

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

Abstract

This article focuses on the role played by the images that hotels use on their websites. Under this approach, this study analyses the main image used in a hotel website, considered an area of outstanding interest, which can help to improve the first impression when arriving at the website and, with it, increase the number of bookings. The absence of studies on this matter aroused the interest in it.

The proposed experiment allows to check how these images influence the pattern or metrics of visual attention of users as well as their cognitive processing. The eye tracking technology was chosen with the intention of knowing several aspects of this fixation behaviour according to: the position of the image on the website, whether or not it belongs to the Millennial generation and the type of navigation it performs (exploratory vs. goal oriented), in addition to proposing some interaction effects between these classification variables studied.

The results achieved revealed that an image in the upper area of a website is more effective, but there are some differences in the visual attention among groups of participants. This attention to it will depend, in part, on the type of task to be carried out within the website and the user age. Specifically, goal-oriented users showed a lower recurrent interest in the main image. The fixation was shorter in the group belonging to the Millennial generation, who do not need, given their greater experience in the web, a longer time to process the cognitive load of the image. Although the hypotheses proposed on the basis of the literature are not

entirely satisfactory, the present study allows laying the foundations for more complex future works.

Keywords: Eye tracking; tourism; main image; hotel website; Millennials generation; user type.

JEL: C91, M31, M37

1. Introduction

The new "electronic tourism", or eTourism, allows tourists a greater participation in terms of UCG-User Generated Content (Nielsen, 2014), leading to greater independence when planning trips, helping others to do the same, and modifying their own behaviour (Muñoz-Leiva et al., 2012).

A high percentage of tourism companies went from the electronic brochure to the creation of search and reservation systems on the web, being this the current main form of contact between the tourist and these organizations (Zach et al., 2010). Hotel webpages are still one of the forms that produce large volumes of bookings in the sector (Carroll and Siguaw, 2003).

Decisions and the role of images in the evaluation of a tourist website

Nowadays, tourists face numerous options while searching for hotels on the web, therefore, they have to reduce the time spent on each site with heuristic evaluations that accelerate their process of decision making (Gigerenzer and Todd, 1999). That is why the complexity of the website will mark the cognitive processes of the user (Pan et al., 2004), who will consider perceptual characteristics, such as images and colours, to try to get a reliable perception of the hotel (Zhang et al., 2003).

On the other hand, one of the most important aspects when a user browses a webpage is the credibility of its content (Pitta, 2011). Some studies have shown that the presence of images and text contribute to the user's perception of greater trust and credibility in the service offered (Cyr et al., 2009). If a website is attractive to the user, it will have a greater impact on the perception of it (Tractinsky et al., 2000), so well-chosen images,

organized content and smooth navigation are highly recommended (Muhtaseb et al., 2012) in order to guarantee a longer time on the site and, consequently, more bookings. Thus, companies need to understand the behaviour of users in order to use appropriate communication strategies on their webpages (Xiang et al., 2014), since the degree of fixation or visual attention varies according to the characteristics of tourists (Muñoz-Leiva and Hernández-Méndez, 2015).

The images shown on the websites can convey many information quickly (Zimbardo, 1992), and have been used as a way to combat the intangibility of tourist service and anticipate the tourist experience (Tussyadiah and Fesenmaier, 2009). Photographs reflect the design of the product or service and can induce different emotional states and expectations (Desmet, 2002), being one of the great reasons why the consumer opts for one product instead of another (Mishra et al., 2015). In the case of hotel photographs, the inclusion of features, such as the environment in which the hotel establishments are located, can allow the users to imagine enjoying the service and bring them closer to a possible purchase (Ha and Jang, 2012). Therefore, these visual elements are an important element in decision-making (Underwood and Klein, 2002).

The images stand as elements seeking to attract the attention of the user, but in the field of tourism have not proved to be overly studied (Li et al., 2016). Furthermore, the absence of studies on different patterns of visual attention according to the type of navigation and user age aroused the interest on this matter. In this way, the current analysis fills the research gap in the existing literature and the theoretical principles that support these differences are described below.

Type of navigation and user in the experience of a website

It should be noted that when generating an experience on a website, it must generate

acceptance and be easy to use for the user (user-friendly), resulting in a usefulness and pleasant feeling. In addition, this experience can be guided by intrinsic and extrinsic motivations that vary depending on whether the user who visits a website has a goal or objective or, on the contrary, is only freely browsing, being a determining or moderating factor of the user experience (Sánchez-Franco and Roldán, 2005). Despite the lack in research that denotes the best positioning of the images on a website, there are some studies about the position of other graphic elements. In this research, we found a study on how banners ads are recognized by the user, where the best location is in the upper part rather than in the lower one (Li and Bukovac, 1999), and more specifically within the upper left zone (Nielsen, 2000). In the Li and Bukovac (1999) study, the dependent variables were: a) brand recall via self-report questionnaire and b) clicks on the banner ad and their reaction time via an online tracking program. In addition, other studies show: a) that these banners have little interest in users seeking information or being advanced in Internet use (Pagendam and Schaumburg, 2001), since they focus on their goals and not on elements that do not have relevance (Allport, 1987), and b) that such attention varies according to how advanced the search is (Wang and Day, 2007). The opposite occurs when there is a navigation without goals, in which the stimuli of elements, such as an image, can attract more attention from the users (Bekkering and Neggers, 2002).

When a website shows the information that users search and tasks are done quickly and easily, trust increases and this influences purchasing decisions (Chen et al., 1999), being the organization of the web environment an essential aspect to avoid confusion and generate rapidity (Chen et al., 2002) for which elements, such as photographs, are shown as an asset to also generate entertainment and improve the positive attitude of the client (Raney, et al., 2003).

In addition, we consider that age can also have a decisive effect on visual attention. In particular, "Millennials" are considered a generation that has grown with technology, resulting in the vast majority searching for their trips through the Internet.

