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Is Banner Blindness Genuine? Eye Tracking Internet Text Advertising

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Summary: Over the last decade or so, the Internet has become a privileged media for advertisement. Despite this increase in popularity, several studies suggested that Internet users 'avoid' looking at ads (what is often referred to as the banner blindness phenomena). This conclusion, however, rests mostly on indirect evidence that participants do not remember the ad content. Therefore, it is unclear whether participants actually fixated the ads and how their gaze behaviour is related to memory for the ad. In the present study, we investigated whether Internet users avoid looking at ads inserted on a non-search website using an analysis of eye movements, and if the ad content is kept in memory. Our results show that most participants fixate the ads at least once during their website visit. Moreover, even though the congruency between the ad and the editorial content had no effect on fixation duration on the ad, congruent ads were better memorised than incongruent ads. This study provides a novel and systematic method for assessing the processing and retention of advertisements during a website visit. Copyright © 2010 John Wiley & Sons, Ltd.

During the last 15 years, the Internet has overtaken traditional media such as radio or cable TV and has become an unavoidable media for advertisers. Internet advertising investment has almost tripled to exceed $23 billion in the US in 2008 (IAB, Pricewaterhouse-Coopers Annual Report, 2009). Despite this increase in popularity, some studies have raised doubts with regards to Internet advertising effectiveness. For instance, Benway (1998) showed that when surfing on non-search web sites, Internet users seem to avoid looking at banners, a phenomenon that has been referred to as *banner blindness*. This conclusion, however, rests mainly on indirect evidence such as the extent of memory for the ads assessed through direct memory tests (Pagendarm & Schaumburg, 2001) or self-reporting measures (Cho & Cheon, 2004). Indeed, most studies did not examine whether participants avoided looking at banners through an analysis of eye movements, which renders the conclusion that Internet users avoid looking at ads rather speculative. Moreover, the relationship between fixation on the banner and memory for its content has not been investigated. Even though contextual advertising—which consists of inserting advertisements only on websites in which the content is congruent with the ad's message—is one of the most important online advertising strategies used by marketing agencies, only a few studies have investigated the effect of ad congruency on banner blindness and memory (e.g. see Moore, Stammerjohan, & Coulter, 2005). The objective of the present study is to examine whether participants look at the banners inserted on Internet pages and how their gaze behaviour is related to memory for the ad content by using an analysis of eye movements during a website visit. A second objective is to investigate how fixation duration and memory performance are modulated by the ad congruency with the editorial content.

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LITERATURE REVIEW

Banner blindness and eye movements

Banner blindness usually refers to the finding that Internet users avoid looking at (Drèze & Hussherr, 2003) or paying attention to (Chatterjee, 2008) ad banners inserted on web pages. However, despite the fact that the user's attentional or looking behaviour is invoked in most definitions of banner blindness, only a very small number of studies have measured eye movements to investigate this phenomenon. Indeed, most of these studies concluded that banners are avoided on the basis of performance in memory tests or self-report procedures. For example, in a study by Chatterjee (2008), participants were required to visit a website in order to find an apartment. During the visit, participants were exposed to ads for a fictitious brand. At the end of the experiment, participants had to list the information from every ad they remembered seeing (free recall). The authors concluded that banners were avoided based on the finding that recall scores were low (about 26% of the ads were recalled). Even though the finding that participants do not remember having seen an ad suggests that its processing was limited, no conclusions can be made about whether or not attention has been paid to the ad. Indeed, it is possible that attention was paid to the ad, but that participants could not remember its content at the end of the experiment.

In order to study the attentional processes involved in a task, the analysis of eye movements has proved to be a valuable source of evidence in various fields such as web design (Guan & Cutrell, 2007), scene perception (Castelhano & Henderson, 2007) and print advertising (Pieters & Wedel, 2007a, 2007b; Rayner & Castelhano, 2007; Wedel & Pieters, 2000). Indeed, even though it is possible that attention is paid to an object when it is not currently fixated, an eye movement is necessarily accompanied by a shift of attention (e.g. see Shepherd, Findlay, & Hockey, 1986). Therefore, an eye movement made to an object indicates that attention

has been paid to it and fixation duration is a good indicator of the amount of attention that is paid to that object (Hollingworth & Henderson, 1998; Pieters & Wedel, 2004). Given the close relationship between eye movements and attention, the measure of eye movements is an unavoidable tool in order to examine if an ad has been under the focus of attention during a website visit and for how long it has been processed.

