

The influence of banner position and user experience on recall. The mediating role of visual attention

Mediating role
of visual
attention

La influencia de la posición del banner y la experiencia del usuario sobre el recuerdo. El efecto mediador de la atención visual

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横幅位置 and 用户体验对记忆的影响： 视觉注意的中介作用

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Abstract

Purpose – This study aims to analyse the effectiveness of a static promotional banner located on a hotel reservation website in terms of capturing the visitor's visual attention by exploring how this impact depends on the user's degree of internet experience.

Design/methodology/approach – An experiment was conducted using the eye-tracking methodology, in addition to a self-administered questionnaire. Through eye-tracking technology, eye movements were recorded whilst participants explored a generic hotel website. The factors used in the analyses were the position of the banner on the website and participants' experience as internet users.

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Findings – The findings showed that positioning a banner at certain locations on the webpage may lead to a better recall, which, in part, seems to result from the visual attention that such locations attract. The mediation analysis showed that the bottom-right and bottom-left positions have a negative effect on banner recall due, in part, to the shorter attention times and the smaller number of fixations those positions induce. Although the visitor's level of internet experience affected his/her visual attention towards the banner, its impact on banner recall was non-significant. Results are discussed considering which variables produce greater effectiveness in capturing the user's attention.

Practical implications – The paper draws several implications for the marketing literature, hospitality management and society in general.

Originality/value – The study is the first to analyse the impact of the position of a static ad on users' visual attention and memory, considering the user's degree of internet experience.

Keywords Hospitality, Internet usage experience, Attention to advertising, Banner position, Banner recall, Eye-tracking study

Paper type Research paper

Resumen

Propósito – Este estudio analiza la eficacia de un banner promocional estático ubicado en un sitio web de reservas de un hotel en términos de captación de la atención visual del visitante examinando cómo este efecto depende del grado de experiencia del usuario en Internet.

Diseño/metodología/enfoque – Se llevó a cabo un experimento utilizando la metodología de seguimiento ocular (eye tracking), junto con un cuestionario autoadministrado. A través de la tecnología de eye tracking, se registraron los movimientos oculares mientras los participantes exploraban el sitio web genérico de un hotel. Los factores considerados en los análisis fueron la posición del banner en el sitio web y la experiencia de los participantes como usuarios de Internet.

Hallazgos – Los hallazgos mostraron que colocar un banner en ciertas ubicaciones de la página web puede conducir a un mayor recuerdo, lo que, en parte, parece ser el resultado de la atención visual que atraen tales posiciones. El análisis de mediación mostró que las posiciones inferior-derecha e inferior-izquierda tienen un efecto negativo en el recuerdo del banner debido, en parte, a los tiempos de atención más cortos y al menor número de fijaciones que provocan esas posiciones. Aunque el nivel de experiencia de Internet del visitante afectó su atención visual hacia el banner, su impacto en el recuerdo del banner no fue significativo. Los resultados son discutidos considerando qué variables producen mayor efectividad a la hora de captar la atención del usuario.

Implicaciones prácticas – El artículo presenta una serie de implicaciones para la literatura de marketing, la gestión hotelera y la sociedad en general.

Originalidad/valor – Nuestro estudio es el primero en analizar el impacto de la posición de un anuncio estático en la atención visual y la memoria de los usuarios, considerando el nivel de experiencia del usuario en Internet.

Palabras clave – Hospitalidad, Estudio de seguimiento ocular, Experiencia de uso de Internet, Posición del banner, Atención a la publicidad, Recuerdo del banner

Tipo de papel – Trabajo de investigación

摘要

目的 – 本研究分析了位于酒店预订网站上的静态促销横幅在吸引访问者视觉注意力方面的效果,并探索了这种效果如何受到用户的互联网体验程度的影响。

研究方法 – 本文除了采用自填问卷的方式,还使用眼动追踪方法进行了实验。通过眼动追踪技术,记录了参与者在浏览一般酒店网站时的眼动情况。分析中使用的因素是网站上横幅的位置和参与者作为互联网用户的体验。

研究结果 – 调查结果显示,将横幅定位在网页上的某些位置可能会导致更佳记忆,这种效果在一定程度上是由于横幅的位置吸引了视觉注意力。调解分析表明,横幅在右下角和左下角的位置对回忆有负面影响,部分原因是这些位置引起的注意时间较短、固定次数较少。虽然访问者的互联网体验水平影响了他/她对横幅的视觉注意力,但其对横幅记忆的影响并不显著。讨论结果时考虑到了某些变量在吸引用户的注意力方面具有更明显的效果。

实践意义 – 本文对市场营销文献、酒店管理和社会都具有一定的借鉴意义。

原创性/价值 – 本次研究是第一个分析静态广告的位置对用户视觉注意力和记忆的影响的研究, 考虑到用户的互联网体验程度。

关键词。 – 款待 眼动研究 互联网使用经验 横幅位置 对广告的注意 横幅回忆

文章类型 – 研究型论文

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1. Introduction

People spend more than 2 h a day connected to the internet, most of the time surfing social networks (Gutiérrez, 2017; We Are Social and Hootsuite, 2020). This netizens proliferation has profoundly affected the economy and contributed to the unprecedented development of electronic business. Consequently, investment in online advertising has steadily increased and is expected to increase by 9.9% between 2016 and 2021 (a much more significant increase compared to 1.3% for television). In 2019, the investment in advertising for digital media in Spain reached 3,150m euros, which represents an increase of 10.6% compared to the previous year. The advertising investment served through graphic formats such as banners represents 30.7% of this investment (IAB Spain, 2019). Year after year, online advertising has become a vital part of the economy. eMarketer predicted that digital ads would surpass traditional ads spending in 2019, with an increase of 19.1%, reaching 129.34bn dollars in the USA (Ha, 2019). Consequently, more than 2bn dollars have been invested in innovations to carry out the optimization and monitoring of advertising.

In total, 25 years after the first online advertising banner, we have reached an era of personalized advertising where ads “pursue” us through the different websites we visit. This advertising strategy is called “retargeting” and has been defined as a behavioural segmentation that involves showing a specific ad to a user who has viewed or searched for a certain type of content. User’s browsing behaviour data contains information on the visited webpages, keywords and likes on pages as well as contents shared on social networks (Ghose *et al.*, 2013), allowing a personalized target advertising. All these developments shape a continuous challenge for web designers and online advertising agencies, as it became crucial to attract the attention of consumers.

During these two and a half decades, numerous studies about advertising effectiveness have investigated how our mind reacts to the banners we daily find whilst surfing the internet. The consensus is that online advertising produces overall positive returns, but the magnitude of such returns varies significantly by product category, customer segment and ad format (Liu-Thompkins, 2019). Indeed, research results about internet advertising effectiveness have been mixed.

One significant obstacle to ad effectiveness is “banner blindness”, a term coined by Benway and Lane (1998) to describe the tendency for experienced website visitors to ignore the regions of the page where banners are usually located (such as the right margin), thus skipping the conveyed information or multimedia content (Benway and Lane, 1998; Resnick and Albert, 2014; Hernández-Méndez, 2015). Even colourful, conspicuous dynamic banners with relevant information can be ignored. One explanation for this blindness may result from exaggeratedly abusive and non-segmented use of banners during the nineties and early 2000s. Banners conveyed messages without special interest for the internet user, who, in turn, learned to automatically ignore them in their following visits. Further research has established that the position of the ads strongly affects banner blindness, as users expect that content displayed at specific points of the webpage will likely be undesired advertising (Burke *et al.*, 2005; Cooke and Buckley, 2008; Owens *et al.*, 2011; Pasqualotti and Baccino, 2014).

Banner blindness may be explained by the reactance theory (Brehm, 1972; Brehm and Brehm, 1981), which postulates that when an individual's freedom is reduced, a motivational state ("psychological reactance") appears to restore that loss of freedom. In the internet medium, this reaction may occur as an attempt to restore freedom of choice in the presence of intrusive advertising that appears without permission (Edwards *et al.*, 2002). In this context, banner blindness is viewed as a mechanical avoidance strategy carried out by the user to resist advertising. Therefore, in line with Belanche *et al.* (2017), banner blindness can be considered a measure of advertising effectiveness in terms of the willingness of users to process commercial information despite the time or nuisance caused by ads.

However, banner blindness does not seem to always occur. Several features of web and banner design can affect blindness in complex ways. For instance, animated banners can have an inverted U-shaped curve effect (Yoo and Kim, 2005). Although effective, too much animation may reduce the advertising effectiveness due to the consumer's limited cognitive capacities or the pre-attentive avoidance of a too conspicuous banner. A great number of digital marketing studies argue that the consumer's cognitive response to banners depends directly on the amount of visual attention focused upon them (Manchanda *et al.*, 2006; Simmonds *et al.*, 2020a, 2020b). However, visual attention is also affected by the type of task in which the user is involved. For instance, Flavián *et al.* (2012) focused on a taxonomy of three search tasks (navigational, informational and transactional) and found that situational factors such as the temporal dimension imposed by the task but also user's emotional states, greatly affect the search patterns as well as the emotions experienced by the user. According to several previous authors, sometimes high rates of memory and recognition of banners can occur (Benway, 1999; Lewenstein *et al.*, 2000). The advertised brand seems to be what people most recall about banners (Crespo, 2011).

Tourism marketing relies heavily on visual stimuli to attract attention and increase interest in the experience offered by the tourist sites (Kong *et al.*, 2018). Traditionally, the structure of the tourism industry had three main components: suppliers (mainly hotel chains, airlines and car rental companies), intermediaries (tour operators and travel agents) and final consumers (who enjoy the service). However, this structure has been drastically affected, as the early nineties with the advent of the internet (Buhalis, 1998). Specifically, tourists' behaviour has changed dramatically when planning and buying their trips through the internet. The distance that previously separated the provider from its client no longer represents an effort or cost and the geographical location is no longer a barrier to communicate with the customer. Hotel websites invite tourists to play a more proactive role in the decision-making process concerning their trip. Because of their detailed multimedia content (Muñoz-Leiva *et al.*, 2012), those websites provide clients with a "pre-experience" of their tourist destination. Thus, visual media plays a key role in the marketing of tourist services and hotels. In addition, destination resorts take advantage of banners strategically placed on their websites to attract clients' attention to their offers.

The present study will focus on the visual attention captured by tourism banner advertising by examining the impact of the location of a static banner in users' attention and subsequent self-report memory for the advertised information, which is also controlled for the level of users' internet expertise. More precisely, the intent is to analyse whether a task-irrelevant banner interrupts attention in a transactional search task (checking the availability of a hotel room) and if the memory for the banner depends on grabbing visual attention.

To achieve this goal, the interaction between the banner's features and user's characteristics will be objectively examined in an experimental environment, using the eye-tracking methodology to capture selective visual attention (Geise, 2012) and complementary

self-reported measures of memory (Hernández-Méndez and Muñoz-Leiva, 2015). Recent studies have analysed the advertising effectiveness, measuring the visual attention to the ads with a similar methodological approach (Flavián *et al.*, 2011; Muñoz-Leiva *et al.*, 2018; Simmonds *et al.*, 2020a, 2020b).

Specifically, our work will try to clarify the mediation role of visual attention on the impact that banner location has on memory and how this impact depends on the consumer's internet experience. The review of the relevant scientific literature found no study in the e-tourism context focused on the determinant effect of these factors on banner effectiveness evaluated via eye-tracking technology.

Therefore, this study aims to evaluate the advertising effectiveness of a banner displayed in a hotel generic website by measuring psychophysiological variables (visual attention), along with post hoc measurements of spontaneous (unprompted) recall. In the context of tourism websites, these specific objectives will respond to the following questions:

- Q1. Is the effect of the banner's position on recall mediated through visual attention captured by the banner? And
- Q2. Is the effect of visitor's internet experience on banner recall mediated through visual attention?