The eye tracking study carried out by Mikalef, Sharma, Pappas and Giannakos (2017) shows that consumers with high experience in a social commerce website spend more time on the images of a selected product and in its details than on other elements, comparing these two forms of information with each other, leaving aside the zoomed image to choose or not that product. In addition, the negative reviews from other customers also have great influence to discard that product. However, in a more recent study (Mikalef, et al., 2018) also through an eye tracking approach, it was concluded that high engagement (measured as peak saccadic velocity) in a product only differs when looking at images and zoomed images. Therefore, it is relevant to understand the value of visual cues when deciding on a product, and specifically being able to see the details.

Mikalef et al. (2018) used several measures associated with distinct cognitive mechanisms that can be identified applying an eye tracking study: a) 'engagement' through the peak saccadic velocity or percent of the saccade length when the maximum velocity was reached, b) 'cognitive processing' through the pupil diameter, which is related to the proxy of the mental activity during a specific task and c) 'observation' through the average period of time during which the gaze is relatively stable. The present study focuses on this 'observation' mechanism through several fixation measurement (as fixations until get the image, number of fixations or fixation duration). Some studies have observed the differences that occur on a website where users belong to the "Millennial generation" and others that are of the so-called "baby boom" generation. These indicate how the confidence variable determines the final purchase

intention. For baby boomers, easy navigability and information from the provider is sufficient, although they tend to be more sceptical of buying online and share less information.

Those websites aimed at selling products for the baby boomer generation should place a lot of emphasis on having elements, such as the privacy policy, easily visible on the website. On the other hand, the websites destined to sell products for the Millennial generation must have search boxes that improve navigability, as well as recommendations and reviews by other consumers (Obal and Kunz, 2013).

Other studies carried out by the eye tracking technique (Djamasbi et al, 2008) show and corroborate how the Millennial generation or 'Y generation' has a predilection for websites that include, in addition to search functions, a large main image, since these elements were those that showed higher fixation levels in relation to others. In addition, having images of celebrities also slightly increased the number of fixations (Hernández-Méndez and Muñoz-Leiva, 2015).

Further research shows how presenting simplified texts and using simple language is beneficial for Millennial users, reducing cognitive effort, decreasing fixation and increasing the user's saccades (Djamasbi, Shojaeizadeh, Chen and Rochford, 2016).

Therefore, the question of whether different age groups (Millennials vs. non-Millennials) show different visualization patterns on the main image of a website will be analysed.

Research proposal and structure

This study is intended to assess the effectiveness of the main image within a hotel website, used often as a header image. The absence of studies that have been previously responsible for this analysis aroused interest in this matter. As has been shown, these

images have a determining role when it comes to making a decision to book a hotel online. The proposed experiment allows checking how these images influence the pattern or metrics of visual attention of users as well as their cognitive processing. Specifically, the area in which users register a greater interest in visualizing the main image of the hotel will be verified. In addition, other complementary analyses will be carried out, such as determining whether the type of user (goal-oriented or free navigation) or belonging in the 'Millennial generation', influences a greater or lesser fixation on such images, and some interactions between these classification variables will be considered.

To do this, the paper is structured in different sections. In the next section a literature review is made to justify several research hypotheses. In the third section the main methodological aspects are shown. The methodology of data collection was based on the technique of eye tracking and a post-test questionnaire. This eye tracking technology is very interesting for analysing eye movements and the bindings that occur on specific areas of interest (Hughes et al., 2003). In our case, the main image exposed in the webpage of the hotel. Finally, the main results are presented and the paper ends with the main conclusions and recommendations.

Literature Review

Influence of images in the website and its fixation by individuals

The objective of companies when creating webpages is to make them as attractive as possible so that consumers' first impressions and attitudes are positive (Burke et al., 2005). In this context, it is essential that the interface conveying information has an attractive design for potential buyers (Demangeot and Broderick, 2010), using at the

same time elements that generate content that is visually attractive and lead to intentions of purchasing (Dedeke, 2016).

In addition, users can assess the visual appeal of the website in a very small interval of time since they accessed it, establishing in a few previous searches a period of only 50 milliseconds to make a good first impression (e.g., Lindgaard et al., 2006). This forces designers or webmasters to place the most interesting elements in the most appropriate place to form a positive opinion in the first moments of the visit.

When talking about a topic as intangible as tourism, images play an essential role for tourists to know the service that companies provide to their customers. Underwood and Klein (2002) already mentioned the importance of images to report and generate positive attitudes among buyers, providing a better brand image for companies in the industrial sector. Turning to the tourism field, the attitude toward the hotel becomes more positive if: a) the website incorporates images that describe the place, b) presents an image of that establishment and c) it is possible to start enjoying the experience before making the trip (Walters et al., 2007).

Phelan et al. (2011) state in their study that the participants, after being subjected to a qualitative and quantitative analysis, indicated in 70% of the cases that the inclusion of images on the hotel website was the most important factor for them. The lack of this element for the user resulted in a "difficult search online if you do not see the product" or "not want to stay" in the hotel, and that the inclusion of the same presuppose the feeling of "having a desire to be there" and "see if it's worth what you pay for".

To address the relevance of including images on a website, Scott (1994) proposed the 'theory of visual rhetoric', which alludes to the fact that images are important visual elements to convey messages and to reduce cognitive efforts at the time to market

something, influencing consumer behaviour (Goodrich, 2011). Based on the exposure and visualization of these elements, they will contribute to making purchase decisions according to the studies of Park and Srinivasan (1994), since the images are representations of reality that avoid the cognitive process and allow the user to imagine using the object or service (Scott, 1994).

As a result, the users of a hotel acquired the service before they can enjoy it, therefore, the attractive photographs of the functional and aesthetic design of the same, as well as the platform in which they are located (their website), allows the creation of mental images that provoke emotions (Baek and Ok, 2017).

When a website is accessed for the first time, users will have an initial impression of the interface. It is at this stage that they will check whether they want to continue browsing the web or abandon it (Li et al., 2009). Between the first two and ten seconds, the user performs a sweep over titles, images, classifications, etc. (Fogg, 2003), leaving the website between ten and twenty seconds later (Nielsen and Pernice, 2010). The Nielsen and Pernice (2010) study was a comprehensive three-year study based on eye tracking-based analyse usability in 1.5 million instances where users look at websites to understand how the human eyes interact with design.

