Keyword advertising is not what you think: Clicking and eye movement behaviors on keyword advertising

Shao-Kang Lo a,⁎, Ai-Yun Hsieh b, Yu-Ping Chiu b

a Department of International Trade, Chinese Culture University, Taipei, Taiwan
b Department of Business Administration, National Taiwan University of Science and Technology, Taipei, Taiwan

ARTICLE INFO

Article history:
Received 9 March 2013
Received in revised form 6 April 2014
Accepted 6 April 2014
Available online 18 April 2014

Keywords:
Advertising avoidance
Empirical research
Eye tracking
Keyword advertising
Organic search
Search engine results pages (SERPs)
Sponsored search

ABSTRACT

This study examined the behavior of online searchers in relation to keyword advertising according to the theory of advertising avoidance. A total of 451 volunteers were recruited for an experiment. A computer program and an eye-tracking device were used to measure the number of clicks and eye movements. The findings show that the number of clicks for to obtain organic search results is higher than that for keyword advertising. There is no difference in observation count between the area of keyword advertising placed above the organic search results and the area of the organic search results themselves. However, observation counts for the organic search results and keyword advertising placed above the organic search results are higher than for the keyword advertising placed at the right-hand side of the page. Searchers seem to spend the longest observation time on the organic search results, then on the keyword advertising placed above the organic search results, and finally on the keyword advertising placed at the right-hand side of the page.

1. Introduction

With the rapidly evolving Internet technologies, people rely on the Internet to search for and find information. About 70% of Internet users use a search engine each day (Jansen 2010). Along with the growing use of search engines, keyword advertising has become popular among advertisers and is now one of the fastest growing types of online marketing (Search Engine Marketing Professional Organization 2009).

Keyword advertising is a premium service offered by such search engines as Google, Yahoo! and MSN. The service assists advertisers in choosing specific keywords to include in their advertising text. When online searchers use these keywords to search for information, related advertising appears on the search engine results pages (SERPs). This type of advertising, which is also called sponsored advertising, paid results (Gauzente and Roy 2012), sponsored links (Naldi et al. 2010) or paid placement (Chen and He 2011), usually appears at the top, bottom, or in the column to the right of the organic search results area. Because keyword advertising can satisfy a searcher’s information needs, it often generates higher advertising effectiveness (Yoo 2009, Kim et al. 2012) than do non-targeted banners.

Although many studies have discussed what type of advertising creates better advertising effectiveness, some researchers have proposed that people avoid looking at advertising. Especially in the online world, the Internet provides users with environments such as social networking sites, online games, news, and search engines that users generally enter with specific goals in mind (Duff and Faber 2011). When online advertising appears in high goal-oriented environments, it obstructs the user's task, interrupts their focus, and even terminates their viewing of the content, thus creating a negative attitude toward ads (Speck and Elliott, 1997, Cho and Cheon 2004). To decrease the interference from so much ad content and to eliminate their exposure to ads, online users adopt behaviors such as ignoring or skipping the ads. This type of behavior is called advertising avoidance (Speck and Elliott 1997, Duff and Faber 2011).

Because the behavior of searching online is a highly goal-oriented task, advertising avoidance may appear obvious. When searchers enter the search engine results pages, they may purposefully focus on information that appears in organic search results to avoid keyword advertising interference. Hence, the purpose of the present study is to verify that consumers ignore keyword advertising when searching online. We observe two modes of advertising avoidance – physical ad avoidance and cognitive ad avoidance – in both the sponsored search results and the organic search results on the search engine results pages. We propose that searchers are more inclined...
to click on organic search results than sponsored search results as physical ad avoidance, and that they will take no notice of sponsored search results as cognitive ad avoidance. Thus, the observation counts and observation lengths of viewing keyword advertising are expected to be lower than those for the organic search results.

This study conducted a laboratory experimental method to understand the behavior of clicking and eye movement on keyword advertising. After recruiting participants for the experiment, we instructed them to search for information using a mimic Yahoo! search engine for the assigned task. Participants’ click-through behaviors were recorded by the computer program, and the browsing route over the search engine results page was recorded using an eye-tracking device.

Differing from previous keyword advertising related research, the following are the unique findings of this study. First, many previous studies on keyword advertising effectiveness compared keyword ads with only other types of online ads. This study focuses on the media context of the search engine results pages in which keyword advertising is embedded and compares the difference between sponsored search results and organic search results. Within the context of the search engine results pages, we can precisely understand consumers’ true response to keyword advertising. Second, previous studies have argued that the click-through rate on keyword advertising is high. However, advertising avoidance behavior causes the keyword advertising click-through rate to be lower than that of organic search results. Finally, advertising avoidance is usually measured by self-reporting, which easily lends itself to bias and distortion as the advertising avoidance behavior is a subconscious process. This study provides more precise and complete results by objectively recording the searchers’ clicking behaviors and the paths of their eye movements while browsing with system programming and an eye-tracking device.

