisements (see Appendix A for an example of the layout of the stimuli).

News article

For the news component, the current thesis chose the imminent food crises in African as the topic for the news article for the following reasons. First, the article should not concern a well-known topic or issue. This is because participants' pre-existing knowledge and/or involvement on an issue may affect the amount of cognitive resources allocated to process information related to the issue (Lang, 2006). People are more likely to engage in a deeper cognitive processing when they are asked to read news about the topic that they find personally relevant. Therefore, choosing well-known issues or topics may undermine the current thesis' ability to test its hypothesis since participants pre-existing knowledge and/or involvement may intervene. Therefore, to minimize such possibilities, the topic of the experiment used in the current study should concern less-well known issue(s). Second, the topic under discussion should deserve media attention. It is news media's job to shed light on issues that require the immediate attention and action of the public (Gans, 2003; McCombs & Reynold, 2009). Among these issues are natural disasters, sectorial conflicts, and

hunger problems. Based upon these two criteria, an article on the imminent food crises in Africa was used to test the hypotheses.

The news article was created based upon a number of news articles on the imminent food crises in Africa published in March and April of 2013 by news organizations such as *New York Times* and *Guardian* (See Appendix B for the news article). The hunger problem in the region is important because it threatened lives of millions of people living in the region, and at the same time it is less known to the general public, satisfying the two criteria suggested above.

Online Banner Advertisements

Two online banner advertisements were exclusively created for this study using the computer software *Motioncomposer*. One banner advertisement was for an airline company and the other a hotel chain. The advertisement for the airline company promoted a round-trip flight to Miami. The advertisement included the price for the trip and the fact that the company was a member of an airline alliance. The hotel advertisement mentioned that customers would get a complementary stay if they stayed at their resort for more than three days. The two ads were embedded in the body of the news (see appendix A for the locations of the advertisements in relation to the news).

Two versions of each aforementioned advertisement were created: one with static images and the other with animated images. The two versions provided identical information. The only difference between the two was that, in the animated versions, text and image components emerged, moved or flashed after loading to create the illusion of moving (See Appendix C for more details). Each

sequence of hotel and airlines advertisements took about 23 seconds and 28 seconds to complete, respectively. For example, in the resort advertisement, the image of a couple lying on a pool suddenly bounced into a box-shaped advertisement about five seconds after participants were directed to the stimulus page with a text touting "Stay 3 Nights at Travelodge Wisconsin Dells." Another text saying, "Last Night is Free" in yellow characters emerged about two seconds after the onset of the couple's image. The character in yellow rotated 90 degrees to the left and then rotated 90 degrees again after six seconds. The image and texts in the advertisements, then, faded out after few seconds. The sequence repeated itself until participants proceeded to the next page.

Photographic image depicting human suffering

Given that the news article used in the current study concerned the imminent hunger problem in a region of Africa, a news image on children suffering from hunger would be appropriate. Moreover, studies have shown that news images of human suffering motivate readers to invest a greater amount of cognitive resources to process. For this reason, the hungry child image well served the purpose of the study given that the purpose of including the image in the news was to direct readers' attention to the image and therefore the news.

Google images were used to search images relevant to the content of the news article. The search terms included "food crisis," "hunger problem," and "famine." Four pictures that portray children suffering from malnutrition were initially selected for a pilot study. The pilot study was designed to select the picture that best served the purpose of the main study out of the four pre-selected

pictures (See Appendix E for the pre-selected pictures). A total of 67 subjects

participated in the pilot study. Participants were randomly assigned to one of four

sequences that presented the four pictures in a different order so that each of the

pictures appeared in each position once to control for the potential order effect

(Winer, Brown, & Michels, 1991; See Table 2).

Table 2. The Picture Presentation Sequences in the Pilot Study

	Position 1	Position 2	Position 3	Position 4
Sequence 1	Picture 1	Picture 2	Picture 3	Picture 4
Sequence 2	Picture 2	Picture 1	Picture4	Picture 3
Sequence 3	Picture 3	Picture 4	Picture 1	Picture 2
Sequence 4	Picture 4	Picture 3	Picture 2	Picture 1

A set of questions was used to evaluate the four images on a number of

dimensions. These questions measured to what extent participants thought each of

the pictures (a) described human suffering, (b) was emotionally engaging, (c) was

arousing, and (d) was difficult to look at. Given that the news image used in the

main study should describe human suffering and motivate newsreaders to engage

in the news, the first two criteria used to select the picture were to what extent a

picture was a good description of a child suffering from hunger and to what extent

the picture was emotionally engaging. Hence, picture(s) that scored significantly

lowers than others on these two criteria (measured by questions (a) and (c)) were

first eliminated.

If there were more than one picture left, I then compared the pictures in

terms of how difficult it was to look at the pictures (question (d)) and how

arousing the picture was (question (c)). The former criterion was given more

weight than the latter one because the news image selected for the main study should not be difficult to look at in order to effectively engage people in the news (See Appendix D for the list of questions).

To compare the four pictures on the aforementioned criteria, a series of repeated measure ANOVA were conducted (See Table 3). First and the most important criterion concerned the degree to which each of the pictures describes human suffering. The result showed significant differences among the four pictures, $F(1.625, 107.244) = 141.81$, $p < .01$, partial $\eta^2 = .68$. Picture 3 ($M = 6.96$, $SD = .21$) marked highest score in description of human suffering followed by picture 1 ($M = 6.87$, $SD = .76$), picture 2 ($M = 6.78$, $SD = .51$), and picture 4 ($M = 4.46$, $SD = 1.46$). Since the mean score of picture 4 was statistically lower than other pictures in terms of description of human suffering, the picture 4 was excluded from the pool. To what extent each picture is emotional engaging was the second most important criterion for selecting the stimulus. However, since the result revealed no statistically significant differences among the remaining three pictures, $F(2, 132) = 1.29$, $p > .01$, partial $\eta^2 = .03$ (See Table 3), all three pictures were further compared based upon the extent to which participants found each of the pictures difficult to look at. The difference among pictures reached the conventional significance level, $F(1.703, 112.402) = 6.462$, $p < .01$, partial $\eta^2 = .09$. Among the three pictures (pictures 1, 2, and 3), picture 2 ($M = 5.81$, $SD = 1.62$) marked the lowest score in the perceived difficulty to look at followed by picture 1 ($M = 6.01$, $SD = 1.51$) and picture 3 ($M = 6.27$, $SD = 1.45$). A statistically significant difference was found between picture 2 and picture 3, $t(66)$

= -3.04, $p < .01$. Although picture 3 scored highest in the description of human suffering, it was also evaluated as the most difficult picture to look at, which may make participants disengage from news reading. Therefore picture 3 was excluded from the pool. Of the two remaining pictures, picture 2 was marginally significantly less difficult to look at (for picture 1, $M = 6.01$, $SD = 1.51$; for picture 2, $M = 5.81$, $SD = 1.62$), $t(66) = 1.7$, $p < .1$, and was less emotionally arousing (for picture 1, $M = 5.03$, $SD = 1.71$; for picture 2, $M = 4.82$, $SD = 1.79$), $t (66) = 1.75$, $p < .1$. Given that the criterion of difficulty of looking at was weighted more than the criterion of how arousing a picture, the picture 2 was chosen over picture 1, despite the fact that picture 2 was less arousing than was picture 1.