The inclusion of graphic components also allows the reduction of the quantity of text that appears in a website, avoiding an overload of information that complicates the decision making for the consumer (Mitchell et al., 2005). The studies carried out by Pan and Zhang (2010) show that when there are images, the cognitive load decreases, since they are easier to evaluate, resulting in a more pleasant experience on the website and greater interest on the part of tourists.

Another reason that indicates the mandatory nature of accommodating the graphic

elements in a suitable place, which increases the fixations, is the result of the state of boredom that the users are experiencing as time progresses while browsing the website, which can lead to a loss of effectiveness or in the worst-case scenario, not looking at them (Eastwood et al., 2012).

The importance of the role of images within the content of a website for users to decide whether or not to stay in a hotel establishment is also reflected in the studies conducted by Noone and Robson (2014). In this study, the number of fixations that users made during the search phase in the images of different hotels was only surpassed by the name of the hotel, the price and some comments. However, when the user had to decide on a particular hotel to make a booking, the number of fixations in the images increased much more until it became the main component in which the users looked to decide. Under this methodology, Mikalef et al. (2017) found that there was no difference between the proportions of the total time spent on the price or zoomed images.

Studies such as the Djamasbi et al. (2010) influence the way of navigating from top to bottom and left to right, where the low area was not even visualized in some occasions (Castelluccio, 2004), leaving the first three fixations in the upper area. In these studies, the objective was discovering a direction of visual patterns. Concretely, the Djamasbi et al. (2010) study applies the eye tracking methodology to test the effect of images of faces on the visual appeal, efficiency, and trustworthiness of a finance-centered website. The study found that the participants completed the task requiring information from the left side faster than the task located on the right side.

There is, therefore, a visual hierarchy, which is created by the appropriate position within the interface of the webpage of those elements most important in communication, such as text and images (determinants in the visualization of the web).

In this regard, researches reveal that those elements which are situated on the top are perceived more significantly (Faraday, 2000). Consequently, the top left zone is the most suitable for the images following the recommendations made by Nielsen (2000).

When users access a website, their first fixations do not occur randomly, since they usually have preferences in these initial looks. Therefore, the shorter the time until the first fixation in an area of interest (AOI), the greater the technical usability and usefulness and, in the case of the elements located in the web, the more attractive and better properties it will have to attract the attention of the user. However, these data do not permit explaining how the rest of the web search process will be developed, so other elements must be considered, such as the number of times a user places his or her eyes within the different AOIs. In general, the initial fixations usually occur in the upper area of the web, producing a top-down sweep that rarely develops otherwise (Byrne et al., 1999).

Besides, websites that require a greater number of fixations of some of their components seem to confirm that their interpretation requires a longer process. If the user has not yet processed all the relevant information that this area provides, there will be no reason for a saccade (or rapid movement between fixations) that initiates a new cognitive process in another area. Therefore, the duration of the fixations indicates the time necessary to process that figure that is visualizing, and a long duration can be a good sign of attracting attention (Goldberg and Kotval, 1999; Just and Carpenter, 1976). The position adopted for the present research is aligned with this second approach.

Based on the research question and literature review, the following research hypotheses are proposed:

H1a: Individuals will show a shorter fixation time until the image is reached when it is

placed in an upper area of the website of the hotel compared to a lower area of the interface.

H1b: Individuals will fix their gaze a greater number of times on the main image when it is in the upper area.

H1c: Individuals will fix their gaze longer on the main image when it is in the upper area.

Attention to images based on a search with or without goals by the user

Websites and social networks have different characteristics with respect to a physical store, since sellers and consumers act to create personalized content (Mikalef et al., 2012), which can give an opinion based on two points of view on the part of the potential buyer. In this aspect, Filieri (2015) talks about trade environments with information sources that contain informative and normative factors. The first represents the price, the technical characteristics and images of the miniature and enlarged product (Wells, et al., 2011); whereas the normative ones represent the social aggregation; the opinions of the multitude that values the product by scores represented by star systems, for example. Ye et al. (2011) concluded that an increase in this rating caused an increase in bookings in the hotel sector within their study. Yoo and Kim (2014) even corroborate that the possibility of interacting with visual cues (such as zooming the images) has a significant relationship and effects to the consumer's buying behavior.

Therefore, the information can be produced in various formats that improve consumer purchase intentions, thus going through different types of information to have a holistic view of the product (Chen et al., 2016).

Park et al. (2007) differentiate between users with high or low involvement when

navigating a particular website, and those with high browsing navigate with a goal and focus on finding information to carry out a task, ignoring the information that is not useful to them. The satisfaction of these users will depend on whether or not they find what they were looking for and if they do it with greater control and ease, so the website must contain a design and relevant information. On the other hand, users with low involvement do not have goals and navigate seeking enjoyment or entertainment without directing their attention to a specific point (Wolfenbarger and Gilly, 2001). Therefore, the design and information can be varied (Kaltcheva and Weitz, 2006) allowing peripheral elements to also attract users' attention.

Other researches, such as the one carried out by Park and Srinivasan (1994), assure that users who only browse the web, without a clear goal, will be more open to a possible purchase if the website uses attractive elements, such as images, among others. Therefore, different studies showed that the users' navigation styles affect their performance on the webpage and, depending on whether the user is in an exploration mode or is immersed in the search to comply with a goal, the behaviour will be affected by such a task. Djamasbi et al. (2010) conducted a study in which the participants carried out a navigation without goals where they had a greater volume of fixations in images on the high zone of a web. When the user navigates to reach a goal, the existence of a web hierarchy will permit the information is organized and easy to reach.

This will enable them to develop the tasks faster, increasing control, something that does not happen with clients who navigate without a clear goal, and whose control is low (Hsieh et al., 2014).