## 2. Theoretical background

### 2.1. Keyword advertising

Keyword advertising is one mode of search engine marketing, which is a form of Web advertising that companies use to promote their products and services on search engine results pages (Jansen and Schuster 2011). Search engine websites provide slots to advertisers who are willing to purchase space for placing keyword advertising. Advertisers can bid on keywords or keyword phrases and then pay the accepted bidding price to the search engine for each click that brings an online user to their landing page. This payment mechanism is called pay-per-click and also cost-per-click (Jansen and Schuster 2011). The main advantage of pay-per-click is that advertisers can easily track the input and output, namely, every payment that the advertiser inputs should reflect on advertising performance. However, it comes with an inherent disadvantage – to increase the advertiser’s payment, automated agents of competitors may click the ad incessantly. In spite of this malicious behavior, the PPC mechanism is still popular among advertisers and commonly used on search engines (e.g., Google and Yahoo!) (Naldi et al. 2010).

With respect to advertisement ranking, bid price and quality score are the two factors that influence slot position. The search engine system provides the advertisers who bid the highest price the most attractive sponsored advertising slots at the top of the web page. Accordingly, click-through rates and slot position have a positive relationship. That is, the higher the slot position, the higher the click-through rates and the better the revenue (Naldi et al. 2010, Huang and Kauffman 2011). Thus, if advertisers want their advertising to be positioned at the top and above the organic search results, the bid price must be enhanced (Naldi et al. 2010). Quality score also influences slot position. This score is used to measure how relevant the keyword is to the ad text and to the user’s search query (Jansen and Schuster 2011). The higher the quality score, the stronger the advertising relativity and the better the performance of the search engine. Thus, to maintain and improve the quality of ads listed on their sites, search engines place keyword advertising with high quality scores at the top of the web page yet charge a lower fee as a reward.

Keyword advertising is receiving increasing attention from academic researchers. Of the previous studies on online

---

### Table 1
The results of clicking on the search engine results pages (SERPs).

<table>
<thead>
<tr>
<th>Product</th>
<th>SERPs</th>
<th>Number of clicks</th>
<th>$\chi^2$</th>
<th>Degrees of freedom</th>
<th>$p$-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>iPhone</td>
<td>Organic search results</td>
<td>AOI 2</td>
<td>149</td>
<td>116.578</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sponsored search results</td>
<td>AOI 1</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AOI 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Google Glass</td>
<td>Organic search results</td>
<td>AOI 2</td>
<td>122</td>
<td>88.007</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sponsored search results</td>
<td>AOI 1</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lyrto Camera</td>
<td>Organic search results</td>
<td>AOI 2</td>
<td>146</td>
<td>121.090</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sponsored search results</td>
<td>AOI 1</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AOI 3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p*-Value $< 0.05
keyword-based ads, some have focused on slot context and the bidding mechanism (Vorobeychik and Reeves 2008, Naldi et al. 2010, Huang and Kauffman 2011). Others have discussed how the format of the content of keyword advertising influences the click-through rates (Ghose and Yang 2008, Gauzente and Roy 2012). Still others have probed into the influence of consumer characteristics and their behaviors toward keyword advertising on campaign performance (e.g., Brooks 2006, Yoo 2009, Gauzente and Roy 2012, Kim et al. 2012). The majority of these studies have focused on the many varied aspects that can enhance the effectiveness of advertising. Although it is important to understand how keyword advertising influences consumer click-through behavior, understanding whether keyword advertising is negatively affected by advertising avoidance, as for other Internet ads, is also an important issue. Hence, this study focuses on advertising avoidance and discusses its influence on keyword ads.

2.2. Advertising avoidance

People are exposed to thousands of advertising messages in their daily lives: on the street, on television, in magazines, and on the Internet. However, these ads are not always welcome by the general population; they tend to interrupt or interfere with an individual's general activities (Krattemaker and Powe 1994) or disrupt the individual as he is engaged in a specific activity (Speck and Elliott 1997). Such interferences and disruptions cause consumers to resist or avoid contact with any marketing message. In the advertising-related literature, this condition is called advertising avoidance, which is defined as all of the actions that media users employ to reduce exposure to ad content (Speck and Elliott 1997).

Previous research has addressed four reasons as to why people avoid viewing advertising. The first is to decrease one's loss in terms of opportunity cost. Consumers may feel they can use the time spent watching advertising to engage in other more worthwhile things, such as communicating with other people or watching other programs (Tse and Lee 2001, Prasad et al. 2003). The second reason is that it is perceived as ad clutter. When the amount of advertising in a medium is excessive, consumers perceive the advertising as clutter (Elliott and Speck 1998). This perceived ad clutter leads to negative attitudes and subsequent ad avoidance (Cho and Cheon 2004). The third reason is that ads disturb or terminate the process of achieving one's goals. In other words, if advertising disturbs or interrupts non-advertising content, these ads diffuse the browser's attention, which results in less focus on the intended targeted information.

This concept is what Cho and Cheon (2004) labeled perceived goal impediment, suggesting that Internet advertising can interrupt users' web page viewing and intrude on their search for the targeted information. Some ads completely suspend the user's activity by preventing the user from reading, viewing or listening to the desired content (Speck and Elliott 1997). The fourth reason for avoidance is prior negative experience. When making decisions, consumers tend to rely on conclusions drawn from their personal experiences (Hoch and Deighton 1989). Online consumers who have been disturbed by advertising may develop negative attitudes and, in turn, resort to advertising avoidance (Cho and Cheon 2004).

