Changing Banner Ad Executions on the Web: Impact on Clickthroughs and Communication Outcomes

Patrali Chatterjee, Rutgers University

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ABSTRACT

Online advertisers change banner ad executions to overcome negative returns from repetition, improve clickrates and communication outcomes. We investigate the effect of banner ad repetition level, same and varying banner ad executions and consumer navigation orientation on behavioral response (clickrate) and memory-based outcomes (unaided recall, aided recall and recognition). We found that number of clickthroughs, aided recall and recognition scores were higher when subjects were experientially oriented. There is no significant effect of banner ad executions or repetition level on clickthroughs and unaided recall. Recognition is higher under high repetition and same ads in goal-directed condition and varying executions in experiential orientation.

Advertising as a business model has dominated the commercial growth of the Internet. The ability of the medium to track and record advertising served to consumers and low relative costs promises advertisers greater accountability and economy in targeting their markets. Despite declining clickthrough rates and predictions of the “death of the banner ad”, the banner ad as an advertising unit has stood the test of time and has always accounted for the largest portion of all ads served, 58% as of Q3 2003 (DoubleClick Ad Serving Trends 2003). Many blame the declining clickrate of banner ads to their ubiquity, small size and high repetition—making consumers immune to noticing, much less clicking on them. Based on prior research in TV and print, changing banner ad creative executions may be a solution however little is known if the same effects hold true on the Web.

Metrics used to capture the effectiveness of banner advertisements have been debated since the early stages of Internet commerce. Since it is relatively easy and inexpensive to track consumer browsing behavior during website visits, the focus has been on measuring behavioral outcomes like “clickthroughs” rather than affective or cognitive communication outcomes. A clickthrough indicates that the web surfer has seen the banner ad and clicks through to the advertiser’s URL via the banner. Websites hosting on-line ads favor traditional “exposure” based metrics, such as “impressions or pageviews” served, to allow them to charge for each banner exposure. However, advertisers’ desire for accountability in performance and challenges posed in accurately measuring whether the banner ad was actually noticed during an “impression” (as we discuss in the next sections) has lead to insistence on click-based pricing (CPC) which accounts for 28% of online advertising revenues (DoubleClick.com 2003).

While an interactive measure like clickthrough, allows for exact response quantification, it may not be suitable for all types of advertising, particularly those focused on achieving memory rather than instantaneous response. Several researchers suggest that repeating banner ads has a positive impact on brand awareness and recognition (Briggs and Hollis 1997) even without clickthrough. However memory-based communication measures like recall and recognition are difficult to measure on an ongoing basis, and there is a need to understand the relationship between impressions, clickthroughs and communication outcomes. In this research we study the impact of repeated ad exposures with same executions and varying executions on behavioral clickthrough response as well as memory-based outcomes—recall and recognition.

CONSUMER INTERACTION WITH BANNER ADS ON THE WEB

A banner advertisement is a section of on-line advertising space that typically consists of a combination of graphic and textual content and contains an internal link to target ad pages (the advertiser’s information on the host site) or an external link to the advertiser’s website via a clickthrough URL. Click rates have declined from 2.4% in 1994 (Williamson 1996), when the Web first gained acceptance as a mainstream medium, to an average of 0.54 in 2003 with a range between 0.61%–0.76% based on size (DoubleClick Ad Serving Trends 2003). However banner ads remain the dominant ad unit online and accounted for 58% of the $4.9 billion online advertising revenues. The number of banner ad impressions delivered per day has consistently increased from 440 in 1999 to 950 in 2003 (DoubleClick.com 2003).

Several researchers have investigated how consumers process banner advertising on web pages. Chatterjee (2001) proposes a model of processing of banner ads which proceeds through a hierarchy of stages of preattention, attention, click decision and finally comprehension and elaboration of advertising message in the advertiser’s target ad page. Consumers visit websites to process content on web pages, hence attending to, clicking on and processing information in banner ads represents a secondary task. Exposure to banner ads is typically incidental, in that they individually occupy a very small portion of the web page (10% of visual field) and have to compete for consumer’s attention with content on the web page and in most cases, with other ads. Banner ads typically have very little information, hence exposure without clickthrough can (at best) generate lower order communication outcomes.