According to the aforementioned studies, when the user is exploring the website without a fixed goal, the elements on each page receive peripheral stimuli that can compete with

each other so that the user gives more attention since it is not giving attention to a specific position. In the case of the users being in the middle of the search phase to reach a goal, attention on the remaining elements will descend and focus of their centre of interest (Danaher and Mullarkey, 2003).

In relation to the content displayed on a website, it is relevant mainly for users with a task or objective, who spend more time seeing the components that meet their goal (Gallagher et al., 2001). On the other hand, the average duration of fixations, when the user faces several tasks, usually depends on the complexity involved and the stimulation generated in the individual. This duration is about 290 ms over static elements, achieving fixations of longer duration in situations where the user adheres more to achieving a specific goal than in mere exploration tasks.

Users that are not oriented towards goals do not look at specific points (Burke et al., 2005), and it is desirable that they have a feeling of high enjoyment towards a website, since this will increase the perceived usefulness of the website and sales can occur. Other goal-oriented users do not need an easier experience, since their attitude toward the website is based on achieving their goals, generating this usefulness, since seeing their time reduced to reach this goal, they will tend to ignore all the elements that neither arouse nor generate usefulness (Burke et al., 2005).

Given the absence of studies that focus on where it is more convenient to place the main image on a website, depending on whether users are looking for something on the Internet (such as checking availability of a hotel room) or without a clear goal (only searching for information), it is necessary to propose alternative approaches that analyse the fixation pattern generated by the images according to these types of users. For this, some studies have tried to see how banner ads affect the attention of the user, showing

that the banner is more effective in users who only limit themselves to navigate aimlessly (Hamborg et al., 2012).

On the other hand, when the user is in a pondering phase and thus navigating without a clear goal, in an exploratory mode, the number of fixations on images increases considerably and outranks other elements, such as brand or price (Noone and Robson, 2014).

In fact, the Pieters and Wedel (2007) study indicates that the greatest number of fixations on the images within a webpage occurs when the user is trying to know the brand and, therefore, in a navigation mode.

Based on the provided literature, the research hypotheses proposed are:

H2a: Users who browse the website with a goal will fix their gaze on the main image later than those without it.

H2b: Users with a goal will tend to arrive before the main image when it is above, than those who do not have it, when it is below.

H2c: Users who browse the website with a goal will fix their gaze on the main image less times than those without it.

H2d: Users who browse the website with a task or goal will fix their gaze on the main image less than those without it.

The influence of the 'Millennial generation' in fixing images on hotel websites

For some authors, such as Sorace et al. (2005), age is one of the factors with high explanatory power of online purchases, with young people seeking greater online information, and older ones with a higher purchase rate after searching. This process

seeks to find true, accurate and attractive information, deepening the relationship with the brand through portals and digital media.

Given that the behaviour on the web is influenced by age (Kaspar et al., 2011), we also speak of younger generations that have had contact with technology from a very early age, having always been part of their lives. They use it in a more active way to look for any activity related to tourism and how to plan their next trips, being more committed to this activity, which gives them a greater level of skills when checking the different means of communication.

In addition, the survey conducted by Destination Analysts (2015) shows that distinct generations have been involved in the Travel 2.0 tools or websites in different degrees, being more used in Generation Y or the so-called 'Millennials', taking advantage of more and better information available on the web. According to the Spanish International Institute of Digital Marketing (IIEMD), they are known as the children of the *Baby Boom* generation.

As a result, we have a growing segment that increasingly shows itself as a more interesting target audience using Internet and its digital resources - Generation Y. This generation is formed by young people between 24 and 39 years old currently, or born between 1979 and 1994 (Kotler and Keller, 2012) or between 1982 and 2004 who have lived and grown up with technology and, therefore, exposed to Internet throughout their lives, being very active on the web, both in offering content and taking advantage of the opportunities that the net offers, including travel reviews (Fox, 2008). These are experienced tourists, since they have had more possibilities to travel than previous generations, so are much more active when planning trips (Benckendorff et al., 2010). It is a generation that usually buys online, focusing a lot on the aesthetics that a website

shows, as well as on images and other elements of entertainment (as the image of an establishment), thus generating positive attitudes towards a possible purchase (Cyr, 2014).

This generation is characterized by boredom when reading relatively long texts, so entering images on the web may be successful to provoke greater visual attention (Nielsen, 2005). Some research, such as Tullis and Tullis (2007), shows that, in addition, a large image is attractive for this generation, and positive correlations are found between both variables, meaning a large image that occupies at least 40% of the page in question (Djamasbi et al., 2010). In addition, the eye tracking-based studies of these authors indicated that the participants were fixed on large images within the first two fixations that were produced, classifying their pages as more attractive than the rest. Besides, the greater visualizations were concentrated in the upper area and within the first five seconds that users began to see the webpage, since this area is more striking due to the visual hierarchy established by Faraday (2000). Hoyer and Ingolfsdottir (2003), for example, also indicate that users experienced in surfing the web, as members of the Millennial generation, make more lasting visualizations in elements of the web that are of their interest.

On the contrary, some studies show that users who belong to this generation are more experienced in browsing within the web, so they make fewer fixations when processing content and information, given their greater cognitive capacity (Drèze and Hussherr, 2003). Consequently, they do not repeat the same image too many times in comparison to users without excessive browsing experience, who dedicate more time and a greater number of visualizations to the components (Hölscher and Strube, 2000).

From the previous principles based on greater experience and cognitive capacity, which

are presupposed to these members, the proposed hypotheses are:

H3a: Users who belong to the Millennial generation will be less interested in making the first fixation on the main image than those who do not belong to it.

H3b: Users who belong to the Millennial generation will make a smaller number of fixations on the main image than those that do not belong to it.

H3c: Users who belong to the Millennial generation will perform shorter duration of the fixations than those who do not belong to it.

Methodology

Fieldwork

The fieldwork of the study was carried out from July 6 to 14, 2016 in the Department of Psychology at the University of the Algarve (Faro, Portugal). The sample consisted of 48 participants (24 men and 24 women) with ages ranging from 16 years old onwards.