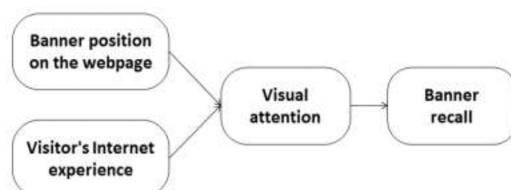
The conceptual model of this study is shown in Figure 1. To fulfil these objectives, an experiment was conducted on a sample of 48 participants, using eye-tracking technology, in addition to a self-administered questionnaire.

After this introduction, the main theoretical foundations that justify the proposed research hypotheses are presented, followed by the methodological aspects of this between-group design. Next, the results of the study are summarized and, finally, a discussion of the main results is developed, where the theoretical and managerial implications and a set of limitations and future lines of research are extracted.

2. Theoretical background

2.1. Eye tracking metrics and advertising effectiveness

How to measure the effectiveness of advertising banners has generated numerous debates (Homburg *et al.*, 2012), regarding metrics based on user behaviour (e.g. click-through rate, CTR), information processed by the user or communication-related characteristics that generate certain attitudes towards the advertisement or affect the intention to purchase (Naidoo and Hollebeek, 2016). Whilst some authors use innovative metrics and heuristics to evaluate web design and user behaviour, others choose to focus on experimental data extracted after the exposure to an advertising banner (Manchanda *et al.*, 2006), using the eye-tracking methodology (Li *et al.*, 2016) or self-report tools where the respondent is asked about the brand or product category (s)he remembers seeing (Simmonds *et al.*, 2020a). In the



Source: Authors

Figure 1.
Conceptual model

present case, eye tracking methodology provides a solution to this potential misrepresentation and enables us to compare visual attentional data with self-reported data on recall.

[Just and Carpenter's \(1980\)](#) eye-mind hypothesis states that there is no significant lag between what we fixate on and what we process. Whilst exploring a commercial website, the careful observation of a specific stimulus just denotes that the consumer is processing the local information, rather than processing the entire page or product to find relevant information for the purchase. This careful observation can be objectively measured through eye-tracking, considering the time during which the eye is relatively stable and fixed on the stimulus.

The literature review shows a clear need for more research on consumers' processing of marketing stimuli (attention and perception), as lack of attention can hinder the consumer's further information processing. Such research should be based on experimental and behavioural observation methods rather than purely recall-based survey research, as it used to be ([Van Trijp, 2009](#)).

The literature review led to a series of interesting findings regarding advertising on hotel websites. However, findings related to the effect of consumer's internet experience and banner position on its effectiveness have been mixed. Regarding banner recall, some authors confirm that many users do not recall banners after visiting a website ([Pagendam and Schaumburg, 2001](#); [Dr ze and Hussherr, 2003](#); [Heath and Nairn, 2005](#); [Chatterje, 2008](#)), whilst other authors find no reliable signs of such banner blindness ([Hern ndez-M ndez, 2015](#)). Many factors can be responsible for these inconclusive results, among others: the specific website used, the level of internet experience of the user, the banner type or the type of measures used to assess effectiveness. If different factors are isolated, banner blindness and low recall could, in part, be explained by the position of the banner and the level of experience of using the internet. In fact, experienced users would rarely attend to locations where advertising is expected ([Resnick and Albert, 2014](#)).

Despite the clear predominance of visual stimuli in tourism marketing contexts, the application of eye-tracking methodologies in business practices and the recognition of the importance of visual-cognitive processing for consumer behaviour, in addition to the scientific literature dealing with applications based on the eye-tracking methodology, is relatively limited.

Eye-tracking methodology was used in the present study to record the eye movements of participants during the laboratory task to discover their visualization patterns ([Flavi n *et al.*, 2011](#)). Over the years, the use of this technique has increased and become quite common to assess the usability of e-commerce sites ([Wong *et al.*, 2014](#)), the effect of online images and the effectiveness of online advertisements ([Hern ndez-M ndez and Mu oz-Leiva, 2015](#)), among other issues of interest. Eye movements are the external manifestation of the much wider cognitive processes involved ([Rovira, 2016](#)).

Eye movements comprise mainly a sequence of fixations (discrete periods of relative immobility of the eye whilst visual information is extracted) and saccades (quick jumps between fixation locations that allow us to fix an object with foveal vision; vision is basically suppressed during saccades). Thus, fixations correspond to moments of attention to the stimulus ([Rayner, 1998](#)). When carefully observing an object, a person makes many fixations (and saccades) to inspect it in detail and extract all the relevant information.

Several metrics based on eye fixations have been proposed. Time to the first fixation (TFF) indicates the amount of time that it takes to look at a specific region of the stimulus, as its onset. This measure is sensitive to the size of the area of interest (AOI), the clarity of tasks, foreground/background contrast of visual targets and other factors ([Holmqvist *et al.*, 2011](#)). For example, greater visual complexity is associated with a longer time to see

intended visual targets. This measure indicates the power of a stimulus to capture attention and implies a level of automatic processing with a low level of awareness (Colorado *et al.*, 2015).

Fixation before (FB) is the number of fixations that subjects make before entering an AOI. The measurement begins when the first AOI is displayed and ends when the AOI is looked at. A larger number of fixations indicates a greater amount of confusion and cognitive load. Colorado *et al.*'s (2015) work on labels indicates that better designs imply fewer attachments before arriving at the AOI. This measure has also been used in web design to analyse customers' behaviour (Hernández-Méndez and Muñoz-Leiva, 2015; Sari *et al.*, 2015), where FB has been used to ascertain the design that most attracts users.

Fixation duration (FD) is measured in milliseconds and corresponds to the average length of the fixations on an AOI. The nature of FDs shows that fixations below, but not above, 140 ms are affected by lexical properties of the text read (McConkie *et al.*, 1992). Buswell (1935) noted that the earliest fixations on a picture are shorter (around 210 ms) than later fixations (around 360 ms). This was later interpreted as an early orienting period followed by a more scrutinous inspection of informative details, which could motivate a division of fixations according to ambient and focal processing modes (Unema *et al.*, 2005).

The fixation count (FC) corresponds to the number of fixations within a given AOI. However, this is a very general indicator (Holmqvist *et al.*, 2011; Jacob and Karn, 2003) which needs to be completed with others such as FD, the TFF and dwell time (DT, the total length of time the participant spent looking at the AOI during the experiment).

When the banner is the AOI, all these measures reflect the attentional resources allocated to the banner, as stimulus information is extracted during eye fixation.

2.2 Research hypotheses proposed

Given that only a small proportion of website visits end up becoming a purchase, the measurement of user intentions is not the ideal way to measure the effectiveness of advertising banners (Manchanda *et al.*, 2006; Drèze and Hussherr, 2003). Accordingly, research-based on tools such as questionnaires (Baack *et al.*, 2008; Putrevu, 2008) considers the need for a comprehensive study of the role of memory in the decision-making process of the clients, framing all this within the advertising effectiveness. It is definitely necessary to understand how the human mind processes ads and how they are remembered later to understand their role in the buying decision (Krishnan and Chakravarti, 2003).

The impact of attention on memory has been addressed by many cognitive theories (Chun and Turk-Browne, 2007). As our attention capacity is limited, not every stimulus encountered will be processed extensively. The cognitive response to the stimulus depends directly on the degree of attention it received. Once the advertising message has successfully attracted the user's attention, his/her information-processing system will activate cognitive storage mechanisms, ensuring a reliable recall of the displayed information (Yoo, 2008; Lee and Ahn, 2012; Nihel, 2013). This way, there is empirical evidence of a positive relationship between the degree of visual attention paid to the banner and the self-reported memory (Gidlöf *et al.*, 2012; Muñoz-Leiva *et al.*, 2018). For instance, there is evidence that the use of "averted gaze" banners, drawing the viewer's attention towards the object present in the banner, increases the memory of the conveyed message, the commitment with the brand and the details of the product (Sajjacholapunt and Ball, 2014). Simmonds *et al.* (2020a) found similar results with video advertising. In this study, specifically, the FC had a significant effect on recall for a brand's non-users and light users. Muñoz-Leiva *et al.*'s (2018) found positive main effects on recall in the case of the FC, as well as visit duration (VD), a measure

similar to DT. However, other metrics such as visit count (VC), did not reveal any significant effect.

The suggested existence of a positive relationship between the visual attention that the user pays to the banner and the self-reported memory or recall led to hypothesize that:

H1. Visual attention, expressed in terms of FC (*H1a*), FD (*H1b*) and DT (*H1c*), has a positive effect on the recall of the banners displayed on tourism websites.

Based on [Kahneman's \(1973\)](#) ideas, [Simola et al. \(2011\)](#) suggested that internet ads act merely as distracters, competing for the attention of the user whilst (s)he performs his/her main online activity. Customers want to navigate the site and find the pertinent information they are looking for without being distracted by irrelevant or annoying ads. Therefore, the design of the web interfaces has become increasingly relevant to ensure grabbing consumers' limited attention. Particularly relevant are the displaying options available on the webpage and analysing which is the most suitable location for the promotional banner.

The location of the banner on the webpage is known to have a critical influence on users' visual attention and recall. Banners located at the top of the screen are recalled more often than those located in the lower part ([dos Santos, 2002](#); [Burke et al., 2005](#); [Nihel, 2013](#)). For instance, [Simola et al. \(2011\)](#) discovered that vertical banners located on the right side (especially if banners were vertical) attracted more attention when containing animated elements that contrasted with static horizontal banners. The authors propose that this effect is probably a consequence of western readers having a perceptual span highly biased towards the right of the fixation point (e.g. around 15 letters), whilst the perceptual span at the left side of the fixation is narrower (only about 3–4 letters; [Rayner et al., 2010](#)). Curiously, [Owens et al. \(2011\)](#) found that banner blindness occurs more frequently when the ad appears on the right-hand side of the page than when it is positioned at the top. In online newspapers, there is no banner blindness when ads are located at the top of the page. Therefore, to help increase users' fixation time on the banner, it should be placed very close to the main text of the news story or even in the middle of the story ([Mosconi et al., 2008](#)). Research results are mixed regarding the attentional advantage of stimulus placed on the low or upper visual fields ([Goodrich, 2010](#)).

It is also interesting to mention [Nielsen's \(2006\)](#) and [Pernice's \(2017\)](#) research, which has shown that internet users normally follow an F-shaped pattern when extracting information from a webpage: they begin by looking at page elements from the upper left to the upper right corner, then read the page lightly, again taking the view from left to right and finally continue to fix down on the left side of the page. This F-shaped reading pattern suggests that the elements that are placed in the bottom centre and bottom right of a webpage are the most likely to be ignored.

Considering the empirical evidence reviewed and despite the mixed findings, we hypothesized that:

H2. Banner's position influences recall, being this effect most positive for banners located at the top-right position when compared to the left and bottom positions.

H3. Banner attracts more visual attention, expressed in terms of FC (*H3a*), FD (*H3b*) and DT (*H3c*) when located at the top-right position when compared to the left and bottom positions.

Once advertising has impacted the user's attention, the information processes activate storage mechanisms that will have an impact on memory ([Lee and Ahn, 2012](#)). In the study of [Sajjacholapunt and Ball \(2014\)](#), there was evidence that the use of "averted gaze" banners,

drawing viewer's attention towards the object present in the banner, would increase the commitment with the brand and the memory of the advertising messages, the brand information and the details of the product (Plumeyer *et al.*, 2019).