In the field of advertisement, eye movements have been measured mostly to assess ad efficiency in the context of search engines such as Google, Bing and Ask. These studies showed that most users look at banner ads located on results pages (Guan & Cutrell, 2007; Weinreich Obendorf, Herder, & Mayer, 2004). Even though advertising on non-searched websites represent 30% of ad investment (IAB, Pricewaterhouse-Coopers Annual Report, 2009), very few studies have measured eye movements in order to investigate whether or not ads on non-search websites are looked at by Internet users, and the results are contradictory. For instance, in a study by Burke, Hornof, Nilsen, and Gorman (2005), participants were required to search for a specific word inserted in a set of words arranged in columns on a web page in which different banners had been inserted. An analysis of eye movement indicated that participants looked at the banners in 11.7% of the trials but that in 70% these cases, fixation on the banner occurred because the ad appeared where the participants were fixating. The low number of trials in which banners were looked at suggests that participants actively avoided looking at ads. However, the artificial context of the task might have influenced the participant's looking behaviour. In another study, Lapa (2007) inserted banners at the bottom of the website pages that participants were instructed to read and reported that participants paid attention to the banners since these were fixated. Interestingly, he observed that when the page structure was preserved over successive web pages, fixation duration on the banner decreased as a function of page number. He suggested that Internet users learn very quickly the structure of a webpage and use this knowledge in order to avoid the banner. In the present study, we measured eye movements in a naturalistic non-search website visit in order to examine (1) if attention is paid to the ads and (2) how long the ads are fixated. Moreover, the page structure was changed over the course of the experiment in order to examine the effect on eye movement behaviour. If participants can use their knowledge of the page structure to avoid ads, there should be more eye movements toward the ad when it is unexpected.

Banner blindness and memory

Most marketing studies focusing on ad efficiency and ad processing have measured participants' memory and reported that memory for the ad message was rather poor (Chatterjee, 2008; Drèze & Hussherr, 2003; Heath & Nairn, 2005; Hefli & Haygood, 1985). However, these studies mostly used explicit memory tests such as free recall procedures (e.g. see Hefli & Haygood, 1985), two or more-choice recognition tasks (e.g. Chatterjee, 2008; Drèze & Hussherr, 2003; Heath & Nairn, 2005), self-report procedures in which participants are asked to list information about each of the ads they remembered seeing (e.g. Chatterjee, 2008), or to answer how many times they have seen an advertisement (Heath & Nairn, 2005). Although they suggest that participants do not explicitly remember the ad content, it is still possible that they can retain implicit knowledge of the content. Indeed, several studies in the domain of memory show that even if participants cannot recall items that had to be memorised when explicitly instructed to do so, they have encoded this information since they are more likely to refer to the memorised material afterwards. In line with this idea, Petre (2005) showed that participants could remember the ad content through an implicit memory test even when it could not be recalled with direct memory tests such as free recall. Given the finding that explicit memory for an ad is generally very poor, the present study used the implicit memory test proposed by Petre in order to verify if participants had encoded the ad content. In this test, participants are asked to identify the message of ads that are presented with a certain level of noise. It is an implicit test since participants do not know that some ads were presented during their website visit.

Moreover, even though most studies can conclude whether or not participants remember the message of the ad, memory performance is rarely related to the amount of attention that was paid to the ad. Disentangling attentional from memory phenomena has important implications for marketing strategies since different factors are known to attract attention to an item such as its colour (e.g. see Theeuwes, Kramer, Hahn, & Irwin, 1998), and to increase its memorability such as its familiarity (e.g. see Saint-Aubin & Poirier, 1999) or the time spent fixating it (e.g. see Saint-Aubin, Tremblay, & Jalbert, 2007). One exception is the study by Burke et al. in which memory for the banners was assessed through a yes/no recognition task where participants were required to indicate whether or not they had seen the banner during the task. They reported that the banners that had been fixated were no better recognised than those that had not been fixated. However, as suggested earlier, it is possible that the explicit memory test they used was not sensitive enough to detect a difference.

Congruency

The effect of ad congruency has been widely studied and several types have been investigated, such as the congruency between the ads' spokesperson and the advertised brand (Misra & Beatty, 1990; Till & Busler, 2000), or the congruency between the ad content and the users' interests (Johar & Sirgy, 1991). Congruency between the ad content and the web page editorial content is an important marketing strategy aiming at increasing attention paid to the ad and memory for the ad content (e.g. Google Investor, 2008). Although this type of congruency has been shown to improve memory in the context of TV programmes (Goldberg & Gorn, 1987) or magazines (Yi, 1990), to our knowledge only one study has investigated the role of congruency in the context of Internet ads and reported mixed results (Moore et al., 2005). In their first experiment, Moore et al. asked their participants to evaluate a new apartment website. A free

recall test and a recognition test were used to assess participant memorisation of the ads. The results indicated that incongruent banners were memorised better than congruent banners. However, in a second experiment in which participants had to evaluate a website about cameras, a moderate level of congruence yielded a higher level of memorisation than completely congruent and incongruent ads, which did not differ from each other. In this study, as is the case in most studies on Internet advertising, the level of attention to the banners was assessed indirectly using explicit memory measures (Rosenberg, Pieters, & Wedel, 1997). One possibility is that the level of attention devoted to the ads did not differ between congruent and incongruent ads even though greater congruency between the ad and editorial content was beneficial to memory for the ad. The latter relationship can be ascribed to the editorial context acting as a semantic prime known to facilitate retrieval of semantically related material presented subsequently (here, the congruent ad; see Finlay, Harvey, Marmurek & Morton, 2005) and consequently, increase the recall performance for congruent ads.

