

# The impact of context on display ad effectiveness: Automatic attitude activation and applicability



Shiu-li Huang\*

Department of Business Administration, National Taipei University, No. 151, University Rd., San Shia District, New Taipei City 23741, Taiwan, ROC

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## ABSTRACT

Display and search ads are the most popular Internet ad formats. Instead of being placed on search engine result pages, display ads are placed on webpages that include more actual content. In order to improve online contextual advertising, the effects of webpage content on embedded display ads must be understood. This study investigates how viewers' attitudes toward content and the applicability of that content to the adjacent display ads impact the effectiveness of those ads. The moderating effects of viewers' attention and need for cognition are also examined. The experimental results show that webpage content automatically activates ad evaluations, and that this effect increases when viewers pay less attention to the ad or have a high need for cognition. If the webpage content is highly applicable to the ad, improvements are seen in the attitude toward the ad and the attitude toward the brand.

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## 1. Introduction

Online advertising revenues continue to increase at a high rate. The IAB's Internet Advertising Revenue Report showed that Internet advertising revenues in the United States totaled \$42.8 billion in 2013, an increase of 17% over 2012. According to Nielsen's Global AdView Pulse Report, although the majority of global ad dollars were spent on television ads in 2013, Internet ad spending grew faster than that of any other media. The market research company eMarketer reported that search and display ads are the most popular Internet ad formats, making up roughly 90% of online ad spending. While search ads placed on the results pages of search engines are selected by matching the key search terms entered by users, display ads are placed on webpages that include more actual content. Internet users spend the majority of their time online on content page views. Search page views make up only 3–5% of all page views on the Web (Geddes, 2012). In most cases, however, webpage display ads are selected either randomly or based on correlations with keywords in the page content. In order to improve the effectiveness of display ads, the effects of webpage content on embedded display ads must be more deeply investigated and understood.

Internet advertising services such as Google AdWords, Yahoo! Search Marketing, and Bing Ads use ad delivery systems a.k.a. ad servers to place advertisements on websites and search engine

results pages. Geddes (2012) described how Google AdWords matches display ads with webpages in its display network. First, Google scans a page and assigns a theme to that page. Next, Google scans the advertiser's ad group (a collection of closely related keywords) and assigns a theme for that ad group based on the keywords chosen by the advertiser. Finally, Google places the display ad on a page when the webpage content and the advertiser's ad group contain the same theme. Existing Internet advertising services have not considered concept-level congruence between webpage content and ads and the effect of viewers' attitudes toward webpage content on display ads for online advertisement delivery.

Little research has been done to investigate the effects of webpage content on embedded ads. Huang and Chen (2012) found that mood states induced by webpage content impact viewers' attitudes (toward the products advertised by banner ads), purchase intentions and ad clicks. Induced positive mood states have favorable impacts. Attitude, emotion and mood are basic affective concepts (Zhang, 2013). Attitude is a summative evaluation of a stimulus (Cacioppo and Berntson, 1994; Crites et al., 1994). Emotion is an affective state induced by or attributed to a specific stimulus (Barrett et al., 2007; Clore and Schnall, 2005; Russell, 2003). Attitudes and emotions are a person's responses to a stimulus. Emotions are ephemeral and cannot be stored in memory. They exist only as long as the supporting cognition, perceptions or other elicitors are active. In contrast, attitudes are evaluative tendencies that do not necessarily vanish when one stops thinking about the object of the attitude (Clore and Schnall, 2005). Moods

\* Tel.: +886 2 86741111.

E-mail address: [slhuang@mail.ntpu.edu.tw](mailto:slhuang@mail.ntpu.edu.tw)

are low-intensity, diffuse, and relatively enduring affective states without a specific stimulus and with little cognitive content (Forgas, 2001). Context-induced moods and attitudes have more potential influence on individuals' judgments because moods and attitudes are relatively longer lived than emotions.

Prior studies on the effects of context on ad effectiveness focus mainly on context-induced moods rather than context-activated attitudes (Gardner, 1985; Huang and Chen, 2012; Luomala and Laaksonen, 2000; Poels and Dewitte, 2006). Though consumers' mood states are difficult to detect, particularly on the Web, several techniques like recommender systems (Adomavicius and Tuzhilin, 2005; Bobadilla et al., 2013; Huang, 2011) and opinion mining (Liu, 2011; Pang and Lee, 2008) can be used to detect or predict consumers' attitudes toward webpage content. The present study aims to investigate how a viewer's attitude toward the content of a webpage impacts the effectiveness of the embedded display ads.

In order to improve ad effectiveness, Internet advertising service providers ensure that the display ads they embed have the same themes or product categories as the webpages on which the ads are embedded. Prior studies have found that consumer responses to banner ads are enhanced when the product category of the advertised product is congruent with that of the website (Choi and Rifon, 2002; Moore et al., 2005). However, advertisers might want to increase viewers' impressions of certain display ads by allowing those ads to appear on a variety of websites or webpages. Is it appropriate to place a mobile-phone ad on a travel website? The important issue is how to determine the kinds of webpages on which ads can be appropriately placed even when the ads and webpage content are not theme-congruent. Thus, another aim of this study is to examine the effects of the applicability of webpage content to display ads. Applicability is the degree to which features of contextual primes and presented target stimuli overlap or fit (Shen and Chen, 2007). High applicability of the webpage content to the ads means that the concepts primed by the webpage content significantly overlap the attended features of the embedded ads (concept-level congruence). In contrast, high theme-congruence between webpage content and ads means that the webpage content and the ad focus on similar product categories. Content-ad theme congruence (e.g., placing a mobile-phone ad on a mobile-phone website) implies a high level of applicability; nevertheless, a high level of applicability may also occur when the webpage content and the ads are theme incongruent (e.g., placing a mobile-phone ad on a travel website that primes the concept "mobility"). The relevance between the features of webpage content and the features of display ads (or their landing pages) can be calculated using the techniques of information retrieval and document classification (Liu, 2011; Manning et al., 2008).

This study focuses on the contextual priming effects of webpage-content attitude and applicability because they can be detected and manipulated by information systems. Thus, the research findings can be used to improve ad delivery systems and, subsequently, enhance ad effectiveness. Furthermore, viewers may rely on contextual cues to process ad information and form their attitudes toward the ad if their elaboration levels are low (Petty and Cacioppo, 1986a,b). This study also investigates the moderating effects of both the attention viewers paid to the ad and their need for cognition on the influences of webpage content on ad effectiveness. To summarize, this study would like to answer the following research questions:

- RQ1: How does the viewer's attitude toward the webpage content impact the effectiveness of the embedded display ads?
- RQ2: How does concept-level congruence between the webpage content and the embedded display ads impact the effectiveness of the ads?

- RQ3: How do viewers' elaboration levels, particularly the attention they pay to the display ads and their need for cognition, moderate the context effect on ad effectiveness?

The remainder of this paper is organized as follows. The next section reviews relevant literature and proposes research hypotheses based on priming theory. The third section develops the research framework. The research methodology and experimental procedure are described in the fourth section. Data analysis results are described and discussed in the fifth and sixth sections. The paper concludes with theoretical and practical implications.

## 2. Literature review and hypothesis development

Interpretation of information often depends on the particular knowledge structures (e.g., concepts and schemas) that are currently active (Higgins and King, 1981; Wyer and Srull, 1981). Active or accessible concepts serve to direct attention to selective aspects of information and are likely to be used in subsequent interpretations. Priming refers to the process of activating parts of particular representations or associations in memory just before carrying out an action or task (Higgins and King, 1981). Individuals do not draw upon all cognitive schemata to guide information processing; rather, they tend to rely on the schema that is most accessible at the decision point (Higgins et al., 1985; Higgins and King, 1981). Priming could be applied to activate a user's previously stored schema (preexisting constellations of implicit knowledge, beliefs and expectations) and bring it to the working memory, which then becomes accessible for guiding information processing and judgment formation (Dou et al., 2010; Mandel and Johnson, 2002; Wyer and Srull, 1981). Priming works in implicit memory, a non-conscious form of human memory; it does not involve explicit or conscious recollection of previous experiences (Tulving and Schacter, 1990).

Priming effects can be explained via a spreading-activation model (Collins and Loftus, 1975; Klauer and Musch, 2003). The model views memory search as activation spreading from the node of the primed concept to the nodes linked to it in a semantic network, down to some depth. When another concept is subsequently presented, it makes contact with an activated node to find an intersection. The semantic network is organized along the lines of semantic similarity. The more properties two concepts have in common, the more closely related are the concepts. The priming of a concept increases its excitation level, and a concept's excitation level must reach a certain minimal threshold for that concept to be used in stimulus processing (Collins and Loftus, 1975; Higgins et al., 1985).

