

Bartering Our Attention: The Distraction and Persuasion Effects of On-Line Advertisements

Brad J. Sagarin, Ph.D.

M. Anne Britt, Ph.D.

Jeremy D. Heider, M.A.

Sarah E. Wood, M.A.

Joel E. Lynch, B.S.

Northern Illinois University

New marketing models enable consumers to choose between paying money for products or receiving ad-sponsored versions. Two experiments examined whether these ad-sponsored products represent reciprocal exchanges of desired goods for consumer attention, as perceived by marketers, or giveaways of desired goods at no cost whatsoever, as perceived by consumers. Participants solved anagrams on a computer in the presence or absence of small, static, visually peripheral advertisements. Results suggest that although consumers maintain illusory beliefs that they can tune out such ads, the ads have substantial persuasive and subtle distracting effects. Additional results demonstrate the interference effects of ad competition; recognition and persuasion were reduced by a second ad, but animating the ads partially mitigated this effect. Ads distracted participants by facilitating procrastination (Exp. 2) but also may have aided participants by helping them break mental sets (Exp. 1).

In a recent interview with *Cableworld* magazine (Kramer, 2002), Jamie Kellner, chairman and CEO of Turner Broadcasting, made a remarkable statement. Kellner accused television viewers who use the commercial-skipping features of their personal video recorders (e.g., TiVo, ReplayTV) of theft: "Your contract with the network when you get the show is you're going to watch the [advertising] spots. Otherwise you couldn't get the show on an ad-supported basis. Any time you skip a commercial ... you're actually stealing the programming" ("VOD's Ad-Skipping Irks Kelner" section, ¶ 20). Underlying Kellner's accusation is the recognition of a reciprocal relationship that supports many current marketing models. Consumers receive desired content (e.g., television programming, Internet web sites) in exchange for their attention to advertisements.

Traditional ad-sponsored media provide consumers with two options: attend to the content and accept the advertisements, or reject the content and avoid the advertisements. However, recent technological advances have enabled marketers to offer consumers more sophisticated choices. With the introduction of product options such as Eudora in "Paid mode" versus "Sponsored mode" (Qualcomm, 2000) and NetZero's "Platinum Service" versus "free service" (NetZero, n.d.), consumers can make individual decisions to pay money

for a product or service or to barter their attention for an ad-sponsored version.

Bartering Our Attention

In a February 15, 2000, press release, Qualcomm Incorporated announced the new version of its popular e-mail software: "The Eudora 4.3 release offers three user-selectable modes, including a new sponsor-supported mode that provides the full-featured program to consumers for free. The Sponsored mode of Eudora includes all of the capabilities that were previously available only in the retail version of the product known as Eudora Pro (suggested retail price \$49.95)" (Qualcomm, 2000, ¶ 1). It is notable that Qualcomm described the Sponsored Mode software as "free"—as being of value but having no cost. Prospective users seem to concur with this characterization. According to the press release, "In an MSNBC online poll conducted during the first weeks of the 4.3 beta release, 65 percent of all respondents said that they would be willing to accept advertising in return for a free \$50 piece of software" ("Users Embrace the New Sponsored Mode" section, ¶ 2).

Similar approaches have been taken by a number of other companies, including e-Rewards (which pays users to receive and react to e-mail advertisements; e-Rewards, n.d.), Lexus (whose web site "Luxury for Living, contains links to Lexus adver-

tisements, but ... is dominated by lifestyle information on topics including luxury hotels, high-technology homes and farmers' markets"; Ives, 2003, ¶ 2), and *The Economist* magazine (which offers free subscriptions to its normally \$69/year web site for users willing to receive e-mail advertisements; Ives).

Clearly, these manufacturers believe that they are getting something of value (consumer attention) in exchange for the products or services they are providing. To examine whether consumers share this perspective, we asked 90 undergraduate Internet users ($M_{\text{hours/week}} = 7.6, SD = 9.4$) how much they believe they are affected by Internet banner ads. On a 7-point scale, with 1 indicating that "Banner ads don't affect me at all" and 7 indicating "Banner ads have a very strong effect on me," respondents reported that Internet banner ads were almost completely ineffective ($M = 1.7, SD = .86$), with fully 49% reporting that banner ads had no effect whatsoever. Interestingly, this invulnerability to advertising appears to apply only to the respondents themselves and not to their peers. Participants indicated that a comparable peer-group member ("the typical NIU student") is significantly more affected by Internet banner ads ($M = 2.9, SD = 1.2$) than they are themselves ($M = 1.7, SD = .86$), $t(89) = 10.05, p < .001$.

An Economic Enigma

This result suggests that consumers and marketers have very different perspectives regarding consumers' attentional resources. These differing perspectives raise an interesting economic enigma: Are these products and services free, or are they not? We see two possibilities:

1. Consumers are correct in their perception that they can simply tune out the advertisements. If so, then consumers receive these products and services at neither monetary nor attentional cost, and the products and services are truly free. In this case, marketers may wish to abandon this marketing model.

2. Marketers are correct in their perception that the advertisements are effective. In this case, consumers' erroneous perception that they can tune out the advertisements leaves them in a highly disadvantageous negotiating position—they are aware of the value of the products they are receiving, but they are grossly underestimating the costs.

The present program of research was designed to resolve this economic enigma by examining the distraction and persuasion effects of on-line advertising. In order to provide the most stringent test of the effects of on-line advertising, the present experiments implemented ads modeled after the least

intrusive type of on-line advertising we could find: the non-animated, static, visually peripheral ads that appear in Eudora's "Sponsored Mode" (about which one reviewer explained, "Personally, I find the little ads so inoffensive that I can't imagine why anyone would choose the partly disabled Light mode over the ad-sponsored one"; Moore, 2000, ¶ 36).

We focused on three possible effects of on-line ads: distraction, recognition, and persuasion. Marketers are likely to be primarily concerned with recognition and persuasion, as these are the outcomes that determine the effectiveness of on-line advertising. Marketers are probably less concerned with distraction (except insofar as an overtly distracting advertisement may create resentment, which would undermine persuasion).

Consumers, in contrast are likely to be concerned with distraction and persuasion, in that both represent (potentially hidden) costs associated with the presence of advertisements. With respect to distraction, advertisements that negatively impact consumers' ability to perform a focal task are unlikely to be seen as innocuous. Furthermore, as the public outcry against subliminal advertising suggests, consumers are likely to find distressing the possibility that visually peripheral advertisements are persuading them without their awareness. Thus, an examination of distraction and persuasion will determine whether consumers are affected by visually peripheral ads in ways they currently deny, whereas an examination of recognition and persuasion will determine whether marketers are correct in their assumptions regarding the efficacy of visually peripheral ads. It should be noted that our grouping of recognition and persuasion, and distraction and persuasion are meant to represent the outcomes of particular interest to marketers and consumers, respectively. We are not positing any causal relationships between these outcomes.

Two theoretical perspectives on attention suggest that the presence of advertisements may cause measurable distraction from task performance. First, one explanation for people's ability to divide attention between multiple channels proposes that each channel draws resources from a separate limited capacity pool (Cowan, 1995; Kahneman, 1973; Wickens, 1984). To some extent, people can carry out multiple tasks at one time as long as channels draw from different modality pools (e.g., typing and reading). However, if the channels draw from the same pool (e.g., a visual focal task and a visual advertisement) and the resources required of both tasks exceed the amount available, then the two tasks will compete with each other. Second, research on attentional capture

(Yantis, 1993) has demonstrated that perceptual factors such as movement, blinking, and color change (Thackray & Touchstone, 1991; Theeuwes, 1994) are extremely effective in capturing attention from another task.

