

Does banner advertising still capture attention? An eye-tracking study

Aline Simonetti and Enrique Bigne
University of Valencia, Valencia, Spain

Banner
advertising

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Abstract

Purpose – The purpose of this study is to investigate how much visual attention is given to banner ads embedded in Web page content dependent on whether the user's task is goal- or not goal-oriented, as well as the interplay between attention, banner location, banner click and banner recognition.

Design/methodology/approach – The authors used a within-subjects design where 100 participants performed two tasks – reading a news and finding where to click next – on a Web page containing three banner ads embedded into the website content. The authors gathered behavioral and eye-tracking data.

Findings – Consumers disregard banner ads when they are performing a focused task (reading news). Visual attention paid to the banners while reading – but not while free browsing – and banner location do not impact ad clicking. In addition, it is not necessary to pay full attention to a banner ad to be able to recognize it afterward.

Practical implications – The strategy of embedding banners in the main content of a Web page leads to higher visual attention when consumers are browsing a Web page compared to a focused task (e.g. reading). It also increases ad recognition over time compared to benchmark levels for ads placed in traditional positions.

Originality/value – Previous studies mainly assessed effectiveness of banners located at the top or lateral of a Web page. The authors used eye tracking as an objective measure of visual attention to banner ads embedded in Web page content and behavioral metrics to assess ad interest and measured ad recognition over time.

Keywords Banner advertising, Online marketing, Eye tracking, Attention, Memory

Paper type Research paper

¿Siguen captando la atención los banners publicitarios? Un estudio con Eye-Tracking

Resumen

Objetivo – Investigar cuánta atención visual se presta a los banners publicitarios incrustados en el contenido de una página Web en función de si la tarea del usuario está orientada a un objetivo o no, así como la interacción entre la atención, la ubicación del banner, el clic en el banner y el reconocimiento del banner.

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Diseño/metodología/enfoque – Se utilizó un diseño entre sujetos en el que 100 participantes realizaban dos tareas – leer una noticia y encontrar dónde hacer clic a continuación – en una página Web que contenía tres banners publicitarios incrustados en el contenido del sitio Web. Se recogieron datos conductuales y de seguimiento ocular.

Conclusiones – Los consumidores no prestan atención a los banners publicitarios cuando están realizando una tarea concentrada (leer noticias). La atención visual prestada a los banners durante la lectura – pero no durante la navegación libre – y la ubicación de los banners no influyen en el hecho de hacer clic en los anuncios. Además, no es necesario prestar toda la atención a un banner publicitario para poder reconocerlo después.

Originalidad – Los estudios anteriores evaluaban principalmente la eficacia de los banners situados en la parte superior o lateral de una página Web. Nosotros utilizamos el seguimiento ocular como medida objetiva de la atención visual a los banners incrustados en el contenido de la página Web y métricas de comportamiento para evaluar el interés por el anuncio, y medimos el reconocimiento del anuncio a lo largo del tiempo.

Implicaciones prácticas – La estrategia de incrustar banners en el contenido principal de una página Web aumenta la atención visual de los consumidores cuando navegan por una página Web en comparación con una tarea específica (por ejemplo, leer). También aumenta el reconocimiento del anuncio a lo largo del tiempo en comparación con los niveles de referencia de los anuncios colocados en posiciones tradicionales.

Palabras clave Publicidad en banners, Marketing en línea, Seguimiento ocular, Atención, Memoria

Tipo de artículo Trabajo de investigación

旗帜广告还能吸引人的注意力吗？一项眼球追踪研究

摘要

目的 – 研究用户对嵌入在网页内容中的横幅广告的视觉注意程度，取决于用户的任务是否以目标为导向，以及注意、横幅位置、横幅点击和横幅识别之间的相互作用。

设计/方法/途径 – 我们采用了主体内设计，100名参与者在含有三个嵌入网站内容的横幅广告的网页上执行两项任务—阅读新闻和寻找下一步的点击位置。我们收集了行为和眼球追踪数据。

研究结果 – 消费者在执行重点任务（阅读新闻）时忽略了横幅广告。阅读时对横幅广告的视觉关注—而不是自由浏览时—以及横幅广告的位置并不影响广告点击。此外，不一定要完全注意横幅广告才能在事后认出它。

原创性 – 以前的研究主要评估位于网页顶部或侧面的横幅广告的效果。我们用眼动仪作为对嵌入网页内容的横幅广告的视觉注意力的客观测量，用行为指标来评估广告的兴趣，并测量了广告在一段时间内的识别度。

实际意义 – 在网页的主要内容中嵌入横幅广告的策略导致消费者在浏览网页时，与重点任务（如阅读）相比，视觉注意力更高。与放置在传统位置的广告的基准水平相比，它也会随着时间的推移增加广告识别度。

关键词 横幅广告, 网络营销, 眼动跟踪, 注意力, 记忆

文章类型 研究型论文

1. Introduction

It has been almost 30 years since the first online banner ad appeared on websites. Currently, the presence of banner ads on the internet is ubiquitous, and monetary investment in this ad format continues to grow, with projections of reaching US\$226.80bn by 2027 (Statista, 2022). However, marketers fear and acknowledge an increase in ad avoidance over the years (Çelik et al., 2022). In fact, only four years after the first online banner ad appeared, the term “banner blindness” was created (Benway, 1998).

