REDUNDANCY GAIN OF INCIDENTAL ADVERTISING EXPOSURE ON THE INTERNET

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Abstract

"Redundant ad exposure", defined as simultaneous exposures to multiple exemplars of an ad, is an emerging ad exposure strategy on the Internet and has been employed increasingly by online news sites. The effects of such strategy, however, have never been examined. The current study took the initiative to examine the effects of redundant ad exposure strategy on brand memory and brand preference relative to two other commonly used online ad exposure strategies: single exposure and repeated exposure, when ad exposure was incidental. Additionally, the factor of ad size variation was included to test whether size variation interacted with ad exposure effects. In two experiments, a redundancy gain effect was revealed for exactly identical ads, but not for size-variation ads. Specifically, redundant exposures to exactly identical ads led to (a) greater brand memory and brand preference, as well as (b) faster response to choosing a preferred target brand, than single exposure. Redundant exposures to exactly identical ads were also (c) more effective than repeated exposures in many aspects. These findings provide implications and suggestions for media planners to rethink conventional and modern planning strategies with regard to incidental ad exposure on the Internet.

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Chapter 1

Introduction

Today the Internet is at the core of marketing communication between advertisers and consumers. In the past 10 years, Internet ad spending in the U.S. has grown at a compound annual rate of 20.1% and rapidly increased to $42.78 billion in 2013, unprecedentedly surpassing the ad spending of any other ad-supported media including television, newspaper, radio, magazine, out-of-home, video game, and cinema respectively (IAB 2014). Among many different forms of advertising on the Internet, display advertising, which is defined as a form of advertising where "advertiser pays an online company for space on one or more of the online company's pages to display a static or linked banner or logo" (IAB 2014, p. 23), has stabilized its share of 19% of total Internet ad spending since 2004 and remained the second leading ad format on the Internet, following search advertising (IAB 2004, 2014).

Despite many innovations that have taken place over the past years to make display ads more appealing and better targeted to relevant consumers, the increasing number of such ads also brought negative repercussions on consumers' ad experience and ad effectiveness. One of the most frequent complaints from online consumers is that they are exposed to too many ads, which clutter websites. According to a survey from Burst Media (2008), more than half of the respondents claimed that they could barely tolerate more than two ad units per webpage, and a majority of the respondents (75.5%) who remained on a page they considered to be cluttered said they paid less attention to the ads

that appeared on the page. Meanwhile, the Interactive Advertising Bureau (2011) reported that, although average Americans spent 21.7 hours online weekly, they could only recall seeing 3.7 display ads that they had been exposed to in the past seven days. As expenditure on display ads continues to rise, these issues will also grow, which calls for research and implementation of more effective ad exposure strategies to improve consumer experience with ads and ad effectiveness.

Conventionally, repeated exposure is the most frequently employed ad exposure strategy for online display ads, which refers to sequential exposures to a same ad. In other words, a consumer is exposed to the same ad again at a different time (e.g., on different webpages). Although it is always advertisers' hope that consumers are exposed to a repeated ad for a sufficient number of times before the ad kicks in, the chance is that many consumers may encounter the ad only once (i.e., single exposure). The effects of single exposure and repeated exposures have been examined extensively in advertising literature, and a majority of studies showed that both exposures were more effective than no ad exposure (Chatterjee 2005; Fang, Singh, and Ahluwalia 2007; Lee and Briley 2005; Lee and Cho 2010; Wang, Shih, and Peracchio 2013; Yaveroglu and Donthu 2008; Yoo 2008).

Quite recently, if consumers visit major online newspapers such as the *New York Time*s and the *Washington Post*, they will probably notice that an emerging ad exposure strategy - "redundant ad exposure", is being implemented increasingly on these sites. Redundant ad exposure refers to simultaneous exposures to multiple exemplars of an ad. In other words, the same ad is shown in more than one ad space on a webpage. This form of ad exposure is very interesting because it creates a dominant presence of a brand on a

page and increases a brand's visual significance on that page. However, the effects of such exposure have never been examined empirically.

If conventional single exposure and repeated exposure strategies work well, why bother to use a redundant exposure strategy? Is redundant exposure strategy going to be more effective than the other two strategies? Is it possible that redundant exposures are just the same or even less effective than repeated exposures?

These questions are important because increasing ad exposures involves increasing ad spending. It is going to be a waste of money if return of investment on additional exposures is marginal. Compared with single exposure, adding another same ad on the same webpage certainly increases the brand's perceptual prominence on the page. However, without empirical testing, it cannot be ascertained that such redundant exposures are beneficial to brand effects including brand memory and brand preference. In fact the current study found that the advantages redundant ad exposures had over single exposure were rather conditional. Additionally, compared with repeated exposures, it is also unclear whether the synergetic effects of redundant exposures would be different from those of repeated exposures. Therefore, it is imperative to conduct research to examine relative effects of redundant ad exposure strategy and to provide important insights.

On the other hand, in order to understand the impact of Internet ad exposure, it is also important to firstly understand the characteristics of such exposure in everyday online activities. Compared with many other media, consumers are believed to be able to take more control of what they want to see and want to avoid on the Internet (Rodgers and Thorson 2000). Because consumers generally visit a website with some sort of goals

and tasks (e.g., reading news, searching, and blogging) and most display ads are typically task-irrelevant, the ads often receive fleeting or no focus attention (Cho and Cheon 2004; Kelly, Kerr, and Drennan 2010; Speck and Elliott 1997). In other words, ad exposure on the Internet is mostly incidental where the ad is not the primary object of attention for the consumers (Drèze and Hussherr 2003; Yoo 2008). Consequently, the phrase of "banner blindness" was also created to describe the phenomenon that consumers actively ignore display ads on a webpage (Benway 1998).

However, banner blindness does not mean that the ignored ads are completely shut out from a consumer's perceptual experience of seeing the ads, and it also does not mean that a consumer can absolutely avoid being influenced by the ads. A recent eye tracking study shows that most consumers in fact fixate on the web ads at least once even though they have tasks to focus on doing on the website (Hervet et al. 2011). These consumers are simply unaware that they have unintentionally paid attention to the ads, even though they could remember the advertised content implicitly (Hervet et al. 2011; Yoo 2008). The idea that consumers are capable of perceiving and encoding an ad's visual and verbal messages in just a single eye fixation has been further supported by latest research in advertising (Pieters and Wedel 2012).

Other eye tracking studies have shown that even if most web ads are missed (i.e., without eye fixations) and therefore cannot be perceived with accuracy, many of the ads still have cognitive and affective influences on consumers (Drèze and Hussherr 2003; Lee and Ahn 2012). These studies indicate that peripheral ad information can also be encoded and processed to a certain degree. For example, Pieters and Wedel (2012) demonstrated that when an ad was briefly presented (i.e. 100ms) with a high degree of coarseness, a

condition in which ads in peripheral visual field are typically perceived to be, consumers in a subsequent brand recognition task were still able to identify the advertised brands fairly accurately.

Effectiveness of incidental ad exposure has also been documented by many non-eye tracking studies. These studies showed that incidental ad exposure led to greater brand liking (Fang, Singh, and Ahluwalia 2007; Janiszewski 1988; Shapiro and MacInnis 1992; Shapiro and Nielsen 2013), brand memory (Chatterjee 2005; Yoo 2008), and intention to choose the brand (Ferraro, Bettman, and Chartrand 2009; Nedungadi 1990; Novemsky et al. 2007; Shapiro 1999; Shapiro, MacInnis, and Heckler 1997). It is because many unattended or unintentionally attended display ads can still be processed unconsciously (Yoo 2008). Such processing leaves a memory trace of the advertised brands in a person's mind which makes it easy for the person to process the brands in the next time seeing them (Jacob 1991). At the same time, the feeling of ease to process has the function of engendering positive emotions toward the brands (Reber, Winkielman, and Schwarz 1998). For instance, Yoo (2008) demonstrated that, even though subjects did not pay attention to ads on the Internet, they showed greater implicit memory of the advertised brands than those who had no exposure to the same ads. The former subjects also developed a more favorable attitude toward the brands as well as greater intention to purchase the brands. Likewise, Shapiro (1999) showed that subjects who had been incidentally exposed to an ad were more likely to include the advertised product in the consideration set than those who had no ad exposure.

Because incidental ad exposure typically results in cognitive and affective responses such as brand memory and brand preference, it is important for the current study to focus on ad effects that are germane to incidental ad exposure.

In sum, this study aims to address the following research questions: (1) when ad exposure is incidental, do redundant exposures lead to greater brand memory and brand preference than single exposure; and (2) between repeated and redundant exposures which ad exposure strategy is more effective? To address these questions, relevant literature on effects of different ad exposure strategies is reviewed, leading to hypotheses development. To test the hypotheses, two separate experiments are conducted with each experiment focusing on a different effect outcome, brand memory and brand preference.

Chapter 2

Literature Review

Effects of Redundant Ad Exposures and Theoretical Explanations

Definition of Redundant Exposure

Although the concept of *redundant ad exposure* was briefly described in the previous chapter, because this concept is new to advertising literature, it is necessary to clearly define this concept before proceeding to a review of relevant literature.

According to major English dictionaries, the term of "redundant" is used to describe an instance of repetition that is superfluous and needless. A typical case of being "redundant" is to place several identical items together at the same time to present them to the audience. Each item is likely to be considered to be redundant because the item repeats another and is therefore felt unneeded. Likewise, when an ad is accompanied by another exemplar of the same ad, either ad is going to be perceived as being redundant.

A typical example of redundant ad exposures can be found on various outdoor bulletin boards where advertisers like to plaster a whole board with the same flyers (see Appendix A for some real-life examples of redundant ad exposures).

In view of that, this study defines redundant ad exposure as simultaneous exposure to an ad and its additional exemplar(s).

Redundancy Effects

Are redundant ad exposures more effective than a single exposure? How do consumers encode and process redundant ad information when the information is out of primary attention? Previous psychological studies on visual redundancy effects have provided useful insight into these questions.

These studies present strong evidence suggesting that redundant information is likely to generate a redundancy gain effect (i.e., the effects of exposure to redundant information are superior to the effects of exposure to a single piece of information) at various cognitive levels including perception, memory, and learning (Albrecht and Scholl 2010; Alvarez 2011; Ariely 2001; Feintuch and Cohen 2002; Fischer and; Miller 2008; Haberman and Whitney 2009, 2011, 2012; Jiang et al. 2010; Marks and Hellige 2003; Miller and Adam 2006; Miller, Beutinger, and Ulrich 2009; Miller and van Nes 2007; Tollner et al. 2010). More importantly, the gain effects are even stronger when the tested objects are outside the focus of attention (Alvarez and Oliva 2008; Won and Jiang 2013).

Ensemble Representation

One major theory that accounts for a redundancy gain effect is the theory of ensemble representation. The central idea of ensemble representation is that, when a scene consists of multiple objects that share regularities in their features or structures (i.e., similar objects), the human visual system will efficiently (with high speed and accuracy) extract and capitalize on the redundancy in these objects and automatically compute a compressed "gist" about the scene (Albrecht and Scholl 2010; Alvarez 2011). A gist

refers to “abstract information that can be used to rapidly access memory representations of scene categories” (Haberman and Whitney 2011, p. 856). In other words, rather than coding each object that is similar to one another in a scene, the visual system has a tendency toward ensemble coding of all of the similar objects at a time to facilitate an economical scene perception. The term of “ensemble” particularly refers to a “statistical summary” that “collapses across individual image details, whether or not those details are contained within a specific spatial-frequency band, and whether those details are attached to discrete objects, parts, or a location in space” (Alvarez and Oliva 2008, p. 397).

The idea that people are more sensitive to the gist of a scene than its individual elements comprising the scene has been evidenced in Haberman and Whitney (2011)’s study. In the study, the authors showed that subject could accurately report changes in the ensemble representation about two originally identical scenes after several objects between the scenes had been changed. However, the subjects failed to tell where the changed objects that had driven the change in the ensemble percept, were located.

In another study, the same authors demonstrated that the process of ensemble coding was implicit and fast (Haberman and Whitney 2009). In the study, subjects were briefly presented with a group of faces that had various facial expressions. Although the subjects were instructed to attend to a particular set of faces in the group, they unknowingly processed all faces and computed mean representation of all facial expressions.

Consistent with the studies presented above, other studies have shown that, ensemble coding can be carried out with little attentional involvement and without intention (Chong and Treisman 2003, 2005). Additionally, when it comes to comparing

the perceptual effects of multiple similar distractors (i.e., those that are presented out of primary attention but still perceivable) with those of a single distracter, multiple distractors are found to be more effective. Alvarez and Oliva (2008), for instance, asked the subjects to perform an attention-demanding tracing task on a group of moving targets while at the same time the subjects had to ignore another group of moving distractors. Following the task, the subjects were asked to locate either an individual distractor or the centroid of all distractors. Tested in three experiments with different settings, the study found that localization accuracy was significantly better in the multiple-distractors condition than in the individual distractor condition, whose performance was nearly at chance.

The reason why multiple distractors could have a greater effect than a single distractor is further explained by Alvarez (2011) in a review article summarizing the advantages of ensemble representation. The article argues that representation of individual visual information outside the focus of attention is often highly imprecise; however, the ensemble process combines all of the imprecise information, pools together their redundant signals and sums them up, and eventually it recovers a precise representation of the combined information.