People can remove advertising information from their attention by ignoring, flipping, skipping, or deleting it. Different media environments generate different types of advertising avoidance (Duff and Faber 2011). To understand avoidance behavior, prior studies have attempted to categorize it. For example, Speck and Elliott (1997) argued that avoidance behavior can be divided into three types: cognitive, behavioral, and mechanical. Abernethy’s (1991) study identified physical and mechanical methods as the two types of advertising avoidance, while Cho and Cheon (2004) presented three types of avoidance strategies: cognitive, affective, and behavioral.

Chatterjee (2008) and Burke and Srull (1988) divided advertising avoidance into cognitive ad avoidance and physical ad avoidance. Although different researchers have devised different categories and labels, this study carefully plumbed the depths to explain, define, and observe real avoidance behavior as adopted by the scholars and determined that these different labels actually have much in common. We also found that these category labels cannot be put together into one all-inclusive system. Accordingly, this study asserts that the behavioral ad avoidance of Speck and Elliott (1997) is the same as the physical ad avoidance of Abernethy (1991) and the behavioral ad avoidance of Cho and Cheon (2004). In addition, the mechanical ad avoidance of Speck and Elliott (1997) is the same as the mechanical ad avoidance of Abernethy (1991) and the affective ad avoidance of Cho and Cheon (2004). However, the behavioral ad avoidance and the mechanical ad avoidance of Speck and Elliott (1997) are combined in the definition of physical ad avoidance by Chatterjee (2008) and Burke and Srull (1988).

In relation to traditional media, the Internet has a higher degree of information richness. Additionally, because of the evolution of program technology, the Internet has been viewed as a media conglomerate as it can provide a variety of information similar to that of traditional media (television, radio, newspapers, magazines, billboards, and direct mail) (Cho and Cheon 2004). Advertising on the Internet has variety and is novel. Furthermore, Internet ads also have more activity and invite more interaction than do traditional ads. Therefore, it may appear that avoidance behavior of online advertising includes more than the two ways that prior research has identified. For example, when the consumer scrolls down the web page to avoid viewing the advertising, should this behavior be categorized as mechanical ad avoidance or as behavioral ad avoidance? Categorizing it as physical ad avoidance, which employs the broader range of the definition of Chatterjee (2008) and Burke and Srull (1988), eliminates the vagueness with respect to the various categories. Hence, this study has opted physical ad avoidance and cognitive ad avoidance from Chatterjee (2008) and Burke and Srull (1988) to interpret advertising avoidance of online advertising.

Physical ad avoidance means that consumers consciously employ actions or mechanical devices such as switching channels, closing pop-up ads, or throwing away direct mail advertisements to avoid advertising exposure (Chatterjee 2008). Physical ad avoidance involves a conscious decision to take action to avoid advertising, and accordingly, it generally induces a different level of resistance response (Brehm and Brehm 1981). Cognitive ad avoidance means that consumers subconsciously avoid fixating on the visual range of advertising (Chatterjee 2008). Cognitive ad avoidance is an automatic procedure in that consumers may be blind to advertising that has been inserted in the media and, thus, see no need to make a conscious decision or take action. That is, apart from ignoring the advertisement, there is no other conscious behavior.

2.3. Development of hypotheses

As previously mentioned, any information that can be recognized as advertising would lead to advertising avoidance, and of course, keyword advertising is no exception. The main objective when developing keyword advertising is to enhance the click-through and look-through rate by giving advertising information that is related to the browser’s search goal. When searchers enter a key phrase, the search engine will generate two results on the search engine results pages — organic search
results, which appear because of their actual relevance to the search terms, and sponsored search results, which are paid by a business based on keywords that are relevant to that business and appear with an advertising link (Battelle 2005, Naldi et al. 2010, Gauzente and Roy 2012).

Based on the norms of advertising management policies of governments throughout the world though, the keyword advertising area must use a different background color to differentiate it from the organic search results. According to gestalt theory, when a similarity of visual elements between two blocks is lacking (e.g., different background color), browsers tend to disregard these blocks as a whole (Wagemans et al. 2012), and immediately determine that the keyword advertising area is independent of the organic search results. The areas of sponsored search results are then easily noticed and are known as commercial information. Furthermore, advertisers must label the keyword advertising area accordingly. For example, Yahoo! labels it “sponsored search results” and Google labels it “Ads related to.” Browsers can also easily gauge that organic search results and sponsored search results are two different areas. Therefore, when searchers are browsing through their search results, they can readily perceive the sponsored search results as being in a commercial advertising area in their pre-attentive processing.

According to the literature previously discussed herein, there are four reasons for advertising avoidance. These reasons also apply to keyword advertising. First, based on the principle of decreasing loss in terms of opportunity cost, people are more inclined to do other things deemed more worthwhile than looking at advertising (Tse and Lee 2001, Prasad et al. 2003). In the case of an online search, the purpose of entering a search engine results page is to search for specific information. To be more efficient, searchers focus on organic search results instead of spending time browsing keyword advertising.