After reviewing the available theory and evidence, the fact that the banner's position affects recall suggests that the storage process is dependent on the visual attention grabbed by the banner. Simmonds *et al.* (2020b) tested the significance of the indirect effect of audio-visual cues on a video recall ad via active attention (as indexed by heart-rate acceleration, in this case). As a result, the following research hypothesis was established:

H4. The effect of the banner's position on recall is mediated through the level of visual attention allocated to the banner, in terms of FC (*H4a*), FD (*H4b*) and DT (*H4c*).

The experience of using the internet is a determining factor for understanding behaviour whilst surfing the internet, justifying the distinction between experienced and novel/beginner users (Castañeda *et al.*, 2007). Previous experience can be expressed by the number of hours dedicated to surfing the internet. internet users who often spend more time on the internet tend to concentrate their views on certain points on the webpage that they often consider high interest according to their past experiences (Hoyer and Ingólfssdóttir, 2003; Belanche *et al.*, 2017). This leads them to be more efficient and faster, thus registering a shorter fixation duration for each region of interest in the web pages (Drèze and Hussherr, 2003). Besides, as previously mentioned, the most experienced people generally share a similar pattern whilst searching for information, which is usually F-shaped (Pernice, 2017; Belanche *et al.*, 2017).

In the past two decades, although the association between the user's experience and memory for visited sites has been extensively studied, the results of these studies have again been mixed.

Dahlén (2001) stated that less experienced users tend to pay more attention to online advertising and click more frequently on banners. Banner blindness is considered a defence mechanism, based on the user's peripheral vision and previous experience (Barreto, 2013). Indeed, users tend to learn to deal with new interactive advertising formats and show that, when previously exposed to a skippable ad, they became faster in skipping a subsequent ad (Belanche *et al.*, 2017). Gidlóf *et al.* (2012) also discovered that skilled internet users, especially teenagers, have unconsciously developed their strategies to efficiently ignore advertisements on the internet. However, Crespo and Del Barrio (2011) said that more experienced users pay more attention to advertising than the less experienced. In social networks, users seem to always pay first attention to the content and then to advertising (Rejón-Guardia, 2014). In this line, Belanche *et al.*'s (2017) study discovered that user's level of experience (in terms of online video watching frequency) increases ad watching time; that is, the heavy users enjoy their video watching experience, including the ads presented.

Product previous usage can also motivate the consumer to process information about the brand and reduces the propensity to avoid advertisements from that brand. In a recent study, Simmonds *et al.* (2020a) explored the moderating effect of brand usage and found that users of one brand are more likely to recall advertising because they pay greater attention to the brand's advertising compared to potential new customers; on the contrary, for light users and non-users of the brand, greater visual attention is required to guarantee an increased recall of the advertised brand, highlighting the importance of visual attention on advertising memory.

However, it may be noted that website visitors can subsequently recognize the brand of a static banner as long as they had looked directly at the ad as static banners usually contain

little information that can be easily captured and recognized even without dedicated attention (Guitart *et al.*, 2019).

Overall, these results emphasize the synergy of several factors that contribute to the role of internet experience on the attention the user dedicates to the banner and its consequent recall. Given the above-reviewed evidence, we recognize an indirect effect between experience and the banner's recall via visual attention. As a result, the following hypotheses were proposed:

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- H5.* The effect of user experience of the internet on banner recall is mediated through visual attention towards the banner, in terms of FC (*H5a*), FD (*H5b*) and DT (*H5c*).

3. Methodology

3.1. Fieldwork and experimental scenarios used

The fieldwork was carried out at the University of Algarve (Portugal) in July 2016. The sample consisted of 48 participants from the general population, between 17 and 53 years of age (average age: 34.6 years) and equally distributed between men and women. The quota-selected reflects the adult Portuguese population based on 2015 Census data (Instituto Nacional de Estatística, Statistics Portugal, 2015) as well as internet use (Cardoso and Mendonça, 2014). For advertising and eye-tracking research, it is important to have a representative range of ages to guarantee external validity, as age affects the way people search on the internet and remember the contents they have been exposed to (Simmonds *et al.*, 2020a). Participants' selection procedure was based on convenience sampling (not probabilistic) and were recruited by telephone or email. Participants were incentivized with a payment of €10 per person to cover travel or transport expenses to reach the laboratory where the eye tracker was located.

For the experiment, four versions of a generic website of a hotel were created, avoiding any allusion to a brand, colour or complexity (see experimental scenarios in Appendix). Each version contained a static banner with a varied location, giving rise to four experimental conditions: banner positioned at the bottom-right of the webpage (see online at: <http://webcim.ugr.es/polls/HOTEL/index.html>); banner positioned at the bottom-left of the webpage (see online at: <http://webcim.ugr.es/polls/HOTEL/index2.html>); banner positioned at the top-left of the webpage (see online at: <http://webcim.ugr.es/polls/HOTEL/index3.html>) and banner positioned at the top-right of the webpage (see online at: <http://webcim.ugr.es/polls/HOTEL/index4.html>). Banners at bottom positions were visible without requiring scrolling down the webpage. Participants were randomly assigned to each condition. The banner consisted of a price promotion (Figure 2) which corresponded to the AOI whilst recording eye movements.

In addition to the position of the banner in the test webpage (defining the four experimental conditions), the participant's experience in using the internet was considered a classification variable. This variable measures the intensity of internet use in terms of the number of hours per week.

3.2. Banner recall measure

Effective advertising should attract the public's attention and remains in their short and long-term memory (Margarida, 2013). Therefore, advertisers are not only concerned that people pay attention to the ads but also that they remember them. Recall measures of ad effectiveness continue to be used in advertising tracking assessments and decisions to



Mediating role
of visual
attention

Figure 2.
Banner of the room
used in the
experiment

Source: Authors

cancel or change campaigns, despite critiques concerning the use of these intermediary metrics (Newstead *et al.*, 2009).

In our study, the banner recall was measured through a procedure adapted from previous studies (Danaher and Mullarkey, 2003; Hernández-Méndez and Muñoz-Leiva, 2015; Muñoz-Leiva and Gómez-Carmona, 2019a) based on an unaided recall item (“Do you remember any promotions during your visit to the website?” – yes or no) and an open-ended question (“In case you remember seeing a promotion, please describe what was in the photo and the text”). As banner advertisement contained three elements (the image of the product being offered, the price and the period of the offer), the open-ended question was scored summing 1 point for each correctly recalled element (thus, scores ranged from “0 – do not remember anything” up to “3 – the complete recall of the banner and its elements”).

3.3. Data collection procedures

A screen-based eye tracker SMI Red500 remote system [SensoMotoric Instruments (SMI), Berlin, Germany] was used with a high recording speed (500 Hz sample rate) that can track the precise position of both eyes (standard level of accuracy of 0.5°, as well as a margin of error of 0.2° for the movement of the head). The system is connected to a laboratory laptop and a 21-inch monitor with a resolution of 1,680 × 1,050 pixels. The software *SMI Experiment Centre* was used for the presentation of stimuli and the *SMI BeGaze* for the eye movements data extraction.

The experimental procedure conducted with each participant followed four steps:

- (1) *Reception, explanation of the steps to follow and ethics.* After explaining the general objectives of the study and signing the “consent form”, participants individually entered a room that complied with the three main requirements for this type of study: normal and stable temperature, absence of noise and the level of light

recommended by the [International Telecommunication Union – ITU \(2002\)](#) to simulate the comfort that can be found in any home. Then, the entire procedure was explained to the participant: ethical issues, calibration process, instructions to the experimental task (to explore a webpage relating to a fictitious hotel) and, finally, a post-test questionnaire. This way, the participant was fully informed about the purpose of the study and the consequences of signing the rights to their personal information (according to [Holmqvist et al., 2011](#)).

- (2) *Calibration process.* Participants sat 70 cm away from the monitor. The recording session started with a 9-point calibration procedure; this initial calibration was repeated when tracking errors larger than 1° were detected.
- (3) *Experimental task.* The experimental scenario (hotel website) was displayed on the monitor and the participant proceeded with navigation and inspection of the site for 50 s. Participants were asked to perform a transactional search query, namely, to check the availability of a room at the hotel for the day following. A transactional search query assumes the intent to complete a transaction such as making a purchase or booking a service.
- (4) *Post-test.* At the end of the experiment, the participants were taken to another room and filled an online questionnaire comprising queries regarding socio-demographic data, behavioural variables (such as internet experience), as well as measures of perceived success and effort ([Flavián et al., 2011](#)), specifically, items regarding the recall the banner located on the website.

3.4. Eye tracking metrics and data analysis

After delimiting the AOI (banner) in all versions of the website, different oculomotor parameters were extracted for every AOI. Purposely, we chose the most common fixation metrics used in the academic literature in the marketing area such as [Hernández-Méndez and Muñoz-Leiva \(2015\)](#), [Muñoz-Leiva and Gómez-Carmona \(2019a\)](#) or [Espigares-Jurado et al. \(2020\)](#). Thus, visual attention was operationalized through fixation indicators such as the number of fixations or FC, FD, the TFF and DT.

Data were exploited using the statistical package SPSS, Version 23.0. To test our mediation hypotheses, PROCESS v3 macro for SPSS ([Hayes, 2019](#)) was used; the significance of the indirect effect was tested through bootstrapping procedures: unstandardized indirect effects were computed for each of 5,000 bootstrapped samples and the 90% confidence intervals were computed by determining the indirect effects at the 5th and 95th percentiles.

4. Results

4.1. The effect of visual attention on banner recall

Two eye tracking measures showed moderate positive significant correlations with banner recall: the number of fixations (FC: $r = +0.35$, $p = 0.016$) and dwell time (DT: $r = +0.30$, $p = 0.042$). The correlation with the other two eye-tracking measures were not significant (TFF: $r = -0.14$, $p = 0.342$; FD: $r = -0.02$, $p = 0.881$). These results partially support our first hypothesis (more specifically, the hypotheses *H1a* and *H1c*) and suggest that banners are better recalled when they received a larger number of fixations (FC) and were looked at for longer times (DT). However, a better recall does not appear to require long (FD, hypothesis *H1b*) or early fixations (TFF).

4.2. The effect of banner location on recall

One-way ANOVA was used to test the effect of the four manipulated banner locations on recall. This overall effect proved to be large and significant [$F(3, 44) = 3.23, p = 0.031, R^2 = 0.18$]. A post-hoc analysis using Tukey HSD showed that the banner was better recalled when located at the top-right of the webpage ($mean = 1.38$, for the maximum score of three evoked elements of the banner) than when located at the top-left or bottom-left positions ($mean = 0.50$; for both cases, Tukey HSD $p = 0.049$). Although recall for the top-right location was more accurate than for the bottom-right location, the difference did not reach statistical significance (Tukey HSD $p = 0.428$; Table 1). These results support generically our second hypothesis ($H2$).

4.3. The effect of banner location on visual attention

Banner position also had a significant overall effect on the eye tracking measures [MANOVA, Wilks' lambda = 0.577; Pillai's trace = 0.470, $F(12, 129) = 2.00, p = 0.029$]. Specifically, position affected the number of fixations on the banner [FC: $F(3, 44) = 2.21, p = 0.063, R^2 = 0.15$], the average duration of each fixation [FD: $F(3, 44) = 4.08, p = 0.012, R^2 = 0.22$], the dwell time [DT: $F(3, 44) = 3.23, p = 0.031, R^2 = 0.18$] and the time for the first fixation on the banner [TFF: $F(3, 44) = 3.47, p = 0.024, R^2 = 0.19$]. Tukey HSD post-hoc comparisons for visual attention parameters in each position confirmed our third hypothesis: if the banner is located at the top-right of the webpage, it will be fixed more times ($H3a$), with longer fixations ($H3b$) and for longer periods ($H3c$) than when located at the bottom-right or bottom-left positions (Table 1). Although visual attention parameters were more favourable to the top-right position when compared to the top-left position (except for TFF, as participants looked earlier at banners on the top-left position), this advantage was not statistically significant.