The present study

In the present study, we examined eye movements and memory for text-only ads and how they are modulated by ad congruency with the editorial content. We focused on text-only ads because, despite the fact that they are systematically used on search engines and very frequent on many non-search websites, to our knowledge, no study has investigated the case of text-only ads on non-search websites. Eye movements were recorded while participants visited a pre-ordered set of web pages. To assess whether participants use their knowledge of page structure to avoid looking at banners, page structure was manipulated by alternating between pages with ads and pages with no ad. This manipulation also allowed us to compare fixation duration on the ad with fixation duration in the same area on a page with no ad. Half of the participants were presented with ads that were congruent with the editorial content and the other half were presented with incongruent ads.

METHOD

Participants

Forty-eight students from Laval University took part in the experiment in exchange for a small honorarium. Their age ranged between 18 and 39 years old. Half of the participants were male and half were female. All participants reported using the Internet on a daily basis. Thirty-two participants were exposed to the banners during the website visit and completed the indirect perceptual-memory task (experimental group). Sixteen participants completed only the memory test and their results were used for the control group. Both groups were divided in two subgroups of equal size, with one completing the memory task for congruent ads and the other for incongruent ads.

Apparatus and materials

The experiment was controlled by a PC computer with a resolution of 1024×768 pixels. Eye movements were recorded with the Tobii eye tracker (Tobii Technology, 2006). The system's resolution and sampling rate are 0.25° and 50 Hz. The eye movements were captured by a camera integrated at the bottom of the 17'' computer screen that was located at about 60 cm from the participants.

The stimuli were eight Internet pages describing how to choose a digital camera. One 180×150 pixels text-only ad was inserted in the right part of the central information area in the third, fourth, seventh and eighth pages (see Figure 1). Therefore, the first two pages contained no ad. The first ad was presented on the third page (ad 1). The fourth page also contained an ad (ad 2) that was different from that on page 3 to avert artificial avoidance due to immediate repetition of that ad. The first sequence of four pages (sequence 1) was repeated for pages 5 to 8 (sequence 2), which differed only by their editorial content. Four different text-only banners were developed. In order to avoid prior familiarity with the advertised brands, fictitious brands were used. Each banner was designed according to the Adwords advertising policies (Adwords, 2009) for text ads. Two ads were concerned with camera-related products and were congruent with the editorial content (see Figures 2A and 2B) whereas the two others were related to furniture and decoration and were incongruent with the editorial content (see Figures 2C and 2D). In the remaining four pages, the area of the ad was filled with editorial content. For the memory task, 14 degradations of each of the four ads were created by adding noise on the original banner with a graphic editing programme (Petre, 2005). The noise ranged from 95% in the most degraded ad, to 30% in the least degraded ad (see Figure 3).

Design

There were two within-subject factors, sequence number (2 levels; sequence 1, sequence 2) and ad order (2 levels; ad 1, ad 2) and one between-subjects factor, congruency (2 levels; congruent, incongruent). Congruency was manipulated between-subjects to reflect the fact that web publishers generally use one or the other. Sixteen participants were exposed to the two congruent ads and 16 participants were presented with the two incongruent ads. Each ad was presented two times. In the congruent group, half of the participants were presented with ad A (see Figure 2) on pages 3 and 7 (ad 1) and with ad B on pages 4 and 8 (ad 2). Ads A and B were exchanged for the other half of the participants. In the incongruent group, half of the participants were presented with ad C on pages 3 and 7 (ad 1) and with ad D on pages 4 and 8 (ad 2) and the two ads were exchanged for the other half of the participants.

Procedure

Participants were invited to take part in a study on Internet users' behaviour and instructed that their eye movements would be recorded. There was no mention of the advertising

Figure 1. Illustration of an Internet page with an ad (indicated in the current figure by a red rectangle)

purpose of the experiment, which was held in a neutral non-marketing room. Participants were instructed to read the eight Internet pages. To ensure that they read for comprehension, they were told that they would have to complete a questionnaire on the website's content. Before the beginning of the experiment, the eye tracker system was calibrated: Participants were asked to fixate nine blue calibration dots that were presented sequentially on the computer screen.