Similar conclusions have been reached by other researchers as well. Won and Jiang (2013), for instance, conducted a series of studies in which subjects were briefly presented with either a single emotional face or four faces with same emotional expressions. During the studies, the subjects were instructed to focus on a central fixation point on the screen that was away from the faces. The first study asked the subjects to judge a previous facial expression following the face display. They found that subjects'

judgment was more accurate in the multiple-face condition compared with the single-face condition. In a second study, the authors used the same stimuli, but the dependent task was to judge face genders. Again, it was found that subjects' performance was much better when four faces were presented.

The ensemble representation theory and the empirical evidence reviewed above imply that incidental exposure to redundant ads should result in a more accurate representation of the ads in consumers' minds compared with incidental exposure to a single ad. When mental representation of an ad is more accurate (vs. less accurate), a consumer should be more likely to recognize the ad in a subsequent encounter of the ad. In other words, an accurate mental representation of an ad should be more conductive to memory effects including recognition.

Indeed, a redundancy gain effect in memory has been found in a recent study by Jiang et al. (2010). In three experiments, subjects were presented with either a single object or four duplicates of the same object before a memory test. Experiment one found a stronger priming effect for the duplicated objects than the single object, indicating that redundant information has an implicit memory effect. Experiment two and three further showed that the duplicates were better remembered than the singles in both short-term and long-term memories.

Therefore, it is hypothesized that:

H1: When ad exposure on the Internet is incidental, redundant exposures to a display ad leads to greater brand memory than single exposure to the ad.

So far, research has been lacking on documenting redundancy effects on affective responses. However, some studies have shown that, after subjects were exposed to redundant information, they were able to respond to the information much faster in later perceptual identification tasks than, after they were exposed to individual information (Jiang et al. 2010; Won and Jiang 2013). For instance, Jiang et al. (2010) demonstrated in a perceptual priming task, subjects who were primed with four redundant faces showed significantly faster responses to the same face in a subsequent gender discrimination task, compared with those who were primed with a single face. As response time is a reliable indicator of processing ease in perceptual tasks (Reber, Schwarz, and Winkielman 2004), such evidence may imply that subjects' perceptual fluency of information processing would be enhanced after they are exposed to redundant information.

Because perceptual fluency is an important source of affective responses in metacognitive experiences, the concept of perceptual fluency is explicated in the following text and its causal relationships with affective responses are explained.

Perceptual fluency refers to increased ease, speed and accuracy with which previously received information is identified, encoded, and processed in a subsequent encounter of the same information (Schwarz 2004). Perceptual fluency arises from a feature analysis. That is, perceptual features (e.g., shapes, brightness, form) of an object are encoded and stored in memory during the course of object exposure, which facilitates processing of the same features at a later time (Janiszewski 1993). A sufficient number of studies have shown that enhanced perceptual fluency leads to positive affective responses, and such effects can be accounted for by two theoretical models - the perceptual

fluency/misattribution model and the hedonic fluency models (Fang, Singh, and Ahluwalia 2007).

The Perceptual Fluency/Misattribution Model

According to the perceptual fluency/misattribution model, when processing of an object becomes easier than a person would expect and the person is unaware of the true source of the enhanced fluency, he or she would misattribute such perceptual fluency to whatever causes that are offered regarding the object at the time of judgment (Alter and Oppenheimer 2009; Bornstein 1989; Janiszewski 1990a, 1990b, 1993; Mandler, Nakamura, and van Zandt 1987; Nordhielm 2002).

A number of object-related "causes" have been tested by both marketing and social psychology researchers, which include liking, recognition, truth, brightness, beauty, and confidence of the object (Brown and Marsh 2009; Leynes and Zish, 2012; Lee 2002; Lee and Larboo 2004; Novemsky et al. 2007; Olds and Westerman 2012; Reber, Winkielman, and Schwarz 1998; Shapiro 1999; Shapiro and Nielsen, 2013). In this line of research, a more extreme judgment regarding the object is often revealed as a result of the fluency experience (e.g., the object is liked more, the object is brighter, or the object is more recognizable).

On the other hand, perceptual fluency as an informative cue for judgment is likely to be discounted if a person realizes that the real source of the fluency experience is irrelevant to the ongoing judgment (Oppenheimer 2008). However, because incidental ad exposure is typically short and unnoticed, and the ad is processed unconsciously, it is unlikely that a person exposed to an ad incidentally would be able to identify the true

source of his or her enhanced perceptual fluency after being exposed to the ads (Nordhielm 2002).

The Hedonic Fluency Model

Compared to the perceptual fluency/misattribution model which is cognitive-based, the hedonic fluency model is affective-based and describes the relationship between fluency and affective responses from a slightly different perspective (Winkielman and Cacioppo 2001).

The hedonic fluency model argues that the dynamic of information processing itself is "hedonically marked and high fluency is subjectively experienced as positive" (Reber, Schwarz, and Winkielman 2004, p. 377). Such positive experience is then transferred to a subsequent to-be-judged object through the affect-as-information heuristic (Fang, Singh, and Ahluwalia 2007).

To be specific, an individual is likely to hold positive responses toward an object because (1) successful recognition of the object creates good feelings (e.g., the good-is-familiar phenomenon; Monin 2003); (2) coherent interpretation of the object elicits positive moods (Winkielman and Cacioppo 2001); and (3) the unconscious familiarity as "affective residue" reduces perceived risk of the object (Baker 1999; Smith 2000). In a word, high fluency is indicative of a positive state of a matter which makes people feel good (Reber, Schwarz, and Winkielman 2004).

In sum, the two perceptual fluency models predict that enhanced fluency leads to positive affective responses. If redundant exposures indeed facilitate subsequent

perceptual fluency, then consistent with the two models, a redundancy again effect on affective responses should be expected from redundant exposures.

Therefore, it is hypothesized that:

H2: When ad exposure on the Internet is incidental, redundant exposures to a display ad leads to (a) greater brand preference and (b) faster response to brand preference judgment, than single exposure to the ad.

Effects of Repeated Ad Exposures

The effects of repeated ad exposures have been studied extensively in both psychology and advertising literature (Anand and Sternthal 1990; Appleton-Knapp, Bjork, and Wickens 2005; Batra and Ray 1986; Bogart 1996; Campbell and Keller 2003; Chatterjee 2005; Chatterjee, Hoffman, and Novak 2003; Kumar, 2000; Lee and Briley 2005; Lee and Cho 2010; Malaviya 2007; Manchanda et al. 2006; Nordhielm 2002; Unnava and Burnkrant 1991; Wang, Shih, and Peracchio 2013; Yaveroglu and Donthu 2008), which showed mixed results.

Some early studies have reported an inverted-U relationship between increased exposures to an ad and advertising performances such as ad attention, brand memory, and brand attitude. For example, Grass and Wallace (1969) conducted both a lab and a field studies examining the effects of repeated exposures to TV commercials on audience's attention to and interests in the commercials. They found that, as the number of exposure

increased, audience's attention and interests firstly increased to a satiation point and then declined to a stable level.

The dominant explanation for this inverted-U relationship is offered by Berlyne's two-factor theory (1970), which posits that advertising influences message responses in two stages. The first stage involves a "wearin" process where initial exposures to a novel ad increase positive habituation of the ad and decrease hostility and uncertainty about the ad. As a result, "wearin" leads to positive reactions toward the ad. The second phase, on the other hand, involves a "wearout" process where boredom and tedium kick in with continued repetition of the ads. Consequently, positive responses to the ad fade.

Cacioppo and Petty (1979) modified the two-factor theory and used the "cognitive response paradigm" to explain the two stages (Batra and Ray 1986). They showed that the effects of message repetition on attitudinal outcomes were mediated by subjects' thoughts and arguments generated in response to the message. As message repetition increased, subjects' agreement with the message first increased and then decreased, whereas their counter arguments to the message firstly decreased and then increased. As a result, a favorable attitude toward the message was observed at the first stage and a less favorable one appeared at the second stage. Cacioppo and Petty's (1979) proposition has found further support in Batra and Ray's (1986) study. In this study, subjects were manipulated as having high motivations and abilities to generate counter arguments to the TV commercials they were repeatedly exposed to. It was found that the subjects raised favorable attitude toward the advertised brands rapidly during the first two commercial exposures. However, as counter arguments set in, their favorable attitude dropped significantly from the forth exposure.

While the two-factor theory (Berlyne 1970) and its modified version (Cacioppo and Petty 1979) clearly have values in explaining the effects of repeated ad exposures, they are rather limited and fail to account for other different findings regarding repeated ad exposure effects. For example, Nordhielm (2002) showed that when conscious processing of an ad was constrained and only shallow features of the ad could be processed, ad repetition frequency was monotonically correlated with ad effectiveness rather than having an inverted-U relationship with the latter. In Nordhielm's (2002) study, subjects were exposed to the ads for zero, three, 10, or 25 times. It was found that when subjects were engaged with the ads and processed the ad features deeply, their favorable attitude toward the ads, which resulted from previous exposures to the same ads, peaked at 10 exposures and fell at 25 exposures. However, when the subjects processed the ads shallowly, their favorable attitude toward the ads continued to grow after 10 exposures and reached the highest at 25 exposures. Although it is possible that the subjects' favorable attitude toward the ads may begin to decline at some point after 25 exposures, Nordhielm's study indicates that ads processed in a deep fashion have a much earlier satiation point than those processed shallowly.

Likewise, in another study by Chatterjee (2005), the effects of repeated incidental ad exposures were tested on the Internet. The author asked the subjects to search and memorize information presented in a website while at the same time ads were repeated on different pages of the site either for four times or for 15 times. It was found that ads with 15 repetitions gave rise to greater brand recall and brand recognition than ads with four repetitions.

The linear relationship between incidental ad exposure and ad effectiveness is often explained by mere exposure effect in psychology, which refers to an event where brief repeated exposures to an object increase a person's positive responses toward the object. Previous research has shown that, when an object has been processed before, subsequent processing of the same object is better streamlined, which results in the feeling of enhanced fluency (Bornstein and d'Agostino 1992; Grims and Kitchen 2006; Jacoby 1991). Therefore, mere exposure effect is theoretically explained by the perceptual fluency/misattribution model and the hedonic fluency model as well. In line with mere exposure effect, researchers have also argued that the two perceptual fluency models provide a more robust account for the effects of repeated incidental ad exposures than does the two-factor theory (Fang, Singh, and Ahluwalia 2007; Nordhielm 2002).

Decades of research has shown that mere exposure effect is a robust and reliable phenomenon (Barchas and Perlaki 1986; Bonnano and Stilling 1986; Bornstein 1989; Bornstein, Leone, and Galley 1987; Janiszewski, 1993; Kunst-Wilson and Zajonc 1980; Mandler, Nakamura, and Van Zandt 1987; Murphy, Monahan, and Zajonc 1995; Seamon, Brody, and Kauff 1983, 1984; Zajonc 1968, 2001). Using repeated incidental ad exposures on the Internet as a context, a recent study by Fang, Singh, and Ahluwalia (2007) empirically tested mere exposure effect and its underlying mechanism. They reported that increased ad repetition resulted in more positive evaluations of the ads, and most importantly, increased perceptual fluency mediated the relationship.

Comparison of Redundant and Repeated Ad Exposure Effects

The present study aims to compare the effects of redundant ad exposures with those of repeated ad exposures when repetition occurs within a short period of time.

Repeating ads with short intervals is particularly common on the Internet and hence important. For instance, a same ad may be placed on top of a webpage, at the bottom of the same page, and once more on the second page. A consumer who is browsing these webpages is very likely to be exposed to these ads sequentially within minutes or even just a minute. Moreover, with the maturity of contextual and behavioral ad targeting techniques on the Internet, the chance to be exposed to the same display ads frequently is even higher.

However, little is known about potentially different effects of the repeated and redundant ad exposure strategies. Research is also scarce regarding comparative advantages of repetition and redundancy. The fundamental interest for such comparison is that, keeping the number of exposures consistent for both strategies, which strategy is more likely to reach a significant effect at the least expense of exposures? In other words, which strategy is going to have a greater magnitude of effects given equal number of exposures?

One piece of relevant evidence from Jiang et al. (2010) showed that an object was better remembered when it was presented simultaneously with three other duplicates than when it was repeated in three consecutive times. This seems to suggest that the effect of redundant exposures likely be better than that of repeated exposures. Further

investigation is needed to explore this question and the present study poses the following research question:

RQ1: When ad exposure on the Internet is incidental, what are the comparative effects of redundant exposures and repeated exposures to a display ad on (a) brand memory and (b) brand preference?

Ad Size Variation on the Internet

Online display ads often come in different sizes. As a result, redundant ads may vary in size, although they share identical content. So do repeated ads. The question is, will size variation play a role in affecting the effects of both redundant and repeated exposures?

Previous studies in redundancy effects that used high-level stimuli often compare exactly identical objects or identical objects of similar content (e.g., faces with different degrees of anger) with a single object (Jiang et al., 2010; Won and Jiang 2013). No studies have examined complicated stimuli that varied in size. However, some brain imaging studies which tested low-level stimuli such as lines and Gabor patches showed that, when lines or Gabor patches were presented simultaneously in different orientations, their effects were considerably reduced compared with those presented in identical orientations (Beck and Kastner 2007). These findings seem to suggest that a stimulus' physical form may affect redundancy effects.

As for repeated exposures, because repetition effects depend on the degree of perceptual fluency and perceptual fluency concerns primarily with an object's physical form (e.g., shape; Shapiro 1999), keeping an object's form consistent over time rather than changing it each time should make processing of the object more easily. For that reason, using identical ads for repeated exposures should result in greater effects than using size-variation ads.

However, because the effects of redundant ad exposures as a result of ad size variation are unclear and hence further examination is needed, the following research question is posed:

RQ2: Does ad size variation affect the effects of redundant exposures on (a) brand memory and (b) brand preference, in comparison with single exposure and repeated exposures?