The method chosen to recruit participants was convenience sampling (not probabilistic), although balance of gender and age distribution was considered. In order to carry out their participation, formal and written consent was required, in addition to confirming that participants had normal or corrected-to-normal vision. Each participant was rewarded 10 euros to cover transport costs to the laboratory. The experiment protocol was approved by the Ethics Committee of the Faculty of Medicine of the University of Granada, as well as the School of Business, Hospitality and Tourism of the University of the Algarve.

In order to recreate conditions as close as possible to a home environment, data was collected in a laboratory with no external noise and with an ambient light of about 200 Lux, following the recommendations of the International Telecommunication Union

(ITU, 2002).

Eye tracking system

The recording system for eye movements was the SMI Red500 remote system [SensoMotoric Instruments (SMI), Berlin, Germany], a screen-based eye tracker with high recording speed (500Hz 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 ocular movements are picked up by the eye tracker, through an infrared light reflected in the centre of the pupil and the visual fixation coordinates on the monitor are recorded (Goldberg and Kotval, 1999). This system was installed in a 19-inch laptop, whose resolution was 1680x1050 pixels (Figure 1).

Figure 1. SMI Red 500 eye tracker used



Eye tracking methodology is especially adequate for recording and analysing the visual fixations on areas or points of interest on a web page. This methodology can be applied to situations where the user is navigating, either freely or with some goal (Hughes et al., 2004). Fixations are particularly relevant since they correspond to a strong cognitive

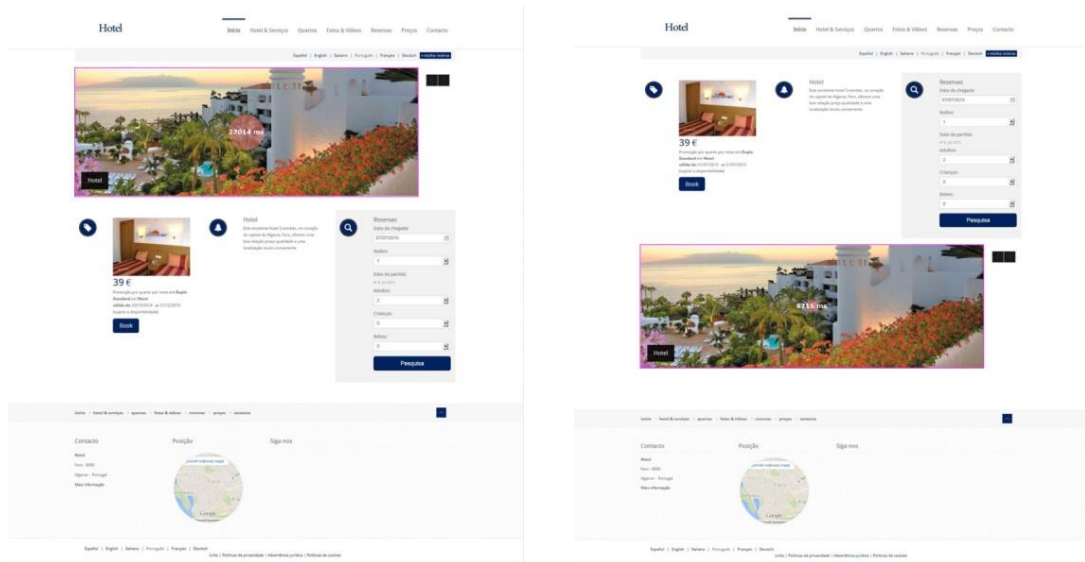
process of visual information (Pan et al., 2004). Thus, fixation position and their duration allow identifying the fundamental elements on a web page that attract attention and contribute to form the first opinion regarding the attractiveness of the page. In this way, it is possible to know which components generate more interest in the user, observing the “scanpath” or visualization pattern and discovering where the attention focus is going as the experiment progresses (Djamasbi et al., 2010).

In the field of tourism, eye tracking methodology has not been used frequently (Marchiori and Cantoni, 2015; Wang and Sparks, 2016); data about user’s responses to tourist images have been traditionally collected through surveys or self-reports (e.g., Cyr et al., 2009). However, the subjectivity of these methodologies has led to the emergence of biases and errors; using alternative methodologies, such as eye tracking, make it possible to overcome such difficulties and gradually extend their use (Wang and Sparks, 2016).

Design and experimental scenario

The experimental scenario was a website of an imaginary hotel where bookings could be made. This website had the typical elements that can be found in any Internet environment, such as navigation menus, banners, informative contents or the physical location of the company. The principal stimulus under study was the website’s main image [our area of interest (AOI)], a large photograph of the exterior of the hotel, showing the environment where it is located, with the sea in the background (see Figure 2a and 2b).

Figure 2. Website with AOI located above (a) and below (b)



The main image of the hotel was presented in two different versions on the website: in one version, the main image was located at the top of the web page; in the other version, the main image was located in a lower area of the web page.

Given the objectives of the study, participants were randomly allocated to four experimental conditions, defined according to the location of the main image in the website and to the type of task required (see Table 1). Participants' randomization was stratified by gender and guaranteed a minimum external validity, as well as internal validity to the experiment (Zikmund, 2003).

Table 1. Experimental groups, image position and task attribution

Experimental group	Image position	Task	No. of participants
GE1	Above	Yes	12
GE2	Above	No	12
GE3	Below	Yes	12
GE4	Below	No	12

Different task instructions were given at the beginning of the experiment, in order to

manipulate participants' navigation mode. The task required for groups GE1 and GE3 was to check the availability of free rooms for a specific day, while groups GE2 and GE4 had no task assigned and participants could navigate the website freely.

Finally, the sample was divided in two groups according to age: Millennials (16 out of 48 participants, 33%, with an average age of 27.4 years) and non-Millennials (32 out of 48 users, 67%, with an average age of 38.1 years). Since this third variable was neither experimentally manipulated nor randomised, it is important to perform and evaluate its association with the other two variables in the experiment (Image position and Task), in order to guarantee statistical independence between independent variables (Muñoz-Leiva, 2008). Chi-square association tests revealed no association between these variables for the 5% significance level (Table 2 and 3); these results indicate that the effects of one independent variable do not reflect the effect of other independent variables considered in the experiment.