Environmental events or contexts can trigger both cognitive and affective reactions (Yi, 1990a). The advertising context can prime recipients with certain concepts or attributes and guide their interpretations of the information in the ad. In addition to cognitive priming, advertising context is often negatively or positively valenced, it can trigger overall affective reactions and, thus, affective priming occurs. In order to fully understand the impact of online context on display ad effectiveness, both cognitive and affective priming effects need to be examined.

Prior studies on affective priming in the context of advertising focus mainly on the effects of context-induced moods on ad effectiveness. Generally, consumers in context-induced positive moods have a more positive attitude toward the advertisement (Goldberg and Gorn, 1987; Huang and Chen, 2012; Yi, 1990a), a more positive attitude toward the brand (Gardner and Wilhelm, 1987) and a higher level of purchase intention (Huang and Chen, 2012; Yi, 1990a) than those in context-induced negative moods. However, how attitude toward the context (itself) affects ad effectiveness

has not been addressed well. The attitude toward the context may not transform into an intense mood. Furthermore, moods are especially difficult to detect in non-face-to-face situations (e.g., on the Internet). Thus, the question of whether or not attitude toward context can transfer to the evaluation of co-occurring advertisements is worth investigating. The present study examines and explains the relationship between consumers' attitude toward webpage content and their attitude toward the co-occurring display ad based on the phenomenon of automatic attitude activation.

Prior studies on cognitive priming in an advertising context focus mainly on the effects of concept accessibility (Coulter and Sewall, 1995; Schmitt, 1994; Yi, 1990a,b). Concept accessibility is the activation potential of the concept (Higgins, 1996). A concept can be made more accessible than its alternatives by priming that concept prior to stimulus exposure. Under such conditions, the concept stored in memory is more likely to be activated and used in subsequent processing of stimulus information. Yi (1990a) reported that a magazine article about the safety of air travel can prime the concept "safety" and make it accessible. The reader is more likely to interpret an ad for a big car in terms of safety. In contrast, a magazine article about an oil entrepreneur increases the accessibility of the concept of "fuel economy" and the reader is more likely to interpret the big car as not being fuel efficient. In addition to accessibility, concept applicability also influences the likelihood that the concept will be activated (Higgins, 1996). Applicability refers to the relationship between the features of the concept in memory and the attended features of a stimulus. The accessible concept "fuel economy" can be used to interpret a car ad because a car has the feature of fuel economy, which means that the concept of fuel economy is applicable to a car ad. In contrast, the concept of fuel economy is probably not applicable to a camera ad because a camera does not possess the feature of fuel economy and, thus, the cognitive priming effect might be low. The present study examines the cognitive priming effect on display ad effectiveness in terms of concept applicability. Understanding this relationship is useful to help online advertising service providers place appropriate ads on webpages based on their feature congruence.

The following subsections introduce the theoretical foundations of automatic attitude activation and applicability. Since the contextual effects on the persuasiveness of an ad can be moderated by the recipients' level of elaboration likelihood (Petty and Cacioppo, 1986a,b), this study further examines this moderating effect on the relationship between webpage content attitude and ad attitude. The research hypotheses are developed based on these theoretical foundations.

### 2.1. Automatic attitude activation

Automatic attitude activation refers to the phenomenon that presentation of an attitude object automatically activates the memory of the evaluation that an individual associates with that object (Fazio, 2001). This phenomenon can be explained by the effect of affective priming. Fazio et al. (1986) found that responses were faster in trials for which the participants' evaluations of the prime words were congruent with the connotation of the target words than in trials for which they were incongruent. For instance, the prime word "cockroach" is evaluated negatively by an individual. If the subsequently presented target word is also negative (e.g., "disgusting"), then the individual is able to indicate the connotation of the target word relatively quickly, faster than when a positive adjective (e.g., "appealing") serves as the target word. The spreading activation mechanism mediates the affective priming effect by activating the prime's representing node in a semantic network, and the activation then spreads to nodes of evaluatively consistent targets, thereby facilitating processing of those targets

but not of inconsistent targets (Fazio et al., 1986; Klauer and Musch, 2003).

According to the theory of automatic attitude activation, the presentation of an attitude object automatically activates affect-congruent concepts or thoughts, e.g., a positive attitude toward an object activates positive thoughts; a negative attitude toward an object activates negative thoughts in memory, and consequently these activated concepts bias the perception and interpretation of a target stimulus in an affect-congruent manner. Automatic attitude activation occurs even when the prime and target are goal independent or are less directly associated with each other (Fazio, 2001; Klauer and Musch, 2003). Marketing research has found that consumer attitudes toward one brand are likely to spill over to a second brand in the case of a brand alliance or brand extension (Boisvert, 2010; Simonin and Ruth, 1998; Votolato and Unnava, 2006). Consumers' brand attitudes and preferences can be positively influenced by celebrity endorsements if the celebrity is perceived as credible or attractive, or transfers the desired symbolic meanings (Patra and Datta, 2012). This influence occurs even the endorser is not a celebrity; for instance, salespeople are more persuasive if customers like them or perceive them as authoritative (Cialdini, 2008). The effects of context-elicited attitudes on advertisements have not been addressed well in prior studies on advertising.

Display ads are placed on webpages that include various types of content. The presentation of webpage content elicits the viewer's attitude toward the webpage content, i.e., a predisposition to respond in a favorable or unfavorable manner to particular webpage content during a particular exposure occasion. Viewers' attitudes toward webpage content activate positive or negative thoughts that may influence their attitudes toward the ads nearby. Thus, on the basis of the theory of automatic attitude activation, the present study posits that webpage content serves as a prime that biases the viewer's evaluation of the display ads placed on that page in an evaluatively consistent manner. The following hypothesis is proposed.

**H1.** Viewers who have a more positive attitude toward the webpage content have a more positive attitude toward the display ad on the page.

### 2.2. Applicability

Applicability refers to the relation between the features of some stored knowledge and the attended features of a stimulus. The greater the overlap between the features of the stored knowledge and the attended features of the stimulus, the greater the applicability of the knowledge to the stimulus and the greater the likelihood that the knowledge will be activated in the presence of the stimulus (Higgins, 1996).

Higgins et al. (1977) conducted an experiment in which subjects were first exposed to either the word "stubborn" or the word "persistent" and then asked to read a description of a person. They were then asked to characterize the ambiguous behavior of the target person. The result revealed that the subjects were more likely to use the constructs primed in the initial perception task to categorize the person's behavior. However, if priming constructs were non-applicable to the description of the stimulus person, e.g., grateful and sly, they would not be used to characterize subsequent behaviors. A priming construct becomes accessible in memory, however, it is not necessarily applicable to interpreting target stimulus. Applicability should not be confused with consistency. A "dishonest" behavior is inconsistent with the category "honest" but shares the dimension of honesty (Higgins, 1996). The conceptualization of applicability can be explained by activation spreading (Higgins, 1989). When a stimulus is presented all

constructs that share features with the stimulus are tested in parallel and the construct with the highest excitation level will be activated.

For online advertising, Choi and Rifon (2002) reported that greater relevance of the advertised product category to the website content theme leads to a more positive brand attitude. Similarly, Moore et al. (2005) found that if the advertiser and the website focus on a similar product category, consumers will have a more positive ad attitude. However, there has yet to be a proper investigation into the extent to which the applicability of webpage content to an ad will influence viewers' attitudes toward the ad and toward the advertised brand. Prior studies focused on the similarity between the product category of the website and the product category of the display ad. If the similarity is high, consumers think the ad provides useful information that meets their current needs and the congruent information is more easily assimilated, thus they have favorable attitudes toward the ad and brand. In contrast, *applicability* in priming theory refers to the relevance between the primed feature and the attended features of a stimulus. Thus, even when webpage content and the embedded ad are product-category incongruent, the webpage content could be applicable to the ad. For instance, an article about the safety of air travel can prime the concept "safety" and is therefore applicable to a car ad because the concept of safety is associated with the car feature of safety even though the product categories "air travel" and "car" are incongruent. Instead of the *product categories* of the website content and display ads, this study focuses on the *applicability of concepts activated* by the webpage content to display ads.