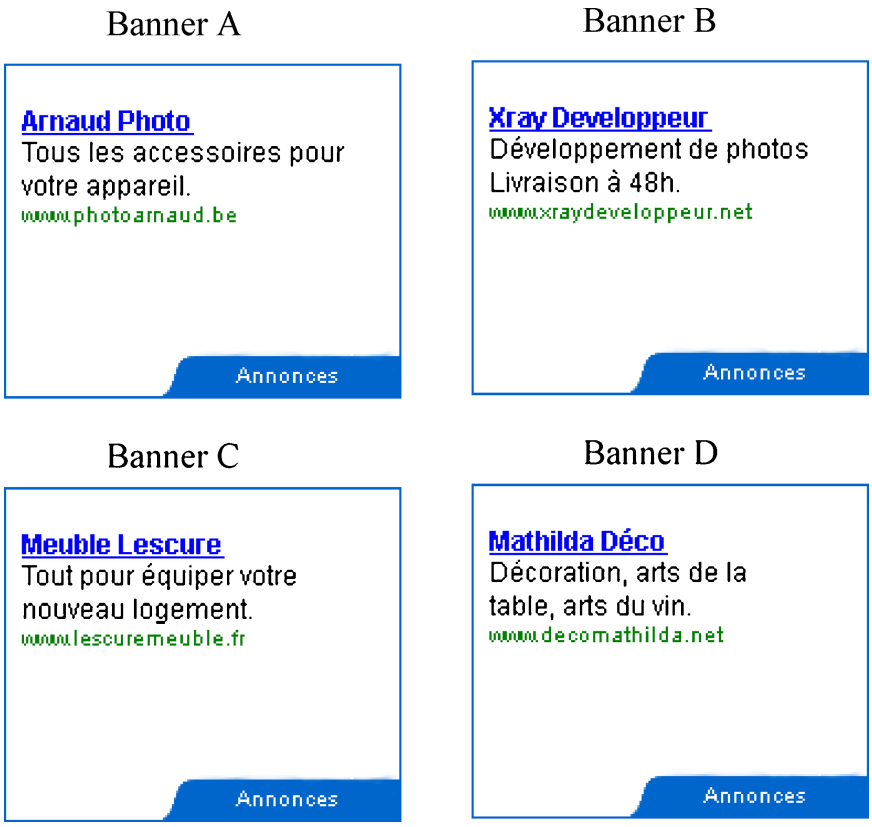

Figure 2. The four banners presented in the Experiment. Banners A and B were congruent with the editorial content and Banners C and D were incongruent

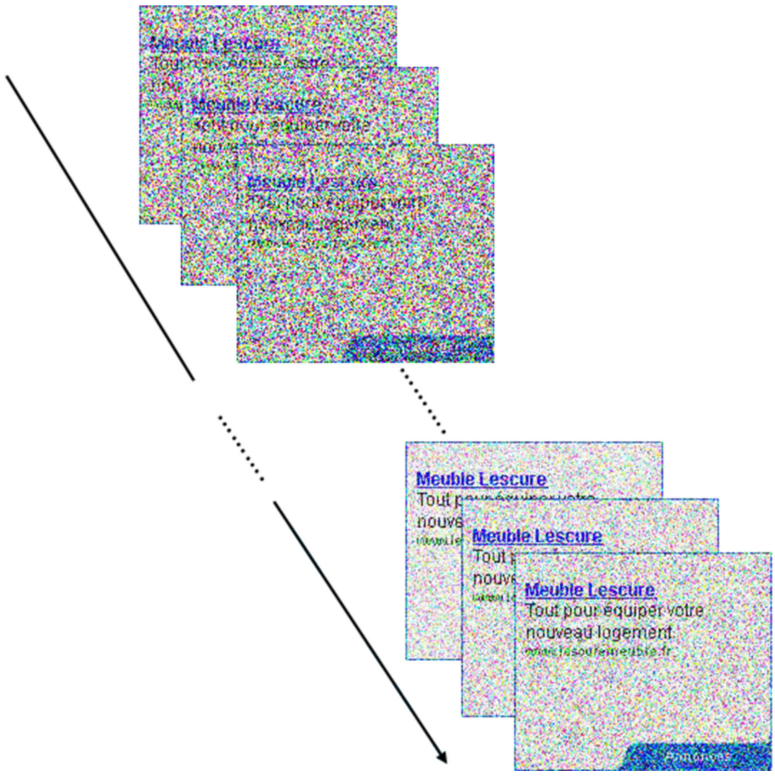

Figure 3. Illustration of the degradations used in the implicit perceptual memory test for one of the incongruent ads from the most degraded (top) from the less degraded (bottom)

Participants were then presented with the eight Internet pages. After reading the eight pages, participants were required to answer some questions about the website's content. About 10–15 minutes after the website visit, the indirect perceptual-memory test was administered. For each of the two ads that had been presented during the website visit, participants were exposed to 14 degradations, from the most degraded (95%) to the least degraded (30%). At each exposure, they were asked to type all they could read in a box below the banner. When they were done, they clicked on a button to remove 5% of the noise and completed the information they had typed in the box when possible.