Table 2. Image position vs. Millennial (absolute frequencies)

		Millennial		Total
		Yes	No	
Image position	Above	5	19	24
	Bellow	11	13	24
Total		16	32	48

Chi square association test: $\chi^2=3.4$; d.f.=1; p=0.066

Table 3. Task vs. Millennial (absolute frequencies)

		Millennial		Total
		Yes	No	
Task	Yes	8	16	24
	No	8	16	24
Total		16	32	48

Chi square association test: $\chi^2=0.0$; d.f.=1; p=1.000

Data analysis

The eye tracking data were recorded and processed with BeGaze, the analysis software from SMI. Data about ocular fixations (time until first fixation in the AOI; number of fixations in the AOI; fixation duration) were then exported to be analysed with the statistical software IBM SPSS Statistics v.22. Statistical analysis included contingency tables analysis, as well as parametric and nonparametric tests to test group differences (independent samples t test, Mann-Whitney U test and Kruskal-Wallis H test). Rosenthal's R and Cohen's D statistics were computed to estimate the magnitude of differences between groups (Cohen, 1988; Rosenthal, 1991).

Results

Testing of research hypotheses

Considering the time needed to reach the main image (TFF), data were very revealing (Table 4): when the image was located on the top of the web page, the average time to reach it was short (413 milliseconds), denoting a greater efficiency for that position. Considering age groups (Millennials vs. non-Millennials), the time for first fixation in the image was much closer, although with a slight tendency favouring those from the Millennial generation (6094 ms vs. 6251 ms). Finally, participants without an assigned task fixed their gaze on the main image before participants who were given a task (3914

ms vs. 8484 ms).

In the case of the number of fixations (FC), the image positioned at the top received more fixations, with non-Millennials being the ones with the most fixations on it. On the other hand, users, without a goal-oriented navigation, are the ones who focus more on the image.

Finally, for the duration of the fixation (FD), the data obtained show how the image had a more lasting fixation, with the participants not belonging to the Millennial generation being the ones with the greatest fixation time, including users who have a goal in their navigation (see Table 5).

Table 4. Average TFF in the AOI (in ms), FC and FD according to factors.

Measure	Image position		<i>Millennial</i>		Task	
	Top	Bottom	Yes	No	Yes	No
TFF	413.625	11984.125	6094.375	6251.125	8484.083	3913.667
FC	57.167	32.708	37.563	48.625	30.417	59.458
FD	143.106	115.092	108.239	139.529	132.810	125.388

Taking in consideration the continuation of the study, below is a table crossing the position of the image with the classification variables (see Table 5). A quick glance over the following table shows how, for each of the categorical variables or factors (task and *Millennials*), the metrics of a greater visual attention (lesser TFF until reaching the AOI, higher FC or higher FD) are much greater when the image is placed at the top than when it is below.

Table 5. TFF, FC and FD according to assigned task and Millennial user (ms)

Factor		Position	TFF	FC	FD
Task	Yes	Top	330.83	42.50	161.56
		Bottom	16637.33	18.33	104.05
	No	Top	496.41	71.83	124.64
		Bottom	7330.91	47.08	126.12
Millennial	Yes	Top	225.60	47.40	135.30
		Bottom	8762	33.09	95.93
	No	Top	463.10	59.73	145.15
		Bottom	14710.53	32.38	131.30

As for the hypothesis H1a, a Student's T-test was performed for difference of means in the case of independent samples defined by the position of the image for the first variable (TFF). The results show a significant effect of the position on the attention measured from TFF ($T = -4.781$; $d.f. = 23.085$; $p = 0.000$). When the basic assumption of normality for the test applied in the Kolmogorov-Smirnov (K-S) test was not met, this result was supported with the nonparametric test U of Mann-Whitney, being confirmed this effect previously found ($U = 33.000$; $Z = -5.229$; $p = 0.000$). In addition, to make the analyses carried out even more robust, another test was carried out on the Rosenthal's R effect size, in order to know the difference between the groups, confirming that this could be considered large (-0.764). Therefore, we accept the proposed hypothesis H1a. The image, therefore, when placed above, receives fixations faster (413.625 ms) than when located below (11,984.125 ms; see Table 5).

For the hypothesis H1b, in the case of FC, the data did not reveal the existence of significant differences with the parametric test ($T = 2.055$; $df = 46$; $p = 0.460$), maybe

because of a problem with the sample size. However, the nonparametric Mann-Whitney test ($U = 179.000$; $Z = -2.248$; $p = 0.025$) shows a significant difference, and a small effect size (-0.324). Therefore, there is evidence to confirm the proposed hypothesis, with the aforementioned means being statistically different. These stand at 57.167 with the image above, and 32.708 with the image positioned below.

As for the H1c, in the case of FD, the Student's T-test yielded some results that slightly supported it ($T = 1.906$; $d.f. = 46$; $p = 0.063$), as there were significant differences for an error of 10%. In this case, Cohen's D was applied to study the differences between groups, and a value of 0.556 was obtained, which indicates an average difference. The image above had a duration of 143.106 ms, compared to 115.092 ms for the image below.

Regarding the hypothesis H2a, which stated that the individuals without a task would focus on the main image the parametric and nonparametric tests applied (in non-compliance of a normality assumption: $p = 0.000$), which showed the absence of a task effect on visual attention measured as TFF ($T = 1.585$, $df = 28.465$; $p = 0.124$; $U = 282.500$; $Z = -0.114$; $p = 0.909$). Therefore, hypothesis H2a is not confirmed.

As for the fifth hypothesis (H2b), and unable to perform an ANOVA analysis because the test rejected that the data followed a normal distribution ($p = 0.00$), the non-parametric Kruskal-Wallis test was applied. Through this test it was possible to check if there were significant differences between the time it took for the participants to arrive at the image located above, when they had a task, to those who did not. The level of significance did not reach 5% ($H = -20.792$, $p = 0.001$), confirming the established alternative hypothesis (H2b), with a time of 330.83 ms in users with a task and the image above, and 7330.91 ms without a task and with the image below.