Table 3. Mean Scores of the Four Criteria Used to Select the News Image

	Picture1	Picture2	Picture3	Picture4
Human suffering	6.87^{ab}	6.78^{b}	6.96^{a}	4.45^{c}
	(.76)	(.51)	(.21)	(1.46)
Emotionally Engaging	6.55^{a}	6.41^{a}	6.56^{a}	-
	(.97)	(1.08)	(.96)	
Difficult to Look at	6.01^{ab}	5.80^{b}	6.27^{a}	-
	(1.51)	(1.62)	(1.45)	
Emotionally Arousing	5.03^{a}	4.82^{a}	-	-
	(1.71)	(1.79)		

Note: Numbers in parenthesis are standard deviation. Each of analysis using repeated ANOVA on four measures reported above reached the conventional significance level. Mean scores within a row that share no common superscript differ at the 95% significance level with the Bonferroni correction.

Participants

A total of 234 students completed the survey. Given that a sequence of airlines advertisement lasted about 28 seconds. Those spending less than 28 seconds on the news page were excluded from the subsequent analyses, leaving a

total of 186 participants for analyses (Male, $N = 58$, 31.2%; Female, $N = 128$,

68.8%). The average age of participants was 21.32 ($SD = 2.85$). The majority of

the participants were white ($N = 153$, 82.3%). On average, participants spent about

2 minutes reading the news ($M = 133.35$ seconds, $SD = 109.54$).

Measures

Two sets of measures were used to test the influence of the simultaneous

processing of news and advertisements. The first set of measures concerned the

amount of information an individual participant got from the news. This set of

measure consisted of free-recall, cued-recall, and recognition of the news. The

second set of measures concerned the amount of information a participant

acquired from the advertisements and consisted of free-recall, cued-recall, and

recognition of the advertisements. The second set of measures was only asked to

participants in the static banners and the animated banners condition.

Free-recall of news was measured by asking participants to write down

anything they could remember about the news in a blank box. Content analysis

was then conducted to analyze the answers. The unit of analysis was a specific

thought concerning the information discussed in the news article. When a

sentence contained more than one thought, the sentence was separated into

smaller pieces accordingly. For example, the following sentence: "There are over

one and a half [him mil] children under five that will suffer malnutrition on this

area of Africa and US government's subsidies on corn production are raising the

costs of food worldwide." Although the answer is one sentence, it contains two

separate thoughts about the hunger issue in the region. Therefore the sentence was separated into two units and coded separately.

A total of 25 randomly selected answers were coded by two trained coders independently to assess the inter-coder reliability. The reliability analysis showed an acceptable level of inter-coder reliability (Krippendorff's alpha = .88). Disagreements between the two-coders were discussed to reach consensus. A coder then coded the rest answers. A total number of thoughts that correctly reflected the information from the news article were counted to create the news free-recall scale. The news free-recall scale ranged from 0 from 7 ($M = 1.82$, $SD = 1.7$).

Cued-recall of news was captured by asking participants to provide correct answers to four questions about the news. The questions are (a) "Approximately how many people could be affected by food shortages in the Sahel?" (b) "How many serious food crises have happened in the Sahel since 2005?" (c) "What country produces a major portion of the grain consumed in the Sahel region?" and (d) "What is the factor that makes importing food from a foreign country difficult for Sahel countries?" Correct answers were coded as one and one extra score was given to the exact answers for question (a) and (b). For example, the exact answer to the question (b) was three times, which was coded as two while answers close to the exact answer such as two or four were coded one. Answers other than these were coded as zero.

A total of 25 randomly selected participants' answers were coded by the two coders for the reliability assessment. Krippendorff's alpha scores were

calculated for each of the four questions. They were 1.00, .92, .91, .84,

respectively. Disagreements were discussed to reach the consensus and one coder

coded the rest answers. The news cued-recall scale ranged from 0 to 6 ($M = 1.7$,

$SD = 1.6$).

　　Recognition of the news was capture by 10 questions. The questions

consisted of six multiple-choice questions and four true and false questions (See

Appendix D for the questions). The correct answer was coded as one whereas an

incorrect answer was coded zero. The number of correct answers was summed to

create the index for news recognition ($M = 5.11$, $SD = 1.97$).

　　Free-recall of advertisements was measured by asking participants to

write down anything they could remember about the online advertisements

presented along with the news article. The procedure used to analyze the answer

to the news free-recall question was also used to examine answers to the

advertisement free-recall question. The advertisements free-recall score ranged

from 0 to 5 ($M = .79$, $SD = 1.12$). A total of 25 randomly selected answers

(20.49%) were evaluated by two trained coders to assess the inter-coder

reliability. The result of assessment showed an acceptable level of reliability

(Krippendorff's alpha = .98).

　　Cued-recall of the advertisements were measured by the following four

questions: (a) "How many nights does one need to stay at the hotel to get a free

night's stay according to the resort advertisement?" (b) "What was the name of the

hotel that was advertised?" (c) "What was the name of the airline company whose

advertisement was placed with the news?" and (d) "How much was the round-trip

fare to Miami according to the airline advertisement?" Correct answers were coded as one. The exact answer for question (a) and (d) were given extra one point. For example, the exact answer to the question was "$290," which was coded as two. The answers close to the exact answer such as "around 300 dollars," "$270," or "$320" were coded as one. Answers others than these were coded as zero. The method used to analyze answers to news cued-recall questions was also utilized to examine the answers to the advertisements cued-recall test. Krippendorff's alpha scores for all four questions were 1.00. The news cued-recall score ranged from 0 to 6 ($M = 1.44$, $SD = 1.54$).

 Recognition of advertisements was measured by a set of questions consisting of four multiple-choice questions and four true or false questions (See Appendix D for the list of questions). For each question, the correct answer was coded as one and incorrect answers as zero. The number of correct answers was summed up to create the index for advertisement recognition ($M = 1.09$, $SD = 1.61$).