Overall Methodological Approach

To test the hypotheses and address the research questions, two experiments were conducted. Experiment 1 focused on the brand memory effect and Experiment 2 focused on the brand preference effect.

The experiments were conducted in a laboratory at the school of journalism and mass communication in a large Midwest university. Each experiment had a between-subject design, and subjects were randomly assigned to different experimental conditions.

In each experiment, subjects went through a fixed number of webpages in a website while at the same time they were incidentally exposed to various display ads presented on different webpages. Following the stimuli exposure, data collection for dependent measures was conducted using the DirectRT computer software. The final data was analyzed using a series of t-tests and univariate ANOVA tests.

A general discussion regarding the results of the two experiments is provided in Chapter 5.

Chapter 3

Experiment 1

Method

Experimental Design

The experiment had a 2 (ad exposure strategy: redundant vs. repeated) x 2 (ad variation: identical ads vs. size-variation ads) between-subject design, and additionally a single exposure condition was included, which resulted in a total of five ad exposure conditions: (1) single exposure, (2) repeated exposures to two identical ads, (3) repeated exposures to two size-variation ads, (4) redundant exposures to two identical ads, and (5) redundant exposures to two size-variation ads.

Participants

A total of 153 undergraduates (Age: M = 20 years; Gender: 45 male, 108 female) from a large Midwest university participated in the experiment for course credit. All of the subjects had normal or corrected-to-normal vision, and none of them was colorblind. The subjects spent 4.45 hours per day on average using the Internet, and nearly half of them (43.33%) read online newspapers three or four times a week. The participants were randomly assigned to the five experimental conditions. Each experimental session lasted approximately 30 minutes. Three participants failed to follow the instructions and were excluded from the final analysis.

Stimuli

An online news site consisting of 22 news webpages was created. Each page included a news article and one (for single ad exposure) or two (for redundant or repeated ad exposures) display ads.

The 22 news articles were collected from the *Science* and the *Technology* sections of the online *New York Times*. Two criteria were used to select the articles: (1) the topic of the article was irrelevant to the advertised product (i.e., coffee), and (2) the content of the article was neutral. After the articles were collected, the author invited five judges (i.e., the author's doctoral colleagues at the school of journalism and mass communication) to review and evaluate the articles by using the two criteria. The judges were also informed about the purpose of the research. The judges all agreed that the selected articles had complied with the criteria.

The news article was placed in the mid-left of the webpage to occupy a majority of subjects' focal attention whereas the ads were placed out of the focal attention on the right side of the article.

Additionally, a total of 22 different brands were selected so that each brand was advertised on each page - 20 target brands and two foil brands which were shown on the first and the last pages[1]. All of these brands were for the same product, coffee.

[1] The reason that each subject was shown 20 target brands rather than just one brand in each experimental condition is because ad exposure in the present study was incidental, which means that subjects might not be able to explicitly remember the brands they had been exposed to. As a result, the subjects might involve much guessing and responses bias in subsequent brand memory judgments. In order to rule out brand guessing and response bias, a measurement and analysis method that counts subjects' brand "hit" rate and "false alarm" rate (see "Dependent Measure" and "Results" sections) is desired, which can be used to compute for a more accurate brand memory score. Using such method requires subjects being exposed to multiple brands.

The brands were selected from 100 real brands found in Wikipedia. Wikipedia had lists of brand names for coffee and coffee makers around the world, among which 100 brand names were chosen for a pretest. In the pretest, a separate group of 20 subjects rated the 100 brands in terms of familiarity and liking on a 9-point Likert scale from "Not familiar at all" to "Very familiar" and from "Dislike it at all" to "Like it very much", respectively. Brands that were unfamiliar to the subjects (M = 1.1475) and with moderate liking (M = 4.7250) were selected for the experiment (see Appendix C for a list of target brands).

Each display ad contained a brand logo and the product image (coffee). In the experiment, the order of the ads was randomized.

Manipulation

Ad Variation: Identical Ads and Size-Variation Ads

In this experiment, identical ads were two exactly same ads for a brand. Size-variation ads were manipulated by changing the length and width of one ad for each identical pair, which resulted in one ad being horizontal and the other being vertical.

Ad Exposure: Single, Redundant and Repeated Exposures

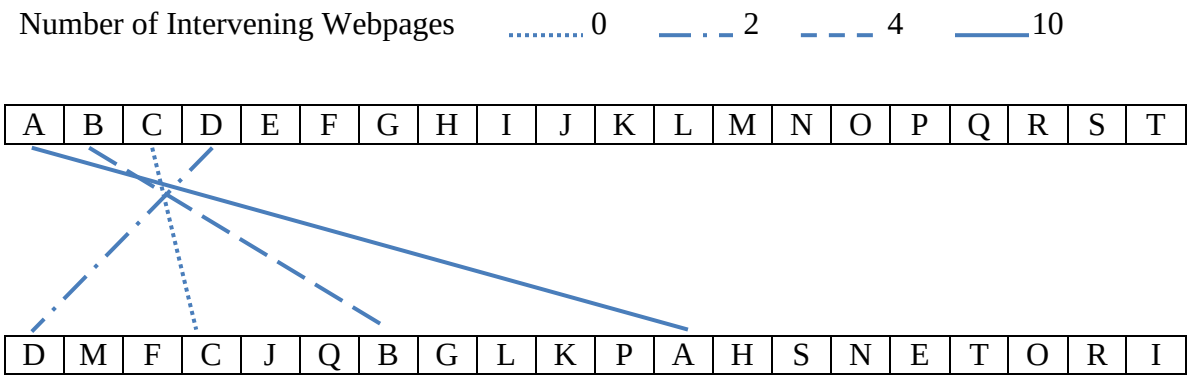
In the single exposure condition, only one ad was presented on each page. The rest of the ad space on the page was left blank with a small watermark of "advertisement" printed at the top. This is how real online news sites treat unsold ad space.

Redundant exposures were manipulated by presenting two ads for the same brand simultaneously on the same page. Repeated exposures were manipulated by presenting two ads for the same brand on different webpages.

Because ad spacing between repeated exposures may affect ad response in various degrees (Appleton-Knapp, Bjork, and Wickens 2005; Janiszewski, Noel, and Sawyer 2003), repetition interval (i.e., spacing) was also manipulated by varying the number of webpages inserted between two ad exposures. The number of zero, two, four, and 10 were chosen for the current study, which resulted in four spacing conditions. Therefore, ad spacing became a within-subject factor in repeated exposure condition.

The 20 target brands was randomized each time and evenly assigned to the four spacing conditions (see Table 1).

Table 1. Spacing Variation for Repeated Ad Exposures



All subjects in all conditions were exposed to the same 22 brands, and the subjects in each condition were exposed to only one type of ad exposure.

Additionally, in all conditions, each webpage was controlled for 10-second exposure duration[2] in order to control subjects' exposure duration. After 10 seconds, each page automatically turned to the next one.

Procedure

On arriving at the experiment site, subjects were invited to be seated in front of a computer. An instruction was shown on the screen asking the subject to go through a series of webpages and read the news article on each page. They were advised to read each article just like they normally did when browsing a news website in their daily life. They were also told that a questionnaire would be given at the end to assess their understanding of the content of the articles. Lastly, they were told that the website was automatically controlled and each page would turn to the next one in 10 seconds. It was emphasized again to the subjects that they should focus on the article and read them naturally (see Appendix E for experiment instructions).

[2]A recent study which examined 205,873 web pages revealed that web browsing behavior exhibited a significant "negative aging" phenomenon (Liu, White, and Dumais 2010). That is, some initial screening was carried out at the early stage of browsing a page and must be passed before a page was examined further. The shorter a user stayed in a page, the higher likely he or she would abandon the page, while the longer the stay, the less likely to abandon the page (Liu, White, and Dumais 2010). By utilizing the "hazard function" provided from this study, an industry report showed that user's decision to stay or leave the page mostly counted on the first 10 seconds of the page visit (Nielsen 2011). Another longitudinal field study by Weinreich et al. (2008) examined web browsing behavior over more than 135,000 user-initiated page visits. Consistent with previous research, they found that more than half of the visits had a short stay time less than 12 seconds for average pages and 8 seconds for Google search result pages, and the peak value was between two and three seconds. These studies indicate that user exposure to online ads is most likely during the first 10 seconds of the page visit. Therefore, it is externally valid to choose 10 seconds as per page exposure duration.

Following the stimuli exposure, subjects did a distraction task for five minutes assessing their knowledge about the news content. Next, the subjects took the brand memory test using the same computer. Finally, they were surveyed about their vision conditions (normal or corrected-to-normal vision), hours spent on the Internet per day, frequency of online newspaper reading per week, and levels of task involvement (measured by three items: focused, involved, engaged, on a 9-point Likert scale). Subject's demographic information was also collected. The subjects were debriefed at the end.

Dependent Measure

Brand memory in the present study was measured in the form of brand recognition by using a yes/no response-deadline procedure. That is, subjects had to make a speeded yes-or-no response to an answer within a limited time frame.

A total of 40 brand names, including 20 target brands and 20 distractors, were sequentially presented on the computer screen in a random order. In each trial, subjects pressed either the "Y" key for yes or the "N" key for no to indicate whether they had seen the brand previously in the ads from the reading task. They were asked to make a judgment as quickly as possible up to 1.5 seconds after each new trial was initiated. If a subject failed to enter his or her answer within the 1.5-second window, a reminder ("please select your answer") would appear on the screen and the subject must make a decision immediately.

The 20 distractors were also selected from the 100 brands in the pretest. Mean familiarity and liking scores for the distractors were 1.2067 and 4.9770 respectively, and

the familiarity and liking scores were not significantly different from those of the target brands (F's < 1, *ns*) (see Appendix D for a list of distractor brands and Appendix F for dependent measure/instruments).

Results

Before hypothesis testing, subjects' level of task involvement was calculated. Because the three items measuring involvement had a high reliability (Cronbach's α = .746), they were combined to form a single score. Mean involvement score was 6.39, suggesting that subjects were fairly engaged in the task. The level of involvement was not different across the five experimental conditions ($F(4,149) = 1.882$, $p = .117$). Also, subjects in the five conditions did not differ in how many hours they spent on the Internet per day ($F(4,149) = .189$, $p = .994$) or how often they read online newspapers per week ($F(4,149) = 1.414$, $p = .232$).

Because recognition memory has been characterized by a signal detection process by many cognitive psychologists (Yonelinas 2002), a nonparametric measure of signal detection - A' (Stanislaw and Todorov 1999) was employed to assess the subject's brand recognition performance.

A' has long been a standard measure for recognition memory in psychology and it takes into account "hits" - the probability of times that a subject evaluated an "old" item as "old" (e.g., report having seen an item and the item appeared previously) and "false alarms" - the probability of a subject to evaluate an "new" item as "old" (e.g., report having seen an item and the item did not appear previously). Because the hit and false alarm rates reflect both response bias and sensitivity (Stanislaw and Todorov 1999), and

counting only the hits tells nothing about a subject's ability to discriminate between an old and a new item, both hit rates (H) and false alarm rates (F) should be considered into calculating for a more accurate recognition score.

A' can be calculated as follows (Stanislaw and Todorov 1999):

$$A' = .5 + \left[\text{sign}(H - F)\frac{(H-F)^2 + |H-F|}{4\max(H,F) - 4HF}\right]$$

where sign($H - F$) equals +1 if H $>$ F; 0 if $H = F$; and –1 if H $<$ F. max(H,F) equals H or F, whichever is greater.

In the current experiment, responding "yes" to a target brand was considered a hit (H) whereas responding "yes" to a distractor brand was considered a false alarm (F). To estimate recognition memory, mean A' values were computed.

Hypothesis Testing

Effects of Redundant vs. Single Exposures on Brand Memory

Hypothesis 1 posited that when ad exposure on the Internet was incidental, redundant exposures to a display ad would lead to greater brand memory than single exposure to the ad.

To test this hypothesis, an independent sample t-test was conducted using ad exposure (redundant vs. single) as an independent variable and brand memory as the

dependent variable. The test showed no significant difference between redundant exposures (M = .6765, sd = .1545) and single exposure (M = .6216, sd = .1794; $t(88)$ = 1.505, p = .136). Therefore, Hypothesis 1 was not supported.

Effects of Redundant vs. Repeated Exposures on Brand Memory

Research question 1(a) asked when ad exposure on the Internet was incidental, whether there were differences between the effects of redundant exposures to a display ad and those of repeated exposures to the ad on brand memory.

Before addressing this question, ad spacing effect within the repeated exposure condition was assessed. Repeated measures ANOVA tests with spacing as a within-subject factor and brand memory as the dependent variable were performed. The results indicated no significant spacing effect ($F(3,177)$ = .617, p = .605 (see Table 2).

Table 2. Spacing Effects on Brand Memory for Repeated Exposures

	0[a]	**2**	**4**	**10**
Identical Ads	.6144 (.2850)[b]	.6708 (.2455)	.6622 (.2384)	.6665 (.2605)
Size-variation Ads	.6083 (.2932)	.6539 (.2088)	.5443 (.2754)	.5726 (.2651)
	.6114 (.2867)	.6624 (2261)	.6032 (.2622)	.6196 (.2648)

[a] Number of webpages between two repeated exposures.

[b] Number in parentheses are standard deviations.

Therefore, the dependent variable data across different spacing conditions were combined to form a single score for each condition.