For the following hypothesis (H2c), the T test was used again, and the comparison of the number of fixations in the main image, according to the type of user, was analysed. The results of the test ($T = -2.488$; d.f. = 46; $p = 0.017$) recommended not rejecting the hypothesis proposed. Again, the normality test of K-S did not yield a favourable result for the normal distribution of the data, so a Mann-Whitney U was carried out to corroborate the findings ($U = 148.500$; $Z = -2.877$; $p = 0.004$). The Rosenthal's R indicated a relatively low difference between the groups (-0.415). In any case, the proposed hypothesis can be accepted, being the FC in users without a task of 59.458.

The following hypothesis (H2d) proposed a difference between the average FD in users with and without a task. Under the assumption of normality, the T test for difference of means ($T = 0.487$; d.f. = 31.722; $p = 0.629$) does not find empirical evidence to confirm the proposed hypothesis. In particular, users with tasks obtained an average FD in the image of 132.810 ms., a slightly higher value than corresponding ones without a task (125.388 ms).

In the last section of the literature, the fixations made by users of the Millennial generation and how it influenced this metric variable was analysed. Once again, a comparison of means based on the Student's T test was carried out for the first of the proposed hypotheses (H3a). In this case, the TFF in the main image, by the members of the said generation, was analysed, stating that they took less time to achieve a fixation on the image. The K-S test indicated the absence of normal distribution in the data, so the result was contrasted with a Mann-Whitney U whose values ($U = 254.500$, $Z = -0.033$, $p = 0.974$) confirmed that there are no statistically significant differences.

For the second hypotheses in this section (H3b) relative to the FC, the test did not confirm the hypothesis ($T = -0.845$; d.f. = 46; $p = 0.402$). The K-S test, evidencing a

lack of normality in the data ($p = 0.000$), recommended supporting this result obtained by the Mann-Whitney U ($U = 236.500$; $Z = -0.427$; $p = 0.670$), finally rejecting the proposed hypothesis.

The third of the hypotheses (H3c) carried out a comparison of means in terms of the FD on the main image. The T statistic values indicated that it is possible to confirm what is stated by the hypothesis, in terms of the existence of significant differences, with a level of significance of 5% ($T = -2.016$, d.f. = 46; $p = 0.050$). The Cohen's D showed a moderate difference between groups (-0.642); in particular, the average duration value in the group of Millennials was 108.239 ms and the non-Millennials group was 139.529 ms.

Table 6. Summary of the hypotheses and decision adopted

Hypotheses	Results	Decision
H1a	$U = 33.000$; $Z = -5.229$; $p = 0.000$	Confirmed
H1b	$U = 179.000$; $Z = -2.248$; $p = 0.025$	Confirmed
H1c	$T = 1.906$; d.f. = 46; $p = 0.063$	Confirmed*
H2a	$U = 282.500$; $Z = -0.114$; $p = 0.909$	Rejected
H2b	$H = -20.792$; $p = 0.001$	Confirmed
H2c	$U = 148.500$; $Z = -2.877$; $p = 0.004$	Confirmed
H2d	$T = 0.487$; d.f. = 31.722; $p = 0.629$	Rejected
H3a	$U = 254.500$; $Z = -0.033$; $p = 0.974$	Rejected
H3b	$U = 236.500$; $Z = -0.427$; $p = 0.670$	Rejected
H3c	$T = -2.016$; d.f. = 46; $p = 0.050$	Confirmed

* we accept quasi-significant differences with a level of significance of 10%.

Conclusions

The study of graphic elements showing the facilities of a tourist establishment seem to

be a fundamental element that quickly causes a global image of the establishment itself and the environment where it is located. Some studies considered (eg, Lindgaard et al., 2006; Li et al., 2009) analysing the degree of attractiveness that the website can generate within the first moments the user enters the website; the first impression being what determines the abandonment or not of the visitor.

Therefore, regardless of how the images are displayed, the position also plays a fundamental role in giving greater presence and interest. In the literature review, the process of visual hierarchy proposed by Faraday (2000) was mentioned. In this sense, the visual attention placed on the main image of the web (in terms of time of fixation until arriving at it –TFF–, the number of fixations –FC– and the duration of the same –FD–), at first, seemed oriented to the upper area of the website, among all the users who were part of the experiment.

The FC turned out to be different when the image was in an upper position in the interface, although in the case of FD the differences are almost significant. In this way, it can be seen how the image elicits a high degree of interest in the first moments of visit when it is located in an upper area, which also translates into a high fixation period, having a number of fasteners higher when it is at the top. This indicates that the image seems to achieve the objective of attracting attention at the same time as providing interesting information, thus being more effective in that position. Therefore, it can be confirmed that the image, a priori, and without studying other elements of the web, must be located above and be one of the first visual references.

When the users had to perform the experiment based on a goal-oriented navigation (in our case making a booking) or free form, a fixation in ‘F’ was produced again in some as in other participants, as identified by Nielsen and Pernice (2010).

For the first hypothesis, the users with a task were assumed a fixation time until reaching the main image, which was lower than the users without a task. However, it was not confirmed since both took approximately the same TFF, something that was probably due to having to perform an initial sweep in search of the goal element (the booking banner) or the self-interest generated by the image despite of the user task.

The first attempt made to carry out the second hypothesis, was to try to demonstrate that the user with a task really fixed at some point on the image before performing the same when it was above, despite that goal and given the visual hierarchy. In addition, this would be done before a user with free navigation with the image at the bottom; a participant that did not have the need to get to any particular element of the web before. This hypothesis was finally confirmed, in the sense that the effect of the visual hierarchy does not disappear even if the participants focus on reaching their goal, not neglecting non-central elements or with less cognitive processing as an image.