RESULTS

In the first section, the analyses were done in order to examine if participants moved their eyes on the ads depending on the different conditions. Then, fixation duration on the ad message area was computed in order to examine how long each ad was fixated (see Figure 1). The ad message area was preferred over the whole ad area in order to make sure that the fixations computed were attributed to reading the ad and not to some spill-over effects—the fact that participants may have fallen within the blank areas by error.

Eye movements on the ad

Eighty-two per cent of the participants looked at one or more ads. Over the 128 exposures (32 participants × 2 ads × 2 exposures), 36.72% were fixated at least once. The probability of looking at each ad was computed by dividing the number of participants that made at least one fixation on the ad message area by the total number of participants in each condition. Figure 4 suggests that the probability to fixate the ad is higher for the first sequence of ads (.50) than for the second sequence (.23), but also higher for the first ad (.52), than for the second ad (.22). A 2 (congruency) × 2 (sequence number) × 2 (ad order) mixed ANOVA was

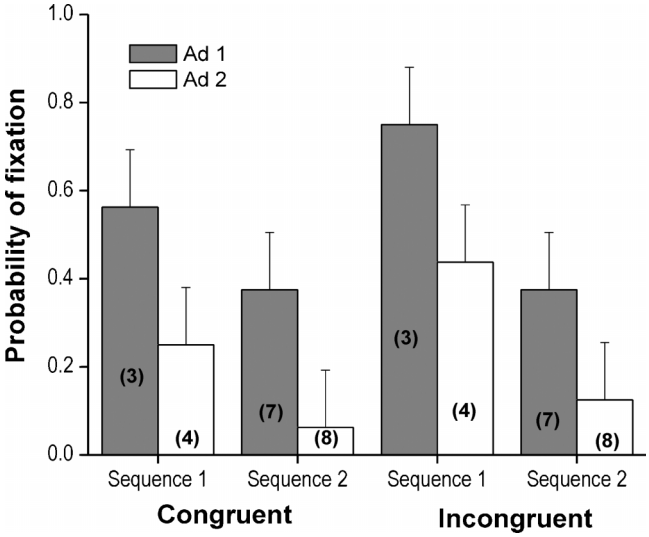

Figure 4. Probability of fixation as a function of sequence number, ad order and congruency. The number of the page on which each ad was presented is inserted in parentheses. Error bars represent 95% confidence intervals

Table 1. Total fixation duration (milliseconds) and number of fixations on the ad message area averaged across participants for the four Internet pages. The number of the page on which each ad was presented is inserted in parentheses

	Sequence 1		Sequence 2	
	Ad 1 (3)	Ad 2 (4)	Ad 1 (7)	Ad 2 (8)
Congruent				
Duration	874	319	704	279
Number	2.8	1.5	1.8	1
Incongruent				
Duration	1019	606	534	408
Number	3.3	2.9	1.5	1

performed on the probability of fixation. In all analyses, the .05 level of significance was adopted and the Greenhouse–Geisser correction was applied when the sphericity criterion was not met. The analysis confirmed that the probability of looking at the ad was higher for the first sequence than for the second sequence, $F(1, 30) = 12.78$, $MSE = 0.18$, $\eta^2_p = .30$, and higher for the first ad than for the second ad, $F(1, 30) = 14.29$, $MSE = 0.20$, $\eta^2_p = .32$. The probability of fixating the ad did not differ between the congruent and incongruent ads, $F(1, 30) = 1.42$, $MSE = 0.27$, $\eta^2_p = .05$. No interaction was significant.

Fixation duration

When participants looked at the ad message area, total fixation duration varied between 100 and 5522 milliseconds ($M = 726$ milliseconds, $SD = 873$ milliseconds). Fixation duration on the ad message area for participants that fixated the ads is reported in Table 1. Because of the numerous cases where there was no fixation on the ad however, it was not possible to perform statistical analysis on these data. Therefore, fixation duration analysis included cases with no fixation, where fixation duration was equal to 0. Moreover, for each page, fixation duration was adjusted for the number of characters: The total amount of time spent in the ad message area was divided by the number of characters in this area. This measure was used to compensate for the smaller number of characters to read in the banner compared to pages with editorial content and was used in all of the following analyses. Fixation was adjusted for the number of characters rather than for the number of words (Poole & Ball, 2006), because all words in our banners were not equated in word length and contained web page addresses. However, during reading, fixation duration is longer on long words than on short words (Rayner, 2009).