The present study posits that webpage content acts as a prime and makes some concepts more accessible. If the salient features of a display ad overlap the features of concepts primed by the webpage content, these concepts can be activated and applicable to processing the ad information. According to the spreading-activation model, a prime (e.g., webpage content) activates related concepts in a semantic network in the viewer's memory. If the target stimulus (e.g., display ad) matches one of these concepts, the processing of the stimulus will be easier because the relevant knowledge have been activated. Thus, higher applicability may lead to a more positive attitudinal response because the viewer feels confident that he or she can easily process the ad information (Feltham and Arnold, 1994; Moore et al., 2005). On the basis of priming and applicability theory, the following hypothesis is proposed.

**H2.** The more applicable the web content to the embedded display ad, the more likely that the elicited attitude toward the ad will be favorable.

Advertisements usually deliver information on the benefits and advantages of the advertised product or service. If the primed concepts match these benefits and advantages, and therefore have high excitation levels, the viewer will pay more attention to these benefits and advantages, and a more positive brand attitude can be elicited. For instance, a web article describing a mobile office probably primes the concept "mobility," and an embedded display ad of a mobile device would have more attention drawn to the device's mobility benefit, eliciting a better attitude toward the brand from the viewer. Thus, the following hypothesis is developed.

**H3.** The more applicable the web content to the embedded display ad, the more likely that the elicited attitude toward the advertised brand will be favorable.

### 2.3. Moderating effects of attention and need for cognition

The nature of advertisements is to deliver persuasive messages to consumers to positively influence their evaluations of the ad, advertised products, services or brands. The context effects on ad persuasiveness may be moderated by the recipient's elaboration likelihood. The term *elaboration likelihood* denotes the extent to which a person thinks about the issue-relevant arguments in a message (Petty and Cacioppo, 1986b). Petty and Cacioppo developed the Elaboration Likelihood Model (ELM) as an information processing theory of persuasion, which postulates that people may change their attitudes via two different routes: central and peripheral (Petty and Cacioppo, 1986a,b). People who have the motivation and the ability to think about the merits of the information content have a high level of elaboration likelihood; their attitudes are changed via a central route. People with a low level of elaboration likelihood may have their personal attitudes changed via a peripheral route as a result of some simple cues in the persuasion context, without careful and thoughtful consideration. Consumers' motivation and ability to process ad information may determine which route they adopt and moderate the context effect on their attitude toward the ad. It is important to understand whether or not the contextual priming effects of webpage content on a viewer's attitude toward the embedded display ad are moderated by the viewer's motivation and ability to process the ad information. Attention (distraction) and need for cognition are factors of ability and motivation, respectively (Petty and Cacioppo, 1986b). The present study focuses on the two factors because they may influence affective priming effects. Recipients process a message unconsciously in low-attention situations (Lee and Ahn, 2012; Yoo, 2008) and tend to avoid cognitive work even the message is relatively short (e.g., advertisements) when they have a low need for cognition (Haugtvedt et al., 1992). In these situations, spontaneous affective reactions rather than cognitions have a greater impact on attitude change and choice (Goodrich, 2011; Shiv and Fedorikhin, 1999). Since priming effects work in unconscious memory, it is worth investigating whether or not the effect of affective priming (e.g., automatic attitude activation) increases in low-attention and low-need-for-cognition situations.

A recent survey by Adweek Media/Harris Poll shows that 63% of consumers tend to ignore or disregard all Internet ads, which is far more than those who disregard traditional media ads (Friedman, 2010). Internet users have more control over selecting what they want to see, making it difficult for Internet ads to catch their attention (Nagar, 2009). Whether or not a recipient pays sufficient attention to target information determines his/her ability to process the information (Petty et al., 1997). Prior studies found that when consumers pay little attention to a display ad, the ad information is processed unconsciously and a favorable attitude is created because of familiarity (Goodrich, 2011; Yoo, 2008). However these studies did not consider the contextual priming effects. The attitude activated by webpage content may influence ad attitude when consumers process ad information unconsciously because automatic attitudes become stronger under conditions when cognitive resources are low (Wilson et al., 2000). The present study posits that when consumers are distracted by webpage content – and, thus, pay little attention to the adjacent display ad – they lack sufficient ability to recognize the merits of the ad information and will process the ad information unconsciously. This increases the effect of their attitude toward the webpage content on their attitude toward the ad. This study proposes the following hypothesis in an effort to examine the moderating effect of the level of attention paid to display ads.



**H4.** Viewers' attitudes toward the webpage content more strongly affect their attitude toward the embedded display ad when they pay less attention (as opposed to more attention) to the ad.

Need for cognition has been identified as the primary variable which influences an individual's motivation to consider a concept or object (Haugtvedt et al., 1992). Need for cognition is the tendency for an individual to engage in and enjoy thinking (Cacioppo and Petty, 1982). It is the need to structure relevant situations in meaningful and integrated ways, and to understand the experiential world (Cohen et al., 1955). Individuals with a high need for cognition tend to enjoy effortful cognitive tasks and evaluate a message by scrutinizing and elaborating issue-relevant arguments (Cacioppo and Petty, 1982; Cacioppo et al., 1983). In advertising, prior studies have found that, relative to high need-for-cognition consumers, those with a low need for cognition are influenced more by cues in the context such as the attractiveness of product endorsers (Haugtvedt et al., 1992; Reinhard and Messner, 2009), purchase limits and time limits (Inman et al., 1997). Thus, this study posits that consumers with a low need for cognition are reluctant to think about the merits of the information in the ad, so their attitude toward an ad or brand is influenced more by their attitude toward the webpage content next to the ad. The following hypothesis is proposed.

**H5.** The viewer's attitude toward the webpage content more strongly affects the viewer's attitude toward the embedded display ad if the viewer has a low need for cognition rather than a high need for cognition.

### 3. Research framework

According to priming theory, when viewers read webpage content, some concepts and evaluations are activated and then become accessible for guiding ad information processing and attitude formation. The degree to which the viewer relies on the contextual cues (e.g., webpage content) when processing ad information and forming an attitude toward the ad may be influenced by his/her elaboration level. This study examines the main effects of contextual priming and the moderating effects of elaboration levels on ad effectiveness.

Fig. 1 presents the research framework for this study. The presentation of webpage content as a prime may activate any associated evaluations and, thus, the evaluation of a target display ad tends to be congruent with the activated attitude. This study also examines the moderating effects of both the level of attention paid to advertisements and the need for cognition on the relationship between webpage content attitude and ad attitude. When viewers have a high need for cognition and pay attention to the ad, they have a greater motivation and ability to process ad information,

and, thus, their attitude toward a display ad may be less likely to be influenced by their attitude toward the webpage content. Furthermore, if the concepts primed by the webpage content match salient features of the advertised product, viewers may generate more thoughts about the merits of the salient features; therefore, a better attitude can be elicited. Viewers' ad attitude is positively related to their brand attitude. This relationship has been confirmed by prior studies (Brown and Stayman, 1992). This study retests this relationship for Internet advertising.

Prior studies also found that, in addition to attention and need for cognition, personal relevance may influence an individual's motivation, and prior knowledge may influence an individual's ability to analyze obtained information (Petty and Cacioppo, 1986b; Petty et al., 1997). Prior knowledge is a person's organized structure of knowledge corresponding to an issue. If consumers have prior knowledge of the advertised product they have the ability to analyze its true merits and are less likely to be influenced by peripheral cues (Huang et al., 2006). Personal relevance is the extent to which an individual perceives the object/objective to be self-related and have intrinsic importance or personal meaning. If consumers find the advertised product highly relevant, they are motivated to process the ad information using the central route (Gnepe, 2012). The present study controls these variables by selecting a product that is familiar and interesting to the experiment participants.

Huang and Chen (2012) found that webpage content-induced mood states affect viewers' responses to display ads. Moods are general "background feeling states" that are the consequence of emotions (Beedie et al., 2005). After consumers read the content of a webpage, they generate affective responses (emotions and attitudes about the content) which may consequently create a more general mood and influence their evaluations of advertisements. This study also investigates the role of moods to understand whether or not the effects of webpage content attitude on the evaluations of display ads are mediated by moods.

### 4. Experiment

#### 4.1. Pretest

Before the main experiment, a pretest was conducted to aid in selecting a product to be advertised, designing a banner ad and writing four web articles. College students were invited to participate in the pretest and the main experiment. A laptop computer was selected as the advertised product because this product category is well known by and relevant to college students.