Next, an independent same t-test was conducted using ad exposure (redundant vs. repeated) as an independent variable and brand memory as the dependent variable. The results were non-significant ($t(118) = 1.281$ $p = .203$), indicating that redundant exposures ($M = .6765$, $sd = .1545$) were not significantly different from repeated exposures ($M = .6404$, $sd = .1540$) in affecting brand memory.

Effects of Ad Variation and Ad Exposure on Brand Memory

Research question 2(a) asked whether ad size variation would affect redundant ad exposure effects on brand memory in comparison with single exposure and repeated exposures.

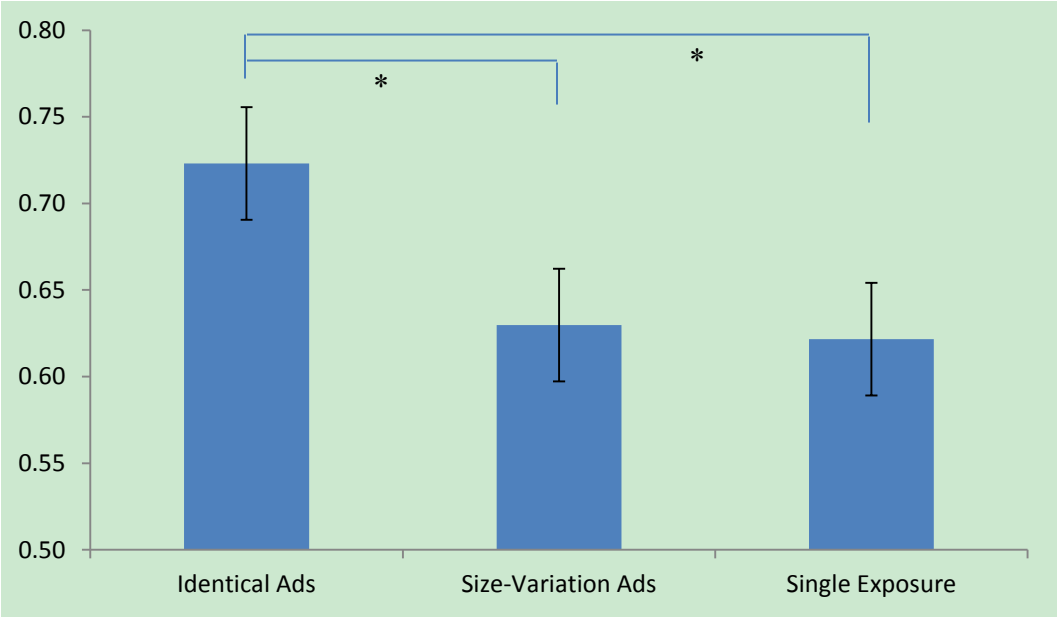
To address this research question, two separate analyses were conducted. The first analysis compared different redundant ad exposure conditions (i.e., redundant-identical ads and redundant-size variation ads) with single-exposure condition. The second analysis tested the interaction between ad size variation and multiple exposure (redundant and repeated) strategy.

Analysis 1: Redundant vs. Single Exposures

A univariate ANOVA test was performed on the three ad exposure conditions: single exposure, redundant-identical ad exposure, redundant-size variation exposure. The results indicated significant differences ($F(2,89) = 3.753$, $p = .027$).

Post-hoc pairwise comparisons revealed that brand memory was significantly better in the redundant-identical ad condition (M = .7231, sd = .1388) than the single-exposure condition (p = .016). The former was also significantly better than the redundant-size variation condition (M = .6298, sd = .1575; p = .026). However, there was no significant difference between the redundant-size variation condition and the single-exposure condition (p = .838) (see Figure 1).

Figure 1. Redundant vs. Single Exposure Effects on Brand Memory



*p < .05

Additional Analysis for Analysis 1

An additional analysis was conducted using one-sample t-test to evaluate whether memory effects of the three ad exposure conditions were better than chance (50%). The

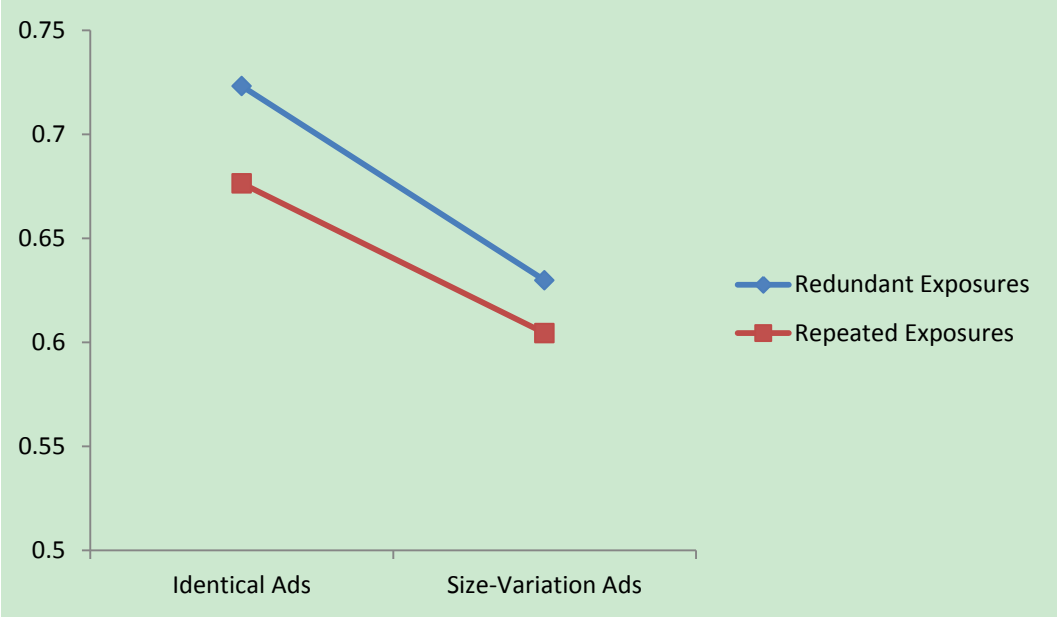
results showed that all three conditions had an effect that was significantly above chance (single: $t(29) = 3.711$, $p = .001$; redundant-identical ads: $t(29) = 8.806$, $p < .001$; redundant-size variation ads: $t(29) = 4.516$, $p < .001$). The findings indicate that ad exposure in general improves brand memory.

Analysis 2: Redundant vs. Repeated Exposures

A two-way ANOVA test was conducted using ad exposure strategy (repeated vs. redundant) and ad variation (identical vs. size-variation) as between-subject factors and brand recognition as the dependent variable.

The test showed that the interaction between ad exposure and ad variance was non-significant ($F(1,119) = .152$, $p = .698$). However, a significant main effect of ad variation was found ($F(1,119) = 9.137$, $p = .003$). Specifically, identical-ad exposures ($M = .7000$, $sd = .1423$) led to greater brand memory than size-variation exposures ($M = .6172$, $sd = .1567$) (see Figure 2).

Figure 2. Redundant vs. Repeated Exposure Effects on Brand Memory



Further analysis using post-hoc pairwise comparisons revealed that brand memory in the redundant-identical ad condition was significantly better than that in the repeated-size variation condition (p = .003).

Additional Analysis for Analysis 2

Note that in analysis 2, dependent variable data for repeated ad exposures was combined across four different spacing conditions. Because the 0-page condition had the least information interference between two repeated exposures among the four spacing conditions, an additional analysis was conducted using the same two-way ANOVA test to compare redundant exposures with repeated exposures in the 0-page condition.

The results showed no interaction of ad exposure strategy and ad variation ($F(1,119) = 1.078$, $p = .301$). The main effects of ad exposure ($F(1,119) = 2.407$, $p = .124$) and ad variation ($F(1,119) = 1.403$, $p = .239$) were also non-significant. The findings suggest that, when ad spacing was super short, redundant exposures do not have a better memory effect than any repeated exposures. Neither are identical-ad exposures more effective than size-variation exposures.

Summary

Experiment 1 aimed to examine (1) the effects of redundant ad exposures on brand memory relative to single exposure and repeated exposures; and (2) whether such effects were affected by ad size variation.

A series of tests comparing redundant exposures and single exposure revealed that redundant exposures led to greater brand memory than single exposure only when the ads were exactly identical. When the ads varied in size, such redundancy advantage faded. On the other hand, both redundant exposures and single exposure gave rise to an increase of brand memory above chance level.

Comparisons of redundant exposures and repeated exposures showed one difference between the two exposure strategies. That is, redundant-identical ad exposures led to greater brand memory than repeated-size variation exposures. There was no difference between redundant-size variation exposures and repeated exposures. On the other hand, further analysis revealed that, when ads were repeated shortly, effects of redundant-identical ad exposures became no different from those of repeated exposures.

In sum, findings from Experiment 1 mostly suggest a redundancy gain effect in brand memory when redundant ads were exactly identical. Further discussion of the findings is provided in Chapter 5.

In the next chapter, method and results from Experiment 2 are reported. This experiment examined the effects of redundant ad exposure strategy on brand preference in comparison with single exposure and repeated ad exposure strategies.

Chapter 4

Experiment 2

Method

Experimental Design, Stimuli, Manipulation, and Procedure

Experiment 2 had the same experimental design, stimuli, manipulation, and procedure as those in Experiment 1.

Participants

Participants were181 undergraduates (Age: *M* = 20 years; Gender: 50 male, 131 female) from a large Midwest university in fulfillment of class credit. Each experimental session lasted approximately 30 minutes. All of the subjects had normal or corrected-to-normal vision, and none of them was colorblind. The subjects spent 4.44 hours per day on average using the Internet, and nearly half of them (44.44%) read online newspapers three or four times a week. The participants were randomly assigned to five experimental conditions: single exposure, redundant-identical ads, redundant-size variation ads, repeated-identical ads, and repeated-size variation ads.

Dependent Measures

Brand preference was measured by using a two-alternative forced choice (2AFC) response-deadline procedure. That is, subjects had to make a speeded choice between two simultaneously presented answers within a limited time frame.

In each trial, two brand name choices were presented bilaterally at the same time on the computer screen, one of which was a target brand and the other was a distractor. Subjects were asked to select the brand they liked more with their gut feelings by pressing either the "E" key for the left brand or the "I" key for the right brand as quickly as possible up to 1.5 seconds. Twenty two pairs of brands were presented which included two pairs of foil brands. All of the target brands and the distractors were the same brands used in Experiment 1.

In each trial, the computer program randomly selected a target brand from the target brand pool and a distractor from the distractor brand pool to form a duo of brand choices. Meanwhile, the brand was randomly assigned to the left and the right positions.

Experiment 2 used the same survey questions from Experiment 1. In addition to that, a new question was added to the questionnaire. The question asked the subjects to report how difficult the reading task was on a 9-point Likert scale from Not difficult at all to Very difficult. Given that display ads may be perceived as distractors and if so the ads are likely to be evaluated more negatively in a difficult (vs. easy) task (Duff and Faber 2011), this question was included to control for task difficulty levels and group differences (see Appendix G for dependent measures/instruments).

Results

Subjects' level of task involvement and level of task difficulty were calculated before hypothesis testing. The three items measuring involvement (Cronbach's $\alpha = .754$) were combined to form a single score. Mean involvement score was 6.42, suggesting that

subjects were fairly engaged in the task. Mean task difficulty score was 4.57, suggesting that the task was not difficult.

Additionally, subjects' level of involvement was not different among the five experimental conditions ($F(4,179) = 1.521$, $p = .198$). Their level of task difficulty did not show any difference either ($F(4,179) = .280$, $p = .891$). Subjects in the five experimental conditions also did not differ in how many hours they spent on the Internet daily ($F(4,179) = .846$, $p = .498$) or how often they read online newspapers weekly ($F(4,179) = 1.446$, $p = .221$).

In the following hypothesis testing, brand preference was calculated in terms of percentage of correct responses (i.e., choosing the target brands). To be specific, the number of correct responses was divided by the total number of trials. To estimate brand preference for each condition, mean percentage scores were computed.

Hypothesis Testing

Effects of Redundant vs. Single Exposures on Brand Preference

Hypothesis 2(a) proposed that when ad exposure on the Internet was incidental, redundant exposures to a display ad would lead to greater brand preference than single exposure to the ad.

To test this hypothesis, an independent sample t-test was conducted comparing the effects of redundant exposures and single exposure on brand preference. The test showed marginally significant effects such that redundant exposures ($M = .6000$, *sd*

= .1160) resulted in greater brand preference than single exposure (M = .5556, sd = .0977; $t(106) = 1.975$, $p = 0.051$). Therefore, hypothesis 2(a) was supported.

Effects of Redundant vs. Single Exposures on Brand Preference Response Time

Following hypothesis 2(a), hypothesis 2(b) proposed that redundant exposures to a display ad would lead to faster response time to choose the brand in preference, than single exposure to the ad.

To test this hypothesis, an independent sample t-test was run to compare the effects of redundant exposures and single exposure on subjects' response time. Response time for incorrect trials (i.e., not choosing the target brands) was excluded.

The results revealed a significant ad exposure effect such that subjects in the redundant exposure condition (M = 808.3217, sd = 190.8038) responded much faster than those in the single exposure condition (M = 900.7903, sd = 187.5009); $t(106) = 2.388$, p = .019). Therefore, hypothesis 2(b) was supported.

Effects of Redundant vs. Repeated Exposures on Brand Preference

Research question 1(b) asked when ad exposure on the Internet was incidental, whether there were differences between the effects of redundant exposures to a display ad and those of repeated exposures to the ad on brand preference.