The graphs extracted from BeGaze analysis software (see Figures A1 to A4 in Appendix, corresponding to the "bottom-right" (BR), "bottom-left" (BL), "top-left" (TL) and "top-right" (TR) experimental conditions) confirm a more intense fixation activity when the banner is located at the TR position. Also, there are several maximum attention times throughout the experiment as the binning charts show.

4.4. The effect of banner location on banner recall is mediated by visual attention

Considering that the banner location influences visual attention measures and that visual attention affects the banner's recall, conditions are met to test the hypothesized mediation model ($H4$): Is the location effect on recall mediated through visual attention? To test this hypothesis, only FC and DT mediators were used (hypothesis $H4a$ and $H4c$), as FD was not associated with the recall, as suggested by the previous studies revised (Simmonds *et al.*, 2020a [FC metric] and

Measure*	Bottom-right	Bottom-left	Top-left	Top-right
Recall (0-3)	0.88 ^{a, b} ± 0.91	0.50 ^a ± 0.67	0.50 ^a ± 0.64	1.38 ^b ± 0.93
FC	12.8 ^a ± 10.8	15.5 ^{a, b} ± 9.7	20.8 ^{a, b} ± 11.4	25.9 ^b ± 16.8
FD (ms)	189.0 ^a ± 33.0	183.3 ^a ± 35.5	217.6 ^{a, b} ± 61.7	245.1 ^b ± 58.3
DT (s)	3.296 ^a ± 3.014	3.963 ^a ± 2.460	6.332 ^{a, b} ± 3.671	7.972 ^b ± 6.379
TFF (s)	14.080 ^b ± 12.692	5.114 ^{a, b} ± 2.963	4.576 ^a ± 7.542	6.142 ^{a, b} ± 6.859

Notes: *FC – fixation count; FD – average fixation duration (milliseconds); DT – dwell time (seconds); TFF – time for the first fixation (seconds); Means sharing the same superscript letters are not statistically different (Tukey HSD, $p < 0.05$, except for FC where $p = 0.061$)

Table 1.
Recall and eye
tracking measures
for the banner
located in the four
positions (mean ±
standard deviation)

Muñoz-Leiva *et al.*, 2018 [FC and DT metric]). Table 2 summarizes the direct and indirect effects for each mediation model tested.

When we consider the mediation role of FC in the effect of banner position on recall, this indirect effect proves to be significant (Figure 3a): banners located at the BR and BL positions are worst recalled than banners located at the TR position because, in part, they receive a smaller FC (standardized indirect effect for BR position = -0.30 ; standardized indirect effect for BL position = -0.24). However, the direct effect of the banner's position on recall remains marginally significant (overall direct effect: $R^2 = 0.14$, $p = 0.062$), suggesting that mediation through FC is only partial. Thus, hypothesis $H4a$ is confirmed. These effects are reliable only for the 10% significance level.

Similar results were found for mediation through DT (Figure 3b; hypothesis $H5c$). Whilst the direct effect of banner position on recall remains marginally significant (overall direct effect: $R^2 = 0.14$, $p = 0.064$), part of this position effect on recall is mediated through DT: the negative effect of BR (and BL) position on banner's recall seems to result, in part, from the shorter attention times allocated to those positions when compared to the attention times received by the TR position (standardized indirect effect for BR position = -0.25 ;

Paths	Unstandardized coefficients (\pm s.e.)	p	Standardized coefficients (β)	Bootstrap 90% confidence interval for β
<i>Mediation through FC</i>				
Direct effects				
TL vs TR \rightarrow FC	-5.17 (± 5.10)	0.317	-0.39	-
BR vs TR \rightarrow FC	-13.17 (± 5.10)	0.013	-1.00	-
BL vs TR \rightarrow FC	-10.42 (± 5.10)	0.047	-0.79	-
FC \rightarrow Recall	0.02 (± 0.01)	0.043	0.30	-
TL vs TR \rightarrow Recall	-0.77 (± 0.32)	0.019	-0.91	-
BR vs TR \rightarrow Recall	-0.25 (± 0.34)	0.472	0.29	-
BL vs TR \rightarrow Recall	-0.67 (± 0.33)	0.047	-0.79	-
Indirect effects				
TL vs TR \rightarrow FC \rightarrow Recall	-0.10 (± 0.12)	-	-0.12	(-0.37; 0.99)
BR vs TR \rightarrow FC \rightarrow Recall	-0.26 (± 0.14)	-	-0.30	(-0.59; -0.05)
BL vs TR \rightarrow FC \rightarrow Recall	-0.20 (± 0.15)	-	-0.24	(-0.56; -0.01)
<i>Mediation through DT</i>				
Direct effects				
TL vs TR \rightarrow DT	-1639 (± 1699)	0.340	-0.37	-
BR vs TR \rightarrow DT	-4676 (± 1699)	0.009	-1.05	-
BL vs TR \rightarrow DT	-4009 (± 1699)	0.023	-0.90	-
DT \rightarrow Recall	<0.00 (\pm <0.00)	0.094	0.24	-
TL vs TR \rightarrow Recall	-0.80 (± 0.32)	0.018	-0.94	-
BR vs TR \rightarrow Recall	-0.29 (± 0.35)	0.415	0.33	-
BL vs TR \rightarrow Recall	-0.69 (± 0.34)	0.048	-0.24	-
Indirect effects				
TL vs TR \rightarrow DT \rightarrow Recall	-0.08 (± 0.11)	-	-0.09	(-0.32; 0.10)
BR vs TR \rightarrow DT \rightarrow Recall	-0.21 (± 0.14)	-	-0.25	(-0.53; -0.01)
BL vs TR \rightarrow DT \rightarrow Recall	-0.18 (± 0.13)	-	-0.22	(-0.51; -0.01)

Table 2. Mediation role of visual attention (FC and DT metrics) in the effect of banner position on recall test results: direct and indirect effects; 90% confidence intervals for indirect standardized effects

Notes: Confidence intervals not containing 0 indicate non-null indirect effects (90% confidence level); banner position on the webpage is described through three dummy variables, representing the contrast between each position (TL – top-left; BR – bottom-right; BL – bottom-left) with the reference position (TR – top-right); eye-tracking metrics: FC – fixation count; DL – dwell time

standardized indirect effect for BL position = -0.22). In this way, hypothesis $H4c$ is confirmed. Note, these indirect effects are reliable again for the 10% significance level.

In short, positioning a banner at a certain location on the webpage may lead to a better recall due, in part, to the visual attention that such locations attract.

4.5. The effect of user experience on memory

The effect of the internet experience on eye-tracking measures was marginally significant for DT ($r = 0.24, p = 0.083$) and FC ($r = 0.22, p = 0.095$), only for the 10% significance level; internet experience was neither associated with TFF ($r = -0.19, p = 0.208$) nor average FD ($r = 0.06, p = 0.696$). These results suggest a quasi-significant effect of participants' experience with the internet on the visual attention grabbed by the banner: participants who spent more time on the internet also had more fixations and looked longer at the banners.

Although these results seem to suggest the influence of internet experience on visual attention patterns (namely, a positive effect on the duration and number of fixations on the banner), the effect of internet experience on banner recall was null ($r = 0.07, p = 0.653$). In such conditions, the hypothetical indirect effect of experience on memory through visual attention (hypothesis $H5$) did not receive empirical support.

5. Discussion

This paper focused on the advertising effectiveness of an ad banner induced by experimentally manipulated variables (in this case, the location of the banner on the website) and by self-reported variables (in this case, visitor's experience with the internet). The experiment was conducted using the eye-tracking methodology, where eye movements were recorded whilst participants explored a generic hotel website to capture the visual attention dedicated to the site. Based on the extant knowledge regarding the relationship between activation and subsequent memory, this study develops a general framework to help understand if the position of a banner on a hotel website, as well as participant's internet experience, have a reliable effect on self-reported banner's recall, considering the mediation role of visual attention.

Whilst studies to date have confirmed that the attention paid to various marketing stimuli is open to the influence of numerous "bottom-up" (those related to the marketing stimulus itself) as well as "top-down factors" (those related to the individual characteristics of the user), this paper has been conducted to respond to the gap identified in the research

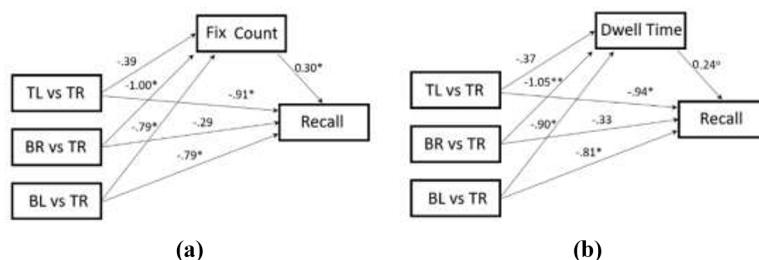


Figure 3. Standardized regression coefficients for the effect of banner position on recall as mediated by dwell time (Model a) and fixation count (Model b)

Notes: The model includes three dummy variables, representing the contrast between each position (TL – top-left position; BR – bottom-right position; BL – bottom-left position) and the top-right position (TR), considered as reference. ** $p < 0.01$; * $p < 0.05$; ° $p < 0.1$

area of tourism websites and explore the factors affecting the impact of the banner's position on its effectiveness. In recent years, some of these factors have attracted significant interest in Academia, applying structural equation modelling with variables such as the experience of using the internet, brand engagement or brand loyalty. In some studies, these aforementioned variables are proposed as future research topics with a determinant role of visual attention or as mediating factors between position/experience on recall. Some of these variables have been incorporated into the current study.

Important conclusions have been drawn from the results; some of them were expected, given the existing literature, whilst others were unexpected. Firstly, the correlation coefficients indicated that visual attention (expressed by the total dwell time and the number of fixations on the banner) has a positive effect on the recall of the information conveyed by banners shown on tourism webpages, as already reported by previous studies applied to other contexts (Simmonds *et al.*, 2020a [video advertising executions]) or similar context (Muñoz-Leiva *et al.*, 2018 [e-tourism 2.0 tools]). These results were expected (considering that visual attention directed to a certain stimulus leads to a better memory) and are similar to those obtained in previous studies (Lee and Ahn, 2012; Sajjacholapunt and Ball, 2014; Shen and Chen, 2007). Therefore, hypothesis *H1* was empirically supported.

Another finding of this research has to do with the position of the banner and the relationship it maintains with the viewer's attention. Everything starts with the position and any publicist wants the visitor to leave the website with a memory trace of the advertising in his/her mind. For this reason, the amount of attention given to the advertising banner will be crucial to attract and maintain the relationship with the potential and current customer. The fact that the position of the banner had a generic significant effect on eye-tracking measures is not surprising (hypothesis *H3* empirically supported), but the results show that the information conveyed by the banner was better recalled when the banner is located at the top-right of the webpage (hypothesis *H2*). This specific position also coincides with being the place where most banners are located on web pages, for example, skyscrapers. When positioned in the top-right position, the banner will be attended first, fixed more times and for longer periods, than when located at other positions. As the dwell time and a number of fixations on the banner showed a significant effect on recall, the results suggest that recall is dependent on the amount of visual attention given to the banner. Mediation analysis through these measures of visual attention supported two partially mediation effects: bottom-right and bottom-left positions hinder banner recall, in part, due to the shorter attention times those positions received and, in part because they received a smaller number of fixations. In this way, hypothesis *H4* has also confirmed: the effects of banners' position on recall are partially dependent on the levels of visual attention that these positions receive. When positioned at a specific location on the website, banners will attract more visual attention and, consequently, are recalled with more detail.