One explanation for banner blindness could be related to selective attention (Wedel and Pieters, 2008). When navigating websites, consumers often are goal oriented. Whether they are making a search, buying a product or merely reading news, cognitive resources are allocated to the task being performed. In this sense, banner ads are considered distractors

(Cho and Cheon, 2004; Seyedghorban *et al.*, 2016) and mental resources would not be directed to them. Moreover, consumers already associate traditional spots (i.e. the top and lateral of a Web page) with advertisements that do not align with their search-oriented goal tasks, leading to banner blindness (Sapronov and Gorbunova, 2022). Hence, hoping to cancel out this conscious avoidance of ads, companies embed banners in the website content. This way, to view all page content, consumers need to scroll through a banner ad. But there are few studies observing whether placing banner ads in between the main Web page content in fact directs consumer attention to ads (Schmidt and Maier, 2022). To our knowledge, no previous study has investigated how task-goal affects attention paid to banner ads embedded into the content.

Looking at something may indicate an active attentional process, but it does not necessarily mean that the acquired information will remain stored and accessible for a long time according to the limited capacity model of motivated mediated message processing (LC4MP) (Lang, 2000). Therefore, simply measuring visual attention toward a banner ad may not lead to accurate conclusions regarding consumers' memory of ads. Thus, several studies have measured brand and banner recognition and recall (Burke *et al.*, 2005; Drèze and Hussherr, 2003; Guitart *et al.*, 2019; Hamborg *et al.*, 2012; Lee and Ahn, 2012; Li *et al.*, 2016; Liu *et al.*, 2019; Muñoz-Leiva *et al.*, 2019, 2021; Schmidt and Maier, 2022) as support metrics to infer banner ad effectiveness. However, most of the studies assessed these memory effects soon after consumers were exposed to the banners. Considering that individuals are exposed to a myriad of stimuli every day, it is also valuable to verify whether ad recognition lasts longer than a few minutes or one day.

Therefore, this study seeks to fill in the gap in the literature on the relationship between task-goal and visual attention to banner ads embedded in Web page content. Moreover, it approaches banner ad performance through ad clicking and lasting memory. Our theoretical approach is based on processes of selective attention and its relationship with task-goal and memory formation. In addition, we consider previous empirical findings on how banner position affects visual attention to it. With this theoretical and empirical background, we aim:

- To investigate whether attention to online banner ads differs depending on the goal of the task (e.g. reading news or finding what to see next). This is the goal effect.
- To assess the position effect of online banner ad clicking depending on the attention paid to the banner and the position of the banner on the website.
- To explore the decay effect of advertising (Havlena and Graham, 2004); that is, if consumers recognize online banner ads from a website after one day and one week of exposure.

The contribution of this study is threefold. First, it expands the knowledge on internet ad avoidance related to task-goal (Cho and Cheon, 2004; Seyedghorban *et al.*, 2016) to recent marketing strategies, that is, embedding banner ads into the content. Second, it provides objective (i.e. eye-tracking) measures of visual attention to this type of banner and its relationship with selective attention and ad clicking. Third, it demonstrates the effectiveness of this type of banner through ad recognition over time.

2. Theoretical and empirical background

Traditionally, banner ads were horizontally placed on the top of a Web page. Later, a vertical format called the “skyscraper banner” was created, and together with the traditional horizontal format, they still have represented the most common formats and locations even

until today (Pernice, 2018). Indeed, several studies have addressed these and similar types of banners (Drèze and Hussherr, 2003; Hamborg *et al.*, 2012; Im *et al.*, 2021; Köster *et al.*, 2015; Kuisma *et al.*, 2010; Li *et al.*, 2016; Liu *et al.*, 2019; Resnick and Albert, 2014). Over time, consumers learned to associate these traditional locations with advertising spots; this association contributes to banner blindness (Sapronov and Gorbunova, 2022). Consequently, in an effort to bring back consumers' attention to banner ads, marketers moved the ads from their rather isolated places to the main content Web page area. Similar practices such as native advertising have been shown to have a better performance than normal banner ads (Sussman *et al.*, 2022). However, as consumers are hardly interested in banner ads when navigating on the internet, attention is often and purposely given to other Web page elements, which may affect banner effectiveness.

Therefore, we aim to test how banner ads embedded into the content perform in terms of visual attention depending on task orientation and its relationship with ad clicking and recognition. Figure 1 depicts our conceptual framework.

2.1 Selective attention

Whenever a task demands attention to specific elements, and not all elements present in the environment are relevant for performing the task, a selection process might occur (Dayan *et al.*, 2000). This process is regulated by top-down signals modulating the activity in sensory regions by prioritizing reactions to task-relevant elements (Gazzaley and Nobre, 2012). Nonetheless, selective attention rarely implies that the irrelevant stimuli are completely neglected; instead, they receive relative reduced attention in relation to task-relevant elements (Dayan *et al.*, 2000; Driver, 2001). Moreover, the level of distractor processing is conditioned to the type and level of load required to process task-relevant information, with high perceptual load leading to complete elimination of distractor processing in certain cases (Lavie, 2005).

In third-party website settings, ad avoidance is mostly explained by perceived goal impediment (Cho and Cheon, 2004; Seyedghorban *et al.*, 2016). In fact, the internet is assumed to be a more goal-oriented medium than other mediums (Cho and Cheon, 2004).