Before addressing this research question, ad spacing effect within the repeated exposure condition was assessed. Repeated measures ANOVA tests with spacing as a within-subject factor and brand preference as the dependent variable were conducted. The

results showed a marginally significant spacing effect ($F(3,213) = 2.434$, $p = .066$) (see Table 3).

Table 3. Spacing Effects on Brand Preference for Repeated Exposures

	0[a]	**2**	**4**	**10**
Identical Ads	.5833 (.1682)[b]	.5333 (.2084)	.5111 (.2108)	.5333 (.2138)
Size-variation Ads	.5944 (.1999)	.5667 (.2111)	.5722 (.1799)	.4611[c] (.2697)
	.5889 (.1835)	.5500 (.2090)	.5417 (.1970)	.4972[d] (.2444)

[a] Number of webpages between two repeated ads.
[b] Number in parentheses are standard deviations.
[c] $p < .05$ compared with 0-page spacing and with 4-page spacing; $p = .1$ compared with 2-page spacing.
[d] $p < .01$ compared with 0-page spacing

Therefore, the dependent variable data across different spacing conditions were combined to form a single score.

Following the analysis, an independent sample t-test was conducted to compare redundant exposure and repeated exposure effects on brand preference. The results showed that redundant exposures ($M = .6000$, $sd = .1160$) gave rise to significantly greater brand preference than repeated exposures ($M = .5465$, $sd = .1108$; $t(142) = 2.829$, $p = .005$)

Effects of Ad Variation and Ad Exposure on Brand Preference

Research question 2(b) asked if ad size variation would affect redundant ad exposure effects on brand preference, in comparison with single exposure and repeated exposures.

To address this research question, two separate analyses were performed. In the first analysis, the three ad exposure conditions: redundant-identical ads, redundant-size variation ads, and single-exposure, were compared in terms of brand preference and response time to brand preference judgment. In the second analysis, interaction between ad size variation and multiple-ad exposure strategy (i.e., redundant and repeated ad exposures) was examined.

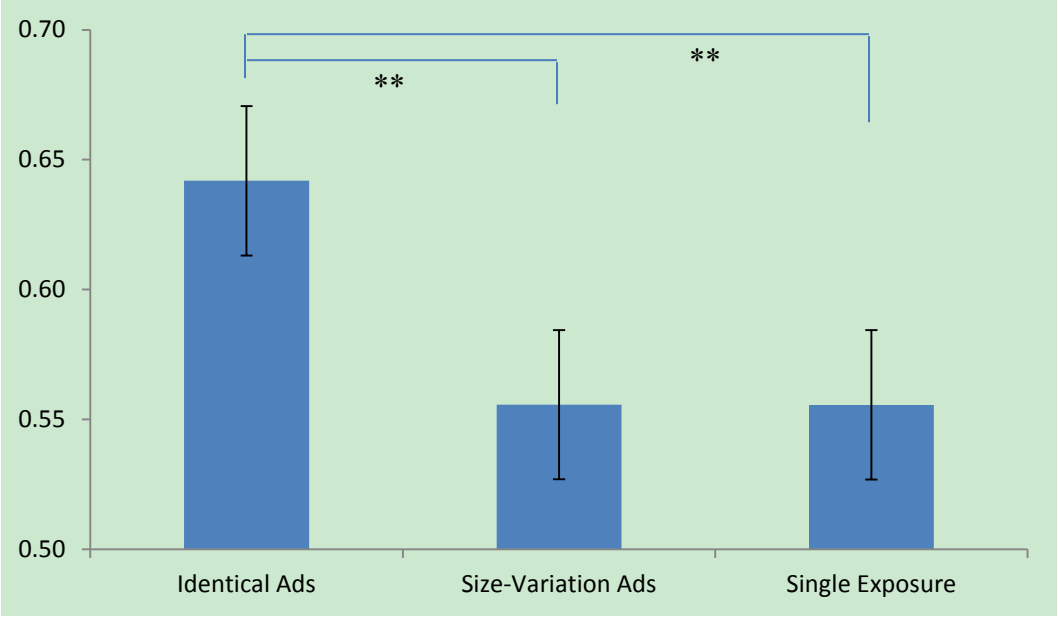
Analysis 1(a): Redundant vs. Single Exposures on Brand Preference

A univariate ANOVA test with ad exposure (single, redundant-identical ads, redundant-size variation ads) as a between-subject factor and brand preference as the dependent variable was conducted. The results showed significant differences ($F(2,107) = 8.224$, $p < .001$).

Post-hoc pairwise comparisons revealed that brand preference was significantly higher in the redundant-identical ad condition ($M = .6419$, $sd = .1121$) than in the single-exposure condition ($p = .001$). The redundant-identical ad condition also had greater brand preference than the redundant-size variation condition ($M = .5557$, $sd = .1042$, $p = .001$).

However, there was no significant difference between the redundant-size variation condition and the single-exposure condition (p = .995) (see Figure 3).

Figure 3. Redundant vs. Single Exposure Effects on Brand Preference



**p < .01

Additional Analysis for Analysis 1(a)

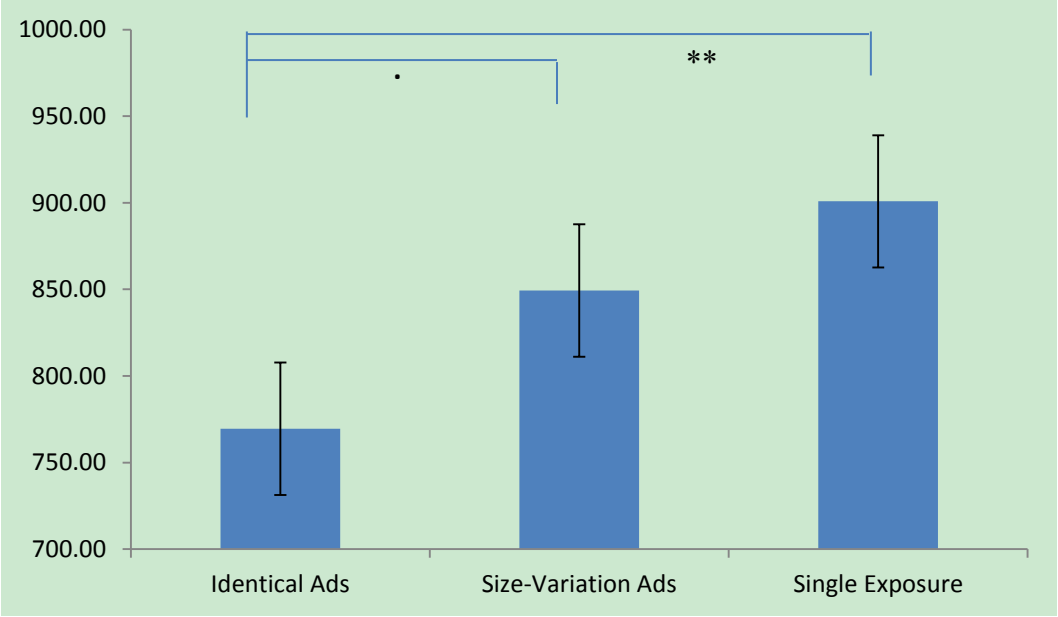
An additional one-sample t-test was performed to estimate the brand preference effects of each ad exposure condition against a chance level (50%). The results indicated that all of the three exposure conditions led to a greater brand preference effect than the chance (single: $t(35) = 3.413$, p = .002; redundant-identical ads: $t(36) = 7.698$, p < .001; redundant-size variation ads: $t(34) = 3.165$, p = .003). The findings suggest that, overall, ad exposure enhances brand preference.

Analysis 1(b): Redundant vs. Single Exposures on Brand Preference Response Time

To compare effects of the three ad exposure conditions (single, redundant-identical ads, redundant-size variation ads) on subjects' response time, a univariate ANOVA test was conducted. The results indicated significant differences ($F(2,107) = 4.536$, $p = .013$).

Post-hoc pairwise comparisons revealed that subjects' response time in the redundant-identical ad condition ($M = 769.5305$, $sd = 201.5149$) was significantly shorter than that in the single-exposure condition ($p = .004$). The former was also shorter than the redundant-size variation condition ($M = 849.3294$, $sd = 172.2172$), but this difference was only marginally significant ($p = .074$). Additionally, subjects' response time was not different between redundant-size variation exposures and single exposure ($p = .251$) (see Figure 4).

Figure 4. Redundant vs. Single Exposure Effects on Brand Preference Response Time



**$p < .01$

·$p < .1$

Analysis 2: Redundant vs. Repeated Exposures

A two-way ANOVA test was conducted using ad exposure strategy (repeated vs. redundant) and ad variation (identical vs. size-variation) as between-subject factors and brand preference as the dependent variable.

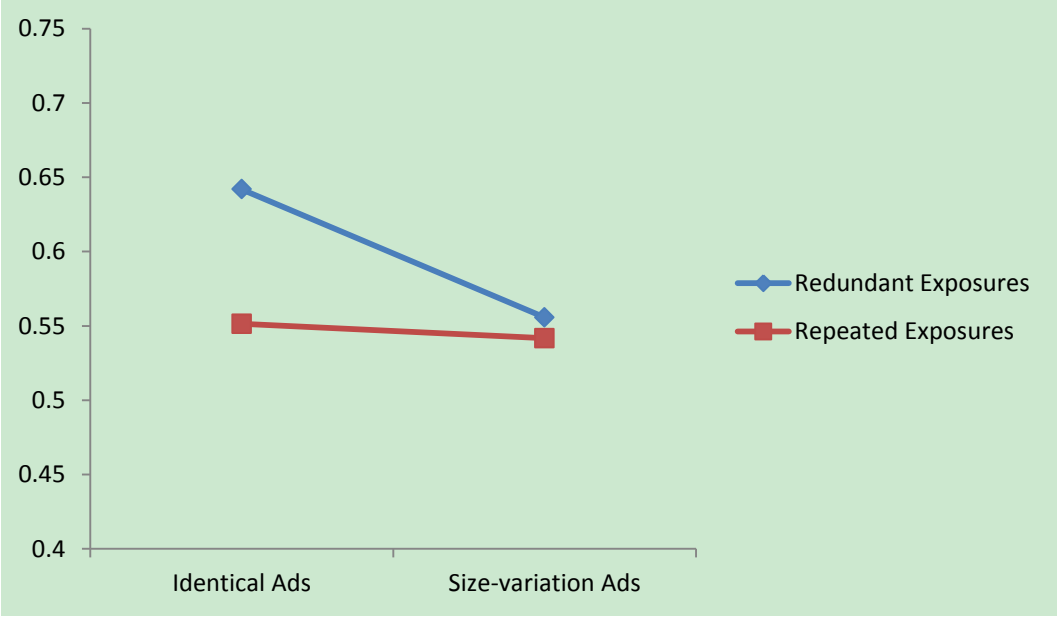
The test revealed a significant interaction of ad exposure strategy and ad variation on brand preference ($F(1,143) = 4.353$, $p = .039$), as well as a main effect of ad exposure strategy ($F(1,143) = 8.140$, $p = .005$) and a main effect of ad variation ($F(1,143) = 6.849$, $p = .010$).

Post-hoc pairwise comparisons showed that brand preference in the redundant-identical ad condition (M = .6419, sd = .1121) was significantly higher than both repeated exposure conditions (repeated-identical ads: M = .5514, sd = .1143, p = .001; repeated-size variation ads, M = .5417, sd = .1086, p < .001).

However, brand preference in the redundant-size variation condition was not different from either of the repeated exposure conditions (repeated-identical ads: p = .869; repeated-size variation ads, p = .591).

In other words, when multiple ads were exactly identical, redundant exposures led to greater brand preference than repeated exposures. On the other hand, when the ads varied in size, the two exposure strategies had no difference (see Figure 5).

Figure 5. Redundant vs. Repeated Exposure Effects on Brand Preference



Additional Analysis for Analysis 2

Following analysis 2, an additional two-way ANOVA test was conducted to examine whether redundant exposures were different from repeated exposures in the 0-page condition.

The results indicated a marginally significant interaction effects of ad exposure strategy and ad variation on brand preference ($F(1,143) = 3.713$, $p = .056$). The main effect of ad exposure ($F(1,143) = .154$, $p = .695$) and the main effect of ad variation ($F(1,143) = 2.211$, $p = .139$) were both non-significant.

Post-hoc pairwise comparisons revealed that there was no difference between redundant and repeated exposure strategies in all comparisons (all p's > .1).

The findings indicate that, when ad spacing between two repeated exposures was very short, redundant exposures did not seem to have an advantage over repeated exposures in influencing brand preference.

Summary

Experiment 2 examined the effects of redundant ad exposure strategy on brand preference, relative to single exposure and repeated exposure strategies. Same as Experiment1, the factor of ad variation was included to test if this variable interacted with ad exposure strategy to affect brand preference effects.

The results showed that redundant-identical ad exposures led to greater brand preference than single exposure, but redundant-size variation exposures did not. On the

other hand, both redundant exposures and single exposure resulted in greater brand preference than chance.

Meanwhile, subjects' response time to brand preference judgment was also examined. It was found that subjects responded to target brands much faster after redundant-identical ad exposures than single exposure. However, the subjects did not show faster responses after they were exposed to redundant-size variation ads. These findings seem to suggest that redundant exposures to identical ads facilitate perceptual fluency of brand processing.

Last, the results also revealed an interaction effect of ad exposure strategy and ad variation on brand preference. Redundant exposures to identical ads gave rise to greater brand preference than both repeated exposure strategies, but redundant exposures to size-variation ads did not. An additional analysis, on the other hand, showed that when redundant exposures were compared with repeated exposures in the 0-page condition, the two exposure strategies had no difference at all. These findings suggest that comparison of redundant and repeated exposures should take into consideration ad spacing as an significant factor.