It was also found that the experience of using the internet (daily number of hours of use) affects visual attention parameters, namely, DT and number of fixations on the banner: participants most experienced in using the internet paid slightly more attention to the banner, confirming previous results by Crespo and Del Barrio (2011). However, internet experience does not seem to affect self-reported recall, failing consequently to support the mediational role of visual attention on the banner memory, as hypothesized in *H5*.

These last results also do not support the banner blindness theory, which states that more expert users have become increasingly immune to banners (Dahlén, 2001; Barreto, 2013). According to our study, experienced internet users involved in a transactional search task may pay more attention to the banner, but such visual attention does not have a significant impact whilst evoking information conveyed by the banner. These results

support the proposal of [McCoy et al. \(2007\)](#): experienced users may look at the banner but, as they assess the conveyed information not relevant for the current task, they quickly forget its content.

Overall, our findings stress again the importance of using complementary research methodologies (eye-tracking techniques and self-reported memory) to obtain a deeper perspective on the way internet users process advertising information displayed on tourism websites. [Table 3](#) summarizes our main results.

6. Theoretical and managerial implications

In summary, the theoretical implications of this study for the extant literature on eye-tracking and advertising effectiveness are twofold. This research provides evidence to a better understanding of the effects of the banner's position and the visitor's internet experience on the effectiveness of static banners, as well as scientific knowledge regarding a methodological resource to evaluate the mediation role of visual attention in the relationship between the banner's position or the visitor's internet experience and banner recall.

In general, the design of the web interfaces has become increasingly relevant to ensure grabbing consumers' limited attention. Several handbooks, guides or papers provide

Hypothesis	Result	Practical finding
<i>H1</i> : Visual attention > banner recall	Partially supported (in terms of fixation counts, FC – <i>H1a</i> and Dwell time, DT – <i>H1c</i>)	Static banners displayed on tourism websites are better recalled when they attracted more attention, namely, when they receive more eye fixations (FC) and were looked at for longer times (DT)
<i>H2</i> : Banner position > banner recall	Supported	In comparison to other positions on the webpage (BL and BR), a static banner will be better recalled when located at the top-right position (TR)
<i>H3</i> : Banner position > visual attention	Supported (in terms of fixation counts, FC – <i>H3a</i> ; fixation duration, FD – <i>H3b</i> and dwell time, DT – <i>H3c</i>)	Compared to other positions, a static banner located at the top-right (TR) position of the webpage will be looked at for longer periods (DT) and will receive longer (FD) and more frequent fixations (FC)
<i>H4</i> : Banner position > visual attention > banner recall	Partially supported (mediation through fixation counts, FC – <i>H4a</i> and through dwell time, DT – <i>H4c</i>)	Positioning a static banner on the top-right position of the webpage (TR) leads to a better recall due, in part, to the visual attention that such location attracts The detrimental effect of other positions (BR and BL) on banner recall results from the limited visual attention that such positions capture (fewer fixations and shorter viewing periods)
<i>H5</i> : User internet experience > visual attention > banner recall	Not supported	Internet experience has a positive effect on the visual attention allocated to the banner (more fixations and longer fixations, FC and FD), but this gain of attention does not affect banner recall

Notes: Banner position on the webpage: TR – top-right; TL – top-left; BR – bottom-right; BL – bottom-left)

Table 3.
Summary of results
hypotheses testing
and findings

guidelines for an effective design, giving relevance to the appearance, navigation, content and purchase process. For instance, designers are recommended to conceive webpages allowing navigation characterized by simplicity and some degree of freedom, aiming to increase consumer's satisfaction and, consequently, purchase intention (Flavián *et al.*, 2009b), in addition to always considering the attractive content provision, as well as updated and relevant information.

Our study contributes to the definition of new methodologies that analyse the effect of advertising on the consumer's experience, as well as adding to the identification of new variables that will allow measuring the effectiveness of ad banners in terms of visual attention and recall from the consumer's perspective. In other words, it is possible to include appropriate and innovative methodologies in the process of developing/designing websites such as eye-tracking technology. The results of the study will be useful for tourists with special limitations (such as accessibility problems), which translates into an increase in the number of visitors to the destination by improving the decision-making process when booking a room.

In practical terms, the findings of this research have direct implications for hotel managers, namely, by providing evidence where to locate a static banner on the hotel webpage that will capture consumers' attention and potentially increase their purchase intention. Banners placed on the top-right of the screen will be longer viewed, stored and recalled more effectively, transforming the customer's query for a room into a potential reservation/purchase for that room or another service. In this way, hotel managers can comprehend how the human mind processes ads and how it recalls them to understand the customers' decision-making process. It also supports the assumption that the location of visual elements is especially relevant to attract the attention of the consumer and should be included in the definition of communication and promotion strategies for products and services, whichever business the site sells through e-commerce.

Considering the mediation role visual attention has on banner recall, online marketing firms should focus on developing attractive static banners, as static banners – as opposed to animated ones – are the best option to enhance the attention-recall processing stage. Indeed, animated banners have been recognized as inducing automatic avoidance behaviours in experimented internet users (Lee and Ahn, 2012) and, according to our results, such attention-avoidance behaviours will have a crucial negative impact on banner recall.

All hoteliers and other stakeholders associated with the tourism industry, as well as other sectors of activity, must have an online presence that allows them to deepen their relationship with the customer, without neglecting social networks. Thus, "responsive" websites should be the means *par excellence* to communicate information about their products simply and transparently through content made available in different formats, where the banner will contribute significantly to capture the attention of potential consumers, thus having a relevant role in transforming them into customers. Through a complementary retargeting strategy, these companies can segment their targets by showing specific ads after viewing or searching for a certain type of tourist content. Therefore, the results obtained are of the utmost importance for communication in this economic sector.

Finally, these results can be useful for managers of other types of hospitality and tourism establishments such as travel agencies, tour operators and food service, as they allow the understanding of the purchase decision process of potential customers searching for products or services on the internet. For the same reasons, the findings of this study can also be used by organizations belonging to other economic activity such as human health and social services, education, finance, as well as non-governmental organizations that want to promote their activities to society.

7. Limitations and future lines of research

This study analyses advertising effectiveness in terms of memory by measuring users' visual attention towards the banner and the determinant effect of banner position and the user's experience of the internet. In the future, it would be interesting to complement these studies with other measurements of advertising effectiveness such as CTR, to determine which subjects voluntarily visit the selected advertiser's website. Many eye tracker equipment allows recording this kind of metrics. Furthermore, we measured the short-term effect of advertising on memory (short-term recall), but long-term metrics (such as future purchasing behaviours or brand loyalty) are more relevant for business.

Another aspect that has not been previously analysed is the motivational impact of the product offered. The product (a room, in the present study) can attract more or less attention depending on the desire the consumer has to travel. For instance, if (s)he has just returned from a trip, room advertising might have a different impact than if (s)he did not travel for more than two years.

Additional classification variables (e.g. gender, employment status and educational level) could be considered for a more in-depth analysis of sociodemographic moderating effects. The level of engagement the user has with the product/website, as well as the user's reaction to it, should also be considered as potential mediator effects.

Another possible variant that could undoubtedly bring a very interesting contribution is to compare a group of Westerners with participants from the Middle East. This study would allow the verification of the conjectural Western bias for the right side of the web pages and the tendency to focus more on banners on this side (Simola *et al.*, 2011), as Middle East participants are accustomed to reading from right to left and seeing banners on the opposite side of the web.

In addition, according to Flavián *et al.* (2009a), the way products are displayed on the webpage (for instance, if the information is systematically organized on a list or table) can have a notable influence on consumers' perceptions and a considerable impact on their purchase decisions. The presence of symbols conveying information about the product status also seems to positively influence consumers' cognitive elaboration and their perception of information diagnosticity (Gurrea *et al.*, 2013). These findings may open new insights for future lines of research.

Finally, future research could explore the conscious and unconscious emotional processes occurring during web search experiences, using other methodological approaches such as the analysis of facial expressions, psychophysiological data or more sophisticated techniques, for example, fMRI (Plassmann *et al.*, 2007; Muñoz-Leiva *et al.*, 2019b). As Flavián *et al.* (2011)'s study established 10 years ago, there is still a lack of studies focusing on the analysis of consumer's emotions during online information search related to purchasing decisions.

References

- Baack, D.W., Wilson, R.T. and Till, B.D. (2008), "Creativity and memory effects: recall, recognition, and an exploration of nontraditional media", *Journal of Advertising*, Vol. 37 No. 4, pp. 85-94, doi: [10.2753/JOA0091-3367370407](https://doi.org/10.2753/JOA0091-3367370407).
- Barreto, A.M. (2013), "Do users look at banner ads on facebook?", *Journal of Research in Interactive Marketing*, Vol. 7 No. 2, pp. 119-139, doi: [10.1108/JRIM-Mar-2012-0013](https://doi.org/10.1108/JRIM-Mar-2012-0013).
- Belanche, D., Flavián, C. and Pérez-Rueda, A. (2017), "User adaptation to interactive advertising formats: the effect of previous exposure, habit and time urgency on ad skipping behaviors", *Telematics and Informatics*, Vol. 34 No. 7, pp. 961-972, doi: [10.1016/j.tele.2017.04.006](https://doi.org/10.1016/j.tele.2017.04.006).

-
- Benway, J.P. (1999), "Banner blindness: what searching users notice and do not notice on the world wide web", Dissertation, Rice University, Houston, Texas (USA), available at: <https://hdl.handle.net/1911/19353>
- Benway, J.P. and Lane, D.M. (1998), "Banner blindness: web searchers often miss obvious links", Rice University, available at: www.ruf.rice.edu/~lane/papers/banner_blindness.pdf (accessed 8 February 2018).
- Brehm, J.W. (1972), *Responses to the Loss of Freedom: A Theory of Psychological Reactance*, General Learning, Morristown.
- Brehm, S. and Brehm, J.W. (1981), *Psychological Reactance: A Theory of Freedom and Control*, Academic Press, New York.
- Buhalis, D. (1998), "Strategic use of information technologies in the tourism industry", *Tourism Management*, Vol. 19 No. 5, pp. 409-421, doi: [10.1016/S0261-5177\(98\)00038-7](https://doi.org/10.1016/S0261-5177(98)00038-7).
- Burke, M., Hornof, A., Nilsen, E. and Gorman, N. (2005), "High-cost banner blindness: ads increase perceived workload, hinder visual search, and are forgotten", *ACM Transactions on Computer-Human Interaction*, Vol. 12 No. 4, pp. 423-445, doi: [10.1145/1121112.1121116](https://doi.org/10.1145/1121112.1121116).
- Buswell, G.T. (1935), *How People Look at Pictures: A Study of the Psychology of Perception in Art*, University of Chicago Press, Chicago, IL.
- Cardoso, G. and Mendonça, S. (2014), *A Internet em Portugal*, Sociedade em Rede 2014, Obercom, January 2014, doi: [10.13140/RG.2.1.3662.9362](https://doi.org/10.13140/RG.2.1.3662.9362).
- Castañeda, A., Ríos, F. and Luque Martínez, T. (2007), "The dimensionality of customer privacy concern on the internet", *Online Information Review*, Vol. 31 No. 4, pp. 420-439, doi: [10.1108/14684520710780395](https://doi.org/10.1108/14684520710780395).
- Chatterje, P. (2008), "Are unclicked ads wasted? Immediate and long-term impact of banner and pop-up ads on communication outcomes", *Journal of Electronic Commerce Research*, Vol. 9 No. 1, pp. 51-61.
- Chun, M.M. and Turk-Browne, N.B. (2007), "Interactions between attention and memory", *Current Opinion in Neurobiology*, Vol. 17 No. 2, pp. 177-184, doi: [10.1016/j.conb.2007.03.005](https://doi.org/10.1016/j.conb.2007.03.005).
- Colorado, D.A., Taba, M.C. and Parra, H.C. (2015), "Las etiquetas nutricionales: una mirada desde el consumidor", *Revista En-contexto*, Vol. 3, pp. 121-140, available at: <https://ojs.tdea.edu.co/index.php/encontexto/article/view/296>
- Cooke, M. and Buckley, N. (2008), "Web 2.0, social networks and the future of market research", *International Journal of Market Research*, Vol. 50 No. 2, pp. 267-292, doi: [10.1177/147078530805000208](https://doi.org/10.1177/147078530805000208).
- Crespo, E. (2011), *Eficacia de la Promoción de Ventas on-Line. Influencia Del Tipo de Incentivo Promocional y la Experiencia de Uso Web*, Departamento de Comercialización e Investigación de Mercados. Universidad de Granada.
- Crespo, E. and Del Barrio, S. (2011), "Impact of online sales promotion type on internet user recall", DOCFRADIS Working Papers 1106, Catedra Fundación Ramón Areces de Distribución Comercial, available at: www.catedrafundacionarecesdcuniovi.es/docfradis-impact-of-online-sales-promotion-type-on-internet-user-recall-es.html (accessed 8 February 2018).
- Dahlén, M. (2001), "Banner advertisements through a new lens", *Journal of Advertising Research*, Vol. 41 No. 4, doi: [10.2501/JAR-41-4-23-30](https://doi.org/10.2501/JAR-41-4-23-30).
- Danaher, P. and Mullarkey, G.W. (2003), "Factors affecting online advertising recall: a study of students", *Journal of Advertising Research*, Vol. 43 No. 3, pp. 252-267, doi: [10.1017/S0021849903030319](https://doi.org/10.1017/S0021849903030319).
- Dos Santos, G. (2002), "El tamaño y la posición de los web banners publicitarios y su recuperación de la memoria episódica. Un análisis desde el enfoque del procesamiento de la información", Dissertation, Autonomous University of Barcelona, Barcelona, available at: www.tdx.cat/handle/10803/4127 (accessed 12 November 2014).