 Finally advertisement awareness was captured by the following question: "Was there an advertisement presented along with the news article?" Participants were asked to choose among following three choices (1) Yes, (2) No, and (3) Don't Know. The correct answer was coded as 1 whereas "don't know" and wrong answer were coded 0. For example, for participants in the no advertisement condition, those participants whose answer were "no" were coded 1 while others choices were coded 0. About 71% of the sample were correctly aware of whether they were exposed to the advertisements or not ($N = 129$, 71.3%).

Chapter 4. Result

Manipulation Check

A series of two-way analysis of variances (ANOVAs) on recognition, cued-recall, and free-recall of advertisement were conducted to test whether, compared to static banners, animated banners made participants invest more cognitive resources to process the advertisements (See Table 4). As for advertisement recognition, the analyses found no significant main effect of the types of advertisements $F(1,121) = .58$, $p > .1$, partial $\eta^2 = .01$, and the news image, $F(1,121) = .57$, $p > .1$, partial $\eta^2 = .001$. The interaction between the two variables were also statistically insignificant, $F(1,121) = .57$, $p > .1$, partial $\eta^2 = .01$ (See Table 5).

The analysis on the cued-recall of advertisements showed that the main effect of the type of advertisements, $F(1, 121) = .32$, $p > .1$, partial $\eta^2 = .003$, and the news image, $F(1, 121) = .14$, $p > .1$, partial $\eta^2 = .001$, were not statistically significant; nor was the interaction effect between the two, $F(1, 180) = .96$, $p > .1$, partial $\eta^2 = .01$ (See Table 7). The analysis of free-recall of advertisements revealed that there were no main effect of the types of advertisement, $F(1,121) = 1.67$, $p > .1$, partial $\eta^2 = .01$, the news image, $F(1,121) = 1.09$, $p > .1$, partial $\eta^2 = .01$, or the interaction between the two, $F(1,121) = .27$, $p > .1$, partial $\eta^2 = .002$. Based on the results of the manipulation checked, animated banners were no more effective in attracting a greater attention from newsreaders, suggesting that the manipulation of advertisement conditions were not successful.

Table 4. Means Scores of Recognition, Cued-recall, and Free-recall of Advertisements

	Static Banners	Animated Banners
Recognition		
Without the News Image	1.66[a] (1.73)	1.66[a] (1.93)
With the News Image	1.83[a] (1.74)	1.34[a] (1.62)
Cued-Recall		
Without the News Image	.71[a] (1.07)	.79[a] (1.18)
With the News Image	.83[a] (1.07)	.54[a] (.76)
Free-Recall		
Without the News Image	.74[a] (1.29)	.58[a] (.82)
With the News Image	.9[a] (1.28)	.69[a] (.93)

Note: Numbers in parenthesis are the standard deviation of each condition. Means scores not sharing the same superscript within a row were statistically significantly different from each other at the 95% significance level.

Recognition of News

As for news recognition, a two-way ANOVA on the news recognition test showed a significant main effect of types of advertisements, $F(2,180) = 4.82$, $p < .01$, partial $\eta^2 = .05$. But the effect the news image, $F(1,180) = 1.71$, $p > .1$, partial $\eta^2 = .01$, and the interaction effect between advertisement types and the news image were not statistically significant, $F(2,180) = .11$, $p > .1$, partial $\eta^2 = .001$

(See Table 5 and Figure 1). Pair-wised comparisons with the Bonferroni correction suggested that participants in the static banners condition had the lowest score on the recognition test ($M = 4.53$, 95% CI [4.07, 4.99]). Their recognition score was statistically lower than participants in the no advertisement ($M = 5.52$, 95% CI [5.03, 6.02]) and the animated banners ($M = 5.32$, 95% CI [4.81, 5.84]) conditions. The difference between the no advertisement and the animated banners conditions was statistically indistinguishable. Although the difference failed to reach the conventional significance level, participants in the news image conditions recognized more information from the news ($M = 5.31$, 95% CI [4.9, 5.73]) than those in the no image condition ($M = 4.94$, 95% CI [4.55, 5.32]).

These findings suggest that H1a that predicts the influence of banner advertisements on news recognition was partially supported while H2a that hypothesizes the stronger influence of animated banners compared to static banners was not supported. The hypothesis H3a that predicts the main effect of the news image on news recognition was not supported. The hypothesis H4 predicts that the negative influence of advertisements would be more evident when reading the news without the news image than when reading the news with the news image. However, the result of analysis on news recognition did not support H4.

Table 5. Mean Scores of News Recognition

	None	Static Banners	Animated Banners	Mean
Without the News Image	5.42 (1.77)	4.31 (2.55)	5.07 (1.96)	4.94 (1.97)
With the News Image	5.62 (1.72)	4.74 (1.79)	5.58 (2.32)	5.31 (1.97)
Mean	5.52[a] (1.74)	4.53[b] (1.92)	5.32[a] (2.13)	5.12 (1.97)

Note: Numbers in parenthesis are the standard deviation. Means scores with different superscripts within a row statistically differed at the 95% significance level.
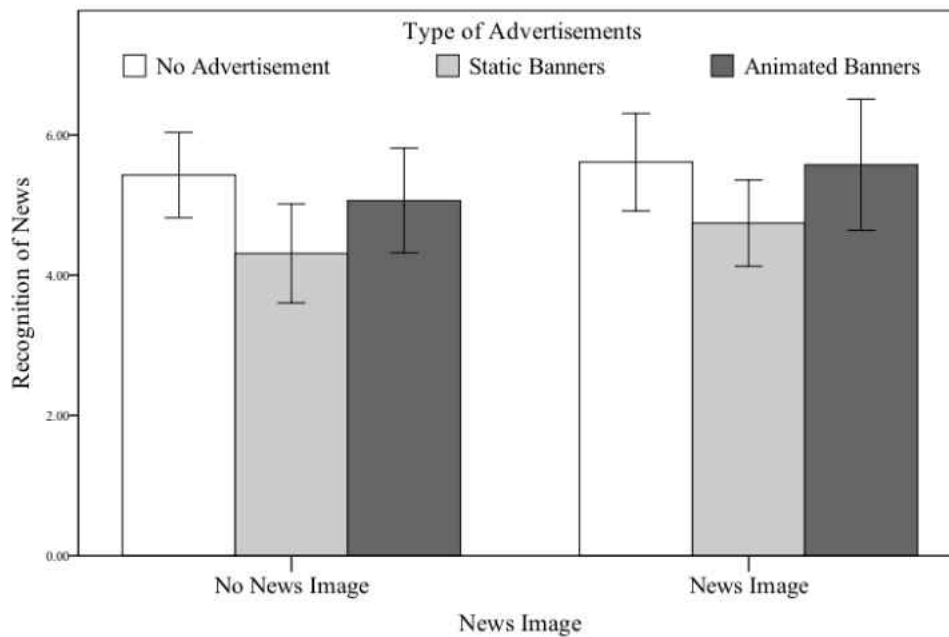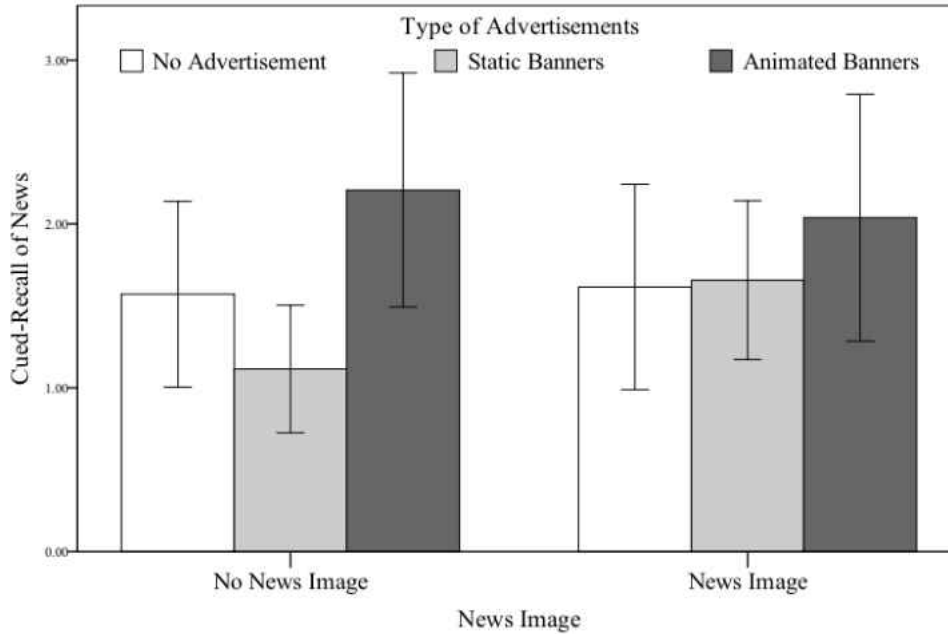