In sum, it is concluded from Experiment 2 that a redundant-identical ad exposure strategy is more likely to generate a redundancy gain effect for brand preference than single exposure and repeated exposure strategy. Further discussion of these findings is provided in the next chapter.

Chapter 5

General Discussion

Conclusions and Discussion

Redundant exposure is an emerging ad exposure strategy on the Internet. Although a sufficient amount of studies have examined other online ad exposure strategies such as single exposure and repeated exposure, research on redundant exposure is scant and calls for attention.

The current study examined the effects of redundant ad exposure strategy on brand memory and brand preference relative to single exposure and repeated exposure strategies, in the context of incidental ad exposure. The study also took into consideration the factor of ad size variation and tested whether size variation would interact with ad exposure strategy to influence both brand memory and brand preference.

In general, the findings revealed a redundancy gain effect for redundant exposures to identical ads, but not for size-variation ads, in both brand memory and brand preference (see Table 4 for a summary of the findings). These findings are discussed in the following text, and their theoretical and managerial implications are provided.

Table 4. Summary of Hypotheses Testing and Research Question Results

Hypotheses/Research Question	Significance	Results
H1: When ad exposure on the Internet is incidental, redundant exposures to a display ad leads to greater brand memory than single exposure to the ad.	.136 .016 (identical ads) .838 (size-variation ads) *Both redundant and single exposure effects are above chance (50%)	Not supported Supported Not supported
H2: When ad exposure on the Internet is incidental, redundant exposures to a display ad leads to (a) greater brand preference and (b) faster response to brand preference judgment, than single exposure to the ad.	(a) .051 .001 (identical ads) .995 (size-variation ads) *Both redundant and single exposure effects are above chance (50%) (b) .019 .004 (identical ads) .251 (size-variation ads)	 Supported Supported Not supported Supported Supported Not supported
RQ1: When ad exposure on the Internet is incidental, what are the comparative effects of redundant exposures and repeated exposures to a display ad on (a) brand memory and (b) brand preference?	(a) No difference between redundant and repeated exposures (p = .203). (b) Redundant exposures more effective than repeated exposures (p = .005).	
RQ2: Does ad size variation affect the effects of redundant exposures on (a) brand memory and (b) brand preference, in comparison with single exposure and repeated exposures?	(a) (1) Redundant-identical ad exposures more effective than repeated-size variation exposures (p = .003). (2) Except (1), no difference between redundant and repeated exposures (all p's > .1). (3) Identical-ad exposures more effective than size-variation exposures (p = .003). (4) *No difference between redundant exposures and 0-page-spacing repeated exposures (all p's > .1) (b) (1) Redundant-identical ad exposures more effective than repeated-identical ad exposures (p = .001) and repeated-size variation exposures (p < .001). (2) Redundant-size variation exposures not different from repeated-identical ad exposures (p = .869) or repeated-size variation exposures (p = .591). (3) *No difference between redundant exposures and 0-page-spacing repeated exposures (all p's > .1)	

*Additional analyses

First and foremost, why was a redundancy gain effect obtained only when the ads were exactly identical? How could changing ad size eliminate the gain? These are the most interesting and surprising findings because they can hardly be interpreted from the theoretical view of ensemble coding. Therefore, the findings may be specific to the context of online advertising in the current study.

In contrast to previous studies of redundancy effects in psychology where redundant information was often presented alone (i.e., without being placed in a context), redundant ads in the current study were surrounded by other online information. That said, the ads had to compete with such information for visual processing.

Previous research has shown that consumers' response to individual pieces of advertising is heavily influenced by the ads' immediate context through processing mechanisms including assimilation and contrast processing, semantic, item-specific, and relational processing (Appel, 2000; Cauberghe, De Pelsmacker, and Janssens 2010; Chowdhury, Finn, and Olsen 2007; Danaher and Mullarkey 2003; Yaveroglu and Donthu 2008). Therefore, there is likelihood that subjects' responses to redundant ad exposures in the current study were subject to the influence of the web context.

The findings seems to suggest that in a complex and competitive information environment such as on a webpage, keeping multiple ads consistent is more effective than varying them (e.g., in sizes). In fact, similar conclusions can be found from previous studies regarding the effects of repeated banner ad exposures on the Internet. These studies showed that, when web information was abundant, repeating exactly identical ads led to greater brand responses than repeating the same brand ads with different ad executions (Chatterjee 2005; Yaveroglu and Donthu 2008).

Second, so far little is known with regard to the neural mechanisms underlying ensemble coding (Alvarez 2011; Haberman and Whitney 2012). Findings from the current study may provide some insights into the neural processing stages at which ensemble coding or redundancy effects occur.

In the current study, size-variation ads are perceptually different in shape. Previous research in neurophysiology showed that brain ventral pathway played an important role in shape perception. In this pathway, the area of V4 was a critical intermediate stage where simple shapes could be recognized and distinguished, before leading toward complex shape identification in later stages (Pasupathy and Connor 1999). That said, the perceived difference of size-variation ads might start to emerge in V4. Additionally, other brain imaging studies showed that when multiple visual stimuli were simultaneously presented, the extrastriate areas of V1, V2, VP revealed no differences between response to similar stimuli and response to dissimilar (in orientation) stimuli (Beck and Kastner 2007). However, the area of V4 indicated differences such that response to dissimilar stimuli was weaker than response to similar stimuli (Beck and Kastner 2007). Therefore, it is possible that ensemble coding occurs at the stage of V4 or later. This hypothesis awaits future neurophysiological research to prove.

Third, results from comparisons of redundant exposures and repeated exposures seem to suggest that, given small and equal number of exposures (e.g., two in the current study), the synergic effects of redundant exposures to identical ads are stronger than those of repeated exposures. But note that, the less effectiveness of repeated exposures might be partially due to the way the repeated ads were presented in the experiment.

In the repeated exposure condition, two ads of different brands were presented on the same page, which introduced a condition for "biased competition". According to the biased competition model in vision research, because human vision has a limited processing capacity, when more than one visual object are presented simultaneously within a visual receptive field, different objects would compete with one another in a mutually suppressive way to gain access to cognitive processing resources for encoding and mental presentation (Bles et al. 2006; Desimone and Duncan 1995; Hopf et al. 2006; Kastner et al. 2001; Reynolds, Chelazzi, and Desimone 1999). Therefore, the two ads were likely to compete for visual processing, and such competition might bring down the ads' effects to some degree. On the other hand, from a practical point of view, considering the fact that web sites were often flooded with all sorts of ads, showing multiple ads on the same webpage yields a higher external validity.

Additionally, the experiments also revealed that when ads were repeated shortly, the effects of repeated exposures were in fact not significantly different from those of redundant exposures. This finding sets a boundary condition for the comparative effects of the two exposure strategies.

In sum, the present study contributes to advertising literature by being the first to offer a comprehensive understanding of redundant ad exposure strategy on the Internet, which suggests that redundant exposures to identical display ads enhance brand memory and brand preference.

This study also contributes to science by showing that redundant information has mnemonic and affective consequences. So far the focus of psychological research in redundancy effects has been mostly on perception and on low-level stimuli, and less is

known about redundancy effects on higher cognition and in complex scene (Haberman and Whitney 2009). Alvarez (2011, p. 128) once speculated that "at the level of the ensemble representation, it is clear the data have been transformed into a more compressed form. It is possible that this format is more conductive to memory storage and learning." In response to these concerns and speculations, the current study showed that redundant information not only improved memory but also enhanced liking of the information in a realistic and complex online environment.

Managerial Implications

The world is changed. Media planners may need to rethink conventional and modern ad exposure strategies on the Internet in connection with incidental ad exposure. The current study has two major managerial implications to offer with regard to exposure effectiveness.

First, although online technologies have made it possible to create display ads in various sizes and executions, the present study clearly demonstrated that there was a "redundancy gain" and a "variety loss". In traditional media like TV, consumers watch a commercial carefully. In that media environment, variety is necessary as tedium and boredom with the commercial set in fairly quickly. However, in a new media environment such as the Internet where webpage exposure can be fleeting and ad exposure is peripheral, variety should not be a major concern. Instead of worrying about variety, media planers may want to consider redundancy gain.

Second, former research has suggested using repeated ad exposure strategy to improve ad effects. Because there is an exposure-response curve for ad effectiveness, the

question of how many exposures are needed for ads to be effective has always been around and controversial. What has been shown in the current study is that redundant exposure strategy pushed the curve of effectiveness faster than repeated exposure strategy, as the former led to more significant effects than the latter given equal number of exposures.

On the other hand, redundant exposure strategy should also be used in caution. Assuming advertisers plan to repeat redundant-ad-exposure on different webpages, such combined-exposure strategy may cause the ads to wear out faster than regular repeated exposures, as the former may generate more irritation.

Limitations and Suggestions for Future Research

As with all research, this study has limitations. First, the number of ads in the multiple-exposure conditions was not manipulated, and only two ads were presented in each condition.

Increasing the number of redundant ads, however, may strengthen the ads' representation and enhance their effects. As scholars have argued, increasing the amount of redundant information can increase accuracy of ensemble judgments, and as a result ensemble representation of a large enough sample of information out of focal attention can be almost as accurate as that inside of focal attention (Alvarez 2011)

Showing a large number of identical display ads on the same webpage may be unusual unless it is to make a mosaic-wall of ads or brands (similar as the mosaic-screen of a TV). However, in everyday life, it is not uncommon to see a large quantity of identical ads in other ad-supported media (e.g., the same flyers plastered on a whole

bulletin board; redundant movie posters covering a full wall). Therefore, future research is encouraged to examine redundant ad exposure effects (1) with larger number of ads and (2) in other media.

Furthermore, the content of the display ads in the present study was static. Therefore, it would be interesting to test redundant exposures to ads with dynamic content such as TV commercials on multi-LCD screens or on a TV's mosaic-screen. Meanwhile, it would also be interesting to examine how cross-media redundant ads work (e.g., one ad is shown on a printed poster and another is shown on a LCD outdoor display).

Second, in the current study, each webpage was controlled for 10-second exposure duration. It is unknown if increasing or shorten the exposure duration would affect the comparative effects of redundant and repeated exposures.

On the one hand, it is suggested that a prolonged exposure should increase redundancy gain effects (Won and Jiang 2010) as well as familiarity of repeated objects. On the other hand, as is known that fluency as an informative cue can be discounted if subjects realize that the true source of fluency is irrelevant to the ongoing judgment (Alter and Oppenheimer 2009). Because ad repetition affects brand preference via the fluency mechanism and a prolonged exposure may increase subjects' awareness of the true source of fluency, as exposure duration increases, ad repetition effects on brand preference are likely to change. Accordingly, the comparative effects of redundant exposures and repeated exposures may show difference from what has been found in the current study. Future research can test this hypothesis.

Third, the current study manipulated size-variation ads by changing the ad's length and width, which resulted in one ad being horizontal and the other being vertical. Results of this manipulation may be confounded with the factor of an object's "orientation". What if both ads are horizontal or vertical? This issue awaits further investigation.

Finally, findings in the present study reflect an immediate effect of redundant ad exposure strategy, because subjects' brand memory and brand preference were measured approximately five minutes after stimuli exposure. It is unknown if such exposure effects could sustain a longer time period such as days or even weeks. Future studies are encouraged to examine the delayed effects of redundant ad exposure strategy on brand memory, brand preference, and other brand-related responses including brand choice and purchase intention.

