

The Position of Static and On-off Banners in WWW Displays on Subsequent Recognition

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ABSTRACT

With the growing popularity of the World Wide Web (WWW), more companies are advertising on the Internet with the intention of influencing purchasing decisions. While companies would like to capture people's attention every time a banner ad appears on a viewer's computer screen, there is some research that suggests that they do not. In Experiment 1, static display of banners at each of the four corners of the screen was investigated using a subsequent recognition test. Experiment 2 examined more locations on the screen with on-off banners. The results of both experiments showed that participants better recognized the content of banners positioned on the top left and bottom right corners than the top right and bottom left corners. Experiment 2 showed that participants were more likely to recognize the content of on-off banners that positioned closer to the center of the screen than those at the edges of the screen. Implications for attention capture and distraction are discussed with respect to producing more effective advertisements and communicating priority information are discussed.

INTRODUCTION

The growing popularity of the World Wide Web (WWW) has provided a new medium for advertising. Some companies subsidize monthly service fees on the basis that a user must give up a portion of the viewing area of a computer's screen used for the display of advertisement banner. Other companies are giving away computers with their own specialty browsing software containing advertisements if the consumer makes a long term commitment to a particular internet service provider. The companies hope to capture consumer's attention while they browse the Internet. Advertisements on web pages are not only provided through Internet Service Providers (ISP) but also goods and services can be accessed using soft links from various other web pages with a high volume of traffic. One of the main reasons businesses advertise products and services is to influence the viewers' purchasing decisions.

As Internet users search or browse the web, frequently the goal is to find relevant, interesting or important information. Some research has shown (e.g., Benway, 1997; Spool, Scanlon, Schroeder, Snyder, & DeAngelo, 1997) that Internet users tend to disregard text and graphics on commercial web pages and banners because they deemed them as relatively unimportant. Even when banners are made more salient with brighter colors and animation, users still tend to disregard them (Spool et al. 1997). Benway (1997) calls the phenomenon 'banner blindness.' Benway (1997) investigated the level of recognition of advertisement banners that were located within several levels of a specifically designed four-level hierarchical web site. Within these levels, complexity grew greater into deeper levels such that there were increasingly more links. Advertisement banners in each level varied in location: grouped near the top or bottom of the page. After they completed a number of set trials, a recognition test was given to each participant containing targets (previously

viewed banners) and distractors (similar banners). Noticing the banner partly depended on their location and the level of complexity. Banners located further from the main links at the top of the pages tended to be missed compared to banners lower in the web page closer to specific links. Banners that were in a less complex environment were missed more often than banners in a more complex environment with many links. These results suggest that users notice more banners depending on where they are looking and working.

Though companies are investing considerable amounts of money on banner advertisements but only a fraction of persons exposed may actually look at them. Although users may not want part of their screen used for advertisements, there may actually be a need for effective advertisement banners. The reason is that without some effectiveness of the advertisements, companies may not subsidize what users get for free or reduced cost if they are not effective Doyle, Minor, & Wyrich (1997).

One purpose of the present research was to investigate the relative effectiveness of banners shown at different locations on the screen. Experiment 1, using static banners, investigated the effectiveness of banners displayed at one of the four corners of the screen. Previous research (e.g., Bzostek & Wogalter, 1999) suggests that search times are faster/shorter when information is located at the top left corner of the screen compared to the bottom right corner of the screen. In the present study, we hypothesized that subsequent recognition performance (an indicant of attention capture and encoding) would be highest for banners displayed at the top left corner than the other three corners. However, Benway's (1998) results suggest that performance may be elevated in other areas if the users tend to look and work and at a close distance to the banner a similar suggested was proffered by Doyle et al., 1997. Experiment 2 using on-off banners examined

the effectiveness of on-off banners located in 16 different locations of three regions of the computer screen. We hypothesized that subsequent recognition performance would be highest nearer to the center of the screen compared to other parts of the screen because it was thought that users predominately set their gaze at the center of the screen while browsing. Like Experiment 1, Experiment 2 examined the relative efficacy of the corner locations, but this time using a different experimental design and using three center-to-edge regions of the screen

In both experiments, we measured memory in a subsequent recognition test as an indication of attention (if they remember the banners they must have seen it, i.e., attended to it).

EXPERIMENT 1

This experiment investigated effects of static banner displayed at each of the four corners of the computer screen on a subsequent recognition test.

Method

Participants. Sixteen North Carolina State University (NCSU) undergraduates participated for credit towards a research credit requirement in their introductory psychology courses. The mean age of all the participants was 19.5 (S.D. = 1.5) years. All participants reported to have experience with the WWW. Ninety-three percent reported using the WWW on a daily basis.