Figure 1. Effect of Types of Advertisements and the News Image on Recognition of News

Cued-recall of News

A significant main effect of types of advertisements on news cued-recall was observed, $F(2, 180) = 3.45$, $p < .05$, partial $\eta^2 = .04$. However, the main effect of news image, $F(1, 180) = .36$, $p > .1$, partial $\eta^2 = .002$, and the interaction effect between the advertisement types and the news image, $F(2, 180) = .85$, $p > .1$, partial $\eta^2 = .01$, failed to reach the conventional significance level (See Table 6 and Figure 2). Participants in the animated banners condition ($M = 2.12$, 95% CI [1.71, 2.55]) marked the highest score in the cued-recall test followed by the no advertisement condition ($M = 1.59$, 95% CI [1.19, 2.0]) and the static banners condition ($M = 1.39$, 95% CI [1.01, 1.76]). Although the main effect of the news image is insignificant, the mean scores were in line with the hypothesized direction (for the no news image condition, $M = 1.63$, 95% CI [1.32, 1.95]; for the news image condition, $M = 1.77$, 95% CI [1.43, 2.11]).

The pair-wised comparison with Bonferroni correction showed that the mean difference between the animated banner and the static banner conditions reached the significance level, $t(123) = -2.62$, $p < .01$. However, the mean difference between the animated banner and no advertisement conditions was not statistically significant, $t(129) = .81$, $p < .1$. The mean difference between the static banner and no advertisement conditions also failed to reach the conventional significance level. Hence, the result did not support the predictions that online advertisements negatively influence cued-recall of news (H1b) and such influence would be stronger in the animated banner condition than in the static banners condition (H2b). The result also did not support the positive

influence of the news image on cued-recall (H3b). Also, the result did not support

the current thesis' prediction concerning that negative influence of advertisements

would be more prominent when the news image is not present than when the

image is presented (H4).

Table 6. Mean Scores of Cued-recall of News

	None	Static Banners	Animated Banners	Mean
Without the News Image	1.57 (1.65)	1.11 (1.13)	2.21 (1.88)	1.63 (1.61)
With the News Image	1.62 (1.55)	1.66 (1.41)	2.04 (1.86)	1.77 (1.59)
Mean	1.59^{ab} (1.6)	1.39^{b} (1.3)	2.12^{a} (1.86)	1.7 (1.6)

Note: Numbers in parenthesis are the standard deviation. Means scores with different superscripts within a row statistically differ at the 95% significance level.

Figure 2. Effect of Types of Advertisements and the News Image on Cued-recall of News

Free-recall of News

The analyses did not find significant effect of the types of advertisements, $F(2,180) = .13$, $p > .1$, partial $\eta^2 = .001$, or the news image, $F(1,180) = .53$, $p > .1$, partial $\eta^2 = .003$. However a significant interaction effect between the two was found, $F(2,180) = 6.69$, $p < .01$, partial $\eta^2 = .07$, (See Table 7). The significant interaction effect indicated that the effect of advertisement types on the amount of information remembered from the news was contingent upon the existence of the news image depicting a suffering child (See Figure 3).

To probe the interaction, a simple comparison was conducted. The result showed that when there was no news image, the animated banners condition ($M = 2.31$, 95% CI [1.71, 2.92]) scored highest in the free-recall test followed by the no advertisement condition ($M = 1.57$, 95% CI [1.02, 2.12]) and the static banner

condition ($M = 1.2$, 95% CI [.65, 1.75]), $F(2,180) = 3.66$, $p < .05$, partial $\eta^2 = .04$. The mean difference between the animated banners condition and no advertisement condition were statistically marginal, $t(62) = 1.73$, $p < .1$. The mean difference between the animated banners condition and the static banners condition were statistically significant, $t(62) = -2.43$, $p < .05$. The difference between the static banner and the no advertisement conditions was negligible.

When the news image was present, the static banners condition ($M = 2.31$, 95% CI [1.71, 2.92]) marked the highest score in the free-recall test followed by the no advertisement condition ($M = 2.15$, 95% CI [1.52, 2.79]) and the animated banners condition ($M = 1.23$, 95% CI [.59, 1.87]), $F(2,180) = 3.14$, $p < .05$, partial $\eta^2 = .03$. The mean difference between the static banners condition and the no advertisement condition were insignificant, $t(59) = .17$, $p > .05$. However, the mean score of the animated banners condition were significantly different from that of the static banner, $t(59) = 2.46$, $p < .05$, and the no advertisement conditions, $t(50) = 2.03$, $p < .05$.