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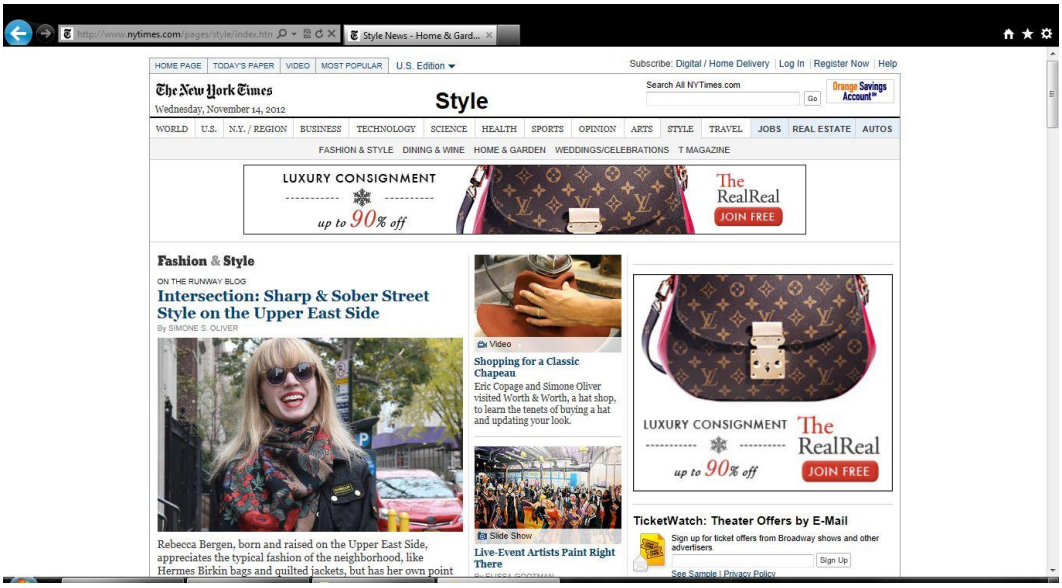
Appendix A

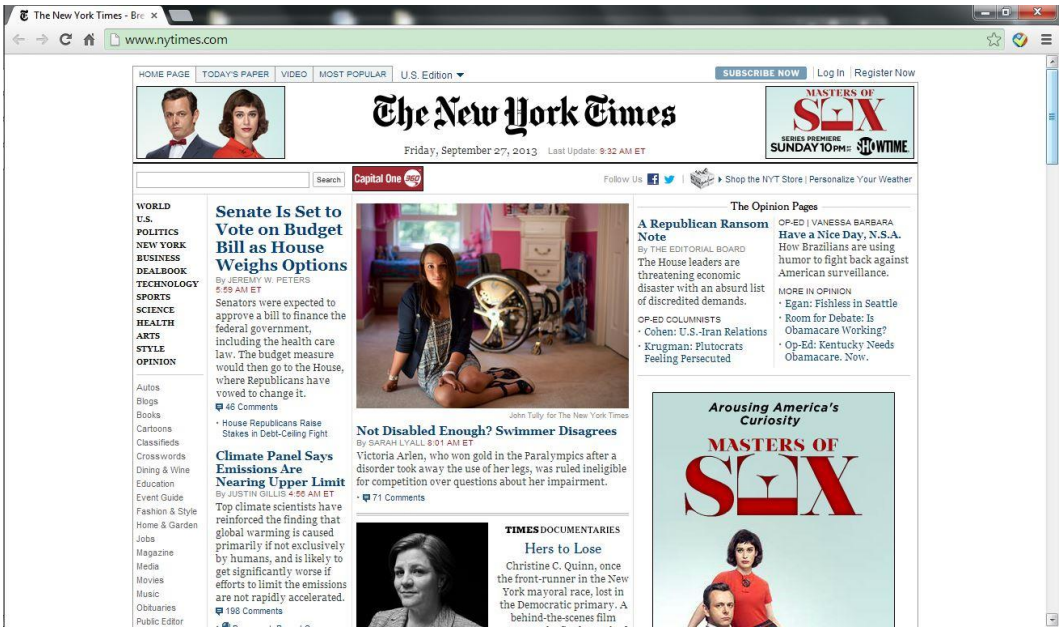
Real Examples of Redundant Ads

Online source: http://adsofjapan.com/?tag=repetition

Online source: http://www.dailybillboardblog.com/2012/01/denzel-washington-safe-house-movie.html

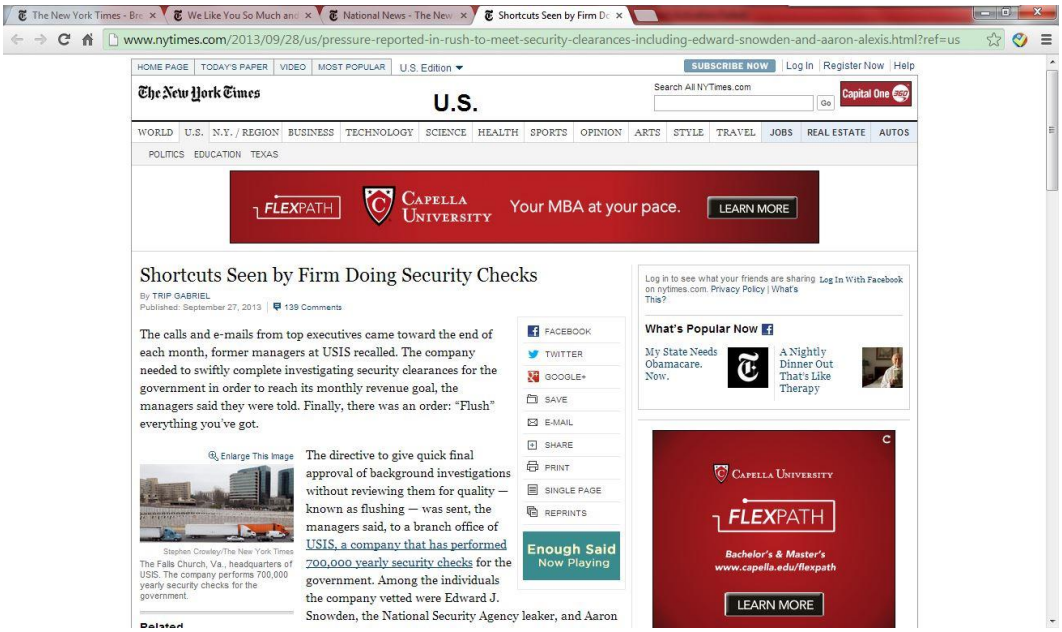


Online source: www.nytimes.com

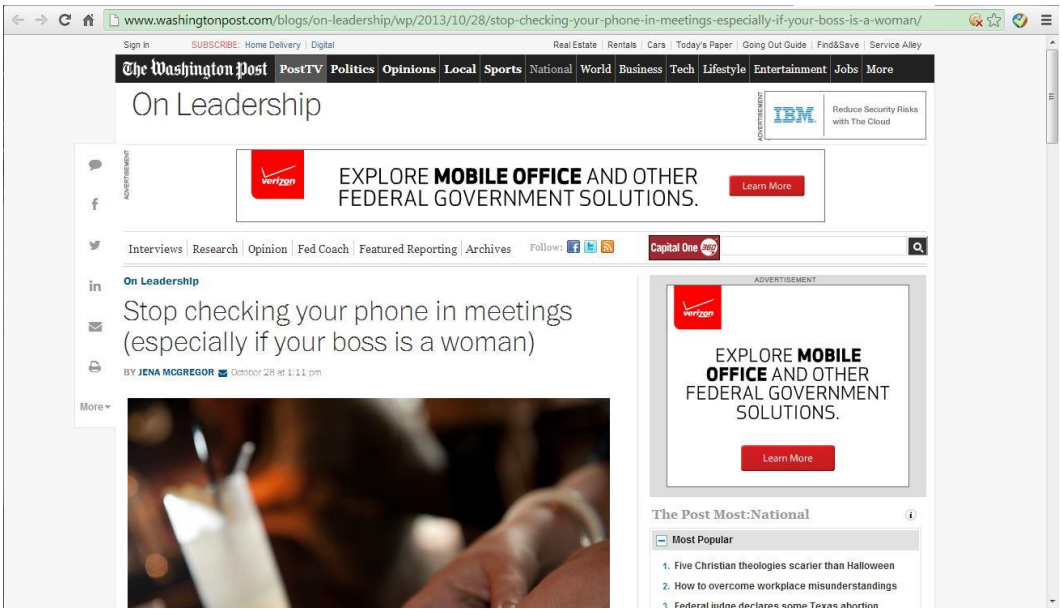


Online source: www.nytimes.com

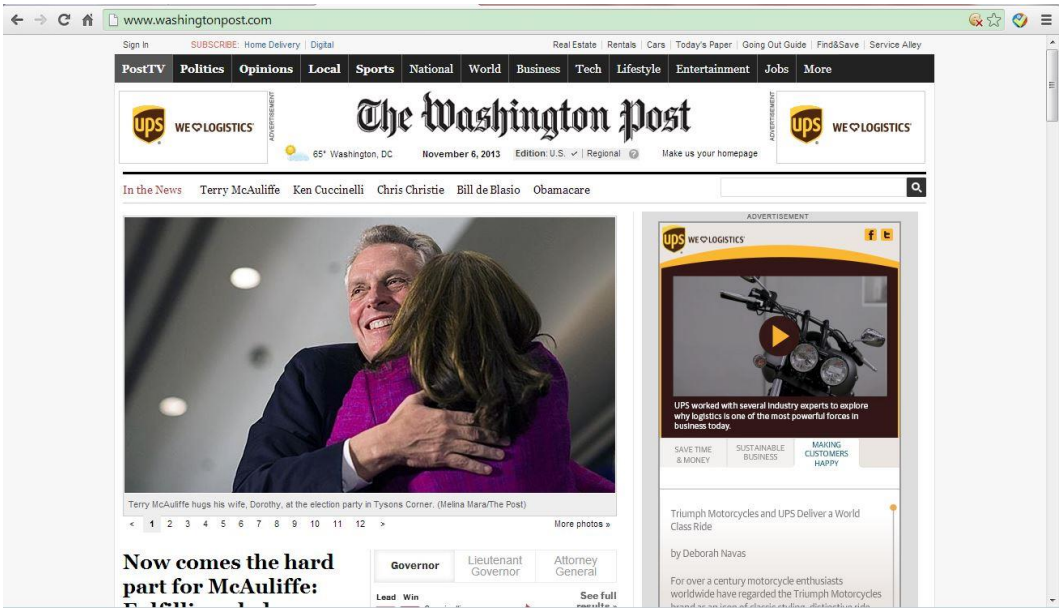
Online source: www.nytimes.com



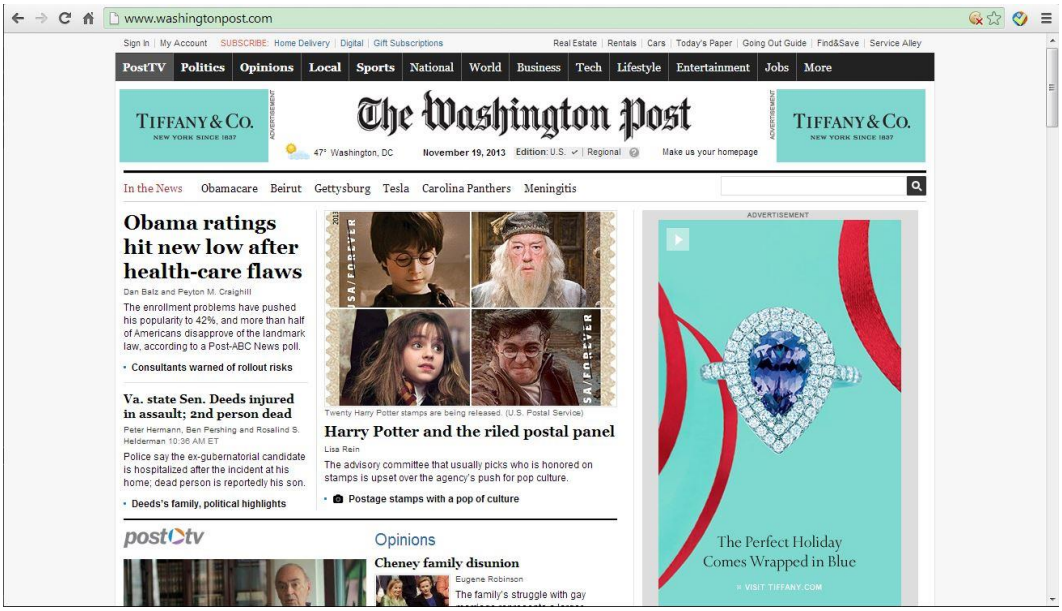
Online source: www.nytimes.com



Online source: http://www.washingtonpost.com/



Online source: http://www.washingtonpost.com/



Online source: http://www.washingtonpost.com/

Online source: http://www.denverpost.com/

Appendix B

Experimental Stimuli

Appendix B.1

Redundant Ad Exposure Conditions

Exactly Identical Ads

Identical Ads with Size Variation

Appendix B.2

Repeated Ad Exposure Conditions

Exactly Identical Ads

First Exposure

(10 s)

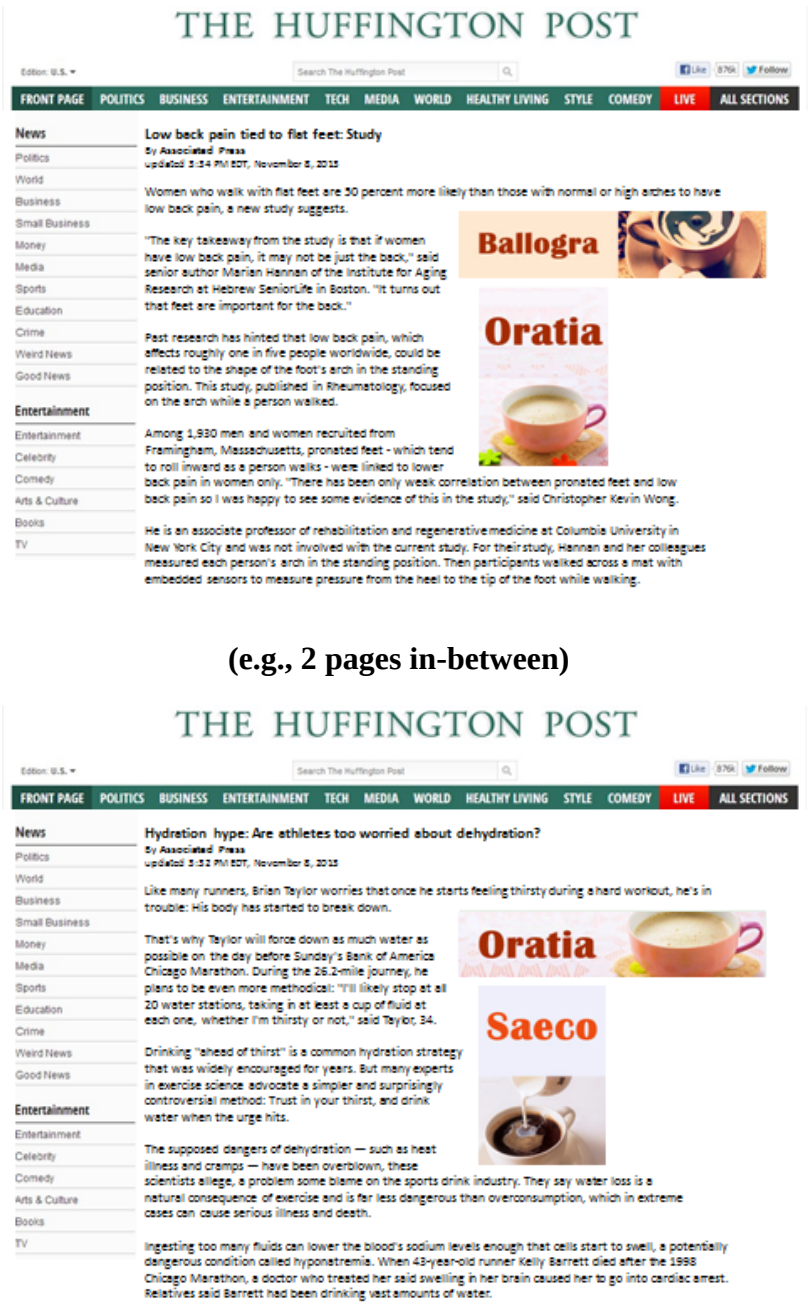
(e.g., 10 pages in-between)

Spacing

Second Exposure

(10 s)

Identical Ads with Size Variation



(e.g., 2 pages in-between)

First Exposure

(10 s)

Spacing

Second Exposure

(10 s)

Appendix B.3

Single Ad Exposure Conditions

THE HUFFINGTON POST

Edition: U.S. ▾ Search The Huffington Post Like 876k Follow

FRONT PAGE | POLITICS | BUSINESS | ENTERTAINMENT | TECH | MEDIA | WORLD | HEALTHY LIVING | STYLE | COMEDY | LIVE | ALL SECTIONS

News
Politics
World
Business
Small Business
Money
Media
Sports
Education
Crime
Weird News
Good News

Entertainment
Entertainment
Celebrity
Comedy
Arts & Culture
Books
TV

Supplements may not guard against cancer, heart disease

By Associated Press
updated 4:14 AM EST, November 8, 2013

There is little evidence that vitamin and mineral supplements protect people from cancer and heart problems, according to a new analysis.

