An Examination of Ads and Viewing Behavior: An Eye Tracking Study on Desktop and Mobile Devices

Research-in-Progress

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ABSTRACT

In this study, we use eye tracking to compare the impact of ads on viewing behavior on desktop computers and mobile phones. As in previous studies, we use a list-based search engine results pages (SERPs) to conduct our examination. Our preliminary results contradict banner blindness on SERPs both on desktop computers and mobile phones. Additionally, the preliminary results suggest that top ads may be more effective in attracting users attention on mobile phones compared to desktop computers.

Keywords

Eye tracking, search engine results pages, advertisements, mobile phone, desktop computers

INTRODUCTION

Information search, a major activity of web users, is becoming increasingly important for performing day-to-day activities mostly due to search engines. In 2002, only 52% of Americans were using search engines, but this number has dramatically increased over the last 10 years to 73% in 2012. In addition, 59% of adults reported that they are using search engines on a daily basis. (Purcell, Brenner, and Rainie, 2012) This is nearly twice the percentage of adults (30%) who used search engines daily in 2004 (Purcell et al., 2012).

The increasing popularity of the use of search engine results pages (SERPs) makes them more and more important in marketing both on desktop computers and mobile devices. Thus, it is important to examine the effectiveness of ads in SERPS and whether this is different for desktop computers and mobile phones. While some studies have explored general search behavior on SERPs (i.e. Lorigo, Haridasan, Brynjarsdottir, Xia, Joachims, Gay, Granka, Pellacini, and Pan, 2008), little work has been done to examine the impact of ads on users' search behavior while viewing a SERP, especially comparing behavior between desktop computers and mobile phones. Therefore, we conducted an exploratory study to look into the impact of ads on viewing behavior on a desktop computer and a mobile phone. Such an examination is important to designers, search engine companies, as well as companies that wish to place ads on SERPs. Further, understanding the impact of ads on users' viewing behavior can help companies improve their search engine optimization efforts and e-marketing strategy developments.

VISUAL ATTENTION AND BANNER BLINDNESS

Visual attention is a major component of viewing behavior. It is defined as a cognitive process typically measured through fixations, which means steady gazes with a minimum threshold (Djamasbi, Siegel, and Tullis, 2012). Rayner, Malcolm, and Henderson (2009) found that users can attend to text with fixation durations as low as 50 ms. Keeping this in mind, we know that users can only pay attention to one stimulus at a time and they tend to become distracted if there are too many objects in the field of vision competing for attention. This competition for attention by the stimuli is typically more intense among stimuli or objects that are placed next to each other (Desimone and Duncan, 1995; Janiszewski, 1998; Faraday, 2000; Djamasbi, Siegel, and Tullis, 2012). The type of object that causes more or less distraction can be measured unobtrusively by using eye tracking equipment (Djamasbi et al. 2012).

Ads are designed to compete for attention. Marketers and web designers spend endless hours developing Internet advertisements to catch users' attention; nevertheless there are some consumers who never receive these messages. Savvy Internet users have adapted to visually blinding themselves when it comes to ads. This phenomenon leads to fewer clicks on ads, which equals less revenue generated by the ads, leading to less money in the pockets of companies. Users tend to overlook advertisements, especially those in the banner location, and focus more on search results and other webpage enhancements (Chatterjee 2008). In their study on banner blindness and text advertising, Owens and Chapparo (2011) found users exhibiting "banner blindness" to text advertisements just like display and banner ads. Although location and type of search was a factor, users ignored ads unless perceived to be useful in completing their search task. Little work has been done to test banner blindness on SERPs. This is crucial because SERPs generate revenue with ads. Further, little work has been done to examine the banner blindness phenomenon on smart phones and compare it to this behavior on a desktop computer. This study addresses this gap by providing an initial step in examining the phenomenon of banner blindness on SERPS on computers and mobile phones. .