Figure 5 shows that fixation duration was longer for the first ad ($M = 6.3$ milliseconds/character) than for the second ad (1.5 milliseconds), and longer for the first sequence of ads (5.9 milliseconds) than for the second sequence (2.0 milliseconds). Fixation duration did not seem to be modulated by congruency. A 2 (congruency) × 2 (sequence number) × 2 (ad order) mixed ANOVA was performed on the adjusted fixation duration in the message area for pages with ads. The analysis confirmed that fixation duration was longer for the first sequence than for the second sequence of ads, $F(1, 30) = 6.97$, $MSE = 70.83$, $\eta^2_p = .19$,

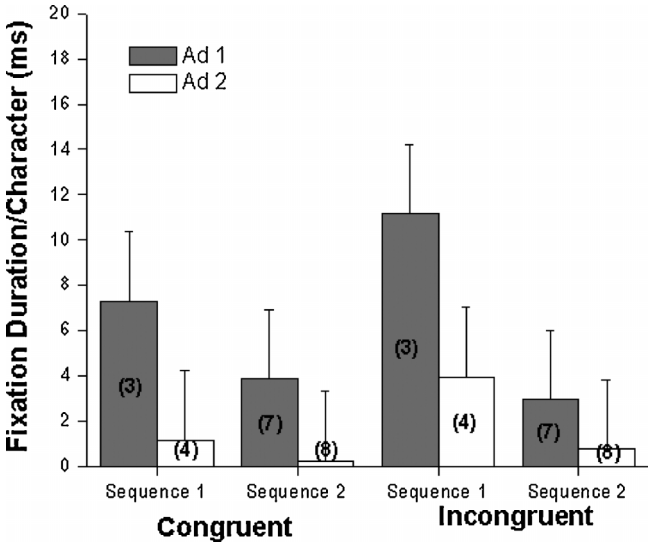

Figure 5. Fixation duration per character as a function of sequence number, ad order and congruency. The number of the page on which each ad was presented is inserted in parentheses. Error bars represent 95% confidence intervals

and longer for ad 1 than for ad 2, $F(1, 30) = 13.96$, $MSE = 52.57$, $\eta^2_p = .32$. The main effect of congruency was not significant, $F < 1$. All other interactions were non-significant. Additional analyses also highlight that for all pages with ads, fixation duration in the message area was shorter than fixation duration in the same area on pages without ads. This was confirmed by four *t*-tests comparing the mean fixation duration on the four pages of editorial content, that is, pages 1, 2, 5 and 6, ($M = 37$ milliseconds/characters, $SD = 19.2$ milliseconds), with fixation duration on page 3 ($M = 9$, $SD = 16$), $t(31) = 7.15$, $p < .001$, page 4 ($M = 3$, $SD = 5$), $t(31) = 10.18$, $p < .001$, page 7 ($M = 3$, $SD = 6$), $t(31) = 9.47$, $p < .001$, and page 8 ($M = 1$, $SD = 2$), $t(31) = 10.88$, $p < .001$.

Memory performance

Performance in the indirect perceptual-memory test was first analysed in the control group (the group that was not exposed to the web pages) to determine the degradation level at which participants could read the information from the banner. For each degradation level, we computed the cumulated percentage of letters correctly reported from the brand name. The percentage of letters correctly reported in the congruent and incongruent groups is presented in Figure 6. A 2 (congruency) × 14 (degradation level) mixed ANOVA performed on this percentage showed that the main effect of degradation level was significant, $F(13, 182) = 165.72$, $MSE = 1082.50$, $\eta^2_p = .92$, but neither the main effect of congruency, nor the interaction between congruency and degradation level were significant, Fs < 1. A *t*-test confirmed that there was no difference between the incongruent and congruent ads at the level 5 of degradation, $t(15) = -0.9$, $p = .39$. *T*-tests were also carried out in order to determine at what level participants could start reading the ad content. The analysis showed that there was no difference between levels 4 and 5, $t(15) = 1.5$, $p = .15$, but that performance was higher