With respect to recognition and persuasion, evidence from three lines of research suggests that visually peripheral advertisements may have persuasive effects. First, research on the mere exposure effect demonstrates that individuals tend to prefer stimuli they have previously encountered over those they have not, and that increased exposure frequency tends to produce increased liking (Monahan, Murphy, & Zajonc, 2000; see Baker, 1999, for a demonstration of the mere exposure effect in an advertising context). Although a meta-analysis by Bornstein (1989; see also Bornstein & D'Agostino, 1992) indicated that subliminal stimuli produce reliably stronger mere exposure effects than supraliminal stimuli, the effects of supraliminal stimuli were reliable in their own right. This body of work suggests that, even if a consumer never clicks on an on-line advertisement, the presence of the ad may elicit persuasion, particularly under conditions of repeated exposure.

Second, an intriguing series of studies demonstrates that visually peripheral advertisements can affect consumers, even if the consumers are precluded from focusing directly on the ads (Shapiro, MacInnis, & Heckler, 1997; Shapiro, MacInnis, Heckler, & Perez, 1999). In these studies, participants read a computer-controlled magazine while moving the cursor as the article scrolled up the screen so that the cursor did not hit any of the words. During this task, advertisements were placed in the periphery of the screen. Participants presented with the ads were significantly more likely to place the products pictured in the ads into a consideration set (a set of brands or products the individual would consider purchasing), despite having no explicit memory of the ads. These results suggest that visually peripheral ads are processed, even in the absence of direct focus on the ads.

Finally, Janiszewski (1993) examined visually peripheral advertisements in a newspaper context, determining that incidental exposure to such ads can positively impact brand attitudes, but that these effects are moderated by left versus right visual field and the visual versus pictorial nature of the surrounding and focal material.

Shapiro et al. (1997, 1999) and Janiszewski (1993) examined persuasion that occurred specifically in the absence of recognition. In Janiszewski's third study, for example, participants who remembered

having seen the target ad were dropped from the analyses. Although these findings inform our hypotheses, our concern was with recognition as an outcome as well as persuasion that may occur in the presence or absence of recognition. Furthermore, we were interested in whether peripheral advertisements distract from the focal task—an effect not examined by Shapiro et al. or Janiszewski.

The Present Experiments

The present experiments were designed to examine the distraction and persuasion effects of on-line advertising. Participants performed a focal task (solving anagrams) in the center of a computer screen while, depending upon condition, zero, one, or more than one advertisement appeared in the periphery. As discussed above, the ads were modeled after an unusually non-intrusive exemplar of on-line advertising: the small, static, visually peripheral ads from Eudora's "Sponsored Mode." In ad-present conditions, participants were informed that advertisements would appear on the screen, but they were neither instructed to attend to, nor to ignore, the ads.

In order to examine the effects of ad competition and ad clutter (a problem of increasing concern for Internet advertisers), three ad-present conditions were included. The first ad-present condition (one ad) had one static ad on the screen. The second ad-present condition (two ads) introduced ad competition by simultaneously placing a second static ad on the screen. In the third ad-present condition (dynamic ads), the ads moved across the screen and became animated when the participant moved the mouse over either ad.

The focal task consisted of solving a series of anagrams. An anagram is a word puzzle that consists of a series of scrambled letters that can be re-ordered to form one or more words. For example, "rissneoapu" can be rearranged to form the word "persuasion." Anagrams were selected for several reasons. First, anagrams are cognitively demanding. They require the participant to mentally transform the stimulus by a trial and error re-arrangement of letters and to compare these hypothesized solutions against a search of known words in memory. Second, solving anagrams requires input from the participant that is more complex than a single key press. Third, solving anagrams requires visual attention to the center of the screen, but only for a limited portion of the solving time. Fourth, solving anagrams is an engaging and enjoyable task. In the present studies, when asked how much they enjoyed doing the anagrams, participants rated the anagrams as enjoyable ($M =$

3.81 on a 0 to 6 scale from “not at all” to “very much”). Furthermore, the variety of anagram-related web sites on Google’s (n.d.) Recreation > Humor > Wordplay > Anagrams directory suggests that solving anagrams on-line has at least some degree of ecological validity.

Finally, difficulty level can be manipulated easily by increasing the number of letters in the anagram. Participants in the difficult anagram condition solved 5-letter anagrams (which are frequently used in other studies—see Mayzner & Tresselt, 1958), while those in the easy anagram condition solved 4-letter anagrams. Several factors are known to influence anagram solution speed, the most important of which are word frequency (Mayzner & Tresselt, 1958; Tresselt & Mayzner, 1968), word imagery (Dewing & Hetherington, 1974), and letter repetition (Mayzner & Tresselt, 1966). Therefore, word frequency and word imagery were equated across difficulty conditions. Words with repeated letters were not used.

Participants were instructed to solve as many anagrams as possible in ten minutes. After one minute, participants were given the option to skip to the next anagram. This provided two measures of distraction: the number of anagrams solved and the number of anagrams skipped.

Our primary measure of distraction was the number of anagrams solved, in that greater ad-induced distraction may lead to less attention allocated to solving anagrams. The number of anagrams skipped may also reflect distraction, however, in that distracted participants may be less willing to devote attentional resources to working on harder anagrams. Since there is no penalty for skipping, distracted participants may skip an anagram at an impasse rather than persist.

After the anagram task, recognition and persuasion were assessed. It was predicted that the presence of ads would distract participants from the focal task. It was further predicted that participants would show significant recognition of the ads displayed during the anagram task compared to a set of distractors, and that the displayed ads would be rated as significantly more persuasive than the distractors. Finally, it was predicted that competition would reduce an ad’s effectiveness (as measured by recognition and persuasion), but that this reduced effectiveness would be mitigated, at least in part, by increased ad salience. Specifically, it was predicted that making the competing ads dynamic and interactive would increase recognition and persuasion, possibly to the level of a single static ad presented without competition. This latter prediction is consis-

tent with Li and Bukovac (1999), who found that animation increased recall for banner ads.

Distraction-related predictions were tested using between-subjects ANOVAs that examined the number of anagrams solved (and, separately, the number of anagrams skipped) across the anagram difficulty and ad type conditions. Recognition-related predictions were tested using mixed-model ANOVAs that examined recognition accuracy for viewed versus unviewed ads across the anagram difficulty and ad type conditions. Persuasion-related predictions were tested with analogous mixed-model ANOVAs.

Experiment 1

Method

Participants. Three hundred forty-three Northern Illinois University undergraduates participated in partial fulfillment of a course requirement.

Stimuli. The words used to create the anagrams were selected from the Medical Research Council (MRC) Psycholinguistic Database (Wilson, 1988, available at http://www.psy.uwa.edu.au/MRCDataBase/uwa_mrc.htm). The familiarity rating of these words was high, between 500 and 650 (Coltheart, 1981). This equates to a 5 to 6.6 on a 7-point scale. From this list of four and five-letter words, all words that had repeated letters were omitted (e.g., “bass”). The remaining words were run through a program that tested all possible letter-order permutations. Only letter strings that formed a single word were retained (e.g., “begin” was removed because its letters also form “being” and “binge”). The final list of 165 four-letter words had an average familiarity rating of 557.98 ($SD = 32.58$), an average concreteness rating of 460.26 ($SD = 118.01$), and an average imageability rating of 485.06 ($SD = 96.44$). The list of 162 five-letter words had an average familiarity rating of 554.16 ($SD = 35.05$), an average concreteness rating of 470.96 ($SD = 114.62$), and an average imageability rating of 491.11 ($SD = 103.76$). A sufficient number of anagrams were generated to ensure that no participants reached the end of the list during the ten-minute anagram task.

To create the anagrams themselves, the letters for each word were arranged in a random order with the constraint that the first letter of the anagram must be different than the first letter of the target word. During the anagram task, all participants received the same anagram for each target word.