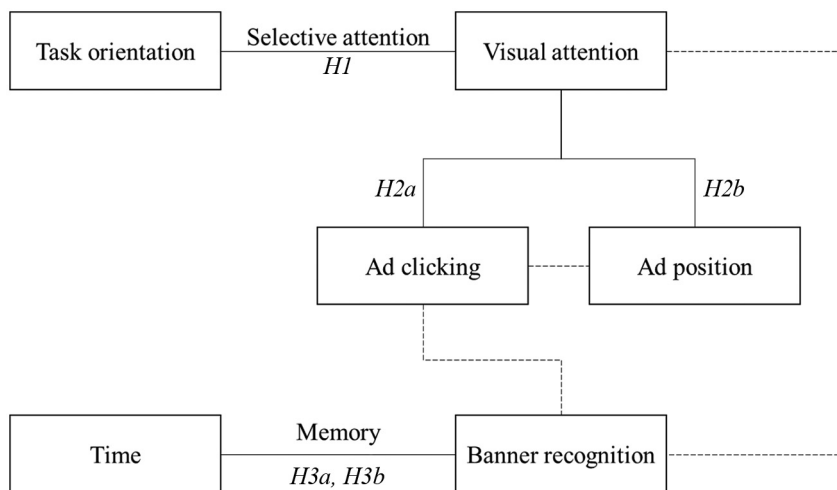


Figure 1. Schematic representation of the study hypotheses (solid lines) and further relationships explored (dashed lines)

When navigating a news website, users mostly encounter textual information. Text processing requires the engagement of cognitive processes, which implies top-down attention in the case of news reading (Sapronov and Gorbunova, 2022). Because banner ads differ from textual news, they tend to be unnoticed by users engaged in news reading (Sapronov and Gorbunova, 2022). Similarly, in devices with larger screens compared to mobile screens, users can easily avoid viewing ads (Schmidt and Maier, 2022) by directing attention to goal-relevant content (Duff and Faber, 2011), which refers to cognitive avoidance (Cho and Cheon, 2004).

A recent study found that cognitive load negatively impacts the attention paid to banner ads (Theodorakioglou *et al.*, 2023). Though higher perceived goal impediment leads to higher ad avoidance, this avoidance is more pronounced if users are in a serious mindset (e.g. searching on the internet) compared to a playful mindset (e.g. surfing on the internet) (Seyedghorban *et al.*, 2016). However, in the absence of a high perceptual load, distractors can interfere with individuals even if they are instructed to pay attention to a given task (Lavie, 2005). Strategies such as personalized banners or highly creative banner ads perform differently depending on whether users are freely browsing or involved in some task (Abedi and Koslow, 2022). Goal-direct looking (i.e. top-down attention) indicates active avoidance of distractors, whereas passive exposure to Web content (e.g. freely navigating a news website) suggests a bottom-up attentional process (Duff and Faber, 2011). Indeed, when the goal is not reading a piece of news, individuals have a higher chance of noticing banner ads (Sapronov and Gorbunova, 2022).

Following the principle of least effort (Zipf, 2016), the brain directs attention to what is relevant at the moment and filters out distractor stimuli. Furthermore, LC4MP says that individuals are information processors, but their capacity to process information is limited (Lang, 2000). Therefore, we expect that:

H1. Attention paid to the banner ads is inversely proportional to the cognitive demand of the task being performed.

2.2 Attentional patterns and behavior

One metric brands use to evaluate banner ad effectiveness is click-through rate (Namin *et al.*, 2020). Ad clicking can only occur if users look at the banner; hence, banner ads must first grab users' attention (Drèze and Husherr, 2003). Increased degree of forced exposure to banner ads was found to positively correlate with perception of the banner ad (i.e. awareness) and the click-through rate (Cho *et al.*, 2001). Furthermore, clicks on a banner ad have been used as a proxy for the attention paid to the banner (Goodrich, 2010, 2011), as visual attention patterns highly correlate with clicking patterns (Egner *et al.*, 2018).

Therefore, based on previous literature showing a positive correlation between the attention given to an element and clicks on the element, we expect:

H2a. There is a positive relationship between attention paid to a banner ad and clicks on the ad.

2.3 Position effect

Visual attention to Web page content is not evenly distributed across the entire page. Instead, different locations attract different attentional levels (Bigne *et al.*, 2021; Drèze and Husherr, 2003; Simonetti and Bigne, 2022). Moreover, the same digital element displayed in distinct locations across a Web page receives a different amount of visual attention

(Muñoz-Leiva *et al.*, 2021). The location of an element also influences its click-through probability. For example, hyperlinks placed at the top of a list tend to be the most clicked ones (Murphy *et al.*, 2006).

In the banner ad context, most studies investigate the two most common locations: the top and lateral parts of the page. Some studies have shown that skyscraper banners, which are usually placed on the right side of a Web page, attract higher attention levels than horizontal banners at the top (Kuisma *et al.*, 2010), but others have shown that lateral banners receive less attention than top banners (Li *et al.*, 2016; Resnick and Albert, 2014). However, when banners are embedded in the content of interest, it is preferable to examine top, middle and bottom Web page locations. In search websites, top-located results receive around 65% of total dwell time, whereas middle- and bottom-located results receive around 15% and 5% dwell time, respectively (Navalpakkam *et al.*, 2013). Banners located at the top of the page receive less attention than banners embedded into the page content (Burke *et al.*, 2005; Goodrich, 2010). On news websites, banners located at the top and left side attract more attention than those placed at the bottom or right side (Outing, 2004). As most Web pages require users to scroll down the page to access the full content, banners located toward the bottom are less likely to be noticed, as users might not scroll down.