First, the salient features of a laptop computer were identified. A total of 33 college students were invited to rank the importance of features that influence the purchasing of a laptop computer. The result showed that processor speed, price, mobility, memory size, and hard drive capacity are the top 5 features. The feature "mobility" was selected for the experiment because it is the key feature when consumers consider purchasing a laptop computer; plus, web articles could be easily created to prime this construct for the experiment.

A 728 × 90 pixel banner ad was designed to advertise a laptop computer. This banner ad contained a laptop image, the fictitious manufacturer's brand name, and the computer's specifications. Four Web articles were written specifically to manipulate the level of attitude toward the webpage content and the level of applicability of that content to the banner ad. Applicability can be manipulated by relevance between a prime and a target (Jiang and Tao, 2011; Shen and Chen, 2007). For creating high- and low-applicability contexts, Articles 1 and 2 used the theme "mobile office" and Articles 3 and 4 used the theme "eyesight." The webpage content

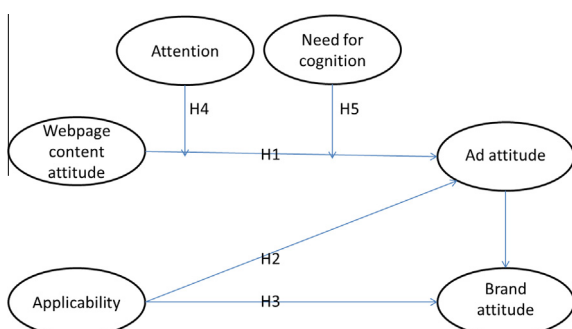


Fig. 1. Research framework.

regarding the mobile office was expected to be more applicable to a laptop ad than the content about eyesight. Article 1 discussed how companies use mobile offices to increase productivity; Article 2 described how mobile offices contribute to employee overwork. For the eyesight theme, Article 3 talked about the benefits of visual education for babies, and Article 4 reported on the prevalence of myopia in schoolchildren. Articles 1 and 3 were used to elicit positive attitudes while Articles 2 and 4 were designed to elicit negative attitudes. The banner ad was placed at the bottom of each article.

A total of 100 college students read one of the four articles each. The article selected by each participant was chosen at random. Subjects then responded to an open-ended question to generate salient features that would come to mind were they to consider purchasing the laptop. The measure *frequency of mention* was calculated to check whether the articles with the mobile office theme could prime the mobility feature more than the articles with the eyesight theme. Finally, four seven-point scales from a previous study (Batra and Ahtola, 1991) anchored by the adjectives “good–bad,” “positive–negative,” “like–dislike,” and “favorable–unfavorable” were used to measure attitudes toward the article content.

Table 1 shows the pretest results. Regarding frequency of mention, 34% of subjects mentioned “mobility” for the eyesight theme, whereas 78% mentioned mobility for the mobile office theme ( $\chi^2 = 19.643$ ,  $p < 0.001$ ). This result indicated that the mobility construct was more likely to be primed and applicable to considering a laptop computer when subjects read the articles with the mobile office theme as opposed to the eyesight theme. Thus, the web articles regarding mobile offices had higher applicability to the laptop display ad than did those about eyesight since mobility is a salient feature of a laptop computer. The articles with positive content (i.e., articles 1 and 3) induced a more positive attitude toward the article content than did the articles with negative content (i.e., articles 2 and 4) ( $t = 13.953$ ,  $p < 0.001$ ). The created articles successfully elicited positive and negative attitudes toward the webpage content. A two-way ANOVA test showed that article content (positive vs. negative) and theme (mobile office vs. eyesight) did not have an interaction effect on attitude toward webpage content ( $F = 0.002$ ,  $p > 0.05$ ), which means that positive content can elicit a more positive attitude toward the content, regardless of the theme.

#### 4.2. Main experiment

A website was created for the experiment. A total of 232 subjects completed the experiment in a computer room. The subjects were college students ranging in age from 18 to 41. Table 2 describes the demographic data. The subjects first read a webpage about the purpose of the study and were given instructions on how to perform the experiment. They were told that they would read a webpage and then fill out a questionnaire to understand their thoughts and feelings about the webpage content. After clicking on a “start” button, they were directed to browse a webpage containing one of the four articles (see Appendix), each of which had

an equal probability of appearing. This randomization prevented the influence of individual differences. The banner ad was displayed at the bottom of the article, so the subjects were expected to read the ad after reading the article. The subjects read the webpage at their own pace. They clicked on a “start questionnaire” button at the end of the webpage when they finished reading the webpage. Finally, they filled out an online questionnaire to measure the variables in question. They were not allowed to go back to the previous webpage.

In order to measure the effectiveness of the display ad, ad attitude (Aad) was measured using four seven-point scales anchored by the adjectives “good–bad,” “interesting–uninteresting,” “like–dislike,” and “irritating–not irritating” (Jiang and Tao, 2011; Shen and Chen, 2007; Yi, 1990a). Brand attitude (Ab) was assessed by three seven-point scales anchored by the phrases “good–bad,” “like–dislike,” and “favorable–unfavorable” (Jiang and Tao, 2011; Shen and Chen, 2007; Yi, 1990b).

The Positive and Negative Affect Schedule (PANAS) mood scales developed by Watson et al. (1988) were used to measure the subjects’ mood states after reading the webpage content. Ten terms (interested, excited, active, strong, enthusiastic, proud, attentive, alert, inspired, and determined) were used for the positive mood scale and ten terms (guilty, distressed, scared, hostile, upset, irritable, ashamed, nervous, jittery, and afraid) for the negative mood scale. Since the subjects’ native language was Chinese, this experiment adopted the Chinese-version PANAS scales (Teng and Chang, 2006), which have strong reliability and validity.

The subjects’ attitudes toward the webpage content (the article they read) were measured by four seven-point scales anchored by the phrases “good–bad,” “positive–negative,” “like–dislike,” and “favorable–unfavorable” (Batra and Ahtola, 1991). The perceived applicability of the webpage content to the display ad was assessed by the three adjectives “relevant–irrelevant,” “appropriate–inappropriate,” and “applicable–not applicable” (Shen and Chen, 2007).

The amount of attention paid to an advertisement determines the level of ad recall (Goodrich, 2011; Huang and Chen, 2012). This study used ad recall as a proxy of attention. Six multiple-choice questions about the ad content were designed to measure the subjects’ recall of the ad information. A higher correct rate indicated higher attention paid to the ad. Cacioppo and Petty originally developed a scale with 34 items as an instrument to assess need for cognition, and later revised it to 18 items for increased efficiency (Cacioppo and Petty, 1982; Cacioppo et al., 1984). This scale was translated into Chinese by Kao (1994). Our study used the 18-item scale in Chinese to measure the subjects’ need for cognition. Prior knowledge was assessed by asking subjects to indicate how much they knew about laptops on a seven-point scale anchored by “very little” and “a lot” (Jiang and Tao, 2011; Shen and Chen 2007). The subjects’ level of involvement with the product was also measured. The modified Personal Involvement Inventory scale from Mittal’s (1995) study was used to measure product involvement. This scale contained five seven-point items anchored by the phrases “important–unimportant,” “of concern to me–of no concern to me,” “means a lot to me–means nothing to me,” “matters to me–doesn’t matter,” and “significant–insignificant.”

**Table 1**  
Pretest results.

Theme Content Article	Mobile office		Eyesight	
	Positive (n = 25) 1	Negative (n = 25) 2	Positive (n = 25) 3	Negative (n = 25) 4
Mention of mobility: frequency	17	22	8	9
Attitude toward content: mean (SD)	5.58 (1.262)	2.21 (1.466)	5.6 (0.919)	2.25 (1.155)

**Table 2**  
Demographic data.

Attribute	Categories	(#)	(%)	Attribute	Categories	(#)	(%)
Gender	Male	105	45.26	Ownership of laptop	Yes	183	78.88
	Female	127	54.74		No	49	21.12
Age	16–25	225	96.98	Hours on Internet per day	1–5	200	86.21
	26–35	6	2.59		6–10	25	10.78
	36–45	1	0.43		11–15	2	0.86
					16–20	5	2.16

## 5. Results

### 5.1. Manipulation checks

The results of manipulation checks are shown in Table 3. The subjects' prior knowledge of laptops ( $F = 1.044$ ,  $p = 0.374$ ) and involvement with laptops ( $F = 1.290$ ,  $p = 0.279$ ) did not differ among the four groups. Their effects were controlled in the experiment. The mobile office theme had a higher level of applicability to the banner ad than did the eyesight theme ( $t = 3.950$ ,  $p < 0.001$ ). The subjects' attitudes toward the articles with positive content (i.e., Articles 1 and 3) significantly better than those toward the articles with negative content (i.e., Articles 2 and 4) ( $t = 10.989$ ,  $p < 0.001$ ).