Second, keyword advertising generally appears at the top, bottom, or to the right-hand side of the organic search results. It may cause perceived ad clutter when searchers enter the search engine results page, which, in turn, produces negative attitudes toward keyword advertising (Cho and Cheon 2004). The third reason for advertising avoidance is perceived goal impediment (Cho and Cheon 2004). When keyword advertising floods the search engine results page, it may disturb or break off the user’s process of searching for the target information. Prior negative experience is the fourth reason. For online consumers who have been disturbed by keyword advertising, the past unpleasant experiences may have led to their current negative attitudes and advertising avoidance (Cho and Cheon 2004). Thus, keyword advertising is the same as other forms of advertising in that its proliferation and location can cause people to avoid taking note of it.

The two methods of advertising avoidance are physical ad avoidance and cognitive ad avoidance (Chatterjee 2008, Burke and Srull 1988). Physical ad avoidance is the performance of a conscious action to avoid advertising (Chatterjee 2008). Because sponsored search results are part of the search engine results page, searchers cannot avoid keyword advertising by closing the web page. Thus, the only way to physically avoid advertising is to click on organic search results rather than sponsored search results. Thus, we propose Hypothesis 1.

Hypothesis 1 (Click Tendency). On the search engine results pages, searchers tend to click on the organic search results rather than on the sponsored search results.

Cognitive ad avoidance is a subconscious avoidance action (Chatterjee 2008) wherein searchers do not take notice of sponsored search results. We suspect that the observation counts and observation lengths of viewing keyword advertising will be less than that observed for organic search results. Thus, we propose Hypothesis 2.

Hypothesis 2 (Browsing Behavior). On the search engine results pages, organic search results generate more browsing behavior than do sponsored search results.

Hypothesis 2a (Observation Count). On the search engine results pages, the observation count of views of organic search results is higher than the count for views of keyword advertising.

Hypothesis 2b (Observation Length). On the search engine results pages, the observation length of viewing organic search results is longer than the length of time spent viewing keyword advertising.

3. Experiment

The purpose of this study is to understand whether people prefer to click and view keyword advertising or organic search results when they are conducting keyword searches. To verify the hypotheses, we conducted our experiment using a laboratory experimental method to imitate real search conditions. Participants were recruited and randomly assigned to one of three specific search tasks. They were instructed to search for information using our mimic search engine website by keying in the assigned word: iPhone, Google Glass, or Lytro Camera. In experiments, we utilized eye-tracking technology to track the eye movement of participants as they viewed the search engine results page, and we used a computer program to record actual clicking behavior. Upon completion of the experiment, the participants were given a small gift as appreciation for their time and effort.

3.1. Participants

A total of 451 volunteers who have website searching experience were recruited and were invited to enter the laboratory. In the iPhone search task, the participant group was comprised of 85 men and 76 women with an average age of 23.14 (std. dev. = 5.12). The average Internet use experience of the participants was 11.34 years (std. dev. = 4.69). In the Google Glass search task, the participant group was comprised of 56 men and 79 women with an average age of 23.97 (std. dev. = 4.65). The average Internet use experience of participants was 10.21 years (std. dev. = 4.10). In the Lytro Camera search task, the participant group was comprised of 75 men and 80 women with an average age of 24.32 (std. dev. = 5.92). The average Internet use experience of participants was 9.47 years (std. dev. = 5.55).

3.2. Materials

To observe and record participants’ clicking behavior and eye movement on organic search results and sponsored search results in the search engine results page, this study divided the results page into three areas of interest (AOI). Fig. 1 indicates that AOI 1 and AOI 3 have been defined as keyword advertising zones, and AOI 2 has been defined as the organic search results zone.

If participants had searched for iPhone, Google Glass, or Lytro Camera information before the experiment, a different behavioral reaction from their original search behavior would have ensued as they would have tried to imitate their original search. This would have introduced an unnatural search motivation into the task. To avoid this, we built motivation into the search task. That is, we used writing a product research report as our specified task to engage participants in the task and enhance their motivation to
search for the iPhone, Google Glass, or Lytro Camera information. The following is the task description:

You have to finish an “iPhone” (“Google Glass,” or “Lytro Camera”) product research report. Therefore, you must retrieve some information about the standards and functions of an iPhone (“Google Glass,” or “Lytro Camera”). You will enter an online search engine and key in the phrase “iPhone” (“Google Glass,” or “Lytro Camera”) in the search box and then click on the one link you want to browse.

The search engine of the experiment website imitates the interface of Yahoo! because it is the most popular search engine in the research area (71.7% of users use Yahoo! as the portal site to search for information in this market). (The interested reader should visit www.insightxplorer.com/news/news_02_23_10.html.) To avoid having an unfamiliar results page cause a reaction that might affect the results (Kerlinger and Lee 2000), the typesetting and product-related information content of the keyword advertising similarly imitated the search engine results pages of Yahoo! We chose iPhone, Google Glass, and Lytro Camera as the three specific search targets because it is easy to obtain related material such as photos, product overviews, features, and specs for such products. Each participant was randomly assigned one of these three search tasks.

