

# Memorization of Brand marks in short-term

## Memorização das Marcas gráficas a curto prazo

Valente, J. Laginha, C. Raposo, D.

IPCB/ESALD - Escola Superior de Saúde Dr. Lopes Dias do Instituto Politécnico de Castelo Branco

IPCB/ESART - Escola Superior de Artes Aplicadas do Instituto Politécnico de Castelo Branco

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**RESUMO:** Este estudo tem como objetivo compreender o processo de memorização das Marcas gráficas (logótipo e símbolo), particularmente, revelando a relação entre os parâmetros de rastreamento ocular e a memorização de marca de curto prazo. Desenho / metodologia / abordagem - O estudo foi realizado online através da ferramenta BrainAnswer, utilizando um sistema de rastreio ocular e um questionário, com 63 consumidores portugueses de azeite. Foi pedido aos consumidores que visualizassem um painel de 15 Marcas gráficas de azeite, seguido de um processo de distração, após o qual lhes foi pedido que identificassem as Marcas gráficas agora misturadas com outras. Os resultados mostram que é possível estabelecer uma correlação entre o processo de memorização de Marcas gráficas a curto prazo e: o Glances  $r(-0,375)$ , as últimas visualizações  $r(0,4929)$ , o maior tempo médio de fixação  $r(-0,28954)$ , Grande variação no tamanho de fixação  $r(0,21626)$  e fixações mais longas  $r(0,21626)$ , como podemos detectar no  $r$  de Spearman. Não foi identificada nenhuma correlação entre a sequência de visualização eo processo de memória. A sequência de visualização é estatisticamente significativa considerando o processo de leitura ocidental.

**PALAVRAS-CHAVE:** Marca gráfica; eye tracking; neuromarketing; Logótipo; símbolo; Memorização; Sector agro-alimentar.

**ABSTRACT:** This study aims to understand the process of memorization of Brand marks particularly, revealing relation between eye-tracking parameters and short-term memorization of Brand marks (logotype and symbol). Design/methodology/approach – The study was conducted online through BrainAnswer tool, using eye-tracker and questionnaire, with 63 Portuguese olive oil consumers. Consumers were asked to visualize a 15 olive oil brands marks panel, followed by a distraction process after which they were asked to identify the sawed Brand marks now mixed with others. The results show that it's possible to establish a correlation between the process of short-term memorization of Brand marks and: the Glances  $r(-0,375)$ , latest views  $r(0,4929)$ , Higher average fixation time  $r(-0.28954)$ , large variation in fixation size  $r(0.21626)$  and more longer fixations  $r(0.21626)$ , like we can detect in Spearman's  $r$ . It wasn't identified any correlation between the visualization sequence and the memory process. The visualization sequence is statistically significant with the occidental reading process.

**KEYWORDS:** brand marks; eye tracking; neuromarketing; logotype; symbol; memorability; agri-food sector.

## 1. Introduction

In Branding research related to Neuroscience has been conducted from marketing perspective, in what has been designated as neuromarketing and is particularly linked to consumer psychology of brands.

Correlated research use Neuroscience methods and theories to create knowledge about consumer psychology and behaviour, witch may allow the improvement of Branding efficiency in holistic and strategic terms. However, consumer neuroscience refers to academic research intersecting neuroscience with consumer psychology, whereas neuromarketing refers the use of eye tracking, skin conductance, electroencephalography (EEG) or functional magnetic resonance imaging (fMRI) or other neurophysiologic tools to guide market research (Plassmann, et al., 2012).

Neuromarketing can provide eye monitoring data and biological measurements that measure unconscious responses. Therefore, through Neuromarketing researchers can obtain an insight that contributes to advance the understanding of the consumer biological behaviour in a specific context and his psychology of brands.

Brands represent themselves and identify their products thought a Brand mark. In other words, brands use marks to identify themselves and their related products. Brand marks are graphic signs or specifically logotypes and symbols used together or individually to invoke a Brand (a set of values and symbolic attributes).

Thus, the Brand mark is the minimum symbolic unit to represent the Brand (Costa, 2010) and one of the elements of the Brand Visual Identity system. But Brand marks are the most used element in visual communication media, to create visual coherence, to mark ownership or authorship, and to ensure recognition and differentiation.

Brand marks are used to ensure the identification of the product, and to do so, this graphic signs need to be memorized.

Therefore, it would be expected to find information about how to design or evaluate a Brand mark according to scientific data and project grounded.

Even though there are many studies related to brands, there are not many studies conducted in the context of graphic design to see how the graphic aspect of Brand marks help in it's memorizing. In fact, the conducted studies tend to isolate Brand marks components, such as typography and symbols or to evaluate them indifferently.

## 2. The purpose of this study

There is some agreement on how Brand marks contribute to brand success. In the same sense, much of the empirical information indicates that the memorization depends on the systematic use of the same brand mark, similarly repeated in the largest number of graphic media and over time.

In this sense, the Brand marks are presented over time to increase the probability of being viewed and memorized.

Studies such as Carpenter & Nakamoto (1989) and Kardes & Kalyanaram (1992) indicate that memorization occurs when the brand is introduced in the market, benefiting from its novelty factor, which stimulates curiosity and attention, that is, because they are attention-drawing (Kahneman, 1973). Thus, advertising campaigns and communication media contribute to increased memorization, enabling consumers to formulate their judgment and preference (Kardes & Kalyanaram, 1992).