The result of two-way ANOVA shows that article content (positive vs. negative) and theme (mobile office vs. eyesight) do not have an interaction effect on attitude toward webpage content ( $F = 0.645$ ,  $p = 0.423$ ), which means that positive content can elicit a better attitude toward the content, regardless of its theme. These results confirm the success of the manipulation.

### 5.2. Data analysis

The reliability of the scales can be ensured via an examination of composite reliability (CR), Cronbach's alpha, and average variance extracted (AVE). These three values should be greater than 0.7, 0.7, and 0.5, respectively (Bagozzi and Yi, 1988; Fornell and Larcker, 1981). The results shown in Table 4 indicate that the scales have good reliability.

Convergent validity should be tested when multiple indicators are used to measure one construct; this can be accomplished by examining item-total correlation (ITC), factor loading and average variance extracted (AVE) (Fornell and Larcker, 1981). Convergent validity requires that ITC, factor loading and AVE be greater than 0.3, 0.7 and 0.5, respectively. The results shown in Table 4 indicate that the scales have good convergent validity.

To achieve adequate discriminant validity, the correlation coefficients among variables should be less than 0.9, and the square

root of AVE should be greater than the inter-construct correlation coefficients (Fornell and Larcker, 1981). The descriptive statistics and the correlation matrix shown in Table 5 suggest that discriminant validity is satisfactory.

The hypotheses were tested via Partial Least Squares regression analyses using SmartPLS. This study assessed the  $t$ -statistics of the standardized path coefficients to determine if each hypothesis was supported. All path coefficients and explained variances for the model are shown in Fig. 2. As indicated, the subjects' attitude toward the webpage content has a positive influence on their attitude toward the ad ( $\beta = 0.162$ ,  $p < 0.01$ ). Thus, H1 is supported. Additionally, applicability has a positive impact on ad attitude ( $\beta = 0.308$ ,  $p < 0.001$ ) and brand attitude ( $\beta = 0.179$ ,  $p < 0.001$ ). Thus, H2 and H3 are supported. The ANOVA result shown in Table 6 validates the PLS result. Webpage content attitude is positively related to ad attitude ( $F = 4.431$ ,  $p < 0.05$ ). Applicability is positively related to ad attitude ( $F = 13.871$ ,  $p < 0.001$ ) and brand attitude ( $F = 28.091$ ,  $p < 0.001$ ).

The path coefficient from attention to the path between webpage content attitude and ad attitude is significant ( $\beta = -0.147$ ,  $p < 0.01$ ), indicating that the level of attention subjects paid to the display ad negatively moderates the effect of their attitude toward the webpage content on their attitude toward the ad. Table 7 reveals the results of ANOVA and Fig. 3 shows the results of slope analysis. Subjects with scores above the median, 2, were classified as high attention, and those with scores below or equal to the median were classified as low attention. The result indicates that if the attention level is high, a more positive webpage content attitude improves ad attitude to a lesser extent. On the other hand, if the attention level is low, a better content attitude can improve ad attitude to a larger extent. Hence, H4 is supported. The subjects' need for cognition significantly moderates the effect of webpage content attitude on ad attitude ( $\beta = 0.114$ ,  $p < 0.05$ ). However, the slope analysis result contradicts the original expectation. Subjects with scores above the median, 4.39, were classified as having a high need for cognition, and those with scores below or equal to the median were classified as having a low need for cognition. When evaluating the display ad, the subjects with a high need

**Table 3**  
Manipulation checks.

Theme	Mobile office		Eyesight	
	Positive ( $n = 58$ )	Negative ( $n = 57$ )	Positive ( $n = 59$ )	Negative ( $n = 58$ )
Content Article	1	2	3	4
Prior knowledge: mean (SD)	4.17 (1.230)	4.02 (1.329)	4.00 (1.365)	3.76 (1.159)
Involvement: mean (SD)	5.11 (1.468)	4.81 (1.398)	5.13 (1.748)	4.66 (1.594)
Attitude toward content: mean (SD)	5.19 (1.177)	3.03 (1.509)	5.81 (1.169)	3.93 (1.513)
Applicability: mean (SD)	3.61 (1.196)	3.32 (1.152)	2.71 (1.543)	2.76 (1.368)

**Table 4**

The results of factor analysis.

Construct	Items	Factor	
		Loading	ITC
<i>Webpage content attitude</i> CR = 0.981 Alpha = 0.973 AVE = 0.927	<i>Describe your attitude toward the webpage content</i> Good–bad Positive–negative Like–dislike Favorable–unfavorable	0.958 0.969 0.966 0.934	0.934 0.951 0.951 0.901
<i>Applicability</i> CR = 0.952 Alpha = 0.919 AVE = 0.869	<i>To the ad, the webpage content is</i> Relevant–irrelevant Appropriate–inappropriate Applicable–not applicable	0.846 0.921 0.937	0.744 0.876 0.906
<i>Ad attitude</i> CR = 0.950 Alpha = 0.923 AVE = 0.826	<i>Describe your attitude toward the ad</i> Good–bad Interesting–uninteresting Like–dislike Irritating–not irritating (reverse coded)	0.818 0.836 0.855 0.800	0.864 0.751 0.901 0.807
<i>Brand attitude</i> CR = 0.965 Alpha = 0.945 AVE = 0.901	<i>Describe your attitude toward the advertised brand</i> Good–bad Like–dislike Favorable–unfavorable	0.833 0.837 0.828	0.876 0.913 0.867

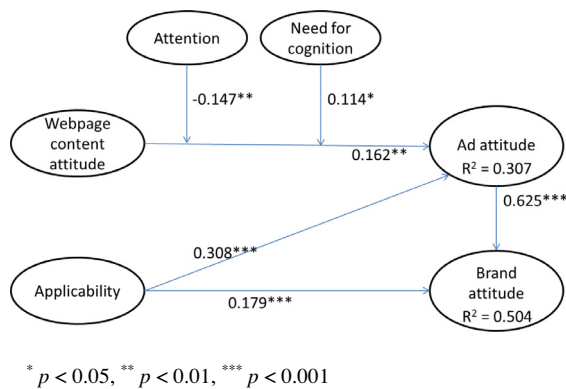
**Table 5**

Descriptive statistics and correlation matrix.

Constructs	Mean	Std. Dev.	Correlation matrix			
			App	Ac	Aad	Ab
App	3.096	1.371	<b>0.932</b>			
Ac	4.499	1.725	0.091	<b>0.963</b>		
Aad	3.941	1.305	0.364	0.227	<b>0.909</b>	
Ab	4.066	1.042	0.407	0.184	0.690	<b>0.949</b>

Note: The diagonal line of the correlation matrix denotes the square root of AVE.

App: Applicability; Ac: Webpage content attitude; Aad: Ad attitude; Ab: Brand attitude.

**Fig. 2.** PLS analysis of research model.

for cognition were influenced *more* by their attitude toward the webpage content than were those with a low need for cognition. This result does not support H5.

## 6. Discussion

The major objective of this study was to examine the effects of webpage content on embedded display ads. The influence of viewers' attitudes toward the webpage content and the applicability of the webpage content to the ad were considered in this study. Our findings based on data from a laboratory experiment have confirmed these effects.

Viewers' attitudes toward the content of a webpage influence their attitudes toward the embedded display ads. They use the affectively congruent concepts activated by their webpage attitudes to evaluate the embedded ad through affective priming. Thus, delivering display ads to webpages that have content the

**Table 6**

The main effects tested by ANOVA.

Webpage content attitude	Ad attitude: mean (SD)	Applicability	Ad attitude: mean (SD)	Brand attitude: mean (SD)
Favorable	4.123 (1.417)	High	4.257 (1.025)	4.415 (0.890)
Unfavorable	3.765 (1.165) $F = 4.431$ , $p = 0.035^*$	Low	3.636 (1.468) $F = 13.871$ , $p = 0.000^{***}$	3.729 (1.071) $F = 28.091$ , $p = 0.000^{***}$

\*  $p < 0.05$ .\*\*\*  $p < 0.001$ .