Therefore, based on previous literature concerning attentional patterns, we expect:

H2b. The bottom position leads to less attention than the middle and top positions, hence, leading to decreased ad clicking.

2.4 Decay effect

Selective attention suggests active engagement in avoiding distractor processing. However, complete disregard for a nontask-relevant stimulus is rare; rather, some attention is directed to it (Dayan *et al.*, 2000). Although superficial information encoding may not be enough for generating explicit long-term recognition (Lavie, 2005), deep information processing to a certain degree could also occur for unattended elements (Driver, 2001).

Memory is classified into three major types:

- (1) sensory memory;
- (2) short-term memory – which is related to working memory; and
- (3) long-term memory (Camina and Güell, 2017).

The mechanism for new memory formation comprises the transferring of sensory information to short-term memory and from short-term memory to long-term memory through a consolidation process (Benfenati, 2007). Without a consolidation process, information stored in the short-term memory fades quickly, leading to forgetfulness (Benfenati, 2007). However, even consolidated memories – particularly those considered useless – can fade and change with time (Silva and Josselyn, 2002). Thus, one way to assess memory for a piece of information could be through information recall or recognition over a period of time.

Recent studies in the banner ad context found that the valence of a banner, but not the arousal it elicits, can affect banner recognition (Sapronov and Gorbunova, 2022). Moreover, hedonic banner ads, compared to utilitarian banner ads, increase the probability of banner recall (Casado-Aranda *et al.*, 2022). Regardless of banner ad features, previous studies measuring memory for banner ads in general found that around 20%–65% of banner ads are recognized. One study presented several hyperlinks on a screen and included two banner ads (Burke *et al.*, 2005). After performing a task, ad recognition was evaluated by presenting

previously shown and new banner ads to the participants. Their results revealed that 20% of the ads were correctly recognized, which was the hit rate, whereas 20% of the new ads were classified as present in the task, which was the false-positive rate. Another study using a search portal and a banner ad located at the top of the Web page found 23% of hits and 18% of false positives, and 30% of hits in a second experiment (Drèze and Hussherr, 2003). In the context of a news website featuring short news articles and banner ads, the participants recognized 42% of the banner ads, with this percentage increasing to 64% with a three-times exposure repetition (Lee *et al.*, 2015). A recent study had participants using either a mobile phone or a computer to browse news articles with embedded banner ads in the news context (Schmidt and Maier, 2022). They were then tested for aided and unaided banner ad recall. For unaided recall, participants remembered 21% of the mobile ads and 28% of the computer ads, whereas for aided recall, it increased to remembering 61% mobile and 67% computer ads. In social media and blogs featuring banner ads, around 60% of visitors recalled having seen an ad (Muñoz-Leiva *et al.*, 2019).

Therefore, based on previous studies and literature on memory, we expect:

H3a. To find similar results as those of previous studies for real (approximately 20%–65% of hits) and mock (approximately 20% of false positives) banner ad recognition after one day of exposure.

H3b. A decay in ad recognition of both real and mock banner ad recognition after one week of exposure compared to after one day of exposure.

3. Methodology

3.1 Participants

One hundred participants living in Spain took part in the study (53 female; age range: 22–53 years old, $M = 32.01$, $SD = 9.00$; occupation: 49% workers, 16% students and 32% both). We recruited participants via an external marketing agency ($n = 81$) and by internal means (convenience sample; $n = 19$). Participants recruited externally were monetarily compensated for their time and effort. The university ethics committee approved the study.

3.2 Design, task and stimuli

We conducted a two (task: Read task \times Click task) within-subjects design. First, the participants performed the Read task; they were instructed to read a preselected sports news article on a Web page that was a recreated version of an existing website. We told them they would answer some questions afterward to ensure that the participants read the news as they would normally read news of their own choice, that is, paying attention to the news. After reading it, the participants performed the Click task; an instructions screen informed them that they would see the same Web page once more, but this time, they could click only once on whichever hyperlink they wanted. This second part aimed to redirect the focus from the text to the other elements of the Web page. Our target stimuli were three banner ads embedded in the sports news Web page. One ad was positioned toward the top part, one in the middle and one toward the bottom part of the Web page's news content (Figure 2). One banner had only a call to action to “discover a cool ad” (banner_a), another banner was from a global commerce platform offering a cleaning robot (banner_b) and the other banner was from a nonprofit organization asking for donations for a campaign to protect the oceans (banner_c). Thus, the three ads were different, and their positions were randomized among themselves in the six possible combinations across participants. The stimulus was

