Abstract
The growth of new technologies along with the advancement of neuroscience techniques/instruments/tools are allowing, both academic and marketing experts/professionals, for a better understanding of consumer behaviour in tourism communication.

The study focused on visual effects in different tourism advertisements. In detail, the aim of this study is to determine the effectiveness of neuroscientific techniques on the attentional evaluations in this context.

With the intention of achieving this end, a mixed experiment with eye-tracking technologies and self-administered questionnaires was conducted.

The results showed that individual’s eye gazes determine the greater acceptance of the advertisement by the participants. In other words, the eye gaze repetition in a heterogeneous group could indicate that a specific advertisement is able to hold the attention more efficiently than others. This study got a support to the use of technology applications for measuring visual attentional behaviours in advertising.

Likewise, findings suggest that the applied research on tourism could improve through the use of a “pre-neuroassessment” to foster the future advertisement creation.

Finally, the present study shows the first preliminary data of a larger project.

Keywords: Tourism, neuroscience, eye tracking, consumer behaviour.

JEL codes: M37, O32.
1. Introduction

According to the Valencia Region Tourist Board, the new tourism campaign of Valencia invites for a return to the region. The creative concept revolves around the idea of returning back to what makes us feel at ease during a tourist experience, and hence, the claim of the campaign is, “It’s time to come back”. The graphic images employed in this campaign around the authentic and unique elements of the Region promote an inclusive and open tourism to all social groups represented by young tourists, families, the most active tourists, senior social groups, and the LGBT segment.

We think that this is a good way to create the brand image of a tourist destination based on the unique benefits it offers in order to gain competitive advantages that help build trust and help increase the attraction and loyalty to the destination (Tamagni et al., 2013).

Generating benefits for the tourism sector must be brought about by correctly adapting to the ongoing changes (Sundbo et al., 2007) since tourism plays a key role in the economy. In fact, being abreast with the changes that occur in the environment and being aware of how these can affect a tourist destination are part of successful management (Aguayo et al., 2010). These changes are produced mainly by technological innovations that can improve the existing knowledge on the tastes of the tourists. In this regard, the progress of neuroscience in the last decade is setting a new trend in the field of tourism advertising industry and the new-age practices of the advertising industry are learning how to leverage and utilise the knowledge in understanding the influential factors as far as visual consumers’ attention is concerned. So the research on consumer behaviour conducted through the lens of neuroscience has enormous potential for research work as well as advertising in other areas of marketing (Vakratsas et al., 1999). These neuroscientific tools provide a fundamental knowledge on the research gap dealing with the perception of consumers and how that perception influences the gathering of information by them (Zaltman, 2003).

This study attempts to overcome the gaps in the knowledge on the behaviour of participants when they are viewing tourism advertising. The technologies used provide information regarding the visual journey that is undertaken during the viewing of a tourism announcement, and the way in which the constituent communicative elements manage to capture the attention of the subject.

Thus, the aim of this preliminary work is to determine which among the communicative elements presented to the participants are able to attract more attention. This study will also attempt to elucidate upon the ideal distribution of these elements at the attentional level.

The measurement of eye tracking allows for the recording of the eye’s reaction to certain stimuli (Horsley et al., 2014). This provides direct measurements of the eye movements without resorting to verbalisations based mainly on memory. According to Rosbergen et al. (1997), it is possible that a stimulus manages to capture the attention of a consumer but does not reach the stage of consciousness. In this case,
consumers do not have enough impression left upon their memory to report what has caught their attention. So eye-tracking techniques are better than research method of response-bias questionnaire. However, they have a more standardised approach to cognitive research than measures based solely on the memory (Krajewski et al., 2011). Thus, the methodological problems that underlie traditional approaches are cancelled out (Plassmann et al., 2007), and it is possible to understand the behaviour of tourists and even be able to predict what is going to be sold or how it should catch attention.

Through eye-tracking techniques, you can monitor and record the form in which a subject is looking at a certain image in order to know which areas specifically attract attention, for how long, and the order this visual exploration follows.