Eight small color advertisements were created for the experiment. The ads varied in size from 143 × 144 pixels to 153 × 150 pixels. Each ad consisted of a name of a fictitious web site printed next to a picture: professor.com (with a drawing of professor lecturing

to students), Aplus.com (a student writing the letter "A" on a chalk board), bookworm.com (a stack of books), extrahelp.com (a student weighed down by a pile of huge books), learningtools.com (a stack of books, an apple, a quill and ink, and a pair of glasses), perfect40.com (three smiling students holding papers with ribbons), allnighter.com (a sleeping student), and tutor.com (a smiling student wearing glasses sitting at a desk). At the time the experiment was run, none of these addresses referred to actual Internet web sites.

For participants in the one ad, two ads, and dynamic ads conditions, the program randomly selected four of these eight ads to be displayed (one at a time) while participants solved the anagrams. All eight ads were rated for recognition and persuasion when the anagram task was complete. For participants in the two ads and dynamic ads conditions, four additional ads were displayed (one at a time) while participants solved the anagrams. To ensure that the rated ads were viewed for an equivalent amount of time by participants in the one ad, two ads, and dynamic ads conditions, four additional ads were created for use in the two ads and dynamic ads conditions: diploma.com (with a drawing of two students in graduation regalia), essaytest.com (a student working at a desk), notetaker.com (a person sitting at a desk with an open notebook and a pen), and studyguide.com (a student at a desk with a stack of books, a piece of paper, and a pencil). These ads were only displayed during the anagram task. They were not rated for recognition or persuasion.

For the dynamic ads condition, seven transformations of each ad were created. These consisted of 90, 180, and 270 degree rotations, vertical and horizontal reflections, color inversion, and embossing (a grayscale, three-dimensional visual effect). When participants moved the mouse over an ad in the dynamic ads condition, the ad would randomly change into one of these transformations. When the mouse was no longer on the ad, the ad would change back. In addition, when the participant clicked on an ad, one of two messages would appear. Ninety percent of the time, the message would say, "Visit us on the web!" Ten percent of the time, the message would say, "Hey, shouldn't you be solving anagrams!" This latter message was included to simulate the type of humor often found in on-line advertising. Results indicated that 86.5% of participants in the dynamic ads condition moused over one of the ads and 10.1% of participants clicked on one of the ads.

Procedure. Upon entering the laboratory, participants were seated in front of a computer running a

custom computer program written in Microsoft Visual Basic. The experimenter typed in the participant's randomly assigned participant number, which indicated the difficulty of the anagrams the participant would solve and whether there would be advertisements on the screen while the participant solved the anagrams. The experimenter then left the room, and the participant completed the experiment at his or her own pace. The initial screen contained the following instructions:

"Hi. Welcome to the Software Study. In this study, you will be using a custom software program written to simulate the types of software that people typically use on personal computers (such as the Eudora e-mail program or software to connect to the Internet and surf the Web). As with some of these other programs, this program was available for free because it contains advertisements."

For participants in the no ads condition, the instructions then said, "After finishing the task (described below) you will be asked to rate a short series of ads." The rest of the instructions were the same for all participants:

"The experiment should take approximately 30 minutes to complete. During the experiment, you'll be solving a series of anagrams. Each anagram consists of a word with the letters rearranged. Your task is to figure out what the word is. Anagrams will appear one at a time on the screen. When you've figured out the word, type it in and press the button. If you're correct, the next anagram will appear. Each anagram will remain on the screen for a maximum of 3 minutes, but if you get stuck, you can skip to the next anagram after 1 minute. If you take longer than 3 minutes on an anagram, the next one will appear automatically. You'll have a total of 10 minutes to finish as many anagrams as possible."

When the participant finished reading the instructions, a practice screen appeared. The practice screen was included to ensure that participants knew what anagrams were and how to solve them before beginning the anagram task. In a Preliminary Experiment that did not have a practice screen, a substantially higher proportion of participants skipped the first anagram than any subsequent anagrams, suggesting that participants may not have fully understood the anagram task until the answer to the first anagram was revealed. The number of letters in the practice anagrams corresponded to the participant's Anagram Difficulty condition. For example, a partic-

participant in the easy anagram condition saw the following instructions, "Here are some practice anagrams. For example, if the anagram is 'adso', you can rearrange the letters to make the word 'soda.'" Below this were two anagrams for the participant to solve. When he or she had solved both anagrams (or pressed the corresponding "Show the solution to this anagram" button), the anagram task began.

The anagram task consisted of a series of anagrams presented in the same order for all participants (see Figure 1). As described in the instructions, participants had ten minutes to solve as many anagrams as possible. If the participant took longer than one minute to solve an anagram, the "Skip to next anagram" button became active. If participants solved the anagram correctly, the next anagram appeared. If participants entered an incorrect answer, the program indicated that the answer was incorrect and highlighted the incorrect answer so participants could type in a new answer without having to erase the old one. If participants pressed the "Skip to next anagram" button after it was activated, the answer to the prior anagram was revealed and the next anagram appeared. The program was designed so that an anagram was skipped automatically after three minutes. Messages to the participant were displayed on the screen above the "Anagram" field, and these messages disappeared automatically after ten seconds.

For participants in the one ad condition, an ad appeared in the upper left corner of the screen throughout the anagram task. The program randomly selected four of the eight ads to display and randomly selected an order in which to display the four ads. The ads appeared one at a time, with the next ad replacing the current one every 45 seconds (a replacement rate corresponding to the approximate rate of ad replacement in Eudora's "Sponsored Mode").

In the two ads condition, a second ad appeared in the upper right-hand corner of the screen. Like the ad in the upper left-hand corner, this ad changed to a new ad every 45 seconds. These ads appeared in a random order, and they only appeared during the anagram task. These ads were not rated for recognition or persuasion.

In the dynamic ads condition, the first ad was placed at the top of the screen just to the right of the leftmost vertical line (see Figure 1). Throughout the anagram task, the ad moved slowly right and left from one line to the other. Similarly, the second ad was placed at the bottom of the screen just to the left of the rightmost vertical line. This ad moved slowly left and right, always in the opposite direction of the

ad at the top of the screen. When the participant moved the mouse over either ad, the ad would change to one of the seven randomly selected transformations, and if the participant clicked on either ad, a message would appear.

Participants in the no ad condition completed the task without ads appearing on the screen.

After ten minutes, the program displayed a dialog box that indicated that time was up and gave the answer to the final anagram. Once the participant acknowledged the dialog box by pressing a button, the participant was prompted to begin the ad-rating task.

In this task, eight ads were presented to participants in a random order. Participants in the ad condition were asked, "Did you see this ad while doing the anagrams?" (answered yes or no) and "How confident are you about whether or not you saw this ad?" (answered on a seven-point scale from "I definitely saw this ad" to "I definitely did not see this ad"). All participants were asked "What do you think would be the quality of the web site advertised above?" (answered on a seven-point scale from "Low quality" to "High quality"), "How interested are you in visiting this web site?" (answered on a seven-point scale from "Uninterested" to "Interested"), and "Please indicate how you feel about this ad:" (answered on a seven-point scale from "Bad" to "Good").

The final page consisted of a debriefing letter that thanked the participant, gave some background on the study, and instructed the participant to get a credit slip from the experimenter.

Independent Variables. Experiment 1 consisted of a 2 (Anagram Difficulty: easy vs. difficult) \times 4 (Ad Type: no ads, one ad, two ads, vs. dynamic ads) \times 2 (Ad Experience: previously viewed vs. unviewed) factorial design. Anagram Difficulty and Ad Type were between-subjects; Ad Experience was within-subject. Ad Experience was manipulated only for participants in the one ad, two ads, and dynamic ads conditions. Participants were randomly assigned to one of the eight conditions.