Regarding the FC on the image, users without a task proposed showed a lower interest in the main image by repeating its fixation on it, unlike the users with a task, who gave more fixations on the same image. This fact indicates that the observation in the main image will depend, in part, on the type of task to be carried out within a hotel website and, logically, the time available for users to carry it out.

In addition, taking in consideration the growing interest of the Millennial generation, characterized by a high usage and knowledge of the new technologies and a greater speed in carrying out searches on the web, it was hypothesized that these participants came before the main image, but this did not receive empirical evidence. As a result, there are no differences that invite us to think that the image can draw more visual attention to these participants than to those who do not integrate in the generation. As

can be deduced from the literature, in general, not only the Millennial generation is attracted to the images of a hotel, but also other users who access a website.

Only significant differences were found in the case of FD. In particular, it was proposed that this generation would have a high interest in the main image, but the fixation would be faster given their great cognitive capacity (Drèze and Hussherr, 2003). The results confirm that the fixation was longer in the group of users who did not belong to the Millennial generation; who do not need, given their greater experience of the web, a high time to process the cognitive load of the image, despite the high interest it arouses within a hotel website. This result could explain the reason why there is no difference between the number of fixations in both groups, which could be due to the fact that the members of the generation collect the cognitive load of the image with few fixations, and do not have the need to return their gaze to the image.

The most significant results are the ones that have to do with the position of the image, where it seems to be clear that the upper zone, given the theory of the visual hierarchy, is the most appropriate and effective place for its position. As well as the effects generated by carrying out tasks, the user with a goal pays less attention to the image due to the type of task to be done, thus eliminating interest in the rest of the elements. More relevant seems to be the results obtained by the users of the Millennial generation, whose literature showed significant differences, but which ultimately did not favour the expected results, according to FC and TFF. Although both members behaved the same way within the fixations on the web portal, there was a slightly higher average FD for users who do not belong to the Millennial generation.

Contributions and managerial implications

Our study has contributed to verify that the concepts of visual hierarchy continue to be valid in different generations and that an image is the initial target of attention even if

there is a goal and only differs in the attention time when the user has to perform a task. This allows defining communication and promotion strategies based on the fact that the images placed at the top of the screen are more effective for the sale of hotel products or services. To increase the effectiveness of a promotion or to involve a tourist more quickly, it is necessary to consider that it should always be associated with the presentation of an image associated with the offer.

In their marketing strategies, hotel managers have to consider that it is necessary to elaborate the communication campaigns accompanied by visual elements. Even if the tourist comes with a specific objective, it is the image that will arouse their first attention in the website.

The age or generation is not a relevant factor in defining different strategies to attract the client's attention. However, the hotel director may consider that if the visual elements have animation, it may arouse the interest of the Millennials more, since the time of fixation is lower when compared to the other group, which means they lose their attention more quickly, leading to the possibility of abandoning the website or the non-fulfilment of the purchase.

Since Millennials take less time to fix the image, it may be relevant for hoteliers to place animated images in their banner, thus drawing more the attention of the natives of this generation; things that capture the attention of the user, for example promotions of their accommodations, either to sell complementary products or to publicize events that are taking place in the tourist destination.

In terms of management implications, it is necessary to consider the development of images, graphic components or multimedia to include in the website of the hotel. Soon it will be necessary to integrate employees with training in graphic and / or multimedia design or require services of outsourcing in this area, in order to be able to pass the

message more effectively through banners placed on the hotel website, preferably at the top of the screen.

Limitations and future research

The present study confirms the existence of a series of limitations that should be considered when conducting new research on the same subject, thus raising new research questions.

In the development of the experiment, the randomness of the experimental participants was controlled, as well as obtaining a representation of the population to which they belong from gender and age quotas. Despite all this, the experiment was not exempt from the influence of other confounding variables given the artificial environment where it was developed, which could also affect the ecological validity of the results obtained to extrapolate them to reality.

During the course of the data analysis, a clear tendency has been observed to find in these a distribution that does not follow the normal one, which has led to apply nonparametric tests in most cases. In addition, the sample size was not excessively large, which could affect the accuracy of the results. Therefore, caution should be used when extrapolating the results. Future work should increase the number of participants. Besides, the control of the age, in order to separate Millennials and non-Millennial participants, would allow having more balanced groups in terms of size, thus exercising greater control over this variable.

Furthermore, a longer fixation could be caused by low readability of the image or a complex and difficult message to understand, but in our case, when using the same image any comparison between experimental groups would eliminate this effect that could bias the results. It would be also interesting to measure the attractiveness that the

image generates for each user, in order to control this perception in the data analysis.

Another possible improvement would be to expand the number of areas of interest and make comparisons with respect to the main image in terms of attention, in order to identify the other more effective regions. It could even expand the number of sociodemographic variables (gender, educational level, etc.), and behavioural variables (greater propensity to travel, etc.), and analyse their influence on visual attention, memory, and even more complex measures such as the CTR (click through rate). With regard to this last measure, it would be interesting to study possible relationships between the conversion rates of users based on their greater or lesser interest in the main image.

Under a holistic and profound approach, it would also be interesting to carry out a complete study of the stages through which consumers pass and not focus exclusively on the image in order to understand how they act within the entire purchasing decision process, including the study of other factors, such as price or complexity of the images and the details of the product (in our case the services provided by the accommodation). Distinct measures linked to cognitive processes should be analysed as dependent variables, such as (Mikalef et al., 2018): a) the peak saccadic velocity for users' level of 'engagement' processing or b) pupil diameter related to the proxy of the mental activity for the 'cognitive processing'.

The impact or role that trust exercises on both generations (Millennial and non-Millennial) should be considered. In addition, the study focuses on final consumers, although it is not known what happens with the visualizations of travel agency directors or even tour operators. On the other hand, it would be interesting to check the influence of the brand and its reputation on the intention to buy and trust.

Finally, the experiment was conducted in the Algarve region with an exclusively

Portuguese sample, although representative of the country's population. In this sense, it would be convenient to carry out this study in other geographical areas, and even expand the means used to plan trips to the mobile case.

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