In the last ten years, eye-tracking systems of high precision and low cost have been developed in order to record eye movements as the eye is observing images in quasi-natural conditions (Wedel et al., 2008). These devices record the position of the eye focus multiple times per second (up to 300 times second in the high-end equipment). Distinguishing between the two basic movements of the eye, which are: (i) the fixations, during which the eye is relatively still, about still for about 200 to 500 milliseconds and (ii) the saccades, which are eye movements that are rapid for usually 20–40 milliseconds. The analysis of the eye tracking can indicate when the attention and interest components of the ads are waking up to the participant (Lee et al., 2012), thus finding what images may specifically be more effective in an ad in terms of stimulation of the visual processing and its positive influences on the interest generated in an advertisement.

Images have been of great importance in the field of tourism advertising. A single image can convey a complex idea and can deliver large amounts of information. Since the characteristics of tourism are intangible and cannot be experienced in advance, photography can help when promoting tourism on different platforms thus providing an holistic experience (Tussyadiah et al., 2009). Several studies have shown an interest in the study of photographic images in relation to tourism advertising (Dewar et al., 2007; Garrod, 2008; Lo et al., 2011; Markwell, 1997; Pan et al., 2014). Some of these studies have succeeded in demonstrating that the images that capture the attention of tourists (Lohse, 1997) generate the perception of the destination (Espelt et al., 2005; MacKay et al., 1997) and even affect the purchase decision (Underwood et al., 2002). However, existing research in this area has focused largely on the interpretations of the participants, viewing pictures pertaining to tourism, and how these interpretations affect the perceived images (Garrod, 2008; MacKay et al., 1997).

Some research has also paid interest to the study of tourism brochures in order to diagnose their effectiveness (Chang et al., 2005; Veen et al., 2014) or the effects of the images inserted in brochures of travel agencies (Laskeyet et al., 1994).

However, one of the well-known methods to evaluate the brochures, and in particular, their effectiveness, is to use questionnaires where preferences and attitudes are measured by scales (Chiou et al., 2011; Walters et al., 2007). In these questionnaires, the participants verbalise their emotional states through a series of manikins,
the SAM (Self-Assessment manikin) questionnaires, which represent different feelings through icons in addition to using the technique of “moment to moment”.

Thus, as discussed above, we can say that the questionnaires have been the most popular choice for reasons such as ease of interpretation or even the wealth of information offered through them (Paulhus & Vazire, 2007). However, questionnaires have limitations when it comes to the verbalisation of feelings in the tourism sector (Philip et al., 1997). Likewise, verbal or written responses are retrospective, i.e., the participant who is supposed to respond should be able to recollect at a later stage what was felt, and this retrospective action skews the answer.

On the other hand, the tourism industry invests large amounts of money when trying to attract tourists to different destinations (Mok et al., 1991; Ruhanen et al., 2013).

Investment in Spain in the field of tourism is mainly institutional (McWilliams et al., 1997; Morgan et al, 2012; Woodside et al, 2011). Within the context of neuroscience techniques, we want to demonstrate an alternative approach to improve the efficiency of tourism advertising.

2. Literature review

Tourism is based on the experience of tourist destinations influenced by moderate travel motivations. The emotional component is many times a determinant of the choice and evaluation of a tourist experience.

We understand that this combination of tourist destinations and tourism products offers an integrated tourist experience (Bigné, 2000). The same author defines it as an area that has characteristics recognised by potential visitors, which justifies its consideration as an entity and attracts trips to the same, also recognising it as a concept perceived by tourists (Bigné et al., 2001).

The need to at least have heard of a tourist destination is essential to form an image of it in order to process this information and store it in the memory. What is of strategic importance is the communications media that evoke the image of the destination position in the mind of the tourist. A tourist destination should establish a position strategy to achieve successful incorporation into the minds of potential tourists, thus differentiating itself in this way among its competitors in the minds of the target audience (Osácar et al., 2005). This position will be defined by a series of attributes associated with the destination.