Several studies in the academic and commercial sector report that most banner ads remain unnoticed by consumers (Benway 1998, Dreze and Husherr 2003). Usability experts studying eye-fixation patterns on web pages contend that eyes have been subconsciously trained to avoid areas of web pages where banner ads are typically placed, hence the term “banner blindness” to refer to non-perception of banner ads. This explains why clickthrough rates are low; consumers have to notice the banner ad in order to click on it but generally avoid looking at banner ads if they are preoccupied with specific tasks during their online activities.

Online advertisers have addressed banner blindness by developing more intrusive ad execution technologies to ensure that ads get noticed. Numerous studies show that colors, design and positioning of the banners did not have a significant effect on recognition. Creative executions of banner ads using animations, audio and video-enhanced, search capability enhanced, rich media, pop-ups, pop-unders, crawling banners may be more intrusive and effective in forcing immediate attention but they are also annoying and intimidating to users. Such technological solutions can collectively lead to more resistance to web advertising. Given the characteristics of the medium, Web users bombarded by numerous ads on the Web can adapt their navigation behavior to counter these technologies. When their novelty fades even the short-run benefits may disappear.

Banners ads need to be repeatedly exposed to consumers to have a chance to be noticed, attended and clicked on. This can lead to positive communication outcomes even in the absence of
clickthrough (Briggs and Hollis 1997), however we do not know if the communication outcomes accrue at lower or higher levels of exposure. Further, in comparison to the print and TV media, repetitions of banner ads are typically more numerous on ad-supported web-sites because of low CPMs (typically between $25-$40) and lower marginal cost of creating additional advertising space online. Industry experts coined a phenomenon “banner burn-out,” suggesting that advertising effectiveness in terms of banner click through rate reaches maximum point at the first exposure. On the Web consumers control the rate at which information is presented, hence there is sufficient opportunity for the consumer to process the ad and information at the first exposure itself. At a disaggregate level, the click through rate after the first exposure, tends to decline rapidly and reaches less than 0.05 percent at the fourth exposure (Chatterjee, Hoffman and Novak 2003). Thus, repetition of banner ads can lead to negative returns a lot earlier than in traditional media. The marginal impact of banner ad repetition on clickthroughs declines with each exposure (Chatterjee, Hoffman and Novak 2003) within a session however little is known about the impact on communication outcomes.

Displaying different versions of banner ads is an alternative used by practitioners to forestall the negative impact of repetition and increase effectiveness of banner ads without irritating consumers. Prior research in marketing and advertising in print and TV media have generally shown that ad variation can reduce the tedium effects caused by multiple exposures to the same ad and thereby maintain advertising effectiveness (Schumann & Clemons, 1989; Schumann, Petty, & Clemons, 1990; Burnkrant & Unnava, 1987). However, there is an important difference: TV ads are more likely to be consciously processed than banner ads on webpages. A TV ad completely occupies the TV screen when aired and is difficult to avoid without zapping to another TV channel. In contrast, banner ads can be easily overlooked hence not consciously processed. Hence there is a need to examine if ad variation can be effective in increasing banner advertising effectiveness. At most popular websites graphical executions of ads vary greatly, often rotated multiple times while the consumer is on the same page. It is a lot cheaper and faster to create multiple execution of web ads (costs range from $0 to $350) than print or TV ads. Since banner ads are in general ignored we do not know if changing banner ad executions will improve or be detrimental to communication outcomes and clickthroughs. This research aims to compare the effect of exposures to same and varied banner ad executions in natural Web browsing environments on behavioral (clickthrough) and memory-based (awareness, recognition, and recall) measures.

**HYPOTHESES**

Existing studies of effectiveness of banner ads at an aggregate level indicate that the after 3 exposures consumers are not likely to click at all (DoubleClick 1996). If most exposure to banner ads on the Web is incidental, does tedium set in after only 3 exposures? To avert wearout of banner ads due to repetition, ad networks display different creative executions of banner ads at each exposure. Further, a particular variation of the banner ad may be more effective than others and there will be increased opportunities to notice and click. If however most exposure of banner ads is incidental, are practitioners wrong in using varied executions of banner ads, sometimes several within the same session lasting under a minute? Can effects observed in traditional media derived for cognitive measures hold true for behavior-based measure like clickthrough? Is this misuse of the capabilities of the medium and detrimental to processing outcomes of banner ads? We seek to answer these questions in this section.