When participants entered the keyword in the search box and hit enter, the search engine results page appeared with its three unmarked AOIs (AOI 1 and AOI 3 are the keyword advertising zones, and AOI 2 is the organic search results zone). To avoid a difference in product information content in each zone (e.g., text color, text length, font size, description) that could influence one’s intention for clicking, all three AOIs provided congruent information. Furthermore, we also imitated Yahoo’s design in using red to mark any keywords that appear in the search engine results pages of Yahoo! We chose iPhone, Google Glass, and Lytro Camera as the three specific search targets because it is easy to obtain related material such as photos, product overviews, features, and specs for such products. Each participant was randomly assigned one of these three search tasks.

When participants entered the keyword in the search box and hit enter, the search engine results page appeared with its three unmarked AOIs (AOI 1 and AOI 3 are the keyword advertising zones, and AOI 2 is the organic search results zone). To avoid a difference in product information content in each zone (e.g., text color, text length, font size, description) that could influence one’s intention for clicking, all three AOIs provided congruent information. Furthermore, we also imitated Yahoo’s design in using red to mark any keywords that appear in the search engine results page. Similarly, to assist participants in easily recognizing the zones of keyword advertising, we highlighted these zones and labeled them “sponsored results” on the upper right corner in a specific color.

3.3. Measures

The actual clicking behavior of participants in the search engine results pages was recorded by a computer program. Participants were given only one chance to click on the hyperlink of the site they wanted to visit. The total number of clicks on each AOI was viewed as the dependent variable of the Click Tendency Hypothesis (H1).

The eye-tracking device cast an infrared light into the participant’s eyes, and a high-powered camera created an image of the pupils. A computer program then analyzed the shape of the pupils and the position of the cornea borders to infer the participant’s gaze plot and the movement of the gaze between fixations. Because count and duration are the two most important aspects of gazing behavior, we adopted observation count and observation length as the measurement variables. Observation count refers to the total number of gazes on each AOI. A higher number indicates more gazes. Observation length refers to the duration of the gazes on each AOI. A higher number indicates that the tally of the gaze durations is longer. The unit of measurement used was the millisecond (ms).

4. Results

To test the Click Tendency Hypothesis (H1), which predicts that online searchers tend to click organic search results rather than sponsored search results, we adopt the \( \chi^2 \) test (goodness-of-fit test) and code 1 for clicking organic search results and 0 for clicking sponsored search results. According to the results, participants’ clicking choices on the three AOIs differed significantly (iPhone: \( \chi^2 = 116.578, p < 0.001 \); Google Glass: \( \chi^2 = 88.007, p < 0.001 \); Lytro Camera: \( \chi^2 = 121.090, p < 0.001 \)). This indicates that the number of clicks on organic search results is higher than the number of clicks on sponsored search results. Therefore, Hypothesis 1 is supported (see Table 1). After conducting the \( \chi^2 \) test of homogeneity, the results show that males and females made the same number of clicks on sponsored search results and organic search results (iPhone: \( \chi^2 = 2.565, p = 0.109 \); Google Glass: \( \chi^2 = 0.680, p = 0.410 \); Lytro Camera: \( \chi^2 = 0.163, p = 0.687 \)). Furthermore, for both males and females, the number of clicks on the organic search results is higher than that in the keyword advertising zone. Thus, Hypothesis 1 is supported for males and females.

With respect to eye movement, the means and the standard deviations of the observation counts and observation lengths for each of the three AOIs are presented in Table 2.
To verify the Browsing Behavior Hypothesis (H2) and determine whether searchers are inclined to browse organic search results more than sponsored search results, we conducted an analysis of variance (ANOVA). The results in Table 3 show a significant difference in the observation counts for the three AOIs (iPhone: $F = 81.736$, $p < 0.001$, $\eta^2 = 0.254$; Google Glass: $F = 66.084$, $p < 0.001$, $\eta^2 = 0.247$; Lytro Camera: $F = 79.571$, $p < 0.001$, $\eta^2 = 0.256$). After multiple comparison procedures on all search tasks, we find that the observation counts for AOI 1 and AOI 2 are significantly higher than those for AOI 3 but that there is no significant difference between AOI 1 and AOI 2, as shown in Table 4. This means that keyword advertising at the top of the search engine results pages and the organic search results are what participants view the most, followed by keyword advertising on the right-hand side of the page. Thus, the Observation Count Hypothesis (H2a) is not fully supported.