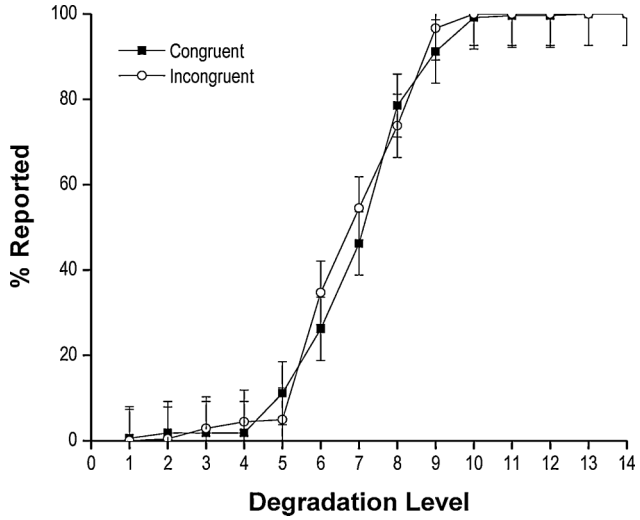

Figure 6. Cumulated per cent of letters correctly reported from the brand name in the congruent and incongruent control groups as a function of degradation level. Error bars represent 95% confidence intervals

at level 6 than at level 5, $t(15) = 4.5, p < .001$, suggesting that before level 6, it was nearly impossible to read information directly from the banner.

Since the control group could start to extract information from the banner at level 6, we analysed the per cent of letters correctly reported from the banner name in the experimental group in the first five degradation levels. The cumulated percentage pooled between the two control groups was used as a baseline condition. As seen in Figure 7, performance for the first ad in the congruent group seemed to be higher than that in the other conditions. Letters correctly reported performance in the experimental group was analysed separately for ad 1 and ad 2 in order to make a statistical comparison with the control group. A 3 (group; control, congruent, incongruent) $\times$ 5 (degradation level; levels 1–5) mixed ANOVA carried out on the per cent reported for ad 1—which was the first ad encountered during the web visit—showed that performance increased as a function of degradation level, $F(4, 180) = 7.52$, $MSE = 336.28$, $\eta^2_p = .14$, and varied between the three groups, $F(2, 45) = 3.22$, $MSE = 1572.67$, $\eta^2_p = .13$. The interaction between group and degradation level was not significant, $F(8, 180) = 1.81$, $MSE = 336.28$, $\eta^2_p = .08$. Pairwise comparisons showed that memory performance in the incongruent group did not differ from the control group, ($p = 1.0$), and that the difference between the control and congruent group was marginally significant, ($p = .06$), suggesting that the effect of group was due to the better performance in the congruent group. A 3 (group; control, congruent, incongruent) $\times$ 5 (degradation level; levels 1–5) mixed ANOVA was also carried out on the per cent reported for ad 2. The main effect of group was not significant, $F < 1$. The main effect of degradation level was significant, $F(4, 176) = 11.85$, $MSE = 520.16$, $\eta^2_p = .21$, but not the interaction between group and degradation level, $F < 1$.

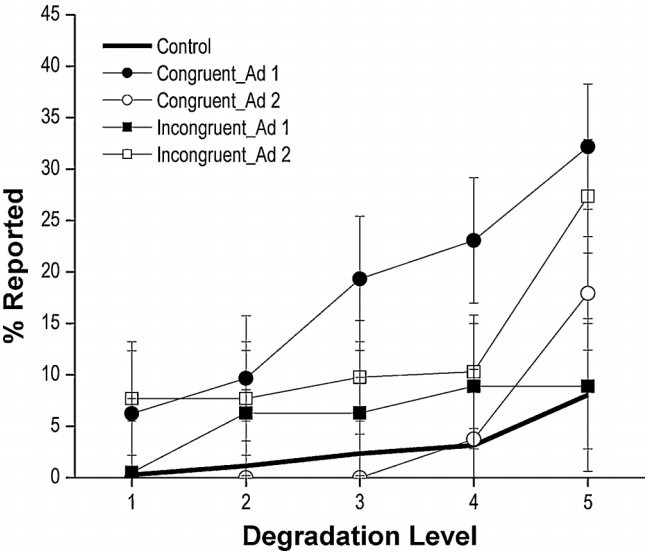

Figure 7. Cumulated per cent of letters correctly reported in the congruent and incongruent groups for ad 1 and ad 2 as a function of degradation level, compared with that in the control group. Error bars represent 95% confidence intervals

DISCUSSION

The objective of the present study was to examine whether web users avoid looking at and remember banners inserted on Internet pages and how this behaviour is modulated by ad congruency with the editorial content. On the one hand, the results showed that a majority of participants fixated the banners at least once during their website visit. On the other hand, the banners were fixated for a shorter amount of time compared to editorial content. Ad order, but not congruency, had an effect on participants' gaze behaviour. Indeed, the first ad encountered during the website visit was fixated more often and for a longer amount of time than the following ads. Moreover, the first ad appeared to be better retained than the other ad, but only when it was congruent with the editorial content. In brief, there is direct evidence of an effect of exposure on gaze behaviour—reduction of fixation following the initial exposure to the ad banner—and the relation between looking and retention seems modulated by congruency.