The insignificant main effect of the type of advertisements did not support the prediction concerning the negative influence of advertisements on news free-recall (H1c). The current thesis also expected that stronger negative influence of animated banners on free-recall of news compared to static banners (H2c). However, the result also was not consistent with the prediction. The hypothesis that predicts the positive influence of news image on free-recall of news (H3c) was not supported. However, the mean scores were in line with the predicted

direction (for the no news image condition, $M = 1.69$, 95% CI [1.37, 2.02]; for the news image condition, $M = 1.87$, 95% CI [1.52, 2.22]).

The hypothesis H4 predicted that negative influences of advertisements would be more evident among participants who read news without any images than among participants who read news with the news image. Although the current thesis found the significant influence between type of advertisements and news image on free-recall of news, the pattern of free-recall scores did not support the hypothesis. While participants in the animated banners condition scored lower than did participants in the no advertisement condition and the static banners condition when they read the news with the news images, participants in the animated banners condition were more likely to acquire information from the news than did participants in the static banners condition when reading the news without any image. The finding suggests that the news image attracting attention from readers may not function as the way that the current thesis expects.

Table 7. Mean Scores of Free-recall of News

	None	Static Banners	Animated Banners	Mean
Without the News Image	1.57^{ab} (1.29)	1.2^b (1.57)	2.31^a (2.09)	1.69 (1.7)
With the News Image	2.15^a (1.83)	2.23^a (1.66)	1.23^b (1.42)	1.87 (1.69)

Mean	1.86 (1.55)	1.71 (1.69)	1.77 (1.87)	1.78 (1.69)

Note: Numbers in parenthesis are the standard deviation of each condition. Means scores with different superscripts within a row statistically differ at the 95% significance level.
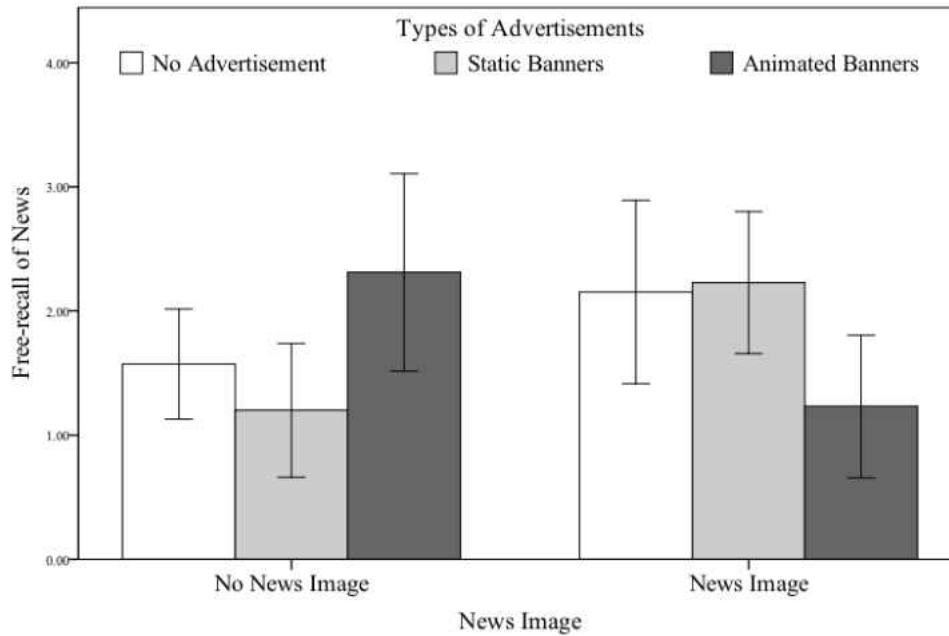

Figure 3. Interaction Effect of Types of Advertisements and the News Image on Free-recall of News

Chapter 5. Discussion and Conclusion

Discussion

This thesis tested the effect of simultaneously processing online news and advertisements on the acquisition of information from the news. It predicted that reading news with advertisements would negatively influence information acquisition (measured by recognition, cued-recall, and free-recall tests) because the advertisements may distract readers. Moreover, the negative influence of animated banner advertisements on knowledge acquisition, if any, was expected to be stronger than that of static banner advertisements based on the assumption that animated banners would induce a greater amount of involuntary allocation of cognitive resources to processing the advertisements. It also predicted that news images that motivate newsreaders to engage in news reading and make them acquire more information from the news. Finally, it is also predicted that news images would mitigate the negative effects of advertisements such negative influence of advertisements would be more evident when reading news without news images than when reading news with the news images.

The findings of the thesis, however, only provided limited support for the hypotheses. The H1 that predicting that advertisements would affect the amount of information that participants acquire from the news was partially supported. The result suggested that advertisements negatively affected acquisition of information from the news only to a certain extent. The amount of information that study participants recognized from the news was the function of advertisements such that participants in the static banners condition acquired less

amount of information from the news than did participant in the no advertisement and animated banners condition. However, recognition test is the easiest measure among the three used in the current thesis (Grabe et al., 2009; Lang, 2000). When it comes to more difficult memory tests—the cued and free recall of tests—the types of advertisements had no statistically significant effects, which indicates that the detrimental impact of the advertisements on the allocation of cognitive resources to news processing may not be strong. Taken together, my findings suggest that advertisements, at least static banner advertisements, may distract participants and made them use less amount of mental effort to process news.

Contrary to the H2 that predicted animated banners would have stronger negative influence on news processing compared to static banners, the result showed that animated banners themselves did not interfere news processing. The recognition, cued-recall, and free-recall scores in the animated banners condition were statistically indistinguishable from those of the no advertisement condition. These findings suggest that participants in the animated banners condition allocated no fewer cognitive resources on processing information from the news compared to participants in the no advertisement condition.

There are several possible explanations for why the animated banners did not have a negative impact on news processing. One possible explanation may be the ineffectiveness of the animated advertisements (compared to static advertisements) in attracting a greater attention from participants. This is because types of advertisements had no statistically significant effects on recognition and recall of information from the advertisements. If the animated advertisements had

been successful in distracting newsreaders, participants in the animated banners condition should have allocated more cognitive resources to process the advertisements—leaving fewer resources to process news—and, therefore, participants in the animated banners condition scored higher on advertising recognition, cued-recall and free-recall tests than did participants in the static banners condition. However, it was not what was found.

Although the ineffectiveness of animated banners (compared to the static banners) in attracting attention from participants may provide a partial explanation, it does not account for why animated banners had boomerang effect on the free-recall test when combined with the news image. This leads to another possible explanation for participants' reactions to animated banner advertisements. Animated banners provided no more information than did static banners except for the visual illusion of movement. Unlike static banners that provide the entire information right away, the way that animated banners present information may continuously stimulate participants to try to get attention from them. This continuous distraction from animated banners might not be successful in making them allocate more cognitive resources to process information, but it might have made participants invest a greater amount of resources to process the new.