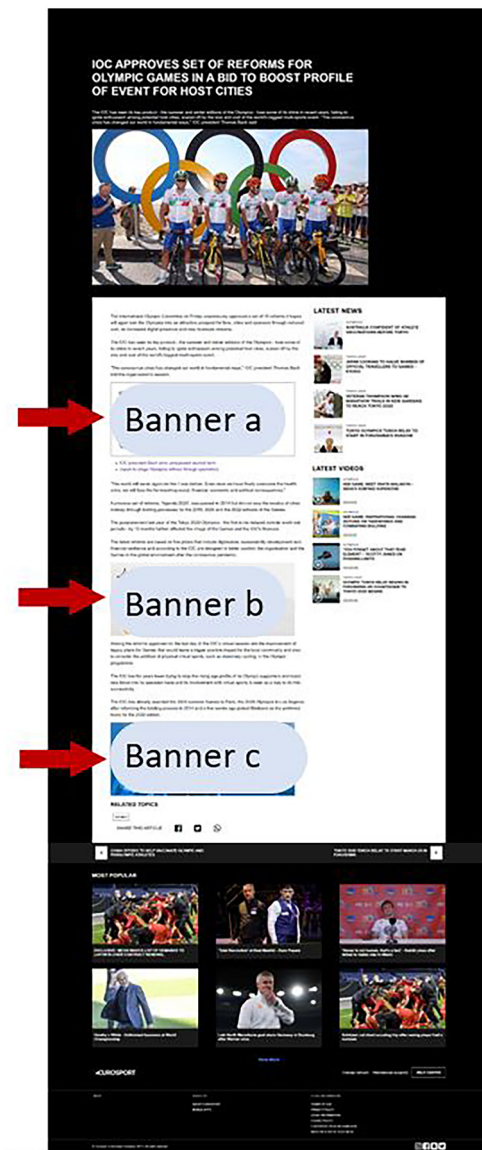


Figure 2.
Representation of the
layout of the news
Web page

Notes: The position of each banner ad was randomized among themselves across participants; the images were blurred for reproduction

presented in a 23-inch $1,920 \times 1,080$ pixel monitor, with a screen-based eye-tracking device (Tobii X2-30 Compact).

On the next day and next week of the lab experiment, the participants received an online survey to assess ad recognition. The survey contained six banner ads: three were the ads present on the Web page of the lab experiment, and another three were new but with similar features to the target ads. The participants were asked whether each banner ad was present or not on the Web page they saw. We presumed that memory effects would not represent a major problem in the results of the last measurement because the participants had a six-day interval between the two assessments where they did not know the banner recognition task will also be asked six days later, they were exposed to thousands of different stimuli in their daily life during this period and the banners were presumably of low interest to them, which implies no need of storing any information about them.

3.3 Metrics and analysis

We gathered behavioral (i.e. clicks and ad recognition) and implicit (i.e. eye-tracking) data. We considered as independent variables: the task (Read task \times Click task), the position (top, middle and bottom) and the time after exposure (one day \times one week) depending on the type of the analysis. The data were analyzed in SPSS 26.

For eye tracking, we selected four metrics:

- (1) time spent in fixations, which is the sum of the total time in ms spent in fixations in a certain area of interest;
- (2) fixation count, which is the total number of fixations within a certain area of interest;
- (3) revisits, which is the number of times a certain area of interest is looked back; and
- (4) time to the first fixation, which is the time in ms that a certain area of interest was first fixated since the starting of the stimulus presentation.

To answer *H1*, we standardized the metric time spent in fixations by calculating the total time each participant looked at the three banner ads in relation to the total time each participant spent on the Web page. The eye-tracking data were recorded through iMotions software version 9.0 (iMotions.com). Two participants were excluded from the eye-tracking analysis due to low data quality.

For behavior, we computed the number of clicks on the banner ads or another Web page element. For ad recognition, we computed the number of correct answers: a “yes” answer to the ads shown and a “no” answer to the ads not shown on the Web page. In this analysis, seven participants were excluded because they either did not complete the survey or completed it at different points in time.

4. Results and discussion

4.1 Goal effect

To investigate how attention to banner ads differs depending on the goal of the task – reading the news or deciding where to click – we compared both tasks. For this, we selected the eye-tracking metric of time spent in fixation as a proxy of attention paid to the ads (Pieters and Wedel, 2004). A paired-sample *t*-test showed that this time differed between the tasks [$t(89) = 6.62, p < 0.001$], where participants spent 11.9% of the time looking at the ads in the Click task, whereas only 5.5% of the time in the Read task, supporting *H1*. Our finding is consistent with a previous study using a goal-oriented task (i.e. finding a piece of information) and a free viewing task (Resnick and Albert, 2014). The authors found

increased visual attention to the banner ads located either at the top or lateral parts of the Web page in the free-viewing task (6.6% of the total dwell time) compared to the goal-oriented task (4.4% of the total dwell time). Therefore, our study confirms the effect of task-goal and expands it to the reading context.

In our experiment, the area covered by the three banner ads represented 10% of the website's content area. Thus, the 5.5% of total time spent looking at the banners in the Read task is roughly half of the expected viewing time if we consider the area comprising the ads. Time spent viewing an ad indicates the level of cognitive avoidance (Li *et al.*, 2002). Thus, we attribute the lower time spent looking at the banner ads in the Read task to selective attention, which relates to cognitive avoidance and perceived goal impediment (Cho and Cheon, 2004). In that task, the participants were focused on processing the news information; hence, looking at the banner ads would be a source of distraction and increased cognitive load. In addition, reading news possibly evokes a serious mindset compared to a more playful mindset when browsing the Web page. Therefore, our results support previous findings on increased ad avoidance when users are in a serious compared to a playful mindset (Seyedghorban *et al.*, 2016).

We also found that in the Read task, 93% of the participants looked at the three banners, whereas only 55% of participants did in the clicking task. This result might be due to the visual range covered by the participants in each task. In the Read task, the participants had to scroll through the entire Web page, but this was not required in the Click task.

4.2 Position effect

Clicking on banner ads was only possible in the Click task. A descriptive analysis showed that 29% of the participants clicked on one of the banner ads (banner_a = 13%, banner_b = 1% and banner_c = 15%). However, attention paid to the Web page elements during the Read task could have influenced subsequent choice on where to click later. Thus, we analyzed the influence of attention paid to the ads on banner clicking for the two tasks.