Design and Stimuli. A between group design was used in which participants saw banners placed at each of the four corners (top-left vs. top-right vs. bottom-left vs. bottom-right). Any given participant saw banners displayed in only one corner of the screen. A static banner is equivalent to conventional advertisement banners that are currently used on the WWW. The target banners were visible for a period of 2.0 s and separated by a black blank inter-stimulus interval of 250 ms before the next target banner was presented. The banners were displayed simultaneously with whatever was on the screen. All banners were 1.9 X 3.81 cm (0.75 X 1.5 inch) in height and length, respectively. All 16 stimuli were randomized by order of presentation for each participant. The browser's window size was modified by reducing overall in height so that the banners on the top corners would not cover the soft buttons of the web browser. All 16 banners were displayed a total of 50 times in the 30 min period browsing session. Each participant saw 16 banners at one of the corners of the screen. Recognition of banners in a subsequent test served as the dependent variable.

Apparatus. A Dell Optiplex 233 MHz Gxi Pentium with high speed Internet connection and a 17-inch (43 cm) diagonal monitor was used. The monitor had a 16-inch (407-mm) diagonal viewing area. The banner presentation program was produced using JAVA (Sun Corp., Palo Alto, CA).

Procedure. Each participant sat in front of the computer monitor at about a distance of 50.8 cm (20 inches). In controlling this distance, participants were instructed to sit upright in a chair that the arms were

butted against the edge of the table. The experimenter instructed each participant to browse within NCSU's web domain during the entire 30-min session. This domain was chosen because: (a) it is a complex interconnecting network, (b) it has information interesting to student of this institution, (c) it has no offensive material, and (d) it provided some degree of control (rather than have everyone go in different directions outside of the confines of the domain). Participants were allowed to explore any web pages within this domain and were encouraged to 'actively browse' as they pleased. During the browsing session, participants explored numerous links including the athletics page, class registration page, their professor's home page, and etc.

To add realism and to not make it obvious to participants the real intent of the research, participants were told at the beginning of the session, "Oh, by the way, this computer has a virus so don't mind the bugs." The "bugs" referred to banners but this relationship was not explicitly pointed out. This instruction was crucial because in a preliminary pilot study, participants sometimes asked the experimenter about the banners appearing on the computer screen and in two cases pilot participants turned off the stimuli while running the experiment.

After the browsing session was completed, participants were given a surprise/unexpected recognition test of the banners containing the 16 targets (banners presented earlier) and 30 distractors. The target and distractors consisted of two word items of fictitious products (e.g., Alabaster Water, Modest Monitors). Each banner had a different colored background that was randomly chosen and assigned to the name. For each testing item, participants were asked if they had seen the item before and what their confidence was of their decision on a single six point scale (Y3 - yes, very confident that it was presented earlier, Y2 - yes, somewhat confident that it was presented earlier, Y1 - Yes, not confident of recognizing it, N1 - no, not confident of recognizing it, N2 - no, somewhat confident of not recognizing it, N3 - no, very confident of not recognizing it). These scores were recoded to 6 to 1, respectively. Each participant also rated several computer related experience items: frequency of use (monthly to hourly), their computer experience (beginner to advance), and annoyance of "bugs" (not annoying to very irritating) with 1 reflecting low quantity and 10 high quantity. Finally, participants were asked their age and sex.

Results

Data from the 4 stationary positions were analyzed using a 2 X 2 (top vs. bottom X left vs. right) between-subjects analysis of variance (ANOVA). Although the ANOVA did not show any significant main effects, there was a significant interaction between the top vs. bottom X left vs. right, $F(1, 60) = 8.00, p < .05$. Means are shown on Table 1.

Discussion

Banners displayed on the top-left and bottom-right banners produced higher recognition performance than banners displayed on the bottom-left and top-right.

Banners located at the top-left corner confirmed results indicated by previous researchers (e.g., Benway, 1998; Bzostek & Wogalter, 1999). The high level of recognition for the bottom-right corner is probably due greater likelihood of scanning certain places than other places while web browsing. Users may gaze frequently at top-left corner because it is adjacent to the frequently used soft browser buttons of back, forward, and stop. They also may gaze frequently at the bottom right corner to perform the command operation of scrolling, a function that web users repeatedly do while web browsing.

EXPERIMENT 2

This experiment investigated effects of 16 on-off banners that were randomly displayed on the computer screen in three regions.

Method

Participants. Sixteen NCSU undergraduates participated for credit towards a research credit requirement in their introductory psychology courses. The mean age was 20.2 (SD = 3.0) years. All participants reported to have experience with the WWW. Ninety percent reported using the WWW on a daily basis.

Design. This experiment used the same 16 banners as in the first experiment. However, there were several differences in the procedures employed. The banners were displayed in 16 locations (see Figure 1). Some were at the *outer* region of the screen (6 positions: 1-6), some were at the *center* (5 positions: 12-16) and some were *intermediate* of the two locations (5 positions: 7-11). A Latin square of the 16 on-off banners was used to balance presentation order of position of the 16 banners with respect to position across participants. Thus, each participant received a different order of banners and order of positions. Across participants, all banners were presented an equal number of times in each position.

A within-subjects group design was used. The same recognition test procedure as Experiment 1 was used.

Subsequent recognition of banners in the three regions (outer, intermediate, & center) was investigated. Recognition scores from each of the 16 position averaged producing an overall mean for each region.

Table 1 Mean Percentage Recognition as a Function of Top vs. Bottom and Left vs. Right (Experiment 1).