METHODOLOGY

Design & Participants

Each participant in the study was required to carry out two web-based searches using Google. All queries were made on the actual real-time Google search engine website. Returned search results were not altered in any way, allowing for a user-experience in an actual environment. In this study, we wanted to explore whether there is a difference between mobile phone and desktop computer users when viewing SERPs.

Device

Eye tracking data was collected using the Tobii X120 eye tracker connected to a 24-inch monitor with a resolution of 1920 x 1200 and a smartphone. This data included fixation and their location on the monitor. Areas of Interest (AOIs) were designated manually, as a way of grouping fixation locations, in order to serve as a means for analyzing the eye tracking data at the conclusion of data collection.

Tasks

We have recruited two groups of subjects each between the ages of 18 to 24 to complete two search tasks on a desktop computer and on a mobile phone. This age group was chosen because of their familiarity with using the Google search engine on a desktop and on a mobile phone. As expected, the majority of the participants self-reported to be experts in search and all reported to own a smartphone at the time the data was collected for this experiment. Each participant was asked to use the same set of keywords for the two search tasks. In task 1, subjects were asked to use the phrase "free screen recording software" to find free screen recording software to be used for a class project. In task 2, subjects were asked to use the keywords, "best snack in Boston" to find a snack place in Boston that they would like to visit with friends. None of the participants used these exact search phrases prior to the experiment. The same two tasks were completed for the desktop computer and for the mobile phone. As customary in usability studies, the tasks were assigned to users in a random order (this ensured that the results were not affected by the order in which the tasks were carried out). As previously stated, in order to study user experience in an real-life, unaltered environment, we asked the participants to use the actual real-time Google search engine website. We did not alter the returned search results in any way, therefore allowing for the number of ads on SERPs to vary.

Measures

Initial interactions with a website can have a significant impact on a user's behavior (Djamasbi, Siegel, and Tullis, 2011; Lindgaard, Fernandes, and Dudek, 2006). Therefore, we looked at viewing behavior during the initial interaction with a SERP, meaning from the time that a SERP was loaded to the time that a user took an action, either clicking on a link or scrolling on the page. We used fixation to measure users' attention to an area of interest (AOI). While a user's field of vision typically consists of an array of objects one can attend to only one of the objects at a given moment (Djamasbi et al., 2011; Faraday, 2000). Reading text requires steady gazes that are about 60 ms long (Rayner et al., 2009). SERPs are mostly comprised of text, therefore for this study we examined fixations that were at least 60 ms. As previously tested (e.g. Djamasbi et al., 2012) this study also used fixation patterns and the proportion of viewers of the AOIs as measures of attention.

PRELIMINARY FINDINGS

We analyzed the first set of data that was collected for 34 subjects (18 for desktop and 16 for mobile users). The same eye tracker was used to collect the data for both the mobile and desktop devices. Because collecting eye tracking data for mobile and desktop requires a different setup, the data was collected first for the desktop setup and then the mobile setup.

Our preliminary findings contradicted banner blindness on a desktop computer. When ads where present on SERPS, 77% participants looked at the ads showing that the majority of our participants did not turn a blind eye on ads (See Figure 1).

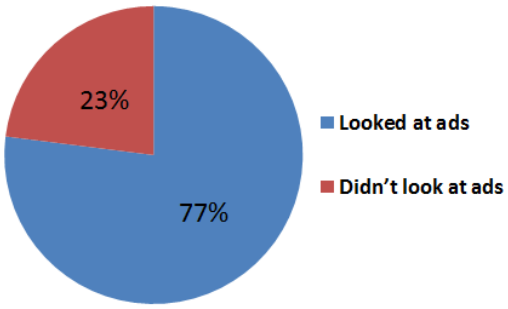

Figure 1 Distribution of users who looked at the ads on a desktop computer

From our findings, we see that ads redirected attention from search result entries. About 10% of attention was redirected from search results toward ads, when advertisements were present (See Figure 2). The average fixation duration on ads was 221 milliseconds. This shows that ads attracted adequate amount of time for users to read and process them (Rayner et al., 2009, Rayner, 1998).