**Effect of Navigation Orientation:**

The hypertext nature of the Web provides users with unprecedented freedom to choose content, time, and speed of information exposure at their own will. Consumer involvement with the navigation task to achieve certain goals entails a clear distinction between goal-directed and experiential or exploratory web browsing that could affect processing of ad stimuli. If a consumer’s navigation through website is goal-directed toward a particular task, for example searching for a particular piece of information, attention is singularly focussed towards achieving extrinsic goals (Janiszewski 1998) and this will reduce the attention paid to peripheral stimuli like banner ads. Literature on preattentive processing suggests that when a person focuses his/her attention on a primary task, ad stimuli are placed outside of consumer focal attention area can still be processed unconsciously. Under these conditions automatic unconscious learning process which operates parallel with the main task will dominate and familiarity based inference process will determine communication outcomes. Please note that if banner ads are contextually placed (e.g. Overture Site Match service at Yahoo) processing of banner ad information may become the primary goal at least temporarily. Involvement with the brand or product category will lead to clicks (Cho and Leckenby 1999) and higher processing outcomes irrespective of navigation orientation. We leave this as a topic to be investigated for future research.

In contrast, experiential or exploratory orientation (i.e., surfing) represents engagement in the activity for intrinsic pleasure of the activity itself, without any extrinsic goals driving the browsing activity. When consumers are in exploratory browsing mode, they are more likely to process peripheral ad stimuli. There is greater opportunity to notice, attend and click on banner ads if the consumer is motivated. Danner and Mullarkey (2003) found that recognition and recall scores are higher when consumers are experimentally browsing rather than goal-directed. This could explain why search engines like Infoseek and WebCrawler have lower clickthrough rates (1.1% and 0.7%, resp.) than content providers like HotWired (2.8% Williamson, 1996).

Noticing and attending to a banner ad is a necessary but not sufficient condition for clickthrough to occur. Clicking banners is a voluntary and conscious decision by the consumer to see more detailed information provided by advertiser and requires willingness to deviate, and in some cases, abandon one’s original goal (by leaving the website to go the advertiser’s site) for visiting the website. Since achieving one’s goal is more important in goal-directed mode than in exploratory mode and clicking on banner ad represents a diversion from that goal, we can hypothesize

**H1:** Consumers are more likely to click in sessions when they are exploratory in their browsing behavior compared to sessions when they are goal-oriented.

We know from countless media reports that clickthroughs are rare events, hence it is possible that clickthrough rates will remain steady across all conditions primarily due to ceiling effects.

**Effect of Repetition Level of Banner Ad Exposures**

Repeated ad exposures are used to increase the likelihood that a brand name is remembered (Unnava and Burnkrant 1991) and strengthen the association between the brand name and the advertised product benefit in memory (Burke and Srull 1998). Prior literature on repetition effects in traditional media suggests a non-monotonic relationship between message repetition and message effectiveness (cf. Cacioppo and Petty 1979) however attempts to specify the nature of relationship has not been consistent (Nordheim
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2002). Similar explanations of Berlyne’s (1970) two factor theory and Petty’s (1979) dual processing model of attitudes and by Pechmann and Stewart’s (1988) two-stage learning model. Pechmann and Stewart (1988) explain the inverted-U curve response of advertising in terms of “wearin” and “wearout.” These effects will hold in online advertising environments if consumers have the opportunity to process banner ads or “wearin” at initial exposures, more likely to occur when consumers are surfing. Peripheral stimuli can compete for attention in exploratory behavior since attention is not so singularly focused (Janiszewski 1998) and consumers have sufficient opportunity and motivation to notice and attend to the banner ad at initial exposures. The declining marginal impact of exposure on affect will occur earlier than in goal-directed condition since banner ads as stimuli are relatively simpler, and exposure is self-paced. Subsequent exposures to the same ad “wearout”, are unnecessary, as there is nothing new (information) for the consumer to process.

Exceptions to the inverted U-shaped relationship have been reported when presumably respondents have little or no motivation or opportunity to elaborate on the stimuli being presented, similar to conditions of goal-directed browsing and incidental exposure to banner ads. In fact, no downturn in affective responses has been observed when respondents’ opportunity to process stimuli consciously is constrained (Bornstein and D’Agostino 1992). The mere exposure effect (Zajonc 1968) suggests that a mere increase in exposure to stimuli would increase positive affect toward those stimuli. Under goal-directed conditions, the perceptual fluency/misattribution model posits that repeated exposure to a stimulus will create a feature-based representation of a stimulus (i.e., feature analysis) in memory that will facilitate encoding (perceptual fluency) and processing of the stimulus when viewed at a later time (Nordheilm 2002). Unconscious processes drive effects of incidental ad exposure, hence response biases caused by exposure are beyond consumers’ volitional control. Thus, even though consumers can avoid looking at banner ads, they cannot avoid being influenced by them subconsciously! Hence, Experiments.