Dependent Variables. Distraction was assessed using two dependent variables: the number of anagrams solved and the number of anagrams skipped. Recognition was assessed by examining participants' responses to the question asking whether they had seen the ad while doing the anagrams. Persuasion was assessed using the three questions regarding perceived quality of the web site, interest in visiting the web site, and feelings about the ad (Cronbach's alphas ranged from .86 to .88). For recognition and persuasion, two composite scores

Table 1
Number of anagrams solved and skipped, and number of hints requested in Experiments 1 and 2

Anagrams	Ads	Solved	Skipped	Hints
Experiment 1				
Easy	No ads (<i>n</i> = 42)	48.07 (23.08)	1.55 (1.47)	
	One ad (<i>n</i> = 44)	53.07 (22.34)	1.18 (1.08)	
	Two ads (<i>n</i> = 42)	53.40 (21.41)	1.50 (1.25)	
	Dynamic ads (<i>n</i> = 48)	51.54 (27.73)	1.62 (1.16)	
Difficult	No ads (<i>n</i> = 40)	14.58 (6.66)	4.15 (1.61)	
	One ad (<i>n</i> = 42)	14.60 (5.46)	3.31 (1.69)	
	Two ads (<i>n</i> = 44)	14.70 (8.54)	3.48 (2.04)	
	Dynamic ads (<i>n</i> = 41)	13.46 (7.08)	4.34 (1.77)	
Experiment 2				
Difficult	No ads (<i>n</i> = 48)	18.00 (7.48)	2.06 (1.38)	6.27 (2.08)
	One ad (<i>n</i> = 47)	18.26 (9.40)	2.36 (1.61)	7.13 (1.78)
	Two ads (<i>n</i> = 48)	18.56 (9.85)	2.25 (1.64)	6.83 (1.68)
	Dynamic ads (<i>n</i> = 48)	18.00 (7.01)	1.71 (1.29)	6.31 (1.84)

Note. Participants solved easy (4-letter) or difficult (5-letter) anagrams for 10 minutes. After one minute, participants were given the option to skip to the next anagram. In Experiment 2, after 30 seconds, participants were given the option to request a hint, which revealed the first letter of the anagram's solution.

were created: one for viewed ads and one for unviewed ads.

Results and Discussion

Distraction. Participants solved significantly more 4-letter anagrams ($M = 51.54$, $SD = 23.78$) than 5-letter anagrams ($M = 14.34$, $SD = 7.00$), and skipped significantly fewer 4-letter anagrams ($M = 1.47$, $SD = 1.25$) than 5-letter anagrams ($M = 3.81$, $SD = 1.83$), $F(1, 335) = 372.58$, $p < .001$, $F(1, 335) = 201.53$, $p < .001$, respectively (see Table 1). Ad Type (i.e., no ads, one ad, two ads, vs. dynamic ads) did not impact the number of anagrams solved, $F(3, 335) = .43$, $p = .73$, but Ad Type significantly affected the number of

anagrams skipped, $F(3, 335) = 4.15$, $p = .007$. An examination of the means reveals that the results were opposite to those predicted: Participants who completed anagrams while one static ad was on the screen skipped significantly fewer anagrams compared to participants in the control condition, $F(1, 335) = 6.48$, $p = .011$. Two static ads showed a similar non-significant effect, $F(1, 335) = 2.31$, $p = .13$. Participants who completed anagrams in the presence of two dynamic ads did not differ from controls in the number of anagrams skipped, $F(1, 335) = .33$, $p = .57$. The interaction between Anagram Difficulty and Ad Type was not significant for number of anagrams solved, $F(3, 335) = .40$, $p = .75$, or number of anagrams skipped, $F(3, 335) = 1.18$, $p = .32$.

These results suggest that minor distractions have the potential to facilitate task performance. While solving anagrams, solvers may get into a "mental set" resulting in a lack of flexibility necessary to make transformations to produce hypothesized solution word sets. Like other problems of functional fixedness, this may require a fresh perspective to help break out of the set (Dunker, 1945), and a minor distraction such as an advertisement may facilitate this fresh perspective. Of course, this explanation should be viewed as speculative, as it represents a post hoc interpretation of an unpredicted effect.

Table 2
Recognition of Viewed and Unviewed Ads in Experiments 1 and 2

Anagrams	Ads	Recognition of viewed ads	Recognition of unviewed ads
Experiment 1			
Easy	One ad (<i>n</i> = 44)	.47 (.35)	.10 (.20) ^{***}
	Two ads (<i>n</i> = 42)	.43 (.32)	.14 (.19) ^{***}
	Dynamic ads (<i>n</i> = 48)	.48 (.33)	.10 (.15) ^{***}
Difficult	One ad (<i>n</i> = 42)	.68 (.31)	.05 (.10) ^{***}
	Two ads (<i>n</i> = 44)	.55 (.29)	.10 (.21) ^{***}
	Dynamic ads (<i>n</i> = 41)	.65 (.27)	.06 (.12) ^{***}
Experiment 2			
Difficult	One ad (<i>n</i> = 47)	.58 (.30)	.04 (.10) ^{***}
	Two ads (<i>n</i> = 48)	.42 (.25)	.12 (.20) ^{***}
	Dynamic ads (<i>n</i> = 48)	.56 (.33)	.13 (.21) ^{***}

Note. Participants solved easy (4-letter) or difficult (5-letter) anagrams for 10 minutes. Recognition measures for each participant represent the mean of the four viewed ads and the four unviewed ads. Recognition scores ranged from 0 to 1, with 0 indicating that the participant reported not having seen the ad, and 1 indicating that the participant reported having seen the ad. Thus, perfect recognition would be represented by a 1 for viewed ads and a 0 for unviewed ads. Significant simple effects of Ad Experience (i.e., viewed vs. unviewed ads) within each condition are indicated by *s, with * indicating $p \leq .05$, ** indicating $p < .01$, and *** indicating $p < .001$.

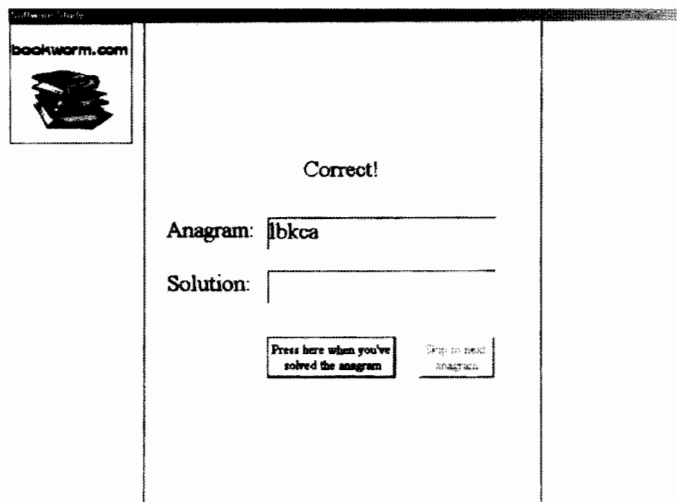


Figure 1. Screenshot from the one ad, difficult anagram condition.

Recognition. The dichotomous recognition question was coded as 0 if the participant indicated that he or she had not seen the ad while doing the anagrams and 1 if the participant reported having seen the ad. Composite scores for recognition of viewed and unviewed ads were created by averaging the responses for the four viewed ads and the four unviewed ads. Perfect recognition would be indicated by a composite score of 1 for viewed ads and 0 for unviewed ads. Because recognition was not assessed for participants in the no ads condition, recognition analyses include only participants in the one ad, two ads, and dynamic ads conditions.