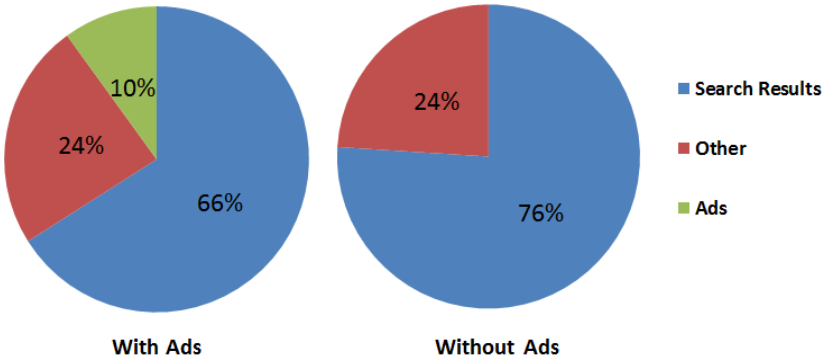

Figure 2 Distribution of attention on SERPs on a desktop computer

For a further exploration, we examined heat maps. While we were not able to aggregate the heat maps because of the organic nature of the study, we inspected the heat maps manually. We found that the heat maps supported the above findings and revealed additional information. Figure 3 displays fixations covering much larger areas on the page when there were no ads on the SERPs. Fixation coverage on a page is an indication of cognitive effort (Djamasbi et al., 2011), thus it seems that when there were no ads people were more willing to investigate the search results. When ads were present, almost always only one of them was viewed. When there was only one ad present the pattern of viewing (while covering less area) was more similar to the pattern of viewing where there were no ads on the page.

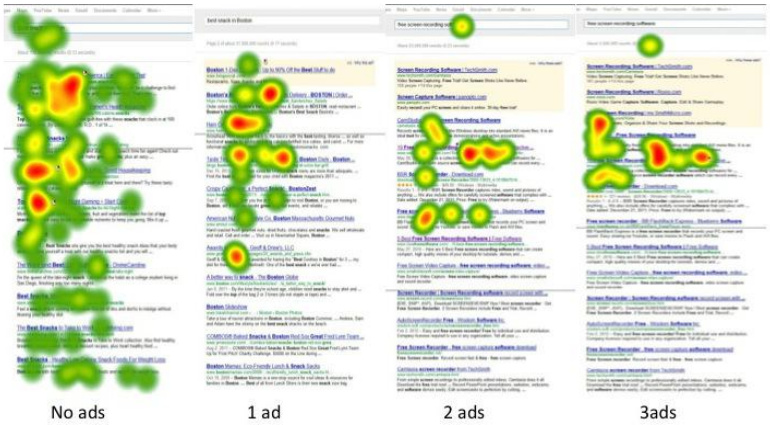

Figure 3 sample heat maps for SERPs with 0 to 3 ads on a desktop computer

Our preliminary findings contradicted banner blindness on a smartphone as well. In fact, more users paid attention to ads on the mobile phone (See Figure 4). Compared to a desktop, the ads were noticed by an overwhelming majority of the participants who viewed SERPs with ads (90% viewed the ads on the mobile phone vs. 77% viewed the ads on the desktop).