Ad avoidance

If banner blindness is defined as the absence of fixation on banners, our results show that banner blindness does not apply to Internet advertisements since 82% of the participants fixated at least one of the four banners during the web pages visit. However, since 63.3% of the banners were not fixated, the Internet appears to be more affected by advertising avoidance compared with television in which less than 10% of ads are avoided (Siddarth, 1999) or Yellow Pages in which about 10% of ads are avoided (Lohse, 1997). Some researchers have suggested that most Internet users actively avoid advertisements or anything that looks like an ad on the Internet (e.g. Nielsen, 2007) and have developed strategies to avoid devoting attention to Internet advertising (Drèze & Hussherr, 2003). The current pattern of results is more consistent with the concept of ad avoidance according to which users take actions to reduce their exposure to

the ads they encounter through visiting a website (e.g. see Chatterjee, 2008; Speck & Elliot, 1997). This idea is supported by the findings that (1) even though we compared fixation on the ad to the same area with editorial content and adjusted for the number of characters, fixation duration on the ad was always shorter than fixation duration on an area filled with editorial content and (2) fixation duration on the banner considerably decreased after the first exposure.

When the first banner was presented in our experiment, it was very likely to be unexpected given the fact that it followed two pages without ad, and that participants were not warned that any banners would be encountered. Our results showed that fixation duration on the first banner was increased compared to when the banner had been preceded by another banner. One potential explanation is that when the banner was inserted on the third page, it changed the structure of the web page, which reduced the effectiveness of ad avoidance strategies. Indeed, Lapa (2007) suggested that Internet users learn very quickly the structure of a webpage, which allows them to locate useful information faster and avoid ad banners. In line with Lapa's results, we observed that when the page structure was changed by inserting a banner, the probability of fixating and fixation duration on the banner was the highest, suggesting that participants tended to verify the usefulness of the information presented in the message area. When participants knew this information was related to the advertisement, they could focus on the area with editorial content only, and fixation duration in the ad area decreased. These results are consistent with the concept of cognitive avoidance developed by Chatterjee (2008) and they suggest that changing the page structure is a good strategy in order to attract the participants' attention to the banner. From a managerial perspective, these results could impact marketers' targeting strategies. For instance, marketers should avoid presenting ads at the same locations in two successive pages. For example, pages with no banner could be inserted between pages with banners.

Memory for the ad

Although most studies assessing memory for the ad banners using direct memory tests showed that very few elements of the banner could be recalled (e.g. see Heath & Nairn, 2005), the implicit memory test used in the present study showed that participants exposed to the banners could identify the brand names of the banner more efficiently than participants not exposed to the banner, at least when the banners were congruent with editorial content. Indeed, the indirect perceptual-memory test used in the present study allows for the assessment of implicit memory and does not require the participants to consciously remember the ad. Such a measure has been shown to be more sensitive than the recall and recognition tests used by Moore et al. (see Petre, 2005, Shapiro & Krihsnan, 2001).

Contrary to what Moore et al. (2005) concluded on the basis of their memory tests, our analysis of eye movements showed that congruency did not influence the probability to fixate the ad. This result is not surprising given the fact that text-only ads were used and that participants must fixate the message content in order to determine whether it is congruent or not with the editorial content (e.g. see Rayner, 1998). Our results also showed that the time spent fixating the ad was not influenced by congruency. However, even if incongruent and congruent ads are looked at for the same amount of time, memory for the ad content was modulated by congruency. One possibility is that the presentation of contextual information (Yi, 1990)—such as the editorial content during a web-site visit—acts as a prime (e.g. see Finlay et al., 2005) and activates the participants' related knowledge in memory (Shapiro, 1999). For instance, reading web pages about cameras would activate the participants' semantic network associated with cameras. As a result, information consistent with the activated network is automatically processed and becomes more accessible to the participant's memory (Grimes, 2008). Therefore, ads concerned with cameras would be integrated into existing knowledge to the same extent as the new editorial content because they are congruent with the activated semantic network. Even though attention is directed to incongruent ads, these would be poorly recalled because they have not been processed due to their incompatibility with the activated network. This result highlights the relevance for marketers to target precisely the websites on which they place advertisement.

CONCLUSION

In conclusion, inserting a banner that changes the web page structure seems to be a powerful means to attract the users' attention and increase the time spent fixating the ad, regardless of whether the ad is congruent or not with the editorial content. Attention does not guarantee that the ad content will be remembered however, since participants could remember the ad content for the first encountered ad, but only when it was congruent with the editorial content. This research highlights the importance of having independent measures for attention and memory by showing that even though attention seems to be necessary for remembering the ad content, other factors are important as well. Therefore, one should be careful before concluding that banners have not been looked at on the basis of memory performance.

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