Participants displayed highly accurate recognition of previously viewed ($M = .54, SD = .32$) versus unviewed ($M = .09, SD = .17$) ads, $F(1, 248) = 439.54, p < .001$ (see Table 2). However, recognition was moderated by anagram difficulty, $F(1, 248) = 24.83, p < .001$. Participants solving difficult anagrams displayed significantly more accurate recognition compared to participants solving easy anagrams. This result offers additional evidence that participants may have glanced at the advertisements when they became stuck on a difficult anagram, leading to increased recognition of the ad. Consistent with this explanation, recognition accuracy was positively correlated with the number of anagrams skipped, $r(252) = .26, p < .001$. In other words, participants who were more distracted (i.e., participants who skipped more anagrams) displayed more accurate ad recognition.

Recognition was also moderated by the number and type of ads present, as reflected in a significant interaction between Ad Type and Ad Experience, $F(2, 248) = 3.80, p = .024$. Comparisons between conditions within this significant omnibus interaction were tested with a series of interactions between Ad Experience and contrasts that compare two Ad Type conditions against each other (e.g., the one ad vs. two ads contrast was represented by a vector with 1 for participants in the one ad condition, -1 for participants in the two ads condition, and 0 for participants in the dynamic ads condition).

An examination of the means reveals that, as predicted, recognition accuracy was highest in the one ad condition. Recognition accuracy suffered when a second ad was displayed, as reflected in a significant interaction between a one ad vs. two ads contrast and Ad Experience, $F(1, 248) = 6.02, p = .015$. This decrease was mitigated by making the ads dynamic and interactive; the interaction between a one ad vs. dynamic ads contrast and Ad Experience was non-significant, $F(1, 248) = .03, p = .872$.

Table 3
Persuasion of Viewed and Unviewed Ads in Experiments 1 and 2

Anagrams	Ads	Persuasion of viewed ads	Persuasion of unviewed ads
Experiment 1			
Easy	One ad ($n = 44$)	2.73 (1.26)	2.29 (1.19) ^{••}
	Two ads ($n = 42$)	2.51 (1.12)	2.39 (1.18)
	Dynamic ads ($n = 48$)	2.83 (1.15)	2.26 (1.00) ^{•••}
Difficult	One ad ($n = 42$)	2.77 (1.21)	2.32 (1.12) ^{••}
	Two ads ($n = 44$)	2.57 (.99)	2.28 (.81) [•]
	Dynamic ads ($n = 41$)	2.54 (1.12)	2.59 (1.29)
Experiment 2			
Difficult	One ad ($n = 47$)	2.57 (1.08)	2.29 (1.04) [•]
	Two ads ($n = 48$)	2.52 (1.11)	2.33 (1.16)
	Dynamic ads ($n = 48$)	2.52 (1.07)	2.31 (1.11) [•]

Note. Participants solved easy (4-letter) or difficult (5-letter) anagrams for 10 minutes. Persuasion measures for each participant represent the mean of the four viewed ads and the four unviewed ads. Persuasion scores ranged from 0 to 6 with a higher number indicating greater persuasion.

Significant simple effects of Ad Experience (i.e., viewed vs. unviewed ads) within each condition are indicated by [•]s, with [•] indicating $p \leq .05$, ^{••} indicating $p < .01$, ^{•••} indicating $p < .001$, and [•] indicating a marginal effect at $p < .10$.

Persuasion. Exploratory factor analyses of responses to the three persuasion questions (using principle components analysis and the eigenvalues > 1 criterion for determining the number of factors to extract) suggested that the three questions formed one factor. Given this, the three questions were averaged to form a persuasion score. Then, as with recognition, composite persuasion scores were created that averaged across the four previously viewed ads and the four unviewed ads (see Table 3). As with the recognition variables, the analyses of the persuasion variables include only participants in the one ad, two ads, and dynamic ads conditions.

Overall, viewed ads were rated as significantly more persuasive ($M = 2.66, SD = 1.14$) than unviewed ads ($M = 2.35, SD = 1.10$), $F(1, 254) = 26.68, p < .001$, but this relationship was moderated by a significant 3-way Anagram Difficulty by Ad Type by Ad Experience interaction, $F(2, 254) = 4.23, p = .016$ (see Table 3). An examination of the means reveals that, as predicted, a second ad reduces the persuasiveness of the first ad, as reflected in a interaction between a one ad vs. two ads contrast and Ad Experience, $F(1, 254) = 2.70, p = .102$. The effects of two dynamic ads were moderated by anagram difficulty. For participants solving easy anagrams, two dynamic ads were no less persuasive than one static ad, as reflected in a non-significant simple interaction between a one ad vs. dynamic ads contrast and

Ad Experience, $F(1, 254) = .43, p = .514$. For participants solving difficult anagrams, however, dynamic ads were significantly less persuasive than one ad, $F(1, 254) = 5.63, p = .018$.

It is interesting that, although the one ad and dynamic ads conditions showed equivalent recognition, the one ad condition showed greater persuasion. It is possible that participants found the dynamic ads to be somewhat intrusive, and this may have led to negative associations with the web sites pictured in the ads. Alternately, participants may have spent more time focusing on the ad in the one ad condition, which may have led to greater cognitive elaboration regarding the web site. According to the cognitive response model (Greenwald, 1968; Petty, Ostrom, & Brock, 1981), such cognitive elaboration will increase persuasion to the extent that the elaboration consists of positive thoughts.

An anonymous reviewer raised the concern that the greater persuasion of viewed versus unviewed ads may have stemmed from demand characteristics rather than actual persuasion. Specifically, participants may have inferred that the ads they had seen were supposed to be persuasive. If so, then participants may have rated those ads as persuasive in order to fulfill the experimenter's expectations.

To examine the plausibility of demand characteristics as an alternative explanation, we compared the persuasiveness of ads that participants viewed during the anagram task and correctly positively identified (true positives) to ads that participants did not view during the anagram task but, nevertheless, positively identified (false positives). Because demand stems from participants' belief that ads they viewed should be rated as more persuasive. A true persuasion effect, in contrast, would manifest as higher ratings of the persuasiveness of true positives compared to false positives. Consistent with a true persuasion effect, persuasion scores for true positives ($M = 3.41$) were marginally higher than false positives ($M = 3.08$), $t(67) = 1.98, p = .052$.

In sum, Experiment 1 demonstrated that even relatively unobtrusive advertisements in the visual periphery are memorable and persuasive, but that ad competition reduces both recognition and persuasion. Increasing the salience of the ads by making them dynamic and interactive partially mitigated the effects of ad competition, but persuasion still suffered among participants solving difficult anagrams. Finally, Experiment 1 demonstrated that static ads can facilitate performance on the focal task, possibly by helping participants break out of a mental set.

Experiment 2

The facilitation effect found in Experiment 1 was particularly surprising in the context of a significant distraction effect found in the Preliminary Experiment mentioned earlier. The Preliminary Experiment was similar to Experiment 1 with one notable exception: Participants did not complete any practice anagrams before beginning the anagram task. As a result, a substantial portion of participants skipped the first difficult anagram. Interestingly, while only 14.3% (2/14) of participants skipped the first anagram when there were no ads on the screen, 56.2% (9/16) of participants skipped the first anagram in the presence of an ad, $\chi^2(1, N = 30) = 5.66, p = .017$. For participants facing the difficult, ambiguous task of solving their first 5-letter anagram, the ad apparently provided a welcome distraction, with over half the participants waiting 60 seconds until they were able to skip the anagram. However, the 85.7% success rate in the no ads condition suggests that most participants could have solved the problem had the presence of an advertisement not sapped their motivation to persevere.