Based on those findings, a U.S. government-back panel issued draft recommendations that echo its previous conclusion: it cannot recommend for or against taking vitamins and minerals to prevent those conditions.

"At this point in time the science is not sufficient for us to estimate how much benefit or harm there is from taking vitamin or multivitamin supplements to prevent cancer or heart disease," Dr. Michael LeFevre said. LeFevre is co-vice chair of the U.S. Preventive Services Task Force (USPSTF), which issues recommendations to help guide doctors and health systems. The USPSTF sponsored the new analysis.

The panel's draft statement also says neither beta-carotene nor vitamin E should be taken to prevent heart disease or cancer. Previously, beta-carotene was found to further increase the risk of lung cancer among people who are already at an increased risk.

Approximately 600,000 people die of heart disease in the U.S. every year, according to the Centers for Disease Control and Prevention. Another 580,000 die of cancer, the American Cancer Society says.

Cancer and heart disease share a number of risk factors including inflammation, researchers wrote in the Annals of Internal Medicine. Animal and lab studies have suggested supplements may guard against some of those risk factors.

Appendix C

List of Target Brands

~Ascaso

~Escor

~Saeco

~Ballogra

~Oratia

~Petlas

~Bodum

~Elasto

~Pronto

~Bialetti

~Melitta

~Lupicia

~Tchibo

~Lassa

~Derwent

~Damiani

~Nemox

~Alessi

~Bentse

~Berol

Appendix D

List of Distractor Brands

~Dallmay

~Brisa

~Bauma

~Vibiem

~Kenda

~Dilmah

~Gamley

~Faucho

~Nuova

~Trelle

~Rancilio

~Kienzle

~Namiki

~Baccarat

~Elseve

~Douwe

~Faema

~Stabilo

~Pelikan

~Tusker

Appendix E

Experiment Instructions

Appendix E.1

Reading Task Instructions

First page

Instruction

In this study, we want you to go through 22 mock webpages from "The Huffington Post", a news website. Like most news sites, each webpage includes a news article, several banner ads, and other web elements.

Your task is to read each article just like you **normally** do when browsing a news website in your daily life.

At the end of the task, we will ask you a few questions about the **content** of the articles you have read.

The webpage will automatically change to the next one in 10 seconds. However, you don't need to rush at all because we are NOT asking you difficult questions. But we do want you to **focus on each article** and read it naturally.

This task will take less than five minutes. Please don't get distracted even if you feel bored during the process. **Keep focused!**

If you have any questions, please ask the researcher for help. If you are ready, please press "→" and begin reading. Thank you!

Last Page

You have completed the first task! Thank you!

Now, we want you to do the second task.

Please press the "Esc" key to exit and then close the PowerPoint.

Please click the "DirectRT" in the taskbar to start your second task.

Appendix E.2

Article Knowledge Test

(Screen 1) In this task you will be asked to answer five very short questions about the content of the articles you have just read.

You have one minute to read and answer each question. The time is computer-controlled.

Please use the keyboard to type your answer.

If you are ready, press the spacebar to begin

(Screen 2) One of the articles talked about bilingualism. What do you remember about this article?

(Screen 3) Next question
(shown 3 seconds)

(Screen 4) One article discussed the relationship between sleep and heart disease. People who tended to get less than how many hours of sleep nightly were more likely to have high blood pressure, high cholesterol, diabetes and to be obese?

(Screen 5) Next question
(shown 3 seconds)

(Screen 6) One of the articles mentioned about eating disorder. Besides young women, who did the new study in the article suggest can also become obsessed with their appearance and go to extremes to enhance their bodies?

(Screen 7) Next question
(shown 3 seconds)

(Screen 8) One article talked about vitamin and mineral supplements. Was there any evidence that these supplements protected people from cancer and heart problems?

(Screen 9) Next question
(shown 3 seconds)

(Screen 10) One of the articles mentioned that women who were during pregnancy might be at heightened risk of having a low-birthweight baby. Why was that?

(Screen 11) Thanks for your answers!

Now please press the spacebar to start you last task!

Appendix F

Dependent Measure for Experiment 1

Appendix F.1

Recognition Measures

Computer Instructions

(Screen 1) In the next task you will be asked to make a series of judgments as quickly as you can. The judgments themselves are easy, but the difficult part is making them quickly.

You will be pressing the "Y" key and the "N" key in order to make your judgments.

In order to help you make these judgments as fast as you can, please keep your index fingers on the "Y" and "N" keys throughout the task. This will help you respond more quickly, as you won't have to move your hand to make your decision.

Please practice by pressing the "Y" key now.

(Screen 2) (The screen shows a "Y", and the subject makes a choice; if a wrong letter is chosen, the screen freezes, and the subject has to choose again)

(Screen 3) CORRECT!
Now practice pressing the "N" key

(Screen 4) (The screen shows an "N" and the subject makes a choice; again, if a wrong letter is chosen, the screen freezes and the subject has to choose again)

(Screen 5) CORRECT!
Press the spacebar to read the task description

(Screen 6) In this task, we will show you a number of brand names. You will see one brand name at a time.

We want to know whether you recognize having seen the brand name appeared on the webpages during your news reading task.

If you recognize having seen the brand name, press the "Y" key. If not, press the "N" key.

There are no right or wrong answers! All you want to do is to make a FAST and ACCURATE judgment! Remember, FAST and ACCURATE!!

You have up to 1.5 seconds to make the judgment. When time is up, you will receive a reminder on the screen. At that time, you MUST make your judgment IMMEDIATELY.

If you have any questions, please see the experimenter. Otherwise, press the spacebar to begin.

(Screen 7) (A series of 40 brands are presented and the subject makes a judgment)

To

(Screen 46)

(Screen 47) **(**Debriefing)

Thank you very much for being in our study today. We think the results will really contribute to our understanding of humans.

Press the spacebar to finish and please fill out the questionnaire on your desk.

Appendix F.2

Questionnaire

ID Number _____

1. Do you have normal or corrected-to-normal (with glasses or contacts) vision? **Yes** **No**

2. Are you colorblind? **Yes** **No**

3. Are you left-handed or right-handed? **Left** **Right**

4. How many hours per day do you use the Internet (not including e-mail)? _____

5. How often do you read online newspapers?

A. Every day or almost every day

B. 3 or 4 times a week

C. 1 or 2 times a week

D. Less than once a week

E. Never or almost never

6. For the news reading task, were you

Not **focused** at all 1 2 3 4 5 6 7 8 9 Completely **focused** on task

Not **involved** at all 1 2 3 4 5 6 7 8 9 Completely **involved** in task

Not **engaged** at all 1 2 3 4 5 6 7 8 9 Completely **engaged** in task

7. Have you been exposed to any of the brand names on the webpage outside of the experiment? (Please circle the brand name you've been exposed to)

Ascaso Escor Saeco Ballogra Oratia Petlas Bodum Elasto

Pronto Bialetti Melitta Lupicia Tchibo Lassa Derwent Damiani

Nemox Alessi Bentse Berol Dallmay Brisa Nemox Vibiem

Kenda Dilmah Gamley Faucho Nuova Trelle Rancilio Kienzle

Namiki Baccarat Elseve Douwe Faema Stabilo Pelikan Tusker

8. What's your gender? **Male** **Female**

9. What's your age? _____

10. Which of the following best represents your racial or ethnic heritage?

A. Non-Hispanic White or Euro-American

B. Black, Afro-Caribbean, or African American

C. East Asian or Asian American

D. South Asian or Indian American

E. Middle Eastern or Arab American

F. Native American or Alaskan Native

G. Other _____

If there is another person in your room, please wait for that person to complete the computer task and this questionnaire.

Please let the researcher know when everyone in the room is finished with the questionnaire.

Appendix G

Dependent Measure for Experiment 2

Appendix G.1

Preference Measures

Computer Instructions

(Screen 1) In the next task you will be asked to make a series of judgments as quickly as you can. The judgments themselves are easy, but the difficult part is making them quickly.

You will be pressing the "E" key and the "I" key in order to make your judgments.

In order to help you make these judgments as fast as you can, please keep your index fingers on the "E" and "I" keys throughout the task. This will help you respond more quickly, as you won't have to move your hand to make your decision.

Please practice by pressing the "E" key now.

(Screen 2) (The screen shows a “E”, and the subject makes a choice; if a wrong letter is chosen, the screen freezes, and the subject has to choose again)

(Screen 3) CORRECT!
Now practice pressing the "I" key

(Screen 4) (The screen shows an “I” and the subject makes a choice; again, if a wrong letter is chosen, the screen freezes and the subject has to choose again)

(Screen 5) CORRECT!
Press the spacebar to read the task description

(Screen 6) In this task, we will show you a number of brand names. You will see two brand names at the same time, one on the left and one on

the right.

We want to know which of the two brand names you like more with your gut feeling.

If you prefer the left one, press the "E" key. If you prefer the right one, press the "I" key.

There are no right or wrong answers! We are MOST interested in your FIRST impression and your IMMEDIATE reaction to the brands!

For that reason, we want you to

1. be as ACCURATE as you can about the brand you like most!
2. make a Quick judgment based on your first impression

You have up to 1.5 seconds to make the judgment. When time is up, you will receive a reminder on the screen. At that time, you MUST make your judgment IMMEDIATELY.

If you have any questions, please see the experimenter. Otherwise, press the spacebar to begin.

(Screen 7) (A series of 22 pairs of brands are presented and the subject makes a judgment)

To

(Screen 28)

(Screen 29) **(**Debriefing)

Thank you very much for being in our study today. We think the results will really contribute to our understanding of humans.

Press the spacebar to finish and please fill out the questionnaire on your desk.

Appendix G.2

Questionnaire

ID Number _____

1. Do you have normal or corrected-to-normal (with glasses or contacts) vision? **Yes** **No**

2. Are you colorblind? **Yes** **No**

3. Are you left-handed or right-handed? **Left** **Right**

4. How many hours per day do you use the Internet (not including e-mail)? _____

5. How often do you read online newspapers?

A. Every day or almost every day

B. 3 or 4 times a week

C. 1 or 2 times a week

D. Less than once a week

E. Never or almost never

6. How difficult do you think the news reading task was?

Not difficult at all 1 2 3 4 5 6 7 8 9 **Very difficult**

7. For the news reading task, were you

Not **focused** at all 1 2 3 4 5 6 7 8 9 Completely **focused** on task

Not **involved** at all 1 2 3 4 5 6 7 8 9 Completely **involved** in task

Not **engaged** at all 1 2 3 4 5 6 7 8 9 Completely **engaged** in task

(continue to the next page)

8. Have you been exposed to any of the brand names on the webpage outside of the experiment? (Please circle the brand name you've been exposed to)

Ascaso Escor Saeco Ballogra Oratia Petlas Bodum Elasto

Pronto Bialetti Melitta Lupicia Tchibo Lassa Derwent Damiani

Nemox Alessi Bentse Berol Dallmay Brisa Nemox Vibiem

Kenda Dilmah Gamley Faucho Nuova Trelle Rancilio Kienzle

Namiki Baccarat Elseve Douwe Faema Stabilo Pelikan Tusker

9. What's your gender? **Male** **Female**

10. What's your age? _____

11. Which of the following best represents your racial or ethnic heritage?

A. Non-Hispanic White or Euro-American

B. Black, Afro-Caribbean, or African American

C. East Asian or Asian American

D. South Asian or Indian American

E. Middle Eastern or Arab American

F. Native American or Alaskan Native

G. Other _____

If there is another person in your room, please wait for that person to complete the computer task and this questionnaire.

Please let the researcher know when everyone in the room is finished with the questionnaire.