According to *H2a*, we expect a positive relationship between attention paid and clicking. To investigate whether attention paid to the banners while engaged in reading the news during the Read task and ad position influenced ad clicking, we conducted a binary logistic regression for two out of the three ads. Only one participant clicked banner_b, and it was therefore not analyzed here nor in the subsequent analyses. The results showed no significant effects of any of the four eye-tracking variables nor position on further ad clicking for none of the ads, rejecting *H2a* for the Read task. We conducted the same analysis for the Click task. The results showed that for both ads, total fixation time was a significant predictor of ad clicking (banner_a: $Wald = 9.15, p = 0.002, Exp(B) = 1.31$; banner_c: $Wald = 8.65, p = 0.003, Exp(B) = 1.22$), where a longer time fixating on the ad increased the probability of clicking on the banner, supporting *H2a* in the case of the Click task. A previous study found that banner ads that induce attention through forced exposure receive more clicks than banner ads with a lower degree of forced exposure (Cho *et al.*, 2001). The findings of our analyses imply that attention paid to the banner only matters when there is a need to consider them before making a decision, that is, a need to analyze all Web page elements to judge what is best to see next. The null effect of attention on clicking for the Read task might be attributed to the possible lack of interest in the advertised content.

To further investigate whether the time spent looking at the ads varied depending on the position of the ads, we assessed the differences between the two tasks, as well as within each task. Paired sample *t*-tests showed a significant difference in total time spent looking the ads depending on the task (all $p \leq 0.001$), where time spent in the Click task was higher than in the Read task in all positions. To evaluate how time spent in fixations on each position

differed within each task, we conducted a repeated-measures ANOVA with position as a factor for each task. In the Read task, there was a significant difference among the positions [$F(2, 89) = 10.16, p < 0.001$]. Pairwise comparisons (Bonferroni corrected) revealed this difference was between the top and middle positions ($p = 0.012; M_{top} = 1.78\%; M_{middle} = 2.48\%$), as well as the bottom and middle positions ($p < 0.001; M_{bottom} = 1.39\%; M_{middle} = 2.48\%$). Top versus bottom was only marginally significant ($p = 0.087$). In the Click task, there was no significant difference across the positions [$F(2, 50) = 1.54, p = 0.224$]. We have predicted in *H2b* that the bottom location would lead to less attention. Our prediction was only partially correct. In the Read task, the bottom location indeed received less attention than the middle location, but no difference was found when comparing it to the top location. Some studies have also demonstrated low attention to bottom-located banners (Muñoz-Leiva *et al.*, 2021; Outing, 2004), whereas other studies showed reduced attention to top-located banners compared to lateral or embedded banners (Burke *et al.*, 2005; Goodrich, 2010; Kuisma *et al.*, 2010). In the Click task, however, all locations did not have different attention levels among them. It is important to note that in the clicking task, only 55% of the participants looked at the three ads.

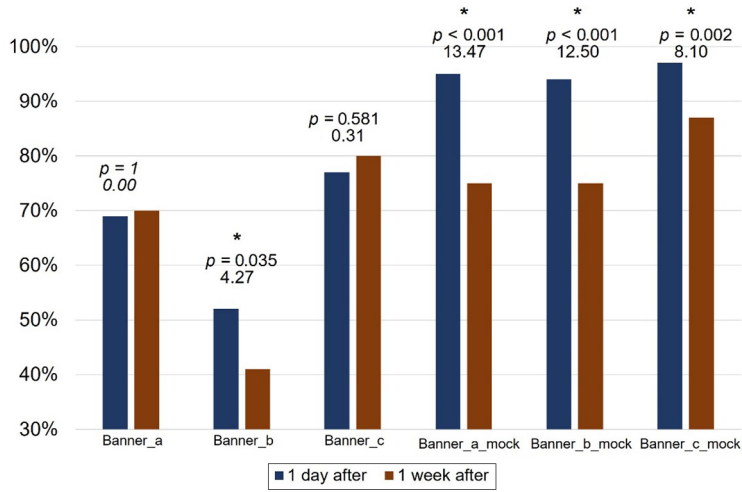
Regarding how ad position on the website relates to ad clicking, regardless of the banner ad creative, the percentage of total clicks for each position were top = 34.5%, middle = 44.8% and bottom = 20.7%. Although the bottom ads received fewer clicks, there were no statistically significant differences in clicks among the ads $X^2(2, N = 100) = 2.55, p = 0.279$, which does not support the second part of *H2b*. This result aligned with the attention paid to the ads in the Click task, in which there was no difference in attention among the ads. However, ads in the middle position tended to receive a higher number of clicks, followed by the top and then the bottom ads. This pattern was the same for the attention paid to the ads in the Read task. The results of the logistic regression did not show any influence of attention on further ad click, but it is possible that we did not have enough power to detect an effect, as only 29% of the participants clicked on a banner ad.

4.3 Decay effect

H3 is related to memory of the ads over time. Thus, for each time point – one day after and one week after exposure – we have computed the percentage of participants that correctly recognized each banner ad. We have also computed the correct absence of recognitions for the banner ads that were not present on the Web page. We performed a McNemar test to assess whether there were differences between the time points. The results of all analyses are shown in Figure 3.