The results of the Preliminary Experiment suggest that advertisements may distract individuals by facilitating procrastination. In other words, the presence of an ad may cause individuals to fail to complete a task that they would have been able to accomplish had the ad not been present. Our use of the term procrastination is not meant to imply that individuals put off the beginning of a task. Rather, we mean that individuals start the task, but when the task becomes challenging, they put off finishing it.

This hypothesized procrastination effect is reminiscent of the concern among employers that high-speed Internet connections will distract employees from their work. Support for the procrastination explanation would suggest that employers should be concerned not only with the availability of work-irrelevant web sites, but also with the presence of distracting ads in work-related software and on work-relevant web pages.

Experiment 2 was designed to replicate and extend the findings of Experiment 1—most notably by providing a rigorous test of the procrastination explanation for the negative impact of peripheral ads on the focal task. To test this explanation, we modified the task to include a "procrastination option" that would help participants solve the current anagram if they were willing to procrastinate for a short time. This was operationalized as a hint button that became active after 30 seconds. When the hint button was pressed, the program revealed the first letter of

the anagram's solution. Consistent with the procrastination explanation, it was predicted that participants solving difficult anagrams would request more hints in the presence of ads than in the absence of ads. Because the distraction effect in the Preliminary Study appeared only for participants solving difficult anagrams, all participants in Experiment 2 solved difficult anagrams.

Method

Participants. One hundred ninety-one Northern Illinois University undergraduates participated in partial fulfillment of a course requirement.

Procedure. The procedure was identical to Experiment 1 with the following changes: The easy anagram conditions were removed, and a hint button was added to the anagram task. As explained to participants on the instructions page, the hint button became active after 30 seconds. Pressing the hint button revealed the first letter of the anagram's solution. In addition, after completing the anagram task, participants were asked to indicate how distracting the ads were on a 7-point scale from 0 ("not at all distracting") to 6 ("very distracting").

Independent Variables. Experiment 2 consisted of a 4 (Ad Type: no ads, one ad, two ads, vs. dynamic ads) \times 2 (Ad Experience: viewed versus unviewed ads) factorial design. Ad Type was between-subjects; Ad Experience was within-subject. Participants were randomly assigned to one of the four conditions.

Results and Discussion

Distraction.

As in Experiment 1, presence of an ad had no effect of the number anagrams solved, $F(3, 187) = .05$, $p = .986$ (see Table 1). In contrast to the results of Experiment 1, presence of an ad also had no effect on the number of anagrams skipped, $F(3, 187) = 1.77$, $p = 1.54$. An examination of the means reveals that, if anything, participants skipped somewhat more anagrams with one or two ads on the screen than when there were no ads on the screen. The presence of an ad had a marginal effect on the number of hints requested, $F(3, 187) = 2.40$, $p = .069$. As predicted, participants in the one ad condition requested significantly more hints than participants in the no ads condition, $F(1, 187) = 5.10$, $p = .025$. Participants in the two ads condition also requested more hints than participants in the no ads condition, but this difference did not achieve statistical significance, $F(1, 187) = 2.22$, $p = .138$. Participants in the dynamic ads condition did not differ from participants in the no ads condition with respect to hint request frequency, $F(1, 187) = .01$, $p = .912$.

Apparently, when participants encountered an anagram that they had trouble solving, the presence of an ad provided a ready distraction until they could request a hint. This result supports the procrastination explanation of the distracting effect of peripheral ads. Such ads facilitate procrastination by providing an available stimulus towards which individuals gravitate when the focal task becomes challenging.

Interestingly, although the static ads elicited greater distraction than the dynamic ads, participants rated the static ads as substantially less distracting (one ad: $M = .85$, $SD = 1.23$; two ads: $M = .77$, $SD = 1.15$) than the dynamic ads ($M = 1.96$, $SD = 1.99$), $F(1, 140) = 18.46$, $p < .001$. This suggests that participants were unaware that the static ads were facilitating procrastination. Instead, participants' experience of distraction seemed to be based on the challenge of maintaining focus on the anagram task in the presence of the ads (a challenge made substantially more difficult when the ads were animated).

Recognition. Overall, participants showed highly accurate recognition of previously viewed ($M = .52$, $SD = .30$) versus unviewed ($M = .10$, $SD = .18$) ads, $F(1, 133) = 247.73$, $p < .001$ (see Table 2). This effect was qualified by a significant interaction between Ad Type and Ad Experience, $F(2, 133) = 6.87$, $p < .001$. An examination of the means reveals that, compared to the one ad condition, recognition suffered significantly in the two ads condition, $F(1, 133) = 13.48$, $p < .001$, and non-significantly in the dynamic ads condition, $F(1, 133) = 1.98$, $p = .162$.

Persuasion. As in Experiment 1, previously viewed ads were significantly more persuasive ($M = 2.53$, $SD = 1.08$) than unviewed ads ($M = 2.31$, $SD = 1.10$), $F(1, 137) = 10.06$, $p = .002$ (see Table 3). This effect was not moderated by Ad Type, $F(1, 137) = .06$, $p = .938$.

General Discussion

An increasing number of companies, including Qualcomm, NetZero, and Salon.com, have begun offering their products and services for free in exchange for consumers' willingness to view and, in some cases, interact with advertisements (Qualcomm, 2000; Ives, 2003). It appears, however, that marketers and consumers have very different perceptions of this relationship. Marketers clearly perceive it as a profitable reciprocal relationship in which consumers receive a desired product or service, and in exchange, marketers receive a highly prized and increasingly scarce commodity: consumer attention. Consumers may believe, in contrast, that they are receiving a desired product or service at no cost whatsoever—a belief exacerbated by their illusions of personal invulnerability to adver-

tising (Perloff, 1987; Sagarin, Cialdini, Rice, & Serna, 2002).

The present experiments were designed to determine whether it is the marketers or the consumers who are correct by examining the distraction and persuasion effects of on-line advertisements. The results were clear. Despite the claim by participants that Internet banner ads have little effect on them (including 49% who claimed that banner ads have no effect whatsoever), across both experiments, peripheral ads had substantial persuasive and subtle distracting effects.

Distraction

The results of Experiment 2 and our Preliminary Experiment suggest that advertisements may distract individuals from a difficult focal task by encouraging procrastination. In the Preliminary Experiment, 56.2% of participants solving difficult anagrams skipped the first anagram when there was an ad on the screen. This relatively high proportion may seem unsurprising at first, given that participants may not have fully understood the task they were asked to perform. However, it is notable that only 14.3% of participants skipped the identical first anagram when there were no ads on the screen. Apparently, the first anagram was solvable by the vast majority of participants, but the presence of an ad led over half of participants to fail on a task that most could have performed in the absence of the ad.

Experiment 2 confirmed this procrastination explanation. In Experiment 2, participants were given the option of receiving a hint 30 seconds after an anagram first appeared. Consistent with the prediction that advertisements facilitate procrastination, participants requested significantly more hints in the presence of an advertisement compared to the absence of an advertisement. Participants solving anagrams in the presence of two ads showed a similar, but non-significant trend toward requesting more hints.

Ironically, the presence of an advertisement may also sometimes facilitate task performance. In Experiment 1, participants skipped significantly fewer anagrams in the presence of one static ad than in the absence of ads. This facilitation effect may be specific to tasks such as anagrams during which participants may get stuck in a mental set. Glancing briefly at an advertisement may help participants break out of this mental set and achieve fresh insight into the anagram. It should be noted that we consider this facilitation effect highly speculative, as it was unpredicted in Experiment 1 and it did not replicate in Experiment 2.

Interestingly, participants solving anagrams in the presence of two dynamic, interactive ads showed neither procrastination nor facilitation effects. It is possible that participants faced with the prospect of solving anagrams in the presence of two dynamic advertisements focused particularly intently on the focal task in order to avoid being distracted.