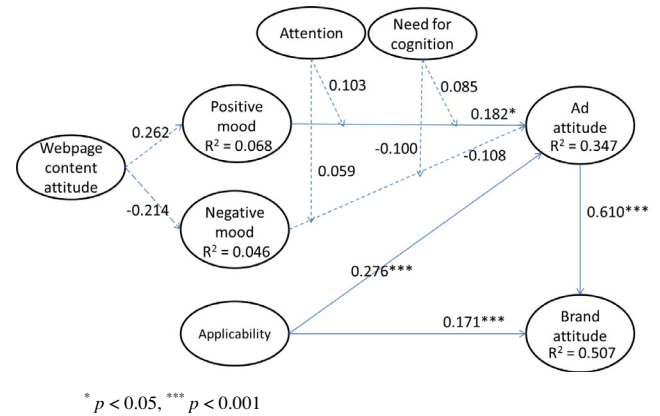
**Table 7**

The moderating effects tested by ANOVA.

Ad attitude: mean (SD)		Need for cognition		Attention	
		High	Low	High	Low
Webpage content attitude	Favorable	4.285 (1.373)	3.915 (1.459)	4.139 (1.286)	4.112 (1.505)
	Unfavorable	3.612 (1.277)	3.866 (1.082)	4.157 (1.071)	3.434 (1.145)
		$F = 3.298, p = 0.071^{\dagger}$		$F = 4.224, p = 0.041^*$	

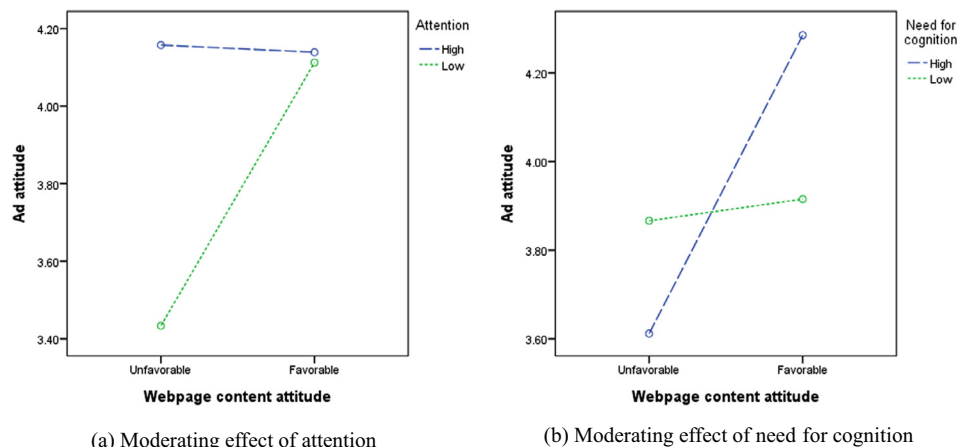
 $^{\dagger} p < 0.1$ . $^* p < 0.05$ .

viewer likes – or to webpages about which the viewer has positive opinions – can improve the effectiveness of the ads. The effect of webpage content attitude on the viewer's attitude toward the embedded display ad is moderated by both the level of attention the viewer pays to the ad and the viewer's need for cognition. According to the ELM, people who have the ability to elaborate on information content tend to form their attitudes based on the merits of the information content rather than on simple cues in the context (Petty and Cacioppo, 1986a,b). When viewers devote their attention to reading ad information they have the ability to recognize the merits of that information and are less likely to use their attitudes toward the webpage content as a cue for ad evaluation. The experimental result shows that viewers who pay little attention to the ad are influenced more by their attitudes toward the webpage content when evaluating the ad than are viewers who pay a high level of attention to the ad. The results also show that, compared to viewers with a low need for cognition, viewers with a high need for cognition are influenced more by their attitudes toward the webpage content when evaluating the ad. The possible reason is that individuals with a high need for cognition would be more likely to have highly accessible and interconnected nodes in memory than those with a low need for cognition, and thus the activated concepts would bias more thoughts for those with a high need for cognition (Cacioppo et al., 1996; Petty and Jarvis, 1996). Hermans et al. (2001) found that affective priming effects should be stronger for people who are more chronically engaged in conscious evaluations. Enhancing the strength of the association between the object and its evaluation (attitude toward the object) makes the attitude more accessible from memory and, consequently, increases the likelihood that subsequent judgment will be congruent with the attitude (Powell and Fazio, 1984).

**Fig. 4.** PLS analysis of extended research model.

People with a high need for cognition might possess stronger object-evaluation associations, which in turn facilitate affective priming. We can infer that viewers with a high need for cognition have stronger associations between webpage content and attitude toward the webpage content; these in turn, activate affectively congruent concepts and make them very accessible. These primed concepts are used to evaluate the embedded ad when viewers elaborate on ad information. Thus, viewers with a high need for cognition are influenced more by their attitudes toward webpage content than are viewers with a low need for cognition.

The experimental results reveal that a high level of applicability of the webpage content to the embedded display ad leads to a more positive ad attitude and brand attitude. The underlying

**Fig. 3.** Slope analysis.

principle is that the greater the applicability, the greater the likelihood that the primed concepts will be activated and used in evaluating the ad and the advertised brand, eliciting a better attitude. Please note that, in the experimental setting, “mobility” is an attended feature of a laptop, and this feature is an advantage that results in a better attitude. If the attended feature referred to some disadvantage, ad and brand attitudes might be worse. Yi (1990a) reported that advertising effects on brand evaluations will be enhanced by a context which primes attributes that are associated with the advertised attribute and have positive implications; however, that effect will be decreased by a context which primes attributes that have negative implications for the advertised brand. For instance, the large size of a car could imply either that the car is not fuel efficient (negative) or that the car is safe (positive). Thus, the primed concept of fuel economy may lead to a negative attitude while the primed concept of safety may lead to a positive attitude. Stimulus information is ambiguous when at least two alternative constructs are applicable to it (Higgins, 1996). Advertisers need to identify the salient features the ad delivers and determine their implication orientations and whether or not these features are ambiguous. In order to improve ad effectiveness, display ads are best put on webpages which have content that primes the same positive features as the ads.

Prior studies about the effects of context on advertisements focused mainly on the effects of context-induced moods. Since attitude includes affective responses, and mood is a general affective state, it is interesting to investigate whether mood mediates the effect of webpage content attitude on ad and brand evaluations. Fig. 4 illustrates another model that considers positive mood and negative mood as mediators between webpage content attitude and attitude toward the ad.

The analysis result shows that positive mood states do affect ad attitudes; however, webpage content attitudes do not necessarily transform into significant mood states. In the experimental setting, the positive moods induced by the four articles did not differ ( $F = 1.020$ ,  $p > 0.05$ ), neither did the induced negative moods ( $F = 2.193$ ,  $p > 0.05$ ). The subjects' mood states after viewing the webpage were measured by the PANAS scales. Each mood term was measured with a five-point item (1 = “very slightly or not at all,” 2 = “a little,” 3 = “moderately,” 4 = “quite a bit,” and 5 = “extremely”). The average positive mood scores of the four articles ranged from 1.900 to 2.068; the average negative mood scores of the articles ranged from 1.491 to 1.774. That means the four articles did not induce intense mood states and, thus, the subjects' mood states had little impact on ad attitudes. In addition, the results of the Sobel test indicate that the relationship between webpage content attitude and ad attitude is not mediated by either positive mood ( $t = 0.424$ ,  $p = 0.672$ ) or negative mood ( $t = 0.631$ ,  $p = 0.528$ ). This analysis result demonstrates that automatic attitude activation occurs even though the attitude does not transform into an intense mood state.

## 7. Conclusions

The objective of this study was to examine the contextual priming effects of webpage content on the effectiveness of the embedded display ads. In addition, the moderating effects of the viewer's elaboration levels were also examined. The findings based on data from a laboratory experiment confirm the contextual priming effects and the moderating effects of viewer's elaboration levels. Viewers' attitudes toward webpage content affect their attitude toward the ads. This effect will increase when they pay less attention to the ads and have a high need for cognition. The applicability of webpage content to the ads is positively associated with the viewer's attitude toward the ad and attitude toward the brand.

### 7.1. Theoretical implications

In comparison with Yi's (1990a) study, the present study focuses on the effect of content attitude instead of feelings induced by the content. In addition, Yi' study did not consider the applicability of magazine articles to a print ad. The present study focuses on content attitude and applicability because they can be detected by ad delivery systems and are important to online advertising. Prior studies of contextual effects on ad effectiveness focused mainly on the effects of context-induced moods. Since – in an Internet environment – viewers' attitudes are more easily detected or predicted than are their moods, understanding the influence of webpage-content attitudes on ad attitudes is critical. This study demonstrated that context-activated attitudes do influence ad effectiveness in a congruent manner, and context-activated attitudes are not necessarily transformed to intense moods. This finding contributes to the knowledge base of contextual advertising. We recommend that future studies develop ad delivery systems that place ads by detecting the viewer's attitude toward the webpage content. Another subject worthy of future investigation is how to relieve the negative influence when ads are placed on a webpage which induces negative attitudes.