The analysis of Figure 3 reveals that almost all participants correctly answered when a banner ad was not present on the Web page the next day they participated in the experiment. The percentage of false positives was much lower than the approximately 20% reported in the literature (Drèze and Hussherr, 2003), not supporting *H3a* for the mock banners. However, supporting *H3b* for the mock banners, the percentage of false positives increased one week after exposure, reaching the benchmark levels.

The results for the Web page banners showed a large percentage of banner ad recognition both one day and one week after exposure for two out of the three ads, much higher than benchmark levels (Burke *et al.*, 2005; Drèze and Hussherr, 2003; Lee *et al.*, 2015; Schmidt and Maier, 2022), which goes against *H3a* for these real banners. In fact, there was no statistical difference in ad recognition between the two time points for the two banners, contrary to our prediction in *H3b* for the real banners. In summary, the results demonstrate that aided memory for the banner ad was remarkably high and remained stable over time. However, for banner_b, the percentages were not better than the chance level and were in the range found



Notes: Percentage of participants that correctly recognized each banner ad and a correct no recognition for the banner ads that were not present on the website in each time point. * $p < 0.05$. The number below the p value refers to the McNemar statistical test: $\chi^2(1, N = 93)$

Figure 3.
Results for ad
recognition

in previous literature. Considering that none of the three banner ads were related to the news participants read, and possibly none of them were relevant to the participants, the findings suggest a possible effect of ad creativity on ad memory (but see [Yang et al., 2021](#)).

To explore whether clicking on the banner was further related to banner recognition, we conducted a chi-square test with banner ad clicking and banner ad recognition for the banner_a and banner_c. The results indicated no significant relationship between banner clicking and recognition on the next day. However, there was a significant relationship for recognition in the next week (banner_a: $\chi^2(1, N = 94) = 5.28, p = 0.022$; banner_c: $\chi^2(1, N = 94) = 4.17, p = 0.041$).

We conducted a Pearson correlation between attention paid to the ad using the total time spent fixating on the ad for each task and ad recognition for the two time points. Banner_b was not analyzed because recognition was at the chance level. The results showed no significant correlation between those variables for either of the ads, which aligned with the findings of a similar recent study ([Schmidt and Maier, 2022](#)) but contradicted other related studies ([Lee and Ahn, 2012](#); [Muñoz-Leiva et al., 2021](#)).

[Table 1](#) summarizes the findings of the study.

5. Conclusion

Companies continue investing in banner advertising despite consumers' avoidance of this form of advertising. Therefore, this study used a recreated Web page of an existing site, two usual tasks of reading the news and deciding what to see more and eye tracking to investigate visual attention given to ads embedded in Web page content dependent on the task being performed. We also investigated how attention, banner clicking and banner recognition relate to each other.

Hypothesis	Outcome	Finding
<i>H1</i> : Attention paid to the banner ads is inversely proportional to the cognitive demand of the task being performed	Supported	Visual attention paid to the banners while performing the Read task, a more cognitively demanding task, was lower than while performing the Click task, a less cognitively demanding task
<i>H2a</i> : There is a positive relationship between attention paid to a banner ad and clicks on the ad	Partially supported	The visual attention paid to the banners while performing the Read task was not related to further ad clicking. However, visual attention measured by total fixation time to the banners during the Click task was positively related to ad clicking
<i>H2b</i> : The bottom position leads to less attention than the middle and top positions, hence leading to decreased ad clicking	Partially supported	In the Read task, visual attention given to the banner ad located in the bottom position was lower than the middle location, but no difference was found when comparing it to the top location. In the Click task, visual attention given to the banners was similar across the positions
<i>H3a</i> : To find similar results as those of previous studies for real (approximately 20%–65% of hits) and mock (approximately 20% of false positives) banner ad recognition after one day of exposure	Rejected	The percentage of false positives for the mock banners was much lower than the approximately 20% reported in the literature. The percentage of hits for the real banners was much higher than benchmark levels for two out of the three banners, whereas it had benchmark levels for the other banner ad
<i>H3b</i> : A decay in ad recognition of both real and mock banner ad recognition after one week of exposure compared to after one day of exposure	Partially supported	For the mock banners, the percentage of false positives increased one week after exposure, reflecting a decay in ad recognition (in this case, recognition that it was not present on the Web page). For the real ads, there was no statistical difference in ad recognition between one day and one week of ad exposure for two out of the three ads, whereas there was lower ad recognition for the other ad

Table 1.
Summary of the
findings

Our main finding was that consumers ignore banner ads embedded in Web page during a focused task, but attention to banners increases in the absence of a goal-oriented process. In addition, banner clicks do not depend on the banner location, but middle locations tend to lead to more clicks. Even though visual attention toward banners during a goal-oriented task does not seem to influence banner ad clicking, this is not the case when users are engaged in a free-browsing mode. Most importantly, it is not necessary to pay full attention to a banner ad to be able to recognize it afterward.

5.1 Theoretical implications

Our study contributes to the knowledge of how consumers attend to online advertising depending on whether they are involved in a goal-oriented activity or not. It differs from most of the existent studies investigating online banner advertising by assessing the performance of banner ads embedded in main website content: in our case, between paragraphs of a piece of

news. In accordance with previous marketing research on online banner ads (Resnick and Albert, 2014) and research in the psychology and neuroscience fields (Dayan *et al.*, 2000; Gazzaley and Nobre, 2012), we have shown that when consumers are engaged in a focused task, they drive attentional resources to the task performance at the expense of directing visual attention to task-irrelevant stimuli, such as banner ads. However, when consumers are freely navigating a website, elements of the Web page (e.g. banner ads) seem to enter the “consideration set” of attention when they would be disregarded in other situations.