This effort to correct for the perceived effect of an overt distraction could be seen as analogous to bias corrections in social judgment and impression formation (Martin, 1986; Martin, Seta, & Crelia, 1990; Wegener & Petty, 1995). In both cases, people who perceive that a stimulus may influence them in an undesirable manner may attempt to counter that influence. This may help to explain why the static ads were more distracting. Because participants believed they were unaffected by these ads, they were unmotivated to take corrective action.

It is notable, however, that participants in the dynamic ads conditions did not ignore the ads completely: The dynamic ads showed significant recognition and persuasion effects. It is also notable that the dynamic ads were rated as significantly more distracting than the static ads, despite the fact that the static ads caused greater actual distraction. Thus, although people may be able to assess the amount of effort they expend at maintaining attentional focus, they may be less able to assess their success at maintaining such focus.

The inability of people to assess their success at maintaining attentional focus has far more ominous consequences in another context: the use of cellular phones while driving. In a series of studies with alarming implications, Strayer and colleagues (Strayer & Johnston, 2001; Strayer, Drews, & Johnston, 2003) demonstrated that cell phone conversations cause a type of inattention blindness, leading to significantly worse performance on driving simulations. Furthermore, about half the participants in Strayer et al. claimed that using a cell phone does not impair their driving, although these participants noted that cell phones impair other people's driving. As in the present experiments, participants in Strayer et al. maintained illusory beliefs in their ability to allocate their attentional resources—illusory beliefs that, in the context of cell phone use while driving, may have fatal consequences.

Recognition and Persuasion

A clear finding across both experiments is that visually peripheral ads are highly memorable and persuasive. Participants in all 9 conditions showed significant recognition effects, and participants in 5 out of 9 conditions showed significant persuasion

effects, with 3 of the remaining 4 conditions showing non-significant effects in the direction of increased persuasiveness (see Tables 2 and 3). Although the effects occurred most strongly when participants were exposed to a single, static ad, increases in ad persuasiveness also tended to occur when two static ads were presented or when the ads were dynamic. In sum, visually peripheral advertisements can have substantial persuasive impact, particularly if they are presented without simultaneous competition from other ads.

Ad Clutter

The results also validate marketers' concerns regarding ad clutter. Adding a second static ad significantly reduced ad recognition accuracy in Experiments 1 and 2 and non-significantly ($p = .102$) reduced persuasion in Experiment 1. Animating the ads partially mitigated these effects, but recognition was still somewhat less accurate in Experiment 2 and persuasion was significantly reduced for participants solving difficult anagrams in Experiment 1. Furthermore, persuasion effects were obtained most reliably in the one static ad condition. Thus, ad clutter negatively impacts recognition and persuasion, even if steps are taken to make the competing ads more salient.

The present results also have implications for the mere exposure literature. First, the results replicate the finding that supraliminal stimuli can elicit reliable mere exposure effects. Second, the results reveal that mere exposure operates for supraliminal stimuli even in the presence of competing stimuli, although those competing stimuli appear to reduce the mere exposure effect.

Limitations and Future Directions

One limitation of the present research is the extent to which results from the anagram task generalize to other web-based activities. Some web-based activities are cognitively taxing. For example, students search the Web for class assignments, consumers search for product information, programmers search for documentation, and stock traders search for information about companies. In addition, Web users read and create work-related e-mail—two tasks that may be quite cognitively demanding. Furthermore, some recreational activities on the Web also elicit high levels of cognitive effort. Many gamers focus intensely on their game-related goals and exert serious effort to overcome game-related obstacles. These activities involve planning, attention, and cognitive processing. Thus, the present findings may apply in these situations.

On the other hand, the present findings may not generalize to casual web surfing activities (e.g., viewing family photos, downloading music, or reading news articles for entertainment) that require less effort or fewer attentional resources. Such casual web surfing is unlikely to spur the frustration that we propose led to the distraction effect observed in the Preliminary Experiment and in Experiment 2. Future studies could fruitfully examine the effects of visually peripheral ads displayed during more casual, less cognitively demanding focal tasks.

The present studies are also limited by the absence of a dynamic one-ad condition. The current results suggest that a second ad draws attentional resources away from the first ad, reducing recognition and persuasion. It would be interesting for future studies to examine whether persuasion in this situation is a zero sum game, or if the persuasive impact of the second ad more than offsets the loss of persuasion of the first ad. The current results also suggest that making ads dynamic mitigates this loss to some extent, although the persuasiveness of the dynamic ads may be reduced by consumers' perceptions that the ads are intrusive or consumers' greater efforts at ignoring the ads. These speculations could be examined with greater confidence with an orthogonal manipulation of the number and dynamics of the ads.

Implications for Marketers

The decline in Internet advertising revenue over the past few years has stemmed from the perceived failure of Internet advertising to achieve its promise. This failure may be due not to the impotence of Internet ads, however, but to an unfortunate choice of success criteria. Instead of viewing Internet advertising as similar to advertising through other media—as a method of increasing product knowledge and brand exposure—marketers expected Internet ads to elicit immediate consumer behavior via click-through. Then, when Internet users failed to click-through at a sufficient rate, faith in the medium declined.

The present results suggest that Internet advertising can be highly effective—if marketers are willing to adopt a different criterion for success. Consistent with the findings of Briggs and Hollis (1997), who found that banner ads do not require click-through to cause attitude change, the present experiments demonstrate that even a relatively innocuous form of on-line advertising can have substantial persuasive impact. As Zajonc (1968) noted, repeated exposure may decrease the perceived risk associated with purchasing a certain brand. Among products such as

computers and printers, the choice of a particular brand may hinge on the perceived risks associated with that brand. By reducing this perceived risk, on-line peripheral advertising could provide a brand a critical edge against its competition.

In addition, ad-sponsored products may confer another benefit. Because consumers may feel indebted to the company that gave them a desired product for free (due to the deeply-rooted rule of reciprocity, Cialdini, 2001), they may pay particular attention to the advertising that supports the product. Marketers could strengthen this effect by highlighting consumers' reciprocal obligation (e.g., "We are pleased to provide this software to you for free. In exchange, we would ask you to consider supporting the companies that make this free software possible.").

Implications for Consumers

The results of the present experiments demonstrate that consumers underestimate the effects that on-line advertisements have on them. Unfortunately, as consumers face an increasing number of opportunities to barter their attention in exchange for products or services, these misperceptions leave them at a substantial disadvantage in negotiation. This is not to say that consumers should never barter their attention. But unless they are aware of the value and scarcity of the commodity they bring to the table, they are likely to demand far too low a price. In considering the true cost of "free" products or services, consumers would do well to remember the words of Scott Kurnit, then chief Internet officer of Primedia: "If I'm giving you something of value at no cost, I will charge you with your time, not your money" (Hansell, 2001, ¶ 8).

The results also have implications for another type of consumer. As corporate sponsorship and other types of advertising reach further and further into schools and classrooms, educators may wish to be particularly wary of ad-supported educational software and web sites. Apart from the ethical implications of the implied endorsement of the advertised products, the procrastination effect found in Experiment 2 and the Preliminary Experiment suggests that such ads may sap students' concentration and motivation during the very lessons that require perseverance.