In order to position how a tourist destination is promoted, the need to build the brand of the destination needs to be taken into account. Tourist brands have two dimensions, namely: (i) the cultural dimension that relates to the identity of the place and (ii) the communicative dimension that is responsible for transmitting that identity. According to Valls (1992), there is a clear synergy between both, and they maximise each other and generate the brand image, thus making it essential to work in both the dimensions with the aim of positioning a particular destination (Sanchez, 2005).
The communicative dimension employs the logo, which can be seen as an identifier of the brand (Costa, 1999). In addition to the logo, the symbol and the distinctive colours are also used systematically for creating the visual identity of the destination. In this way, the brand identifier comprises the integrated basic signs of the destination’s visual identity set. In this sense, the advertising communication should be designed taking into account the brand image to be achieved in the mind of the receiver and how ads can contribute to this consistent image and quality.

Now, the methodology development has proceeded to identify these basic signs corresponding to each of the analyzed results, and compares them with each other in order to test the visual effectiveness of each.

The hypotheses are part of a previous study that is framed within a larger project, as already described above. In this regard, the work done in this study is an analysis merely comprising descriptive statistics.

Thus, the following hypotheses arise:

\[ H1: \text{If there is a coincidence between sexes in visual pattern, this advertisement will be rated high in terms of preference.} \]
\[ H2: \text{The element of the ad that occupies the first place in the viewing pattern corresponds to the item that has caught the maximum attention.} \]

3. Methodology

After establishing their consent, the participants were first informed of the task they had to perform, which entailed viewing different tourist ads on a computer screen. After the participants were accommodated, they proceeded to perform calibration using nine calibration points, discarding the subjects with serious deviations in the calibration test. All eye-tracking systems need a previous calibration process to have been conducted. This is a simple and quick process; however, the problem lies with the subjects who cannot be calibrated, normally from 10–20\% (Jacob et al., 2003; Poole et al., 2004). Among the causes of problems in calibrating, the usage of glasses or contact lenses is one of the main ones (Goldberg et al., 2003).

Once the calibration was performed, participants proceeded to viewing ads chosen for the study. In order to avoid the effect of the position of the stimuli, these ads were presented randomly. Users were located in front of the screen of a computer connected to a tracker system called Tobii TX300. They envisioned a total of five tourist advertisements. Recent campaign of “Comunidad Valenciana” was chosen for this study along with four other randomised ads from the last season from other regions of Cataluña and Andalucía. After the viewing was finished, the participants filled out a questionnaire with personal data and answers on their preferences and memory recognition among the displayed ads.

The experimental work was conducted in the week from 23 to 27 May 2016. The sample consisted of a total of 25 people from both the sexes, where 47\% were women and 53\% were men. The sample was rewarded with a card worth 15\€.
The experiment was conducted in one of the rooms of the Laboratory LabLENI, recreating an usual living room to avoid conditioning the participants.

The experimental component corresponding to this work was based on trying to figure whether or not the viewing pattern of a group of participants can predict their preference towards a particular ad.

Through eye-tracking measures, it is possible to determine the movement of the eyes and the viewing patterns studied in a total of five ads. A descriptive analysis of the basic elements or the signs of visual communication that appear in all the advertisements was performed, which included (i) logo, (ii) claim, (iii) objects, (iv) persons, and (v) funds. This was done in order to determine which elements both within and among the ads have a greater influence at the attentional level. These differences were also evaluated based on the classification variables of the users analysed, with special reference to the gender of the study participants in an attempt to determine whether there are patterns of viewing that are found to be common between the subjects of different genders in context of the same ad.

An example of the graphic elements that have been selected to appear in most of the analysed results are shown in Figure 1. These are: (i) claim: “It’s time to go”; (ii) logo Comunitat Valenciana; (iii) funds, illustration funds; (iv) objects, in this case, the paella; and (v) logo Generalitat Valenciana.

Figure 1. Example of announcement, it has been called gastronomy.