On the contrary, the lack of effects of types of advertisements on recognition, cued-recall and free-recall of advertisements may suggest that study participants made significant effort to ignore the advertisements regardless of the type of advertisements. The insignificant effects of types of advertisements on

recognition and recalls of advertisement, however, do not necessarily mean that advertisements had no effects on the amount of cognitive resources that people devoted to process the news. It might have been a case where a certain type of advertisement made newsreader more likely to cope with the distraction from advertisements by letting them to make more effort to stay focus on news.

Admittedly, there is no direct evidence concerning whether participants made an effort to counteract to the distraction from animated banners. However, the patterns of three measures of memory of news point out that the amount of cognitive resources available to process the information from the news varied based on the type of advertisements. Remember that recognition and recall tests should measure the amount of cognitive resources that newsreaders invest in processing news. Participants in the animated banners condition scored statistically higher than participants in the static banners condition in recognition and cued-recall of news. A similar pattern was observed in free-recall test when participants read the news without the news image. This indicates that participants in the animated banner condition invested a greater amount of cognitive resources to process the information from the news than did participants in the static banners condition. This might be because illusion of movement, the way that animated banners present the information to newsreaders may affect how newsreaders process the information from the news. Even though participants might have succeed in ignoring the advertisements as the three measures of memory for advertisements suggested, it is possible that animated banners due to their style of presenting information might have lead participants in the animated

banners condition to unconsciously make more mental effort to focus on the news to counteract the distraction from the advertisements compared to reading news with static banners.

This explanation becomes more plausible when considering the significant interaction effect between the type of advertisements and the news image in the free-recall test. While free-recall score of participants in the animated banners condition was higher than did participants in the static banners condition when there was no news image, free-recall score of participants in the animated banners condition was measurably decreased compared to other conditions when the news image—that increases cognitive burden on processing information—was included. If the news image motivated participants to engage in thorough processing of the news, and participants in the animated banners condition had enough cognitive resources, participants' free-recall score in the news image-animated banners condition should have increased. As suggested above, animated banners may lead participants in the animated banners condition to make more cognitive effort to process information from the news to counteract the distraction from animated banners, and such efforts to counteract to animated banners made them acquire no less information than did participant in no-advertisement condition. The recognition and cued-recall test suggest that such effort among participants in the animated banners condition actually paid off to some extent. But the inclusion of the news image that demands participants' attention may have further drained their cognitive resources, which resulted in cognitive overload that suppressed news processing. Therefore, unless provided with cues

that helped them to recall the information from the news, participants in news image-animated banners condition were less likely to recall the information from the news than participants in the no news image-animated banners condition.

Turning to influence of news images, unlike the previous literature that suggest the news image attracting a greater attention would make newsreaders engaged in a thorough processing of news, the result of the current thesis suggest that the news image may not be effective in making newsreaders acquire a greater amount of information from the news (H3). And such images do not help mitigate negative influences of advertisements (H4). Unfortunately, given the effect sizes of main effects of news images on recognition, cued-recall and free-recall of news, the sample size of current thesis is too small to find a clearer relationship between the news image and the knowledge acquisition.[2] Nonetheless, the mean scores of news recognition and recall tests across the no image and image conditions were consistent with the predicted direction such that participants in the image condition did better on the tests than those in the no image condition.

The result also suggest that when people read news with a certain type of advertisements that make them invest an extra amount of cognitive resources to focus on the news, placing news images in an attempt to attract a greater attention to the news might bring about the boomerang effect on knowledge acquisition. For example, participants exposed to the animated banners were less likely to

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[2] Based on the given effect size and sample size, the post-hoc power analyses showed that the powers of detecting the main effects of the news image on the recognition, cued-recall, and free-recall are .19, .08, .09, respectively. Consequently, the sample should be larger than 1,289 to detect a significant main effect with the effect size for the recognition test. Similarly, a sample that is larger than 6,487 is needed to detect the significant main effect of the news image on cued-recall. A sample should be larger than 4,321 to find the significant main effect of the news image on free-recall of the news.

learn from the news than did participants in the no advertisement condition and the static banners condition when the news image was present. As aforementioned, the simultaneous exposure to the news image and animated banners might have made participants invest an extra amount of cognitive effort to process news. Such investment might have caused cognitive overload that undermined their ability to thoroughly process the information from the news. Hence, the inclusion of the news image may undermine the thorough processing of news under some circumstances due to the cognitive overload that suppresses one or more of sub-processes of information processing. Consequently, people may have difficulty to retrieve information from the news when cues that help participants recall are not provided.

Conclusion

Although my findings on the influence of simultaneous processing of news and advertisements on news reception were not crystal clear, they help understand the process wherein newsreaders acquire information from news and have practical implications for the design of online news websites.

First, journalists and editors of online news media should consider pros and cons of including images that attract attention from newsreaders to mitigate potential negative influence of advertisements. With an increasing trend of individually tailored advertisements (Turow, 2011), editors of online news media may have little discretion over the content of advertisements shown on readers' screen. Nonetheless, my findings suggest that in cases where newsreaders are assumed to have enough cognitive resources such as reading news with no

advertisement or with advertisements using static images, placing news images that attract newsreaders' attention would provide more advantages than disadvantages. Such images, when placed with static banners, would motivate newsreaders to engage in news and help them get a greater amount of knowledge from the news. The influence of news images, however, needs further investigation. For example, effect of positive news images might differ from that of negative news images. Hence future study may investigate how the valence of news images (positive vs. negative) may affect the interaction effect of online advertisements and the news images on news reception.

Second, the findings suggest that it is important to consider how readers process information when designing an online news website because they showed that simultaneous processing of news, news images, and advertisements might incur cognitive overload. Motivating newsreaders to engage in news processing at a deeper level by including news images may produce desired outcome only to some extent that newsreaders have enough resources to process the information from news. The extrapolation of the result suggests that adding a piece of information including an advertisement and a news image requires caution since it may inhibit thorough processing of news by increasing the cognitive demand.

For this reason, the influence of complexity of news websites should be taken into account when testing information acquisition from online news. Online advertisements may not directly affect the knowledge acquisition through increasing the demand of cognitive resource. But it might indirectly influence the news reception by contributing the complexity of an online news website. Given

that the cognitive overload is the prime suspect for lowering one's ability to get information from news, it is possible that a complex design of online news website, which assumingly requires readers to make greater effort to attend to news, might negatively influence news processing.