- Drèze, X. and Hussherr, F.X. (2003), "Internet advertising: is anybody watching?", *Journal of Interactive Marketing*, Vol. 17 No. 4, pp. 8-23, doi: [10.1002/dir.10063](https://doi.org/10.1002/dir.10063).
- Edwards, S.M., Li, J. and Joo-Hyun, L. (2002), "Forced exposure and psychological reactance: antecedents and consequences of the perceived intrusiveness of pop-up ads", *Journal of Advertising*, Vol. 31 No. 3, pp. 83-95.
- Espigares-Jurado, F., Muñoz-Leiva, F., Correia, M.B., Sousa, C.M.R., Ramos, C.M.Q. and Faisca, L. (2020), "Visual attention to the main image of a hotel website based on its position, type of navigation and belonging to millennial generation: an eye tracking study", *Journal of Retailing and Consumer Services*, Vol. 52 No. 1, p. 101906, doi: [10.1016/j.jretconser.2019.101906](https://doi.org/10.1016/j.jretconser.2019.101906).
- Flavián, C., Gurrea, R. and Orús, C. (2009a), "The effect of product presentation mode on the perceived content and continent quality of web sites", *Online Information Review*, Vol. 33 No. 6, pp. 1103-1128, doi: [10.1108/14684520911011034](https://doi.org/10.1108/14684520911011034).
- Flavián, C., Gurrea, R. and Orús, C. (2009b), "Web design: a key factor for the website success", *Journal of Systems and Information Technology*, Vol. 11 No. 2, pp. 169-184, doi: [10.1108/13287260910955129](https://doi.org/10.1108/13287260910955129).
- Flavián, C., Gurrea, R. and Orús, C. (2011), "Analyzing the emotional outcomes of the online search behaviour with search engines", *Computers in Human Behavior*, Vol. 27 No. 1, pp. 540-551, doi: [10.1016/j.chb.2010.10.002](https://doi.org/10.1016/j.chb.2010.10.002).
- Flavián, C., Gurrea, R. and Orús, C. (2012), "An integrative perspective of online foraging behavior with search engines", *Psychology and Marketing*, Vol. 29 No. 11, pp. 836-849, doi: [10.1002/mar.20568](https://doi.org/10.1002/mar.20568).
- Geise, S. (2012), "Eye tracking in media studies: theory, method, and its exemplary application in analyzing shock-inducing advertisements", *The International Encyclopedia of Media Studies*, pp. 419-444.
- Ghose, A., Goldfarb, A. and Han, S.P. (2013), "How is the mobile internet different? Search costs and local activities", *Information Systems Research*, Vol. 24 No. 3, pp. 613-631, doi: [10.1287/isre.1120.0453](https://doi.org/10.1287/isre.1120.0453).
- Gidlóf, K., Holmberg, N. and Sandberg, H. (2012), "The use of eye-tracking and retrospective interviews to study teenagers' exposure to online advertising", *Visual Communication*, Vol. 11 No. 3, pp. 329-345, doi: [10.1177/1470357212446412](https://doi.org/10.1177/1470357212446412).
- Goodrich, K. (2010), "What's up? Exploring upper and lower visual field advertising effects", *Journal of Advertising Research*, Vol. 50 No. 1, pp. 91-106, doi: [10.2501/S002184991009121X](https://doi.org/10.2501/S002184991009121X).
- Guitart, I.A., Hervet, G. and Hildebrand, D. (2019), "Using eye-tracking to understand the impact of multitasking on memory for banner ads: the role of attention to the ad", *International Journal of Advertising*, Vol. 38 No. 1, pp. 154-170, doi: [10.1080/02650487.2018.1473023](https://doi.org/10.1080/02650487.2018.1473023).
- Gurrea, R., Orús, C. and Flavián, C. (2013), "The role of symbols signalling the product status on online users' information processing", *Online Information Review*, Vol. 37 No. 1, pp. 8-27, doi: [10.1108/14684521311311603](https://doi.org/10.1108/14684521311311603).
- Gutiérrez, J.C. (2017), "Technology has changed advertising forever", available at: www.huffingtonpost.com/entry/technology-has-changed-advertising-forever_us_599c64d4e4b09dbe86ea3764 (accessed 12 May 2018).
- Ha, A. (2019), "eMarketer predicts digital ads will overtake traditional spending in 2019. eMarketer", available at: <https://techcrunch.com/2019/02/20/emarketer-digital-ad-forecast/> (accessed 10 November 2020).
- Hayes, A.F. (2019), "The PROCESS macro for SPSS and SAS", available at: www.processmacro.org (accessed 12 March 2019).
- Heath, R. and Nairn, A. (2005), "Measuring emotive advertising: implications of low attention processing on recall", *Journal of Advertising Research*, Vol. 45 No. 2, pp. 269-281, doi: [10.1017/S0021849905050282](https://doi.org/10.1017/S0021849905050282).

-
- Hernández-Méndez, J. (2015), "Travel 2.0 tools: user behaviour analysis and modeling. Special emphasis on advertising effectiveness through the eye-tracking methodology", Doctoral Thesis, Universidad de Granada, available at: <http://digibug.ugr.es/handle/10481/41009> (accessed 12 May 2018).
- Hernández-Méndez, J. and Muñoz-Leiva, F. (2015), "What type of online advertising is most effective for eTourism 2.0? An eye tracking study based on the characteristics of tourists", *Computers in Human Behavior*, Vol. 50, pp. 618-625, doi: [10.1016/j.chb.2015.03.017](https://doi.org/10.1016/j.chb.2015.03.017).
- Holmqvist, K., Nyström, M., Andersson, R., Dewhurst, R., Jarodzka, H. and van de Weijer, J. (2011), *Eye Tracking: A Comprehensive Guide to Methods and Measures*, Oxford University Press, Oxford.
- Homburg, C., Artz, M. and Wieseke, J. (2012), "Marketing performance measurement systems: does comprehensiveness really improve performance?", *Journal of Marketing*, Vol. 76 No. 3, pp. 56-77, doi: [10.2307/41714489](https://doi.org/10.2307/41714489).
- Hoyer, W.J. and Ingólfssdóttir, D. (2003), "Age, skill, and contextual cuing in target detection", *Psychology and Aging*, Vol. 18 No. 2, pp. 210-218, doi: [10.1037/0882-7974.18.2.210](https://doi.org/10.1037/0882-7974.18.2.210).
- IAB Spain (2019), *Estudio Anual de Inversión Publicitaria en Medios Digitales*, IAB Spain.
- Instituto Nacional de Estatística, Statistics Portugal (2015), "Sociedade da informação e do Conhecimento – Inquérito à utilização de tecnologias da informação e da comunicação nas famílias", available at: www.ine.pt (accessed 10 June 2016).
- International Telecommunication Union – ITU (2002), "Methodology for the subjective assessment of the quality of television pictures, ITU-R BT.500-11", available at: www.itu.int/rec/R-REC/BT.500-11 (accessed 12 Mar 2012).
- Jacob, R.J. and Karn, K.S. (2003), "Eye tracking in human-computer interaction and usability research: ready to deliver the promises", in Hyona, J., Radach, R. and Deubel, H. (Eds), *The Mind's Eye: Cognitive and Applied Aspects of Eye Movement Research*, pp. 573-605, North-Holland, doi: [10.1016/B978-044451020-4/50031-1](https://doi.org/10.1016/B978-044451020-4/50031-1).
- Just, M.A. and Carpenter, P.A. (1980), "A theory of reading: from eye fixations to comprehension", *Psychological Review*, Vol. 87 No. 4, pp. 329-354, doi: [10.1037/0033-295X.87.4.329](https://doi.org/10.1037/0033-295X.87.4.329).
- Kahneman, D. (1973), *Attention and Effort*, Prentice-Hall, Englewood Cliffs, NJ.
- Kong, S., Huang, Z., Scott, N., Zhang, Z. and Shen, Z. (2018), "Web advertisement effectiveness evaluation: attention and memory", *Journal of Vacation Marketing*, Vol. 25 No. 1, pp. 130-146, doi: [10.1177/1356766718757272](https://doi.org/10.1177/1356766718757272).
- Krishnan, H.S. and Chakravarti, D. (2003), "A process analysis of the effects of humorous advertising executions on brand claims memory", *Journal of Consumer Psychology*, Vol. 13 No. 3, pp. 230-245, doi: [10.1207/S15327663JCP1303_05](https://doi.org/10.1207/S15327663JCP1303_05).
- Lee, J. and Ahn, J.H. (2012), "Attention to banner ads and their effectiveness: an eye-tracking approach", *International Journal of Electronic Commerce*, Vol. 17 No. 1, pp. 119-137, doi: [10.2753/JEC1086-4415170105](https://doi.org/10.2753/JEC1086-4415170105).
- Lewenstein, M., Edwards, G., Tatar, D. and DeVigal, A. (2000), "Stanford poynter project: study of reading of on-line news site", available at: www.poynter.org/eyetrack2000/; www.poynter.org/archive/2003/putting-the-eyetrack-study-to-good-use/ (accessed 25 Jul 2012).
- Li, K., Huang, G. and Bente, G. (2016), "The impacts of banner format and animation speed on banner effectiveness: evidence from eye movements", *Computers in Human Behavior*, Vol. 54, pp. 522-530, doi: [10.1016/j.chb.2015.08.056](https://doi.org/10.1016/j.chb.2015.08.056).
- Liu-Thompkins, Y. (2019), "A decade of online advertising research: what we learned and what we need to know", *Journal of Advertising*, Vol. 48 No. 1, pp. 1-13, doi: [10.1080/00913367.2018.1556138](https://doi.org/10.1080/00913367.2018.1556138).
- McConkie, G.W., Reddix, M.D. and Zola, D. (1992), "Perception and cognition in reading: where is the meeting point?", in Rainer, K. (Ed.), *Eye Movements and Visual Cognition: Scene Perception and Reading*, pp. 293-303, Springer, New York, NY.