H2: Clickthroughs, unaided, aided recall and recognition scores will be higher (lower) under high ad repetition condition compared to low repetition condition in goal-directed (exploratory) navigation.

Effect of Varying Banner Ad Exposures

Past research on ad variation has demonstrated that varied ad executions (even slight) can enhance memory and liking for brand name over repeated same-ad executions (Mitchell & Olson, 1981; Schumann & Clemons, 1989; Schumann, Petty, & Clemons, 1990; Unnava & Burnkrant, 1991). Encoding variability effects and differential attention contribute independently to better memorability of varying ad executions. The encoding variability research (e.g., Melton 1967, Madigan 1969) indicates that when the time lag between exposures is short (as in the case of multiple banner ad exposures during a session), pairing a stimulus with two different cues is more effective (i.e., results in more learning) than exposing people to the same stimulus-cue combination twice. Under exploratory browsing conditions, consumers are more likely to allocate cognitive resources to attend to ad content. Hence we would expect more learning to take place when different banner ad executions are used than when the same ad is repeated. Each succeeding repetition of the same stimulus strengthens an existing memory trace by a smaller amount. However, when different cues are paired with the same stimulus, each cue results in a different memory trace. Variation in executions would be more likely to lead to varied semantic encodings of the repeated information than the straight repetition of the same ad, generating multiple pathways to access same information from memory and improving communication outcomes.

Under goal-oriented browsing conditions, a large part of a consumer’s processing of banners may be at the pre-attentive level. If ad executions change at every exposure to the banner ad several memory traces corresponding to each of the varied executions will occur, each of which will be weak to be retrieved from memory. The fundamental premise of the perceptual fluency model is that repeated exposure to a stimulus will result in a representation of the stimulus in memory which will be misattributed to familiarity with the stimulus thus leading to increases in recognition scores. Hence, a certain amount of repetition is a necessary condition for the unconsciously processed advertisements to have familiarity effects, which may not be the case if ad executions are varied on each exposure. Hence we propose an interaction between ad variation (same vs. varying) and consumer navigational goals (exploratory vs. goal-directed).

H3: Under goal-directed (exploratory) navigation, clickthroughs, unaided/aided recall and recognition scores will be higher (lower) for same banner ad executions than for varying executions.

EXPERIMENT

Design: The effects of repeated same and varying ad executions on clickthroughs and communication outcomes were tested using an experimental website developed by the career services department, represent a relevant context for our student sample. The career services department would place banner ads for 8 sponsors on content pages at the site. We developed fictitious brand names and banner ads to replace these sponsor names (all well known brand names) while retaining the product category of the sponsor. Since prior familiarity with the advertised brands could potentially confound our results (Dahlen 2001), we wanted to ascertain that subjects had no prior familiarity with the advertised brands or the website. Questionnaires administered at the beginning of the experiment (to measure experience and use of the World Wide Web and demographic information) and at the end of the experiment to collect dependent measures were integrated into the website so information could be collected electronically.

We used a 3x2x2 full factorial design. Ad exposure conditions were multiple exposures to same ad execution 1 (AE1) versus multiple exposures to same ad execution 2 (AE2) versus multiple exposures to varying ad executions 1 and 2 consecutively (AV). The two navigation orientations were goal-oriented navigation versus exploratory navigation. Level of banner ad exposure were low-4 exposures and high-15 exposures for the chosen sponsor. Approximately half of the students in each of the three ad exposure groups were in the goal-directed and the others in exploratory navigation orientation.

Subjects. Three hundred and two subjects from undergraduate introductory marketing classes participated for course credit and were randomly assigned to the treatment conditions.