References

- Baker, W. E. (1999). When can affective conditioning and mere exposure directly influence brand choice? *Journal of Advertising*, 28, 31-46.
- Bornstein, R. F. (1989). Exposure and affect: Overview and meta-analysis of research, 1968-1987. *Psychological Bulletin*, 106, 265-289.
- Bornstein, R. F., & D'Agostino, P. R. (1992). Stimulus recognition and the mere exposure effect. *Journal of Personality and Social Psychology*, 63, 545-552.
- Briggs, R., & Hollis, N. (1997). Advertising on the Web: Is there response before click-through? *Journal of Advertising Research*, 37, 33-45.
- Cialdini, R. B. (2001). *Influence: Science and practice*. Boston: Allyn & Bacon.
- Coltheart, M. (1981). The MRC Psycholinguistic Database. *Quarterly Journal of Experimental Psychology*, 33A, 497-505.
- Cowan, N. (1995). *Attention and memory. An integrated framework*. New York: Oxford University Press.
- Dewing, K., & Hetherington, P. (1974). Anagram solving as a function of word imagery. *Journal of Experimental Psychology*, 102, 764-767.
- Duncker, K. (1945). On problem solving. *Psychological Monographs*, 58, 113.
- e-Rewards (n.d.). *What is e-Rewards?* Retrieved January 9, 2001, from <http://www.e-rewards.com/program/body.asp>
- Google (n.d.). *Google directory - Recreation > Humor > Wordplay > Anagrams*. Retrieved June 18, 2003, from <http://directory.google.com/Top/Recreation/Humor/Wordplay/Anagrams>
- Greenwald, A. G. (1968). Cognitive learning, cognitive response to persuasion, and attitude change. In A. G. Greenwald, T. C. Brock, & T. M. Ostrom (Eds.), *Psychological foundations of attitudes* (pp. 147-170). San Diego, CA: Academic Press.
- Hansell, S. (2001, March 17). Web site ads, holding sway, start to blare [Electronic version]. *The New York Times*.
- Ives, N. (2003, February 11). Marketers shift tactics on web ads [Electronic version]. *The New York Times*.
- Janiszewski, C. (1993). Preattentive mere exposure effects. *Journal of Consumer Research*, 20, 376-392.
- Kahneman, D. (1973). *Attention and effort*. Englewood Cliffs, NJ: Prentice Hall.
- Kramer, S. D. (2002, April 29). Content's king [Electronic version]. *Cableworld*.
- Li, H. R., & Bukovac, J. L. (1999). Cognitive impact of banner ad characteristics: An experimental study. *Journalism and Mass Communication Quarterly*, 76, 341-353.
- Martin, L. L. (1986). Set/reset: Use and disuse of concepts in impression formation. *Journal of Personality and Social Psychology*, 51, 493-504.
- Martin, L. L., & Seta, J. J., & Crelia, R. A. (1990). Assimilation and contrast as a function of people's willingness and ability to expend effort in forming an impression. *Journal of Personality and Social Psychology*, 59, 27-37.
- Mayzner, M.S., & Tresselt, M.E. (1958). Anagram solution times: A function of letter order and word frequency. *Journal of Experimental Psychology*, 56, 376-379.
- Mayzner, M.S., & Tresselt, M.E. (1966). Anagram solution times: A function of multiple-solution anagrams. *Journal of Experimental Psychology*, 71, 66-73.
- Monahan, J. L., Murphy, S. T., & Zajonc, R. B. (2000). Subliminal mere exposure: Specific, general, and diffuse effects. *Psychological Science*, 11, 462-466.
- Moore, C. W. (2000, February 24). [Moore's views & reviews] Checking out Eudora 4.3, plus an interview with Eudora products' David Ross. *Applelinks.com*. Retrieved January 23, 2001, from <http://www.applelinks.com/articles/2000/02/2000022423926.s.html>
- NetZero (n.d.). *Welcome to NetZero*. Retrieved April 1, 2003, from <http://www.netzero.net>
- Perloff, L. S. (1987). Social comparison and illusions of invulnerability to negative life events. In C. R. Snyder & C. E. Ford (Eds.), *Coping with negative life events: Clinical and social psychological perspectives* (pp. 217-242). New York: Plenum.

- Petty, R. E., Ostrom, T. M., & Brock, T. C. (1981). Historical foundations of the cognitived response approach to attitudes and persuasion. In R. E. Petty, T. M. Ostrom, & T. C. Brock (Eds.), *Cognitive responses in persuasion* (pp. 5-29). Hillsdale, NJ: Erlbaum.
- Qualcomm (2000, February 15). *Qualcomm's new Eudora 4.3 provides industrial-strength e-mail for free*. Retrieved January 24, 2001, from http://www.eudora.com/press/2000/2_15_00.htm
- Sagarin, B. J., Cialdini, R. B., Rice, W. E., & Serna, S. B. (2002). Dispelling the illusion of invulnerability: The motivations and mechanisms of resistance to persuasion. *Journal of Personality and Social Psychology*, 83, 526-541.
- Shapiro, S., MacInnis, D. J., & Heckler, S. E. (1997). The effects of incidental ad exposure on the formation of consideration sets. *Journal of Consumer Research*, 24, 94-104.
- Shapiro, S., MacInnis, D. J., Heckler, S. E., & Perez, A. M. (1999). An experimental method for studying unconscious perception in a marketing context. *Psychology & Marketing*, 16, 459-477.
- Strayer, D. L., Drews, F. A., & Johnston, W. A. (2003). Cell phone-induced failures of visual attention during simulated driving. *Journal of Experimental Psychology: Applied*, 9, 23-32.
- Strayer, D. L., & Johnston, W. A. (2001). Dual-task studies of simulated driving and conversing on a cellular telephone. *Psychological Science*, 12, 462-466.
- Thackray, R. I., & Touchstone, R. M. (1991). Effects of monitoring under high and low taskload on detection of flashing and colored radar targets. *Ergonomics*, 34, 1065-1081.
- Theeuwes, J. (1994). Stimulus-driven attentional capture and attentional set: Selective search for color and visual abrupt onsets. *Journal of Experimental Psychology: Human Perception and Performance*, 20, 799-806.
- Tresselt, M.E., Mayzner, M.S. (1968). Anagram solution times: A function of single- and double-letter solution words. *Journal of Verbal Learning & Verbal Behavior*, 7, 128-132.
- Wegener, D. T., & Petty, R. E. (1995). Flexible correction processes in social judgment: The role of naïve theories in corrections for perceived bias. *Journal of Personality and Social Psychology*, 68, 36-51.
- Wickens, C. D. (1984). Processing resources in attention. In R. Parasuraman & R. Davies (Eds.), *Varieties of attention* (pp. 63-102). New York: Academic Press.
- Wilson, M. D. (1988). The MRC Psycholinguistic Database: Machine Readable Dictionary, Version 2.00. *Behavior Research Methods, Instruments and Computers*, 20, 6-11.
- Yantis, S. (1993). Stimulus-driven attentional capture and attentional control settings. *Journal of Experimental Psychology: Human Perception and Performance*, 19, 676-681.
- Zajonc, R. B. (1968). Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology*, 9, 1-27.

Author Note

Brad J. Sagarin, Northern Illinois University; M. Anne Britt, Northern Illinois University; Jeremy D. Heider, Northern Illinois University; Sarah E. Wood, Northern Illinois University; Joel E. Lynch, Northern Illinois University.

Some of the findings reported here were initially presented at the February 2002 meeting of the Society for Personality and Social Psychology in Savannah, GA, the May 2002 meeting of the Midwestern Psychological Association in Chicago, IL, and the June 2003 Cognitive Technology conference in Winston-Salem, NC. We thank Kimberly Arthur, Julie Bonini, Joanne Comiskey, Anndrea Dixon, Reyna Gilbert, Thomas Millar, and Jennifer Shewalter for their help in running the experiments and Rosanna Guadagno, Virgil Sheets, John Skowronski and two anonymous reviewers for their helpful comments on an earlier draft of this paper.

Correspondence concerning this article should be addressed to Brad Sagarin, Northern Illinois University, Department of Psychology, DeKalb, IL, 60115, bsagarin@niu.edu.