- McCoy, S., Everard, A., Polak, P. and Galletta, D.F. (2007), "The effects of online advertising", *Communications of the ACM*, Vol. 50 No. 3, pp. 84-88.
- Manchanda, P., Dubé, J.P., Goh, K.Y. and Chintagunta, P.K. (2006), "The effect of banner advertising on internet purchasing", *Journal of Marketing Research*, Vol. 43 No. 1, pp. 98-108, doi: [10.1509/jmkr.43.1.98](https://doi.org/10.1509/jmkr.43.1.98).
- Margarida, A. (2013), "Do users look at banner ads on facebook?", *Journal of Research in Interactive Marketing*, Vol. 7 No. 2, pp. 119-139, doi: [10.1108/JRIM-Mar-2012-0013](https://doi.org/10.1108/JRIM-Mar-2012-0013).
- Mosconi, M., Porta, M. and Ravarelli, A. (2008), "On-line newspapers and multimedia content, An eye tracking study", *Proceedings of the 26th annual ACM International Conference on Design of Communication*, ACM, pp. 55-64.
- Muñoz-Leiva, F. and Gómez-Carmona, D. (2019a), "Sparking interest in restaurant dishes? Cognitive and affective processes underlying dish design and ecological origin. An fMRI study", *Physiology and Behavior*, Vol. 200 No. 1, pp. 116-129, doi: [10.1016/j.physbeh.2018.06.017](https://doi.org/10.1016/j.physbeh.2018.06.017).
- Muñoz-Leiva, F., Hernández-Méndez, J. and Gómez-Carmona, D. (2019b), "Measuring advertising effectiveness in travel 2.0 websites through eye-tracking technology", *Physiology and Behavior*, Vol. 200 No. 1, pp. 83-95, doi: [10.1016/j.physbeh.2018.03.002](https://doi.org/10.1016/j.physbeh.2018.03.002).
- Muñoz-Leiva, F., Hernández-Méndez, J. and Sánchez-Fernández, J. (2012), "Generalising user behaviour in online travel sites through the travel 2.0 website acceptance model", *Online Information Review*, Vol. 36 No. 6, pp. 879-902, doi: [10.1108/14684521211287945](https://doi.org/10.1108/14684521211287945).
- Muñoz-Leiva, F., Liébana-Cabanillas, F. and Hernández-Méndez, J. (2018), "Etourism advertising effectiveness: banner type and engagement as moderators", *Journal of Services Marketing*, Vol. 32 No. 4, pp. 462-475, doi: [10.1108/JSM-01-2017-0039](https://doi.org/10.1108/JSM-01-2017-0039).
- Naidoo, V. and Hollebeek, L. (2016), "Higher education brand alliances: investigating consumers' dual-degree purchase intentions", *Journal of Business Research*, Vol. 69 No. 8, pp. 3113-3121, doi: [10.1016/j.jbusres.2016.01.027](https://doi.org/10.1016/j.jbusres.2016.01.027).
- Newstead, K., Taylor, J., Kennedy, R. and Sharp, B. (2009), "The long-term sales effects of advertising: lessons from single source", *Journal of Advertising Research*, Vol. 49 No. 2, pp. 207-210, doi: [10.2501/S0021849909090308](https://doi.org/10.2501/S0021849909090308).
- Nielsen, J. (2006), "F-Shaped pattern for reading web content", available at: www.nngroup.com/articles/f-shaped-pattern-reading-web-content-discovered/ (accessed 5 September 2018).
- Nihel, Z. (2013), "The effectiveness of internet advertising through memorization and click on a banner", *International Journal of Marketing Studies*, Vol. 5 No. 2, pp. 93-101, doi: [10.5539/ijms.v5n2p93](https://doi.org/10.5539/ijms.v5n2p93).
- Owens, J., Chaparro, B. and Palmer, E. (2011), "Text advertising blindness: the new banner blindness?", *Journal of Usability Studies*, Vol. 6, pp. 172-197.
- Pagendam, M. and Schaumburg, H. (2001), "Why are users banner-blind? The impact of navigation style on the perception of web banners", *Journal of Digital Information*, Vol. 2 No. 1, pp. 1-6, available at: <https://journals.tdl.org/jodi/index.php/jodi/article/view/36/38> (accessed 12 May 2018).
- Pasqualotti, L. and Baccino, T. (2014), "Online advertisement: how are visual strategies affected by the distance and the animation of banners?", *Frontiers in Psychology*, Vol. 5, p. 211, doi: [10.3389/fpsyg.2014.00211](https://doi.org/10.3389/fpsyg.2014.00211).
- Pernice, K. (2017), "F-Shaped pattern of reading on the web: misunderstood, but still relevant", in even on mobile, available at: www.nngroup.com/articles/f-shaped-pattern-reading-web-content/ (accessed September 5, 2018).
- Plasmann, H., Ambler, T., Braeutigam, S. and Kenning, P. (2007), "What can advertisers learn from neuroscience?", *International Journal of Advertising*, Vol. 26 No. 2, pp. 151-175, doi: [10.1080/10803548.2007.11073005](https://doi.org/10.1080/10803548.2007.11073005).

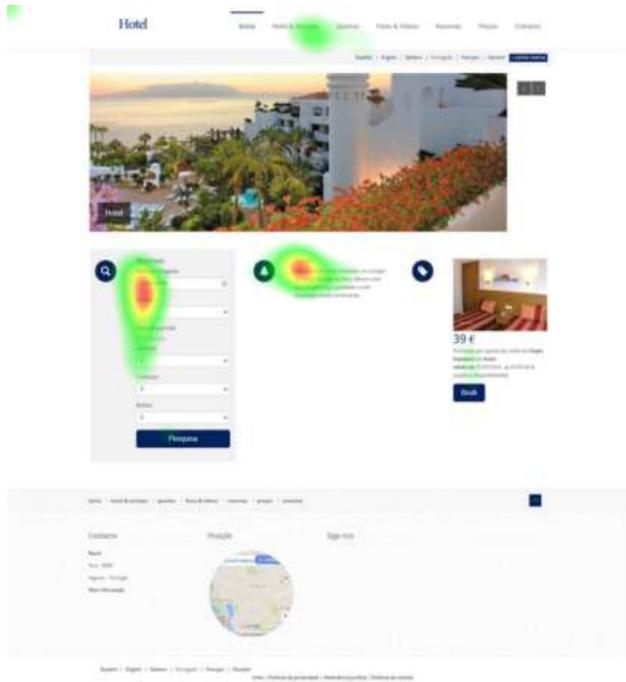
-
- Plumeyer, A., Kottemann, P., Böger, D. and Decker, R. (2019), "Measuring brand image: a systematic review, practical guidance, and future research directions", *Review of Managerial Science*, Vol. 13 No. 2, pp. 227-265, doi: [10.1007/s11846-017-0251-2](https://doi.org/10.1007/s11846-017-0251-2).
- Putrevu, S. (2008), "Consumer responses toward sexual and nonsexual appeals: the influence of involvement, need for cognition (NFC), and gender", *Journal of Advertising*, Vol. 37 No. 2, pp. 57-70, doi: [10.2753/JOA0091-3367370205](https://doi.org/10.2753/JOA0091-3367370205).
- Rayner, K. (1998), "Eye movements in reading and information processing: 20 years of research", *Psychological Bulletin*, Vol. 124 No. 3, pp. 372-422, doi: [10.1037/0033-2909.124.3.372](https://doi.org/10.1037/0033-2909.124.3.372).
- Rayner, K., Slattery, T.J. and Bélanger, N.N. (2010), "Eye movements, the perceptual span, and reading speed", *Psychonomic Bulletin and Review*, Vol. 17 No. 6, pp. 834-839, doi: [10.3758/PBR.17.6.834](https://doi.org/10.3758/PBR.17.6.834).
- Rejón-Guardia, F. (2014), *La Respuesta Del Consumidor a la Publicidad en Redes Sociales: análisis Del Efecto de la Presión Publicitaria y la Experiencia*, Doctoral Tesis, Universidad de Granada, Granada.
- Resnick, M. and Albert, W. (2014), "The impact of advertising location and user task on the emergence of banner ad blindness: an eye-tracking study", *International Journal of Human-Computer Interaction*, Vol. 30 No. 3, pp. 206-219, doi: [10.1080/10447318.2013.847762](https://doi.org/10.1080/10447318.2013.847762).
- Rovira, C. (2016), "La metodología del eye tracker: de la investigación de la lectura al estudio de mapas conceptuales", *HIPERTEXT.NET*, Vol. 14, pp. 1-13, doi: [10.2436/20.8050.01.31](https://doi.org/10.2436/20.8050.01.31).
- Sajjacholapunt, P. and Ball, L.J. (2014), "The influence of banner advertisements on attention and memory: human faces with averted gaze can enhance advertising effectiveness", *Frontiers in Psychology*, Vol. 5 No. March, p. 166, doi: [10.3389/fpsyg.2014.00166](https://doi.org/10.3389/fpsyg.2014.00166).
- Sari, J.N., Ferdiana, R., Santosa, P.I. and Nugroho, L.E. (2015), "An eye tracking study: exploration customer behavior on web design", *Proceedings of the International HCI and UX Conference in Indonesia*, pp. 69-72.
- Shen, F. and Chen, Q. (2007), "Contextual priming and applicability: implications for ad attitude and brand evaluations", *Journal of Advertising*, Vol. 36 No. 1, pp. 69-80, doi: [10.2753/JOA0091-3367360105](https://doi.org/10.2753/JOA0091-3367360105).
- Simmonds, L., Bellman, S., Kennedy, R. and Nenyecz-Thiel, M. (2020a), "Moderating effects of prior brand usage on visual attention to video advertising and recall: an eye-tracking investigation", *Journal of Business Research*, Vol. 111, pp. 241-248, doi: [10.1016/j.jbusres.2019.02.062](https://doi.org/10.1016/j.jbusres.2019.02.062).
- Simmonds, L., Bogomolova, S., Kennedy, R., Nenyecz-Thiel, M. and Bellman, S. (2020b), "A dual model of how incorporating audio-visual sensory cues in video advertising promotes active attention", *Psychology and Marketing*, Vol. 37 No. 8, pp. 1057-1067, doi: [10.1002/mar.21357](https://doi.org/10.1002/mar.21357).
- Simola, J., Kuisma, J., Öörni, A., Uusitalo, L. and Hyönä, J. (2011), "The impact of salient advertisements on reading and attention on web pages", *Journal of Experimental Psychology: Applied*, Vol. 17 No. 2, pp. 174-190, doi: [10.1037/a0024042](https://doi.org/10.1037/a0024042).
- Unema, P.J., Pannasch, S., Joos, M. and Velichkovsky, B.M. (2005), "Time course of information processing during scene perception: the relationship between saccade amplitude and fixation duration", *Visual Cognition*, Vol. 12 No. 3, pp. 473-494, doi: [10.1080/13506280444000409](https://doi.org/10.1080/13506280444000409).
- van Trijp, H.C.M. (2009), "Consumer understanding and nutritional communication: key issues in the context of the new EU legislation", *European Journal of Nutrition*, Vol. 48 No S1, pp. S41-S48, doi: [10.1007/s00394-009-0075-1](https://doi.org/10.1007/s00394-009-0075-1).
- We Are Social and Hootsuite (2020), "140 Estadísticas de redes sociales que son importantes Para los mercadólogos en 2020", We Are Social and Hootsuite, available at: <https://blog.hootsuite.com/es/125-estadisticas-de-redes-sociales/#generales>
- Wong, W.P.M., Lo, M.C. and Ramayah, T. (2014), "The effects of technology acceptance factors on customer e-loyalty and e-satisfaction in Malaysia", *International Journal of Business and Society*, Vol. 15 No. 3, pp. 477-502.