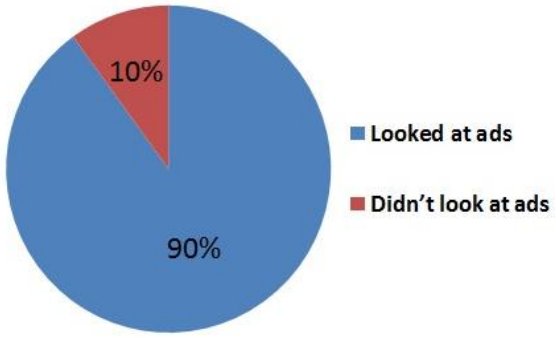

Figure 4 Distribution of users who looked at the ads on a mobile phone

Our preliminary findings show that ads on the mobile phone took attention both from search results and other places on the screen (e.g., search box) unlike ads on desktop that mainly took attention from the search results. Comparing the results displayed in Figures 2 and 5, ads on a mobile phone captured a higher percentage of user attention (28%) compared to ads on a desktop computer (10%). The attention that was dedicated to non-search results items on a mobile phone SERP, tended to be somewhat equally distributed on ads and other places on the SERP. On a desktop computer SERP, the proportion of attention given to ads was almost half of the proportion of attention given to other non-search results items. This suggests that SERP ads on a mobile phone were more successful in attracting attention than ads on a desktop computer. Comparing the percentages of fixation distribution on search results, ads, and other places on the SERP, on the desktop computer the ads tended to take attention mainly away from the search results. On a mobile phone ads seemed to take attention away from both search results and other places on the screen such as the navigation bar and the search box.

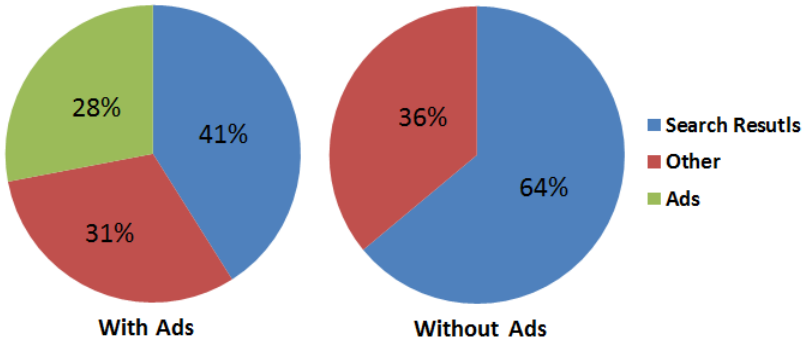

Figure 5 Distribution of attention on SERPs on a mobile phone

Again we looked at the heat maps. As with the desktop computer findings, we were not able to aggregate the heat maps but we inspected them manually for possible trends. Samples of heat maps for SERPs on mobile phones are displayed in Figure 6. In regard to fixation coverage, the differences between SERPs with or without ads on mobile phones were not as pronounced as they were on desktop SERPs. When two ads were present, they tended to be viewed more intensely than when there was only one ad present. The fixations on ads on SERPs with two ads tended to be as intensely as fixations on search results; perhaps because it was harder to distinguish between the ads and search results when ads covered most of the screen space.

Figure 6 sample heat maps for SERPs with 0 to 2 ads on a mobile phone

DISCUSSION

We conducted two exploratory studies that both examined search behavior when using search engine results pages (SERPs) and the impact of advertisements. One study was done using a desktop computer and the other was conducted using a smartphone. Both studies utilized real-time Google search engine webpages. Our preliminary analysis of the data shows ads on mobile SERPs may be more effective than their desktop counterparts. A larger number of people viewed ads on the mobile phone (90%) than on the desktop (77%). Next, there appeared to be minimal impact of the ads on the viewing patterns of our subjects in the mobile phone study. There is similar coverage of the mobile phone SERPs when ads are present and when they are not. This is different on a desktop computer, where subjects seem to scan the page more thoroughly if ads were not present. Perhaps this is because the smaller screen size on a mobile phone encourages users to scan the page the same way regardless of the presence of ads. One explanation could be that users need a minimum amount of coverage (i.e. screen size) to figure out whether ads are present. These questions need to be addressed in future research.

IMPLICATIONS, LIMITATIONS AND FUTURE STUDIES

The preliminary findings have important implications for designers and marketers. They can provide insight for designing ads that are more successful at attracting the attention of the users. They can also help designers with improving the layout of SERPs.

As with any study, there are limitations to the generalizability of the findings. Like other eye tracking studies, this study had a small sample size. Future studies with larger samples will improve generalizability of the results. As with any laboratory experiment, the tasks involved in the study are also a limiting factor. For more robust and higher confidence results, future studies need to include more tasks.

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