### Table 2
Mean values of observation counts and lengths on areas of interest (AOIs).

<table>
<thead>
<tr>
<th>Measures</th>
<th>AOIs</th>
<th>Number of participants</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation count (counts)</td>
<td>iPhone AOI 1</td>
<td>161</td>
<td>16.807</td>
<td>14.437</td>
</tr>
<tr>
<td></td>
<td>iPhone AOI 2</td>
<td></td>
<td>15.422</td>
<td>12.765</td>
</tr>
<tr>
<td></td>
<td>iPhone AOI 3</td>
<td></td>
<td>2.304</td>
<td>2.676</td>
</tr>
<tr>
<td>Observation length (ms)</td>
<td>iPhone AOI 1</td>
<td>161</td>
<td>2712.552</td>
<td>2085.617</td>
</tr>
<tr>
<td></td>
<td>iPhone AOI 2</td>
<td></td>
<td>6034.914</td>
<td>3768.354</td>
</tr>
<tr>
<td></td>
<td>iPhone AOI 3</td>
<td></td>
<td>632.061</td>
<td>740.548</td>
</tr>
<tr>
<td>Observation count (counts)</td>
<td>Google Glass AOI 1</td>
<td>135</td>
<td>17.756</td>
<td>15.430</td>
</tr>
<tr>
<td></td>
<td>Google Glass AOI 2</td>
<td></td>
<td>15.911</td>
<td>13.579</td>
</tr>
<tr>
<td></td>
<td>Google Glass AOI 3</td>
<td></td>
<td>2.407</td>
<td>2.805</td>
</tr>
<tr>
<td>Observation length (ms)</td>
<td>Google Glass AOI 1</td>
<td>135</td>
<td>2875.422</td>
<td>2135.209</td>
</tr>
<tr>
<td></td>
<td>Google Glass AOI 2</td>
<td></td>
<td>6138.930</td>
<td>3901.255</td>
</tr>
<tr>
<td></td>
<td>Google Glass AOI 3</td>
<td></td>
<td>639.696</td>
<td>734.836</td>
</tr>
<tr>
<td>Observation count (counts)</td>
<td>Lytro Camera AOI 1</td>
<td>155</td>
<td>17.135</td>
<td>14.592</td>
</tr>
<tr>
<td></td>
<td>Lytro Camera AOI 2</td>
<td></td>
<td>15.574</td>
<td>12.947</td>
</tr>
<tr>
<td></td>
<td>Lytro Camera AOI 3</td>
<td></td>
<td>2.310</td>
<td>2.696</td>
</tr>
<tr>
<td>Observation length (ms)</td>
<td>Lytro Camera AOI 1</td>
<td>155</td>
<td>2768.200</td>
<td>2105.095</td>
</tr>
<tr>
<td></td>
<td>Lytro Camera AOI 2</td>
<td></td>
<td>6024.819</td>
<td>3767.450</td>
</tr>
<tr>
<td></td>
<td>Lytro Camera AOI 3</td>
<td></td>
<td>635.690</td>
<td>753.201</td>
</tr>
</tbody>
</table>

### Table 3
The influence between AOIs on observation count and observation length.

<table>
<thead>
<tr>
<th>SERPs</th>
<th>Browsing behavior</th>
<th>$F$</th>
<th>$p$-Value</th>
<th>$\eta^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>iPhone</td>
<td>Observation count (counts)</td>
<td>81.736</td>
<td>0.001</td>
<td>0.254</td>
</tr>
<tr>
<td></td>
<td>Observation length (ms)</td>
<td>187.675</td>
<td>0.001</td>
<td>0.439</td>
</tr>
<tr>
<td>Google Glass</td>
<td>Observation count (counts)</td>
<td>66.084</td>
<td>0.001</td>
<td>0.247</td>
</tr>
<tr>
<td></td>
<td>Observation length (ms)</td>
<td>152.450</td>
<td>0.001</td>
<td>0.431</td>
</tr>
<tr>
<td>Lytro Camera</td>
<td>Observation count (counts)</td>
<td>79.571</td>
<td>0.001</td>
<td>0.256</td>
</tr>
<tr>
<td></td>
<td>Observation length (ms)</td>
<td>178.465</td>
<td>0.001</td>
<td>0.436</td>
</tr>
</tbody>
</table>