Yoo, C.Y. (2008), "Unconscious processing of web advertising: effects on implicit memory, attitude toward the brand, and consideration set", *Journal of Interactive Marketing*, Vol. 22 No. 2, pp. 2-18, doi: [10.1002/dir.20110](https://doi.org/10.1002/dir.20110).

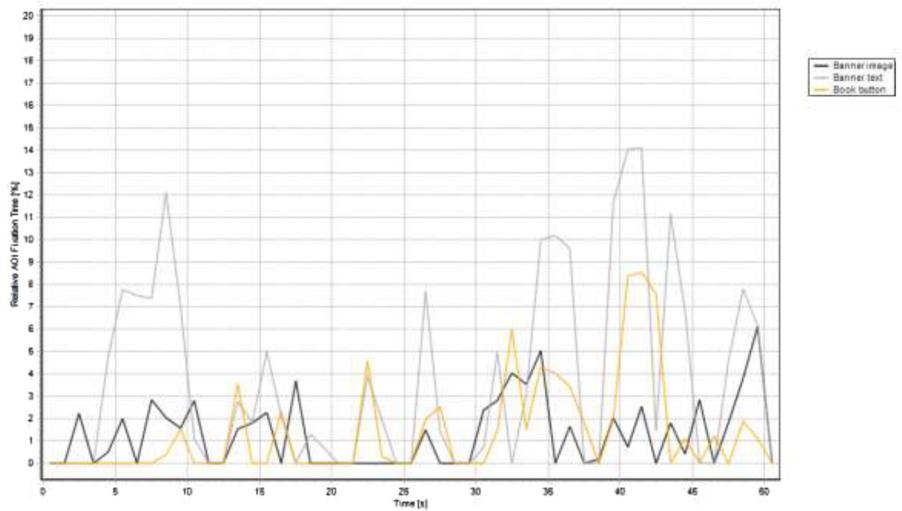
Yoo, C.Y. and Kim, K. (2005), "Processing of animation in online banner advertising: the roles of cognitive and emotional responses", *Journal of Interactive Marketing*, Vol. 19 No. 4, pp. 18-34, doi: [10.1002/dir.20047](https://doi.org/10.1002/dir.20047).

Further reading

Henderson, J.M. and Hollingworth, A. (1999), "High-level scene perception", *Annual Review of Psychology*, Vol. 50 No. 1, pp. 243-271, doi: [10.1146/annurev.psych.50.1.243](https://doi.org/10.1146/annurev.psych.50.1.243).



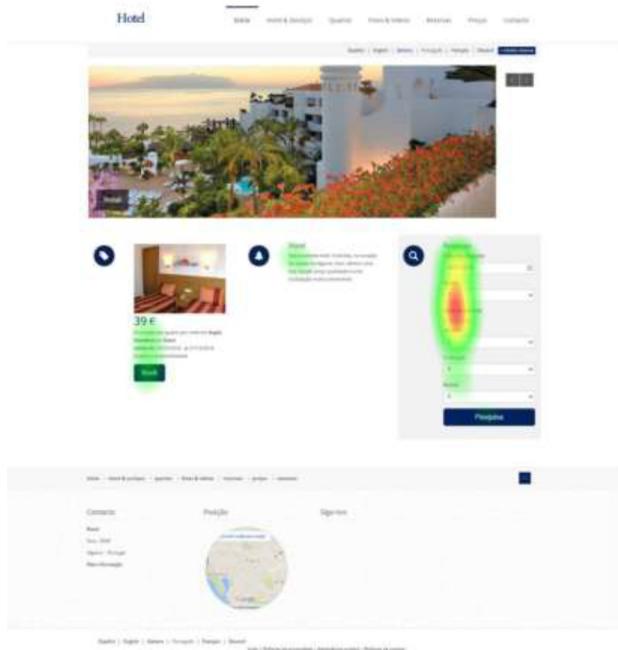
(a)



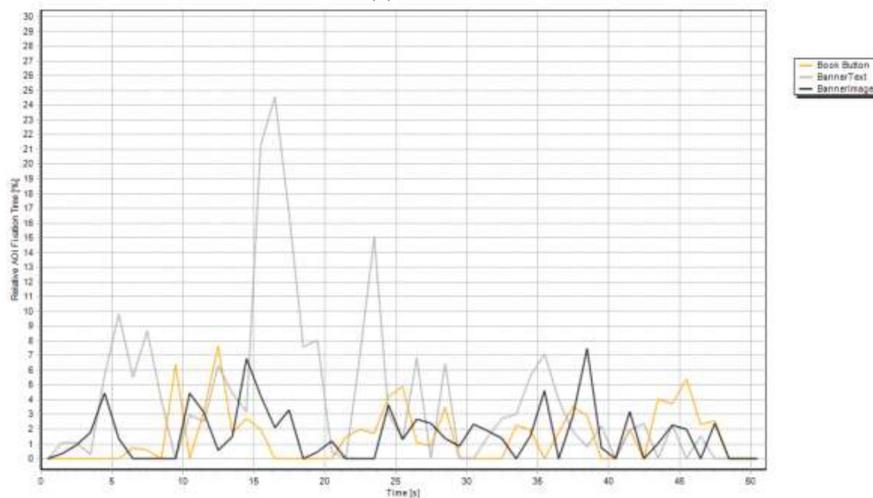
(b)

Figure A1. Heatmap (a) and binning chart (b) for bottom-right position

Mediating role
of visual
attention

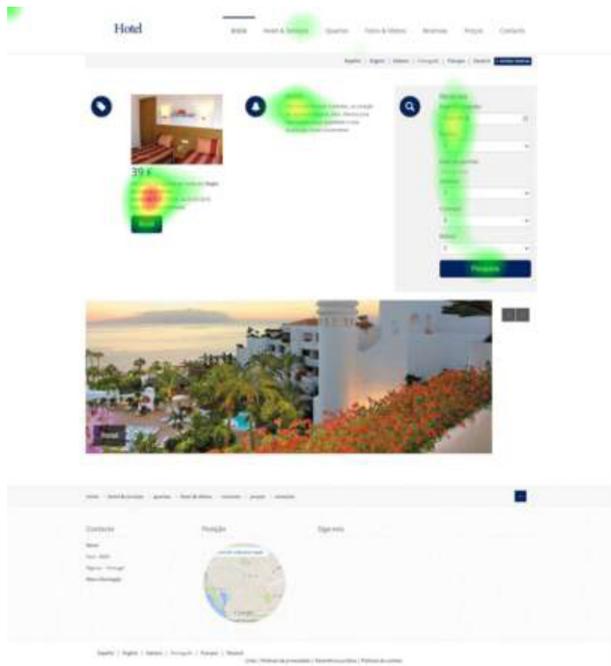


(a)

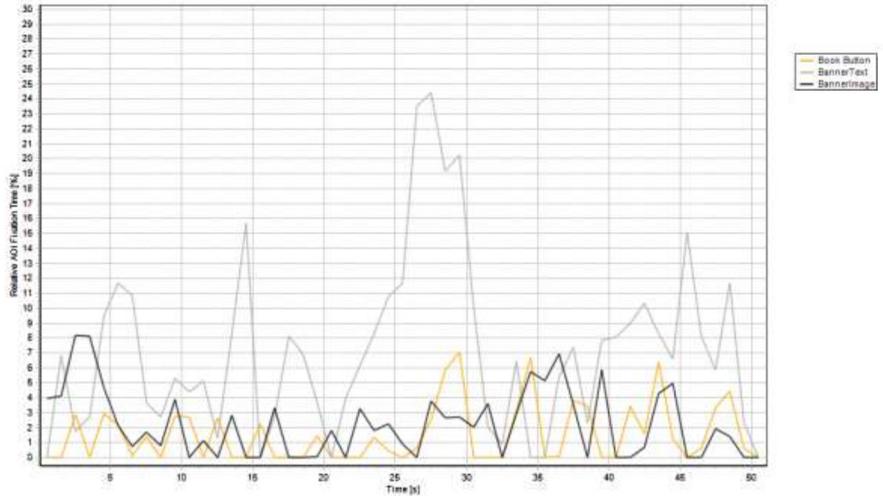


(b)

Figure A2.
Heatmap (a) and
binning chart (b) for
bottom-left position

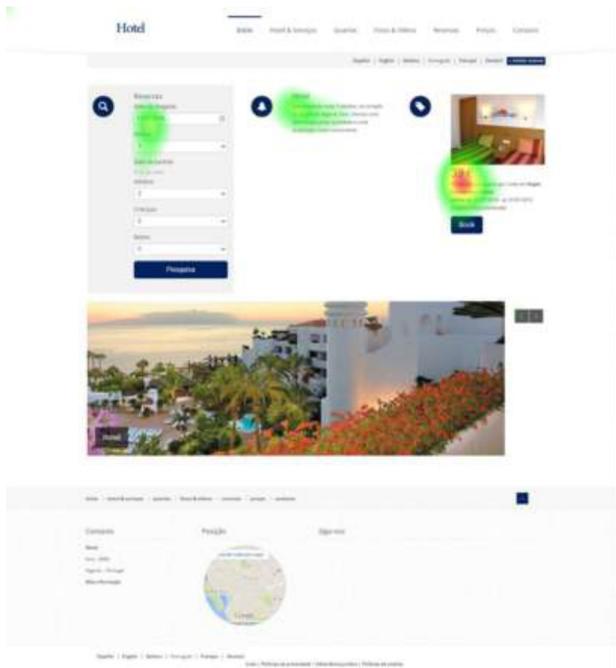


(a)



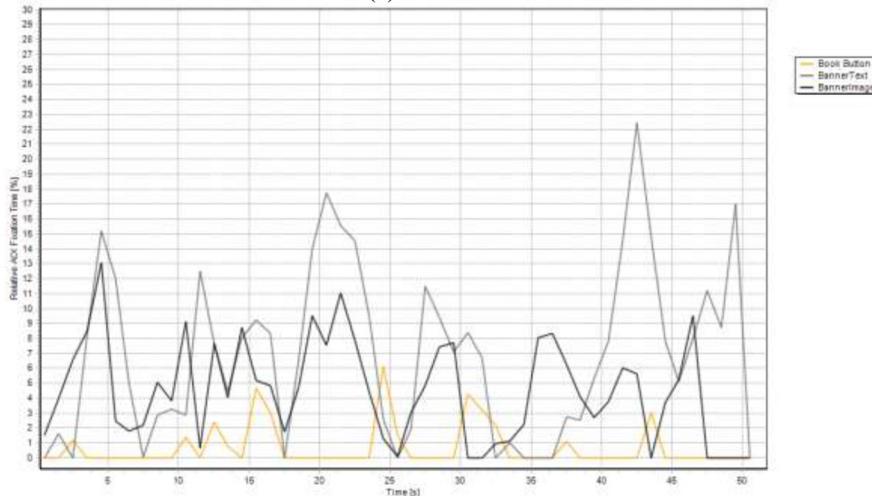
(b)

Figure A3. Heatmap (a) and binning chart (b) for top-left position



Mediating role
of visual
attention

(a)



(b)

Figure A4.
Heatmap (a) and
binning chart (b) for
top-right position

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