Admittedly, this study has a number of limitations. First, online advertisements used in the study were created to serve the purpose of the study irrespective of individual participants' interests and browsing experiences. Data mining technologies allows advertisements to provide individually tailored advertisements that each individual user might find relevant and interesting. Therefore the advertisements used in the current thesis might differ from online advertisements that people actually run into on the Internet. Reading news with advertisements that are individually tailored to attract an individual's interests may provide each newsreader with a unique reading experience. A new article about a hunger problem in an African-nation with advertisements for cosmetic products may provide a significantly different reading experience compared to the same news with advertisements touting a cheap travel opportunity to Africa. Therefore, testing the influences of advertisements on knowledge acquisition by taking into account individually tailored advertisement-experience could increase the external validity of the findings. For example, a future study would benefit from testing the effects of individually tailored advertisements on the interpretation and perception of news through incorporating advertising services such as *Google AdSense* into its experiment. Although such procedure would provide less controllability for a researcher over the experimental manipulation, it

allows researchers to better understand the influence of individually tailored advertisements on news reception.

Second, the insignificant influence of the types of advertisements on the recognition and recall of advertisements suggests that ineffectiveness of animated banners compared to static banners in attracting a greater attention from newsreaders might have critically undermine the validity of hypothesis testing of the current study. The animated advertisements used in the current thesis failed to attract a greater attention than did static advertisements. In fact, neither the static advertisements nor the animated advertisements were successful in attracting participants' attention. However this does not mean that animated banners in general do not interfere how newsreaders process news. Considering that animated banners may have the potential to incur varying amount of involuntary resources allocation based on their pace, movement, and even content, certain animated banners may be more likely to distract newsreaders than others. The animated banners that distract newsreaders more than others may exert greater influence on news reception. Hence, future research testing the effects of animated advertisements may consider other factors that may attract readers' attention. Such factors may include, but are not limited to, the pace of animation, the background color of advertisements, the emotional valance of advertisements, and the individual's relevance of advertisements.

Third, it should be noted that the selection of news article used in this study was not by the user-driven mechanism. In reality, reading news online can be categorized as an interest-based activity (Tewksbury & Rittenberg, 2012).

People selectively expose themselves to news that they find intriguing (or personally relevant) and reject reading that is not. In other words, newsreaders in real life might be more engaged in reading news compared to participants in the current study. The motivation of reading news might affect the information processing strategy such that more motivated newsreaders are more likely to engage in systematic processing (Petty, Brinol, & Priester, 2009). Given that motivation also plays an important role in the allocation of cognitive resources (Lang, 2006), it is possible that forcing participants to read a news article that they did not necessarily find personally relevant and interesting might fundamentally affect the way they processed information from the news, which, in turn, might have affected the study results. A future study should take the influence of user motivation into account to achieve the ecological validity.

Last but not least, the characteristic of the sample might be responsible for the insignificant results. This thesis tested its hypotheses using a sample of college students whose education level is considered to be higher than the general public. Studies have shown that educational level is a significant factor that influences knowledge acquisition from news media (Grabe et al., 2009; J. Yang & Grabe, 2011) such a way that people with lower levels of education are less likely to acquire information from online news website compared to those people with higher levels of education. This might suggest that negative influence of reading news simultaneously with advertisements may be more evident among the general population whose educational background is more diverse than participants of this study. A future study that employs a representative sample of the general

population would provide a more rigorous test of the influence of simultaneous processing of news and advertisements on news reception.

In sum, this study did not provide conclusive evidence on the effect of online advertisements on news reception. Instead, it raises more questions than it answers. However, by highlighting the possible influences that online advertisements may have on information acquisition, the current thesis provides a scaffold for future understanding on how people acquire information from online news environment. Given that the current study's experiment excludes other potentially distracting factors such as links to relevant news articles and navigating menus, the influence of online advertisements on news reception warrant further investigation. For example, considering online news media have started to adopt a new form of storytelling techniques such as info-graphic and interactive features, testing whether advertisements would exert similar influences on processing news presented in such formats is of greater interest.

An informed citizenry is vital to a democratic country (Delli Carpini & Keeter, 1996) because being informed enables citizens to form opinions and engage in political life in a way that best represents their own and/or collective interests. Online news media play an increasingly important role in informing the public. Given that online news is very often juxtaposed with online advertisements, this thesis not only sheds light on how online advertisements and news images may influence news reception but also calls for further investigation on this topic.

Appendix A: An Example of the Layout of an Experimental Stimulus

Condition 5 (With Picture, Static Banner Advertisements)

Appendix B: The News Article

Africa's Sahel region braces for record hunger

Action Against Hunger, a nonprofit organization based in the United States, is gearing up for a second year of emergency response to a looming food crisis in the Sahel, a semiarid region of North Africa where countries such as Mali, Burkina Faso, Chad, and Sudan are located.

According to the United Nations, an estimated of 10.3 million people in the region could be affected by food shortages. Among them are 1.4 million under-fives who are the most vulnerable and could suffer from severe acute malnutrition that requires hospital treatment.

The food crisis in the Sahel this year is exacerbated by a lower than expected harvest in Nigeria, a country producing a major portion of the grain consumed in the region. Given that there have been three serious food crises since 2005, the food shortage in the region reaches a point where some humanitarians call a crisis of resilience, meaning people simply cannot absorb any more shocks

 "We can say there is a crisis already, just by the number of cases of malnutrition which we're dealing with in hospitals from Chad to Burkina Faso to Mali," said Alvaro Pascual, Sahel desk officer for Action Against Hunger.

Soaring food prices worsens the situation even more. Three major international food price spikes in the past five years have made importation of food harder for Sahel countries. Tyler Cowen, a professor of economics at George Mason University pointed out that the US government's subsidies on corn-based biofuels, mainly ethanol have driven up food prices, worsening hunger crises worldwide.

 Another problem is associated with fertilizer that is necessary for boosting up food production in the Sahel. Fertilizer often costs two to four times the world average price in Africa where the soil and rainfall make much of the continent subpar for growing food. In other words, the region that needs fertilizer the most also has to pay more for it, and much of African nations do not have the prosperity to make this an easy stretch.

Action Against Hunger says it is operating in emergency mode, treating severely and moderately malnourished children in hospitals and mobile clinics. However, the lack of resources makes it difficult for the agency to reach a majority of people in need, leaving them unprepared for the looming food crisis. People in the Sahel region are not yet in that happy situation where "what's for dinner?" is a boring question.