* $p$-Value < 0.05

### Table 4
Comparisons among AOIs on observation counts and lengths.

<table>
<thead>
<tr>
<th>Browsing behavior</th>
<th>Comparison of AOIs</th>
<th>Mean difference</th>
<th>Standard error</th>
<th>$p$-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation count (counts)</td>
<td>iPhone AOI 1–AOI 2</td>
<td>1.385</td>
<td>1.252</td>
<td>0.511</td>
</tr>
<tr>
<td></td>
<td>iPhone AOI 2–AOI 3</td>
<td>13.118</td>
<td>1.252</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>iPhone AOI 3–AOI 1</td>
<td>−14.503</td>
<td>1.252</td>
<td>0.001</td>
</tr>
<tr>
<td>Observation length (ms)</td>
<td>iPhone AOI 1–AOI 2</td>
<td>−3322.360</td>
<td>281.317</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>iPhone AOI 2–AOI 3</td>
<td>5402.845</td>
<td>281.317</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>iPhone AOI 3–AOI 1</td>
<td>−2080.485</td>
<td>281.317</td>
<td>0.001</td>
</tr>
<tr>
<td>Observation count (counts)</td>
<td>Google Glass AOI 1–AOI 2</td>
<td>1.844</td>
<td>1.458</td>
<td>0.416</td>
</tr>
<tr>
<td></td>
<td>Google Glass AOI 2–AOI 3</td>
<td>13.504</td>
<td>1.458</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Google Glass AOI 3–AOI 1</td>
<td>−15.348</td>
<td>1.458</td>
<td>0.001</td>
</tr>
<tr>
<td>Observation length (ms)</td>
<td>Google Glass AOI 1–AOI 2</td>
<td>−3263.504</td>
<td>316.765</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Google Glass AOI 2–AOI 3</td>
<td>5499.230</td>
<td>316.765</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Google Glass AOI 3–AOI 1</td>
<td>−2235.726</td>
<td>316.765</td>
<td>0.001</td>
</tr>
<tr>
<td>Observation count (counts)</td>
<td>Lytro Camera AOI 1–AOI 2</td>
<td>1.561</td>
<td>1.292</td>
<td>0.449</td>
</tr>
<tr>
<td></td>
<td>Lytro Camera AOI 2–AOI 3</td>
<td>13.265</td>
<td>1.292</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Lytro Camera AOI 3–AOI 1</td>
<td>−14.826</td>
<td>1.292</td>
<td>0.001</td>
</tr>
<tr>
<td>Observation length (ms)</td>
<td>Lytro Camera AOI 1–AOI 2</td>
<td>−3256.619</td>
<td>287.312</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Lytro Camera AOI 2–AOI 3</td>
<td>5389.129</td>
<td>287.312</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Lytro Camera AOI 3–AOI 1</td>
<td>−2132.510</td>
<td>287.312</td>
<td>0.001</td>
</tr>
</tbody>
</table>

* $p$-Value < 0.05
A further analysis of gender differences in browsing behaviors on the search engine results pages finds that the observation counts on the three AOIs differ significantly for both males and females (iPhone\_male: F = 64.535, p < 0.001, $\eta^2_g$ = 0.282; Google Glass\_male: F = 20.880, p < 0.001, $\eta^2_g$ = 0.202; Lytro Camera\_male: F = 29.257, p < 0.001, $\eta^2_g$ = 0.209; iPhone\_female: F = 52.160, p < 0.001, $\eta^2_g$ = 0.317; Google Glass\_female: F = 48.172, p < 0.001, $\eta^2_g$ = 0.292; Lytro Camera\_female: F = 57.336, p < 0.001, $\eta^2_g$ = 0.326). Regardless of gender, however, counts for AOI 1 and AOI 2 are significantly higher than those for AOI 3, while for all three search tasks, AOI 1 does not significantly differ from AOI 2.

However, a significant difference is revealed in observation length among the three AOIs (iPhone: F = 187.675, p < 0.001, $\eta^2_g$ = 0.439; Google Glass: F = 152.450, p < 0.001, $\eta^2_g$ = 0.431; Lytro Camera: F = 178.465, p < 0.001, $\eta^2_g$ = 0.4366). On all search tasks, participants’ observation length at AOI 2 is significantly higher than at AOI 1 or AOI 3, and AOI 1 is significantly higher than AOI 3, as shown in Table 4 also. This indicates that participants view organic search results the most, followed by keyword advertising at the top of the page and then keyword advertising on the right-hand side of the page. Thus, the Observation Length Hypothesis (H2b) is supported.

Our results also revealed a significant difference in observation length among the three AOIs by all participants regardless of gender (iPhone\_male: F = 111.590, p < 0.001, $\eta^2_g$ = 0.470; Google Glass\_male: F = 138.249, p < 0.001, $\eta^2_g$ = 0.531; Lytro Camera\_male: F = 90.552, p < 0.001, $\eta^2_g$ = 0.473; iPhone\_female: F = 77.922, p < 0.001, $\eta^2_g$ = 0.409; Google Glass\_female: F = 82.803, p < 0.001, $\eta^2_g$ = 0.417; Lytro Camera\_female: F = 81.899, p < 0.001, $\eta^2_g$ = 0.409). On all of the search tasks, both males and females exhibited significantly greater observation length on AOI 2 than on AOI 1 or AOI 3, and AOI 1 is significantly greater than AOI 3. Thus, the Observation Length Hypothesis (H2b) is supported for males and females.

5. Discussion and conclusion

With the rapid development of the Internet, spending on online advertising continues to grow, especially for keyword advertising. It can disturb or suspend consumer access to specific information, forcing them to directly ignore the advertising. 451 participants with online searching experience were recruited. After giving each participant one of three specific tasks, we observed each participant’s click-through behaviors and eye movements. The results show that the number of clicks on organic search results is higher than the number on online advertising zones. Therefore, the Click Tendency Hypothesis (H1) is supported.

With respect to eye movement, while there is no difference in observation count between keyword advertising in the top zone (AOI 1) and in the organic search results zone (AOI 2), both AOI 1 and AOI 2 are significantly higher than keyword advertising in the zone to the right-hand side of the page (AOI 3). As for observation length, searchers spent most of their time on the organic search results (AOI 2), followed by keyword advertising in the top zone (AOI 1), and, finally, by keyword advertising in the right-hand side zone (AOI 3). Therefore, the Browsing Behavior Hypothesis (H2) is partially supported.