Prior studies have found that theme congruence between webpages and display ads leads to better attitudinal responses. However, the effects of concept-level congruence have not been addressed well. This study fills the knowledge gap by investigating the impact of webpage content-to-display ad applicability on ad attitude and brand attitude. This effort calls attention to the relevance between the concepts primed by webpage content and the features of the advertised products. The greater the overlap between these factors, the better the ad attitude and brand attitude that can be elicited. According to this finding, more webpages become candidates for the placement of display ads by advertisers and advertising service providers. In addition to being placed on theme-congruent webpages, display ads can also be placed on webpages that prime concepts which match the features of the advertised product. How to automatically recognize the concepts primed by the webpage content is worthy of future research.

Several studies have shown that when consumers pay little attention to a display ad, the ad information is processed unconsciously and the mere exposure effect emerges, which leads to a favorable attitude (Goodrich, 2011; Lee and Ahn, 2012; Yoo, 2008). It seems that online advertisements are valuable and useful even when they grab little attention and produce a low click-through rate. The present study found that when consumers pay little attention to a display ad they rely more on their attitude toward the webpage content to evaluate the display ad, which implies that consumers will not likely have a favorable attitude toward the ad in a low-attention situation if they have a negative attitude toward the webpage content. Future studies must devote

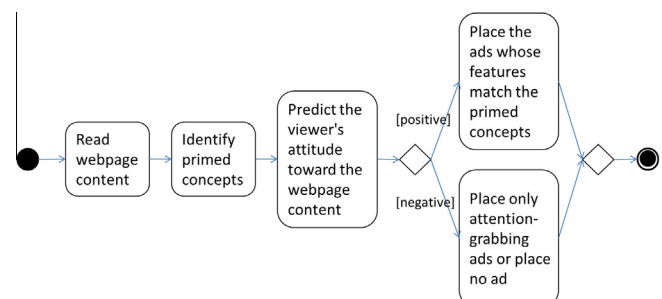


Fig. 5. Procedure for delivering display ads.

more effort to understanding the context effects on display ads when viewers process ad information unconsciously.

This study also found that viewers with a high need for cognition are influenced more by their attitudes toward the webpage content when evaluating the embedded display ad. This finding implies that viewers may rely on contextual cues even in high-elaboration conditions. Higher need-for-cognition viewers' attitude toward webpage content activates more attitude-congruent thoughts, which, in turn, affect their evaluation of the ad. Future research is recommended to increase our understanding of the conditions under which people with a high level of elaboration still rely on contextual cues to process ad information.

## 7.2. Practical implications

This study found that viewers' attitude toward the webpage content automatically activates their ad evaluation. Thus, we recommend that advertising service providers predict viewers' attitudes toward webpages by using recommendation techniques and opinion mining techniques, and deliver display ads to webpages that viewers like or that have content topics for which viewers have positive opinions. Web users' browsing, searching, buying and rating behaviors can be used to understand their preferences. In recent years, lots of websites have used the Facebook "Like" Button and Google Plus plugins to allow viewers to share webpage content and indicate that they like or dislike the content. These ratings are good resources for predicting viewers' attitudes toward webpage content. Based on the findings in this study, we recommend that online ad delivery systems place display ads using the procedure depicted in Fig. 5.

Viewers' webpage content attitudes have more influence on their ad attitude when they pay less attention to the ads. Since Internet users tend to pay less attention to Web ads, delivering ads to webpages whose content induces a better attitude is important. For a webpage whose content induces a negative attitude, attention-grabbing ads can be placed on the webpage to relieve the negative context effect. Additionally, viewers' levels of need for cognition moderate the effect of webpage content on ad attitude. People with a high need for cognition are influenced more by their attitude toward the webpage content when they evaluate embedded ads than are those with a low need for cognition. Detecting website viewers' levels of need for cognition is difficult. Exploration depth (e.g., the time spent or the number of webpages visited during a session on a website) might be an indicator. People with a high need for cognition have active, exploring minds, and through their senses and intellect, they reach and draw out information from their environment (Cacioppo et al., 1996). Li and Browne (2006) reported that people with a high need for cognition have more desire for information and more passion for learning during interactions with the Web. Thus, viewers who tend to explore websites deeply can be identified as viewers with a high need for cognition, and their preferences should be analyzed in order to predict their webpage attitudes.

The level to which the webpage content is applicable to the display ad determines viewers' attitudes toward the ad and the advertised brand. The greater the overlap between the concepts primed by the webpage content and the attended features of the display ad, the more positive will be the viewer's ad attitude and brand attitude. Theme congruence between the webpage content and a display ad implies high applicability; however, high applicability occurs even when the webpage content and the display ad are theme-incongruent. This study suggests that advertising service providers should consider concept level relevance in addition to theme level relevance. In this case, an ad delivery system first

scans the webpage the viewer is accessing to recognize the concepts that can be primed by the content. Next, the system retrieves the salient features of the product, service or activity identified by the advertiser. Finally, the ad is displayed on the page if the primed constructs overlap the salient features. Keywords contained in the webpage content can be used to infer which concepts will be primed; however, simple keyword matching cannot correctly calculate the congruence between a primed construct and a feature shown by a display ad. The meanings of keywords must be understood in the congruence calculation. For instance, a web article could contain the keyword "travel" which becomes a construct that can be primed when the content is read. A display ad about a mobile phone has the salient feature "mobile." The words "travel" and "mobile" may seem unrelated at first glance. A lexical ontology (e.g., WordNet) that defines relationships between words is useful to enable ad delivery systems to understand the meanings of words. According to WordNet, the word "mobile" is similar to the word "moving," and "moving" has the meaning "travel." Thus, a web article about travel can be identified as applicable to an ad for a mobile phone even though the categories "mobile phone" and "travel" are theme incongruent.

## 7.3. Limitations and further research

The present study has several limitations. The experiment controlled the effects of product involvement and knowledge. Future investigations might explore the possibility that these variables moderate the influence of webpage content attitude on ad attitude. In the experiment, the display ad was placed below the web articles to ensure the webpage content served as a prime and the display ad was a target stimulus. Different placement of the display ads may affect the order in which they are read and generate different context effects regarding automatic attitude activation and applicability. This study used only textual content as a prime. Prior studies reported that pictures may lead to a more direct access to meaning representations than do word stimuli and, therefore, generate stronger affective priming effects (De Houwer and Hermans, 1994; Kouider and Dehaene, 2007). Future studies should examine whether or not pictures and video content increase the impact of automatic attitude activation on ad attitude. Webpage content attitude is a summative evaluation of webpage content and thus can be determined by its topic, quality and design. The experiment in this study used four Web articles to manipulate different levels of webpage content attitudes. The four articles have the same quality and design and, therefore, this study manipulated only subjects' opinions on the article topics. Future studies should consider various determinants of webpage content attitude. Prior studies have also revealed that the effect of automatic attitude activation was not apparent when the time interval between the presentation of the prime and the target (stimulus onset asynchrony, a.k.a. SOA) was longer than 1000 ms (Fazio, 2001). If this effect endures longer in Web browsing, the influences of previous webpages the viewer has visited must be considered. Overall, this study contributes to e-commerce research by offering a conceptual model that explains the effects of webpage content on the effectiveness of display ads and calls attention to improving contextual advertising on the Web. Further research is certainly required for a better understanding of the effects of context on display ads.

## Appendix

The original webpages in Chinese were translated into English.



### Mobile devices promote your productivity

With the advances in network technology, the application of smart phones, tablet PCs and other mobile devices provide revolutionary innovation and convenience for human communication and lives. Forrester report pointed out that the mobile workers in enterprise had been reached 73% by 2012. Looking to the future, the collaboration with high action force is undoubtedly the key to business success, and mobile Internet devices with highly robust integration and capabilities through as well as highly efficient, stable and secure network, can create quick, easy and fluent mobile collaborative environment enterprises desire.