Appendix C: The Sequences of Animated Advertisements

1. Travelodge Hotel

Scene 1	Scene 2	Scene 3
Scene 4	Scene 5	Scene 6

2. UNITED AIRLINES

		FLY TO	FLY TO MIAMI
		Roundtrip Fare For Students	Roundtrip Fare For Students From $280*
UNITED A STAR ALLIANCE MEMBER	UNITED A STAR ALLIANCE MEMBER	UNITED A STAR ALLIANCE MEMBER	UNITED A STAR ALLIANCE MEMBER
Scene 1	Scene 2	Scene 3	Scene 4

FLY TO MIAMI	FLY TO MIAMI	FLY MIAMI	
Roundtrip Fare For Students From $280* * Included Tax	Roundtrip Fare For Students From $280* * Included Tax	Roundtrip Fare For Students From $280* * Included Tax	
UNITED A STAR ALLIANCE MEMBER	UNITED A STAR ALLIANCE MEMBER	UNITED A STAR ALLIANCE MEMBER	UNITED A STAR ALLIANCE MEMBER
Scene 5	Scene 6	Scene 7	Scene 8

Appendix D: Measures

- Measure for the pilot test

Human suffering: "To what extent do you think that the child in the picture above is suffering from the hunger problem?" (1) not at all ~ (7) extremely

Emotional Engagement: "How much do you think that the picture above is emotionally engaging?" (1) not at all ~ (7) extremely

Difficulty in looking: "How difficult it is looking at the above picture?" (1) not at all ~ (7) extremely

Self Assessment Manikin (A 7-point scale)
"Which of the following picture best describes how you felt when you saw the picture of the child above?

For this question, please rate your feeling on the excited vs. calm dimension. If you were feeling completely aroused, excited or stimulated or jittery when you saw the above picture, please select the picture on the right end of the scale. If you were feeling completely relaxed, calm, unaroused, dull or sleepy when you saw the above picture, please check the picture on the left end. If you were neither very excited nor very calm, please select the picture in the middle."
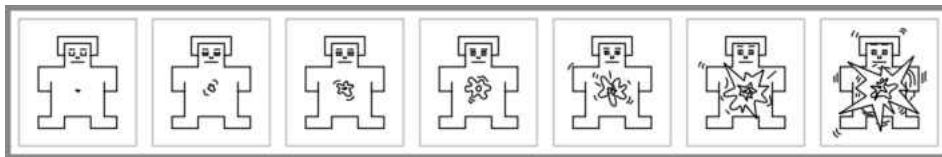
- Measure for the posttest

Free-recall of the News: Please list anything you can remember about the news you just read. (Open-ended Question)

Cued-Recall of the News:
1. Approximately how many people could be affected by food shortages in the Sahel? (Correct Answer: 10.3 Millions)

2. How many serious food crises have happened in the Sahel since 2005? (Correct Answer: 3)

3. What country produces a major portion of the grain consumed in the Sahel region? (Correct Answer: Nigeria)

4. What is the factor that makes importing food from a foreign country difficult for Sahel countries? (Correct Answer: Soaring food price)

Recognition of News (Questions are presented in a random order/ Correct Answers are in bold):

"Please answer the following questions according to the news you have just read."

1. True of False: This year is the first year that Action Against Hunger is preparing for its emergency response to a food crisis?
(1) True (2) False (3) Don't Know

2. Approximately how many people could be affected by food shortages in the Sahel?
 (1) **10 millions** (2) 12 millions (3) 14 millions, (4) Not mentioned (5) Don't know

3. The hunger problem in Sahel countries in this year becomes
(1) Better, (2) About the Same, (3) **Worse**, (4) Don't know

4. How many serious food crises have happened in the Sahel since 2005?
(1) Two (2) **Three** (3) Four (4) Not Mentioned (5) Don't know

5. Which of the following countries produces a major portion of the grain consumed in the Sahel region?
(1) **Nigeria** (2) Chard (3) Burkina Faso (4) Niger (5) Don'tknow

6. True or False: Children under-ten are most negatively affected by the food shortage.
(1) Ture (2) **False** (3)Don't know

7. True or False: The food shortage in the Sahel region is due to the excessive use of fertilizer in the past.
(1) True (2) **False** (3) Don't know

8. Which of the following is the Sahel region refers to?
(1) A semi-desert region of South Africa (2) **A semi-desert region of North Africa** (3) A mountainous region of South Africa (4) A mountainour region of North Africa (5) Don't know

9. Which of the following is NOT a major factor that makes much of the African continent subpar for growing food?
(1) Rainfall (2) Soil (3) **Political instability** (4) Don't know

10. Which of the following factors makes importing food from a foreign country difficult for Sahel countries?

(1) Undeveloped infrastructure (2) **US government subsidies on corn-based biofuels** (3) Corruption in governments of Sahel countries (4) Don't' know

Advertisement Awareness
Was there any advertisement presented along with the news article?
(1) Yes (2) No (3) Don't Know

Free-recall of Advertisement (Only asked to participants in the static and animated advertisements conditions)

Please list anything you can remember about the advertisements shown along with the news article you just read. (Open-ended Question)

Cued-Recall of Advertisement (Only asked to participants in the static and animated advertisements conditions)

1. How many nights does one need to stay at the hotel to get a free night's stay according to the resort advertisement? (Correct Answer: Three)

2. What was the name of the hotel that is advertised? (Correct Answer: Travelodge)

3. What was the name of the airlines company whose advertisement is placed with the news? (Correct Answer: United)

4. How much was the round-trip fare to Miami according to the airline advertisement? (Correct Answer: $280)

Recognition of Advertisement (Only asked to participants in the static and animated advertisements conditions/ Correct answers are in bold)

1. How many nights one does need to stay at the hotel to get a free night's stay according to the resort advertisement?
(1) Two (2) **Three (**3) Four (4) Not Mentioned (5) Don't Know

2. Which of the following is the name of the hotel that was advertised?
(1) Ramada (2) Hilton (3) Super 8 (4) **Travelodge** (5) Don't Know

3. True or False: The man in the resort advertisement wore sunglasses.
(1) **True** (2) False (3) Don't Know

4. Ture or False: Two men were in the hotel advertisement.
(1) True (2) **False** (3) Don't know

5. Which of the following airline companies' advertisement was presented along with the news?

(1) **United Airlines** (2) British Airways (3) Cathay Pacific (4) Asiana Airlines (4) Don't know

6. How much was the round-trip fare to Miami according to the airline advertisement?
1) About 150$, (2) **About 300$** (3) About 450$ (4) Not Mentioned (5) Don't know

7. True or False: The airline company whose advertisement was placed in the news is a member of SKY Team, an airline alliance?
(1) True (2) **False** (3) Don't know

8. True or False: Tax was included in the total price of the airfare.
(1) **True** (2) False (3) Don't know

Demographic Information

Gender: "What is you Gender?" (1) Male, (2) Female

AGE: What is you age? (open-ended question)

Race: What is your race? (White/Black or African-American/ Hispanaic Origion or descent/ Asian or Asian-American, Other)

Income: Which category best represents your household's total income in 2011, before taxes and other deduction? (1-9 Interval 20,000$, 10: Don't know)

Appendix E: Pre-selected Pictures for the Pilot Study

Picture 1

Picture 2

Picture 3

Picture 4

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