Stimuli: The stimulus materials (developed with help from the career services department) consisted of four versions of the target brand name—-we named “Reliable Rental Car Agency”. All banner ads in the study were 468x60 pixels, had the words “click here” on the lower right corner, and an image of a car with the words “Reliable Rentals, www.reliablerentals.com” on the right end. The copy consisted of two sentences in light yellow 16 pt font, a headline “Affordable weekend and weekly car rentals” followed by “Pick up and drop off free” flashing on a light green...
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Results and Discussion

Preliminary analyses indicated 11% of subjects clicked on at least one banner ad during their session. Mean recognition scores (0.612, s.d. 0.21) were significantly higher than unaided recall (0.397, s.d. 0.29) and aided recall scores (0.24, s.d. 0.21). Ad claims were remembered and recall more than URL or brand name. A three-way multivariate analysis of variance (MANOVA) was conducted to determine the effect of navigation orientation, level of exposure and ad execution on repeated exposures on the dependent variables, unaided recall, aided recall and recognition. Since our memory-based dependent variables are correlated we use MANOVA instead of several univariate ANOVAs to test our other hypotheses to avoid inflating Type I error. Detailed MANOVA results are available from the authors. We only report on significant effects in Table 1. There were significant multivariate main effects for exposure and ad execution on repeated exposures on the dependent variables, unaided recall, aided recall and recognition. Since our memory-based dependent variables are correlated we use MANOVA instead of several univariate ANOVAs to test our other hypotheses to avoid inflating Type I error. Detailed MANOVA results are available from the authors. We only report on significant effects in Table 1. There were significant multivariate main effects for navigation condition (Wilks’ Lambda=0.835, F(3,288)=18.725) and repetition level (Wilks’ Lambda=0.967, F(3,288)=3.259) both p<0.01, but not for ad variation. These main effects need to be viewed with caution since several two-way interaction effects were found.

Effect of Navigation Orientation: We found that subjects in exploratory browsing condition clicked more banners than those in goal-directed condition, F(1,290)=4.395 (p<0.01). There was a significant univariate main effect of navigation orientation and H1 was supported. We found equivalent results using logistic regression for clickthrough. Analyses of variances (ANOVA) on each dependent variable conducted as follow-up tests to the MANOVA indicated that navigation orientation had a significant effect on unaided recall (F(1,290)=2.721), aided recall (F(1,290)=4.101) and recognition (F(1,290)=4.613) for the target ad, all p values<0.01. Recall and recognition scores were significantly higher in exploratory compared to goal-directed conditions.

Effect of Repetition Level: The ANOVA on aided recall (F(1,290)=6.968) and recognition (F(1,290)=6.753) due to banner ad repetition level was significant, both p<0.01; however the effect
on unaided recall and clickthrough was insignificant at p<0.1. We found a significant 2-way multivariate interaction effect of repetition and navigation orientation, $F(3,288)=7.426$, p<0.01, thus supporting H2. Follow-up univariate ANOVA shows that the interaction effect is significant for the unaided ($F(1,290)=2.721$) and aided ($F(1,290)=5.12$), recall scores only, both p<0.01 (see Figs. 1 and 2). In exploratory orientation, mean unaided recall scores were not significantly different for low and high repetition (0.29 vs. 0.36), however the difference was significant as we expected for the goal-directed condition (0.18 vs. 0.39), p<0.001. Mean aided recall scores were significantly higher for low vs. high repetition (0.51 vs. 0.38) for exploratory orientation, and significantly higher for high repetition (0.45) vs. low repetition (0.29) in goal-directed condition, p<0.001, as we hypothesized.

Effect of Ad Variation: The main effect of ad execution on clickthroughs or communication measures was not significant, Wilks’ Lambda=0.989, $F(6,576)=0.528$, p>0.78. However the navigation orientation and ad execution interaction was significant, Wilks’ Lambda=0.932, $F(6,576)=3.427$, p<0.01. The navigation orientation and ad execution interaction on recognition was significant $F(2, 290)=3.959$, p<0.01. Pairwise contrasts indicate that in exploratory browsing mean recognition scores in the varying execution (0.74) are significantly higher than those in same ad (0.51) thus providing partial support for Hypothesis 3, p<0.001. Under goal-oriented browsing, mean recognition scores in the same ad execution (0.53) were significantly higher than in varying ad execution (0.31) p<0.01.