This study also explored the effect of gender on clicking and browsing behaviors on the search engine results pages. The results indicate that both males and females make a greater number of clicks in AOI 2 than in AOI 1 or AOI 3. Additionally, both males and females gaze more frequently at AOI 1 and AOI 2 than at AOI 3, and the length of time spent observing AOI 2 is greater than that of observing either AOI 1 or AOI 3. Accordingly, there is no difference between male and female behavior in terms of clicks and gazes when searching the search engine results pages.

The reasons for there being no difference in observation count between AOI 1 and AOI 2 is summarized as follows. First, to identify the zones of sponsored search results and organic search results and to confirm which is the most relevant information, searchers browse back-and-forth. Hence, even if searchers do not click on keyword advertising, the searchers may still glance at the keyword advertising in AOI 1. Second, even though observation count does not differ between AOI 1 and AOI 2, observation length is significantly different between them. So it appears that time spent looking at organic search results is higher for every gaze, a point that is not contrary to the argument of this study.

5.2. Theoretical implications

There are some theoretical implications of this study. First, many prior studies compared keyword ads with other types of online ads with respect to their keyword advertising effectiveness. Instead, this study focused only on the media context of the search engine results pages and compared the difference between sponsored search results and organic search results. By observing search behaviors on the search engine results pages, we can precisely identify consumers’ true responses to keyword advertising. Second, almost all of the results from previous studies supported the fact that the click-through rate of keyword advertising is higher than that of other advertising formats. However, in light of advertising avoidance, this study verifies that even though keyword advertising is related to information that consumers need, consumers still avoid keyword ads and focus instead on organic search results.

Finally, advertising avoidance is usually measured by self-reporting whereby participants are asked directly about the degree to which they participate in various avoidance behaviors, such as ignoring, flipping and eliminating. This study objectively recorded searchers’ clicking and gazing behaviors to eliminate problems of bias and distortion produced by conscious processing. By so doing, the study provides more precise and complete results.

5.3. Practical implications

With respect to practical implications, this study has several suggestions for advertisers and advertising providers.

5.3.1. Suggestions for advertisers

First, according to the results, while consumers do not click on keyword advertising, they do glance around the sponsored area. To
avoid perpetrating even greater advertising avoidance, advertisers should not focus on how to attract consumer attention, but on how to increase keyword advertising effectiveness while advertising avoidance is occurring. Second, advertisers should improve their search engine optimization to obtain product information into the organic search results as this will create a higher click-through rate than keyword advertising ever will.

Third, according to pre-attentive processing research and mere exposure effect, advertising avoidance can actually be processed incidentally and thus produce memory without perception. That is, people have implicit memory but no explicit memory of the target object (Chatterjee 2008). However, although implicit memory is inaccessible, recipients can still develop a preference toward the target object (Janiszewski 1988) and, accordingly, put the target product into a choice and consideration set (Janiszewski 1988, 1990, 1993).

According to the results of this study, while consumers tend not to click on keyword advertising, it is still included in the path of eye movement. Therefore, keyword advertising may obtain more positive results through consumers’ unconscious processing. Combined with the first suggestions for advertisers, this implies that when advertisers conduct keyword advertising, they should not expend much effort on compelling consumers to click, but should focus instead on the content of their advertising copy by being brief and using clear words to express their focal point. This can transmit product messages, brand exposure, and brand awareness directly to the consumers’ unconscious minds even without them clicking on the keyword ad, all of the while keeping the advertiser from paying for the expense of the clicks.

5.3.2. Suggestions for keyword advertising service providers
First, service providers obtain profits for each click on keyword advertising. However, while consumers browse keyword advertisements, they tend not to click them. So advertising effectiveness has been achieved, but the advertisers did not have to pay for it. To create more profit from keyword advertising, service providers should change their method of charging. For example, the standard charge should be based on the number of times the keyword advertisement appears, or a similar concept.

Second, according to gestalt theory, consumers who pre-attentively process the information in their environment will intuitively regard the sponsored search results as organic search results if the two had similar visual elements. Thus, without violating government regulations, advertising providers could use a similarly colored background or other similar visual elements in both the sponsored search results and organic search results areas to further increase the probability of click-through behavior or to enhance the number of gaze counts and the length of gazes on keyword advertising.

5.4. Limitations
The results of this study show that there is no difference in the observation counts between sponsored search results and organic search results. One research limitation is that we do not have a deep understanding of the positive effect of pre-attentive processing, which has been mentioned throughout this study when discussing practical implications. Because this study has focused on the measurement of physiological information rather than on attitude or emotion, it is difficult to explain the subconscious effects of browsing keyword advertising.

Thus, future research should explore why there is no difference in observation counts between organic search results and sponsored search results. Future studies should also measure the effectiveness of keyword advertising, especially ad recall and attitudes toward the ad, in situations where there is browsing but no clicking. Finally, it would be worthwhile to conduct research that manipulates the wording of keyword advertisements and discusses the effectiveness of the tweaks by using MEE and gestalt theory.

References