The deliberate avoidance of paying attention to banner ads can be indirectly measured using click-through rates (Drèze and Hussherr, 2003). Furthermore, it is accepted that in many situations, the location of eye fixation is a valid proxy to infer how much visual attention is given to a fixated element (Wedel and Pieters, 2006). Thus, eye-tracking metrics are appropriate to measure whether consumers attend to banner ads (Casado-Aranda and Sanchez-Fernandez, 2022), regardless of the task being performed. Indeed, there is a call for using eye tracking in ad avoidance research (Çelik *et al.*, 2022). In this sense, our findings also contribute to a better understanding of how visual attention and banner ad position relate to marketing outcomes, such as ad clicks and recognition after exposure. While position does not seem to influence the probability of clicking on an ad, we have found that ads located in the middle perform well compared to ads located toward the top and bottom of the content. This supports previous research testing traditional far most top and lateral positions, as well as other positions (Burke *et al.*, 2005; Goodrich, 2010; Kuisma *et al.*, 2010; Muñoz-Leiva *et al.*, 2021; Outing, 2004). While previous literature suggests that visual attention and clicking are positively correlated (Egner *et al.*, 2018; Goodrich, 2010, 2011), our study suggests that this holds only when consumers are not involved in a goal-oriented task.

Considering memory effects, most past studies evaluated banner recognition or recall soon after ad exposure (Burke *et al.*, 2005; Drèze and Hussherr, 2003; Lee *et al.*, 2015; Schmidt and Maier, 2022). We add knowledge to this body of research by demonstrating that although attention to banner ads is shared with other Web page elements, consumers still can recognize the banners to which they were exposed one day and even one week after exposure. This indicates that information survived short-term memory and was stored in the long-term memory for at least one week. Conversely, in the case of mock banner ads (i.e. not present on a Web page), consumers are fairly accurate when identifying what ads they do not recognize in short-term periods (i.e. one day after the experiment), but they start to get confused in long-term periods (i.e. one week after the experiment). This demonstrates that memory is susceptible to failures, especially over time: a phenomenon largely recognized by neuroscience (Silva and Josselyn, 2002). Our results indicate that memory mistakes are more likely to occur for information not encountered prior than for information to which participants were exposed.

5.2 Managerial implications

On the managerial side, metrics such as click-through rates suggest that online banner ads are an ineffective promotional marketing tool. However, the prevalence of banner ads on websites seems to contradict this. Supporting marketing practices, our results imply that online banner ads are indeed effective promotional means.

Our study has shown that although consumers seek to avoid looking at banner ads while engaged in goal-oriented tasks, their gaze still crosses banners embedded in the Web page content. Thus, managers can benefit from the mere exposure effect at minimum (but see Duff and Faber, 2011). Advertisers are also advised to create banner ads aiming to increase the total time fixating on the banner because this can boost ad clicks when consumers are freely browsing a website. However, we found no correlation between attention paid to the banner ad and its subsequent recognition. Managers can positively

interpret this result because even with low attention paid to the ads, a high percentage of our participants was able to recognize two out of the three banner ads one day and one week after exposure. This indicates that some information was processed and stored in the consumers' memory, which aligned with previous findings (Burke *et al.*, 2005; Drèze and Hussherr, 2003). Moreover, in our study, banner ad recognition was higher than benchmark levels. We speculate that this is due to the position of the banners on the Web page. Most of the past studies have assessed memory effects on banners located in traditional positions: horizontally at the top and lateral banners. In contrast, we placed the banners within the news content of the Web page, as many websites currently use this format. A recent meta-analysis found that consumers are becoming more accustomed with intrusive elements in online settings, decreasing the impact of irritation on consumers' attitude (Lütjens *et al.*, 2022). Thus, we suggest brands embed their ads in the content of a page instead of traditional locations due to its positive effect in ad recognition. However, further research is needed to fully understand the differences between these two strategies: whether to have the ads mixed with the Web page content or not.

5.3 Limitations and future directions

This study has limitations. First, the experiment was conducted in a laboratory setting with predetermined instructions, which can hamper real behavior. Second, we did not evaluate the relevance of each ad for each participant and the effect of creative elements, including contrast levels, which could have influenced the results (Chiu *et al.*, 2017; Drèze and Hussherr, 2003; Resnick and Albert, 2016). Third, we tested our hypothesis only using a desktop version of the stimulus. Recent research has shown that viewing patterns and ad memory can differ from desktop to mobile devices (Schmidt and Maier, 2022). Fourth, we did not counterbalance the order of the tasks. Although a similar study did not find any effect of task order in any eye-tracking metric (Resnick and Albert, 2014), the order of the tasks could have affected our results. Fifth, the term "free browsing" referring to the Click task may not be entirely correct, as the task required participants to click on something. Therefore, the task included a low goal-oriented process (Seyedghorban *et al.*, 2016).

Future research can address the limitations of this study, particularly how our findings replicate in mobile settings. Furthermore, new types of banner ad formats embedded in content (e.g. banners that appear and disappear with content scrolling) deserve further exploration to better guide designers and managers on their choices. For this, the use of neuroscience tools besides eye tracking (e.g. electroencephalography) may add value to self-reported and behavioral metrics.

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Corresponding author

Enrique Bigne can be contacted at: Enrique.Bigne@uv.es