We hypothesize similar effects for all of our dependent variables, hence explanations for the inconsistent results are in order. The insignificant effect of repetition and ad variation on a clickthrough may be a result of ceiling effects and it requires a conscious decision by the subject to deviate from his (default) task. Cognitive learning measures recall and recognition are two types of information retrieval mechanisms from memory and requires conscious awareness of information stored in memory. In unaided recall, the information has to be reproduced from memory without cues, hence ease of retrieval depends on the organization of information in memory. Since most subjects in goal-directed mode are more likely to be preoccupied with navigation activities while being exposed to banner ads, subject are not likely to organize the information during exposure and encoding. They have to search for the information individually in memory (thus accounting for lower recall scores) hence more difficult to achieve than aided recall or recognition. Aided recall is assisted by the provision of retrieval cues that enable the subject to quickly access the information in memory, hence more easily achieved compared to unaided recall in H2. However under ad variation, memory traces of ad information were possibly not to strong enough to be retrievable during a direct search of memory without or with cues, hence no significant impact on either recall scores (H3).

### TABLE 1

<table>
<thead>
<tr>
<th>Source</th>
<th>Multivariate F (df)</th>
<th>Univariate F</th>
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</thead>
<tbody>
<tr>
<td><strong>Main effects</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Navigation Orientation</td>
<td>18.725 (3, 288)</td>
<td>4.395 (1,290)</td>
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<tr>
<td>Clickthrough</td>
<td></td>
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<tr>
<td>Unaided recall</td>
<td>2.721 (1,290)</td>
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<tr>
<td>Aided recall</td>
<td>4.101 (1,290)</td>
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<tr>
<td>Recognition</td>
<td>4.613 (1,290)</td>
<td></td>
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<tr>
<td>Repetition</td>
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<td>6.968 (1,290)</td>
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<tr>
<td>Aided recall</td>
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<tr>
<td>Recognition</td>
<td>6.753 (1,290)</td>
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<tr>
<td>Ad Variation</td>
<td>0.528 (6, 576)*</td>
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<tr>
<td><strong>Interactions</strong></td>
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<td>Navigation Orientation X Repetition</td>
<td>7.426 (3, 288)</td>
<td>2.707 (1,290)</td>
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<tr>
<td>Unaided recall</td>
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<tr>
<td>Aided recall</td>
<td>5.12 (1,290)</td>
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<td>Navigation Orientation X Ad Variation</td>
<td>3.427 (6, 576)</td>
<td>3.959 (2,290)</td>
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<td>Recognition</td>
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*not significant at p<0.1
are more appropriate for high involvement ad processing, while recognition can be achieved even for low involvement ad processing (Singh and Rothschild 1983).

**IMPLICATIONS**

Most existing research on web advertising has dealt with impact of banner ad features, repetition level and exposure duration on either clickthrough or communication outcomes. In this study we examined both components of a consumer’s response to advertising, clickthrough and communication outcomes. We demonstrated that the effects of level of ad exposure and ad execution on clickthroughs, recall and recognition measures differ based on navigation orientation of the consumer. Our results support the contention that banner ads on websites that encourage exploratory browsing (e.g. portals) are more likely to clicked upon and remembered than websites where consumers are goal-directed. While repetition levels or ad executions do not have any significant impact on clickthroughs, the gains from repetition on communication outcomes are higher when consumers are goal-directed than experientially oriented. The gains in memory-based communication outcomes from changing ad executions accrue when consumers are exploratory-oriented. In fact, changing ad executions appears to be detrimental to communication when consumers are goal-directed under high and low levels of ad exposure.

We find that the browsing orientation of consumer determines the likelihood of a clickthrough occurring in a session, a variable outside the control of the advertiser. Neither the repetition schedule nor execution changes have any impact on clickrate. This could be particularly worrisome for advertisers whose sole purpose for placing banner ads is to invite action, e.g. banner ads for surveys, entering sweepstakes, or requesting quotes. Sites that encourage goal-oriented browsing seem particularly disadvantageous in sell-
ing their banner ad space. Google.com’s practice of presenting advertising messages in the form of text hyperlinks alongside relevant search results thus making them visually similar and more difficult for consumers to avoid can be appreciated. Investigating the effect of repetition of text-based ads and substantive (content) variations in banner ads (instead of cosmetic changes in this research) on clickthrough and communication outcomes is an important topic for future research. As post-impression tracking mechanisms online gain widespread acceptance, repetition effects of banner ads on post-impressions (visit to a website, after exposure to banner ad, without clicking on it, but tracked by a cookie) will provide higher accountability for memory-based measures.

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