As for the metric used and proposed in the scientific literature by Poole et al. (2004), the following were included: (i) the number of fixations – the greater the number of fixations, the greater the importance perceived by the user, (ii) duration of fixation – longer duration indicates greater difficulty in interpreting the contents of the area of the advertisement, (iii) spatial density of fixations – if the fixations are concentrated in a smaller area, this indicates that the visual search is being more efficient, but when the fixations are presented in a dispersed manner, this suggests that the search is proving to be less efficient, (iv) time to first fixation – indicates
the amount of time that it takes a respondent (or all respondents on an average) to look at a specific area of interest (AOI) from the stimulus onset. From the metrics described above, the time to first fixation time (TTFF, time to first fixation) and the number of fixations have been used.

Likewise, to present information in a more graphic way, heat maps are the most commonly used eye-tracking representation to present the results. It is usually presented showing temporal changes of fixations, adding the time utilised per participant. Summarising the analysed data in a visual way can offer an overview of the eye movements, allowing for the identification of those parts of the stimulus that capture more attention. An example of a heat map is shown in Figure 2.

Figure 2. Example of gastronomy’s heat map.

Likewise, ads have been divided into AOIs. The AOIs are studied to gain an understanding of the stimulus subdivisions that are of interest when extracting data. In this study, each ad has been divided into many AOIs as visual elements appearing therein. The metrics that are extracted from the AOIs are important because they measure the transition between them. In Figure 3, the divisions in terms of the AOIs established for the study is shown.

Figure 3. Example of AOI with their metrics.
Figure 4 contains all the ads that have been viewed by the participants.

Figure 4. Ads viewings: lgbt, mountain, gastronomy, the elderly and city of sciences.
4. Analysis and results

Towards drawing a comparison of hypothesis 1, metrics that seemed to have effect visually have been studied, such as time to first fixation and the number of fixations at the level of the AOI divided among the different ads and heat maps.

Noting the various heat maps, it is detected in three of the ads, specifically those called city of science, elderly, and lgbt (see Figure 4 for identification), that the fixations have a less scattered scheme in comparison to the other two (mountain, gastronomy), which in our opinion signifies that the information is clear and does not require much effort to view and understand (See Figure 5).

Figure 5. Example of a more dispersed heat map: gastronomy; heat map example of less dispersed: lgbt.
Besides the advertisements in which the heat map from fixations appeared less dispersed, only two heat maps have a display pattern that appears in the same order for both men and women. (city of science and lgbt) (see Figure 6). These results do not agree with the gender differences that are usually found in time to first fixation (TTFF) and time spent as well in the number of fixations at the genus level.

Figure 6. Pattern display ads that have less dispersion in the fixations: city of sciences and lgbt
Towards the end of the experiment, participants who had participated in eye-tracking answered a question in the questionnaire for which they had to see again the images previously displayed for expressing their preference in terms of the pleasure quotient. By studying the frequency of the responses, the qualifying order of the ads displayed was as follows: (1) city of sciences (2) mountain (3) lgbt (4) elderly. However, there was no clear occupant for the fifth position, and even the announcement of gastronomy was not clearly positioned. Hence, through this way, we can ensure that in the case of gastronomy ad, the position in the minds of consumers is not clearly determined, deduced by watching the dispersion of fixations in its heat map. Additionally, the first position in the ranking of voluntary preference coincides with the ad that showed a common visual pattern for both men and women.

While analysing the areas of interest, it is observed that in 70% of the cases, the claim of the announcement has sparked greater interest, capturing the attention of the participants in the study before any other element (Figure 6). Comparing the Time To First Fixation of the claim of the campaign, the moment in which the users have perceived the stimulus has been significantly low in both the ads (see Table 1) as
compared by gender (see table 2). These differences clearly indicate that the stimulus was easy to perceive and that has caught the attention of the participants.