	Left	Right
Top	16.8	13.7
Bottom	14.1	16.1

Apparatus and procedure. The apparatus and procedure were the same as in Experiment 1, with the exception that the on-off banners randomly displayed at 16 positions on the screen. These on-off banners were displayed for durations of 2.0 s with a transparent inter-stimulus duration of 10.0 s followed before the next on-off banner was displayed at a different position.

Results

Each participant's recognition scores of the banners in each region was averaged producing three means, one for each region. A repeated measures one-way ANOVA on these data showed a significant effect, $F(2, 15) = 4.80, p < 0.05$. Comparisons among the means using Fisher's Least Significant Difference (LSD) test ($p < .05$) indicated that banners positioned in the center region ($M = 4.82, SD = 0.57$) produced significantly higher recognition than banners in the outer region ($M = 4.07, SD = .47$). Performance for the intermediate region ($M = 4.66, SD = 0.35$) was not significantly different from the other two regions.

To examine performance for banners placed in the corners, raw recognition scores were only taken from banners placed at corners of each of the three regions. A 3 (Region: outer, intermediate, center) X 2 (Top vs. Bottom) X 2 (Left vs. Right) repeated measures ANOVA on these data was conducted. This analysis showed a significant interaction of Top vs. Bottom and Left vs. Right, $F(1, 15) = 6.28, p < .05$. The means for this interaction are shown in Table 2.

Discussion

Recognition of banners displayed in the center region was significantly better than the outer region. This finding is probably due to user's gaze being centrally placed in the display relative to more peripheral placement. The other finding in this experiment is a confirmation of Experiment 1's corner placement results, that the top left and the bottom right corner banners are recognized in the subsequent test better than the other two corners. The findings of high recognition in the center and in the corners might appear to be in conflict but they are not. The reason is that

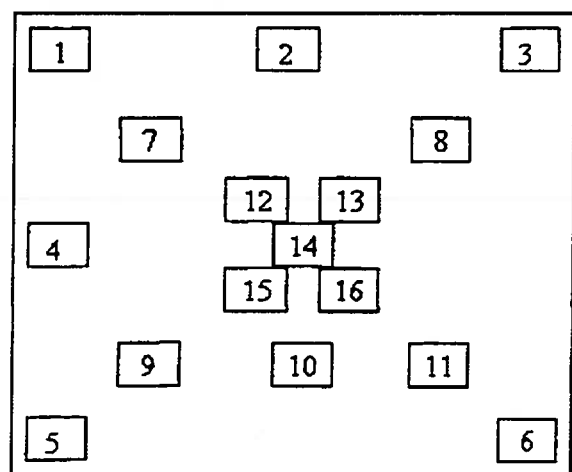


Figure 1. On-off banner locations

Table 2 Mean Percentage Recognition as a Function of Top vs. Bottom and Left vs. Right (Experiment 2).

	Left	Right
Top	4.96	3.85
Bottom	4.38	4.88

there were different placements considered in the two analyses. In one analysis, only the corners were examined, and in the other analysis, all of the banners placements were included.

GENERAL DISCUSSION

Experiment 1 tested for differences in static banner placement in the four outer regions of the screen. The results showed that banners placed in the top left and bottom right were better recognized in a subsequent memory test than the other two corners. This finding was confirmed in Experiment 2 using on-off banners and using a different experimental design. Experiment 2 also found that recognition was better for banners placed in the central regions of the screen as opposed to the outer regions of the screen. One explanation of these results is that the highly recognized banners were placed near where users are looking and working on the screen (e.g., Doyle et al., 1997). At these locations they are more likely to be glanced at, seen, and attended to and subsequently recognized. However, this finding conflicts with research (e.g., Bzostek & Wogalter, 1999) showing that placement of information on the right bottom corner produces longer search times than the other three corners. In the present research, users frequently used the scrolling soft button function near the bottom right corner to move through information on the net. In previous research, participants performed a search on static displays and apparently performed the task by looking for information using a reading-type scan. Thus, the different findings with respect to the

bottom right corner is probably attributed to the tasks that participants are asked to do in the research. If the task is simply an information search task then starting from the top left and ending on the bottom right is parallel the way English is read. However, if the task involves browsing extensively over the whole screen, then presentation of banners in the most looked at areas are more likely to be encoded and subsequently recognized.

Experiment 2 also showed that performance was highest when banners were placed in the center of the screen. This result can be explained in a similar way as the right bottom corner result. The screen's central location is where most of the browsed information is located (relative to the more peripheral areas). Also it is the area where users will gaze as they move back and forth between the top left and the bottom right regions.

These results suggest that banner placement in the three-point diagonal area between the top left corner through the center of the display to the bottom right corner is more likely to be seen and attended to by users of current internet displays.

Besides the advertising industry, salient placement of banners could be useful in screen-based applications in a more general way. Salient placement could aid users in receiving vital information. Such cases can be seen as analogous to having a visual pager. However, banners can also be distracting. Thus presentation of highly salient banners is not advisable when the task relies upon users giving their full attention to the main contents of the display such as monitoring processes related to safety (e.g., air traffic controllers).

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