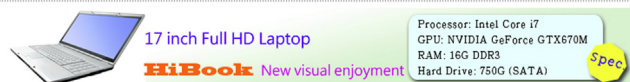
Frank Wu, general manager of Taiwan Cisco, once said: “generation of highly mobile work has come, and flexible work environment can improve personal productivity, thereby strengthening the competitiveness of enterprises. Enterprises should actively think about how to use a variety of mobile devices to create highly flexible and secure communication patterns and working environment. The mobile office created by Cisco effectively changes traditional business operating and communicating patterns, accelerates sales, product and decision-making process and provides mobile workers with efficient and safe operation, communication and collaboration experience.”

“Staff can still vividly generate productivity even not in office; people’s mobility will be enhanced with information following them.” Dennis Niu said. He is Taiwan Cisco’s vice president. Cisco, the world’s largest network equipment provider, relies on their own network capacity to provide complete job information everywhere and turn all places into office.

Winston Yu, CEO of KPMG Accounting Firm, said that the company is a typical service industry and uses various IT systems to help accountants and consultants working outside provide customers with appropriate service in order to improve customer satisfaction. When thinking about how to help consultants provide customers with better service at the same time, the company can break through space and time via Internet service and collocation of various mobile devices to truly make accountants and consultants seamlessly and instantly access various systems within the company.

He said: “Consultants can still work out of the office so that the customers’ various queries can be solved in the first time, which naturally enhances customer satisfaction so they are more accustomed to commissioning KPMG to provide more service.”

Mobile office purports to reduce of the costs and time of corporate communication greatly. IBM, Google, Bank of America, Citigroup and other famous enterprises have begun to test the feasibility of mobile cloud office.



Processor: Intel Core i7  
GPU: NVIDIA GeForce GTX670M  
RAM: 16G DDR3  
Hard Drive: 750G (SATA)

### Webpage containing Article 1

#### The importance of the eye

How important are the eyes? I learned from my past teaching experience in primary schools that the most important thing in early childhood is the development of their eyes.

Desmond Morris, a famous British zoologist and anthropologist, once said, “human eyes are smarter than any other animal, because babies use their eyes to see the world after born.” After all, people grow more slowly than other animals, and the cradle period is also much longer than other animals.

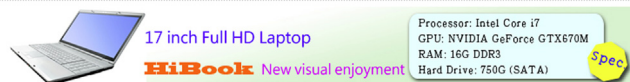
Babies can only rely on their eyes to observe and explore things around when lying in cradle; thus training children’s eye acuity is of great help to children’s future in the process of growing from infants to children. This process of training children’s eye sensitivity is a kind of “visual education”.

Previous visual arts education did not really involve visual education. In fact, I think visual development will lead to children’s abilities of painting. The things children have seen will run into their minds, and they will come out with the stroke according to the images in mind. Therefore, it can be said that visual education is a good way to promote children’s observation and memory abilities.

Many parents ask me why we need to use picture books to guide children to develop and learn in infancy. The reason is very simple, that is, I have repeatedly mentioned that babies use eyes to learn. Some adults may think that children do not need to look at picture books and watching TV can also provide them with good stimulus, but it actively may cause very serious problems.

Because TV screen is shown through light body and flashes fast, while the picture books appear in a fixed form, the images are stable and more suitable for infants and young children to read. Moreover, infants are still in the growth stage and visual ability is relatively weak, so picture books particularly designed for infants and young children have more blanks to highlight the theme for children to recognize easily.

How keen are my granddaughter La La’s eyes? Once her favorite Datong doll smashed accidentally, I found exactly the same one to her, but she did not accept it. Later I found the new baby’s eyes were not the same as that of the original one. The original doll had the white of eyes, but the new one had no white of eyes, so she thought it’s different. This life story convinces me more of children’s eyes are very sensitive, and the enhancement of these capabilities is visual education.



Processor: Intel Core i7  
GPU: NVIDIA GeForce GTX670M  
RAM: 16G DDR3  
Hard Drive: 750G (SATA)

### Webpage containing Article 3

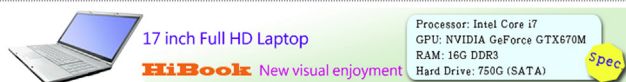
### Mobile devices make people work overtime

Scholars have pointed out that the popularity of smart phones, tablet PCs and other mobile devices make it easier to work at home. In addition, globalization also means that workers in some companies have to contact people with different time zones around the world, so a lot of people work overtime besides the normal working hours.

Professor Perlow from Harvard Business School found that 26% of businessmen will put their mobile phones next to bed while sleeping at night. The American company Good Technology interviewed 1,000 U.S. workers and found that Americans continued to work for an average increase of 7 hours with mobile devices after work per week, which was almost a complete unpaid working day. Survey shows that 80% of respondents said they would work with mobile devices after work. Half of the respondents admitted that they would check e-mails on bed; 40% still worked after 22:00; more than two-thirds of people would not go to bed before checking e-mails. About half of the respondents said they had no choice but to check working e-mails outside of working hours because their customers or bosses expect them to do so.

The boundaries between work and family blurring, some office workers and their families are feeling the pressure. Labor psychology expert Craik said that the number of people suffering from mental illness almost doubled in the past 10 years. If a person is always in a state of being at call, part of his energy will be involved by work continuously, which will thus affect his devotion to other things. Finally the time spent with individuals and families becomes less and less, resulting in increased friction and greater family stress.

In Taiwan, overtime work is also a serious problem. According to the Karoshi Statistics Officially identified by the CLA last year, there was averagely a person dead of karoshi every 7.6 days, 3.4 times more than that of the previous year; while it also found from the working hours by the CLA statistics that the annual working time of Taiwan people is up to 2,174 hours, 25% more than the Japanese who are considered as workaholic, so Taiwan can be called labor hell. The reason for Taiwan karoshi phenomenon is that employer abuse accountability so that employees have to work overtime to avoid being disbanded. Recent karoshi cases include an engineer in his twenties, a 41-year old physician and a driver at the age of 51; they may have family member, children and perhaps elders but died of overwork in their prime. Bestowed by technology, mobile devices become the best tool for employees to continue working at home.



Processor: Intel Core i7  
GPU: NVIDIA GeForce GTX670M  
RAM: 16G DDR3  
Hard Drive: 750G (SATA)

### Webpage containing Article 2

#### More than two million students in elementary, junior and senior high schools are shortsighted

When can Taiwan get rid of the notoriety of “myopia kingdom”? The popularity of 3C products remarkably influences degree of schoolchildren’s vision. According to the survey by Ministry of Education, the schoolchildren’s myopia problem is worsening year by year; from elementary to high schools, more than two million students in Taiwan are shortsighted, ranking first in the world.

The survey found that the myopia rate in academic year 2011 was more than 50% for elementary school students, 74% for junior high school students, 86% and 76% for senior high school students and vocational students respectively, and 90% for university students; myopia rate increases year by year, and the rate in all grades hits a record high. It is very astonishing.

Ministry of Education said that the causes include academic pressure, long-term indoor activities in after school and long-term use of 3C products. Liao Changbin, ophthalmology physician in Taipei Shuten Clinic said many children’s myopia soared 100 to 200 degrees in the two-month summer vacation. Modern people always take tablet PCs and smart phones in hands and even children are no exception. Prolonged use of eye in close distance makes ciliary muscle show a state of tension and unable to relax, causing myopia after a long term. There was a pupil in the fifth grade having 300 degrees of myopia, while his myopia worsens at 900 degrees after summer vacation.

Health Promotion Administration has investigated more than 2800 children aged 3-11 and also found that children spent 2 hours a day in average surfing online, playing games and watching TV in non-holiday and nearly 4.5 hours being “sticky” with the screen in holidays. A 6-year-old girl began playing video games when she was three, holding “player” in hand every day, even including the meal times; one of her eyes has caught as high as a thousand degrees of myopia recently through vision inspection!

Eyes will also suffer karoshi! Excessive use of eyes and high myopia above 600 degrees will increase the risks of cataract, retinal detachment, macular degeneration and others. In recent years, there are people over 30 years old suffering from cataract! The number of cataracts cases on Taiwanese aged between 40 and 50 years has increased 50% compared with that in 10 years ago. More people even feel there are black dots or small spider web in front of eyes when waking up, which is the symptom of “flying midge disease”, and the severe cases may cause retinal detachment and blindness!

The myopia proportion of Taiwan’s population ranks first in the world; this is not a glorious situation, which will cause inconvenience to life in addition to influencing national health! Some industries requiring high standard vision are difficult to find talents.



Processor: Intel Core i7  
GPU: NVIDIA GeForce GTX670M  
RAM: 16G DDR3  
Hard Drive: 750G (SATA)

### Webpage containing Article 4



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