Table 1. Number of fixations and TTFF on the claim AOI compared between ads.
The results indicate that there is empirical evidence supporting the premise expressed in the hypothesis 1. Likewise, it can also been seen that when the fixations are more concentrated, the preference degree is higher. The bias of verbalised preference is also evident. The results in the order of preference put first the city of sciences announcement and third the announcement called LGBT, where both visual preference and viewing pattern is ranked second.

On the other hand, the element of visual identity listed first in the order of viewing (claim) was also studied to offer evidence that effective data extracted from eye-tracking can identify which item captures mainly the attention in advertising creativity of this type, thus contrasting hypothesis 2.
5. Discussion and conclusions

Effective positioning of the tourist destination is performed in the mind. It is derived from the same imagination required for both the interaction with the target and the experience derived therefrom. As Um (1993) suggested, mental images for future consumption not only contribute to the perception, but also become facilitators for attaining tourist satisfaction. Hence, it is important to know the information presented in the tourist ads visuals.

Tourist destinations compete by investing lots of time, money, and effort in the creation of a positive image in order to make their own imaging more favourable than the competitors’ image, influencing this image even in the spending patterns of the tourists (Fridgen, 1984). Hence, the items that make an ad creative can be deduced through a thorough study. This is the fundamental basis when creating ads because by the means of this method we can ensure that attention is attracted by the items of interest, such that the attention of the tourists can be gathered to thereby generate a positive image of the destination. This study has tried to know the pattern of viewing and the element that captures attention, in order to show that the use of neuroscientific tools provides a new insight into the tourism sector. The contribution of neuroscientific techniques helps the tourism sector by enhancing the ability to record the tourists’ unconscious response to advertising. This response has been demonstrated in several studies to forward similar proposals, which say that our brain governs the final decision, and hence, there is interest in the quantification of metrics related to this. Specifically in the context of the part that works with the communication undertaken to promote tourist destinations, such a measure is essential because it facilitates adaptation to new trends, thus equating tourist brands with trademarks.

However, this study is not free of limitations, and one might think that the sample size is not large enough because research works done so far have been using traditionally a larger sample as those studies were being conducted solely through questionnaires. Even the lack of reliability poses problems when it comes to the generalisation of the finding or for opportunistic findings. In any case, and in contrast to this position, we must say that the number of participants is not necessarily small if one considers that most studies using neuroscientific techniques involve subjects designs and deal with more objective kinds of information that are sampled quite a number of times by second, creating a record of a single subject involving thousands of logging data, which, in this case, is eye-tracking. This suggests that for this type of experiments large samples are not necessary to achieve statistical meaningful results. Likewise, and considering the articles published in journals such as Journal of Consumer Research and the Journal of Marketing Research, it can be seen that there are several studies with 25–30 participants. However, considering the wide range of the sample population, it would be interesting to analyse whether the subjects were from different nationalities.

On the other hand, and since the work presented here is part of another more elaborate work, it could give the impression that the data has not yet been worked extensively, which would be a limitation if one takes into account only the
Exploratory nature of the same. For the same reason, there has been no data on the study conducted with participants belonging to different communities; however, it is a work that still remains to be done.

For future research, we can say that in the absence of the studies using neuroscientific techniques, the environment of Valencia could be of particular interest to develop a line of research that validates elements of analysis of visual communication using the techniques used at this work to ensure that future creatives can employ them. Additionally, the study of other measures, such as the brain response (EEG), heart rate variability (HRV), facial coding or skin conductance (GSR) can also be extended to fit into this domain of research. Also, other factors such as the impact of different formats or the context where these visual media contents are viewed also needs to be taken into account, assimilating in this way, the tourist brands and trademarks that work towards attracting attention, in order to understand the brain mechanisms underlying the success of advertisement proposed.

Thus, we think that this study, even with its limitations, can open a gap in the tourism sector that allows the possibility of including neuroscientific contributions to the design of tourism advertising. In the future, there may be neurodesigned content adapted to each type of tourist profile and even in accordance to the type of media exposure, ensuring better psycho-emotional impact on the sector for which it is intended.

References


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