A more recent study indicates that in 313 ms consumers can identify two different food brands and decide which one they prefer (Milosavljevic, Koch, & Rangel (2011)

Although Brand marks do not guarantee the success of the brand, they are one of the main ways of recognizing products, particularly when the company does not invest in advertising. In this way it is essential that the graphic mark is quickly memorizing.

As observed, the majority of studies focused on the understanding and perception of value, and there is a lack of data on the process of memorizing Brand marks.

According to Wheeler (2003), the sequence of visual perception is the shape, color and lastly the content, indicating that perception occurs firstly at connotative meaning level and only after at the denotative, which takes more time.

However, knowing this sequence is not enough to understand which graphic features have influence to brand mark memorization. On the other hand, some studies indicate that the perception can occur in the conscious, supraliminal and subliminal levels.

At the conscious level the brain processes stimuli of which it is cognizant. Schiffman & Kanuk (2010) report that subliminal perception or subception occurs with stimuli too weak or too brief for their conscious perception, but strong enough to be picked up by one or more recipient cells.

According to Lewis's (2013) study in about 10 milliseconds it is possible to activate archetypes and stereotypes stored in memory, allowing to make judgments about an image, that is, supraliminal meanings perceived at the edge of consciousness, before being subliminal.

Additionally, also the study of Chartrand, Huber, Shiv, & Tanner (2008) confirmed that consumer choice also depends of unconscious perception process.

Study's such as Wolfe & Horowitz (2004) indicate that consumers eye movement and attention is related with the identification of the most relevant information among available data, based in visual inputs such as colours, luminance, orientation, size, shape, movement, etc.

Norton & Stark (1971) identified three types visual of scan paths or eye movements in ads, such as scanning (the eyes goes to headline and graphics), initial (the eyes move to the headline, graphics and to brand) and sustained (when the eye moves to the headline, graphics, brand, and text).

According to Plassmann, et al. (2012), representation and attention are complex processes with impact in all brand decisions, and neuroscience can help to better understand how attention and its effects impact on consumer behavior and psychology of brands. But there are few studies devoted to this subject and less about the impact of graphic features of Brand marks in consumer decision and in consumer memorization or recognition process.

Questionnaires or interviews seem to generate insufficient data, unrepresentative or perhaps inaccurate, which don't acknowledge knowing how Brand marks memorization is processed. So, Neuroscience methods represent an opportunity to advance knowledge.

Considering what has been stated and based on the described assumptions and shortcomings, the study was carried out taking into account the following hypotheses:

It's possible to establish a correlation between short-term memorization of Brand marks and its graphics features Glances, including long eye fixations.

H1 The display sequence used by participants to observe the panel of Brand marks coincides with the normal reading process of an Western reader.

H2 The fixation number changes with the advance in the reading sequence.

Study on the memory process:

H3 The fixation sequence of the Brand marks is related with its memorization.

H4 The number of revisits to a brand mark will increase the its memorization capacity.

H5 The last brand mark to be visited before leaving the pannel is more likely to be remembered.

H6 The time spent on each brand mark increases its probability to be remembered.

H7 An active view with small and large attachments is correlated with the memorization process.

H8 The time spent focusing on small details, focus, is correlated with memorization.

## 3. Study methodology and procedures

This study focused on the agrifood sector and specifically on the Portuguese olive oil chain, from Beira Baixa, Beiras and Serra da Estrela, in the central region of the country of NUTS II.

In order to delimit the study, we focus on 15 brands marks of Beira Interior olive oils, which were selected by the InovCluster – Associação do Cluster Agroindustrial do Centro and by APABI – Associação de Produtores de Azeite da Beira Interior, considering its representativeness in the sector in regional context.

Generically, the Brand marks belong to brands with short investment in advertising and without brand management, reduced to main visual identity elements, such as brand mark, packaging and label.

Was made an effort to get a set of Brand marks in two by typologies: symbol and logotype (with or without designation) and only logotype (with or without designation).

Was conducted a non-interventionist research based on questionnaire and eye tracking.

After the questionnaire was drawn up and tested, started the data collection with a sample of 63 respondents, consumers of olive oil, considering that consumption implies the purchase of olive oil for own consumption. The sample consisted in 45 female and 18 male subjects, aged between 18-25, 26-35, 36-45, 46-56, 57-65 and > 66, who participated randomly and voluntarily in the study, being informed of study participation conditions.

The experiment took place in one meeting rooms, because of its isolation from external disturbances, which could influence the quality of data. Each participant was inquired in a single computing device (laptop) individually in the company of a monitor responsible for checking the data collection devices and for the promotion of a friendly atmosphere.

There was no mention to the memory measurement and they were sent directly to the experiment. The control of time was given to the participant, who accessed directly the information protocol, using online to BrainAnswer tool through the computer.

At the equipment level, a computer was used, an eye tracking system that allows measuring the field of vision of each individual, that is, allows to measure the positioning and behaviour of the eye. The eye tracker is composed of infrared sensors that capture all parameters, such as fixation (when the eye remains still over a period of 9time), eye movement, and the focus of attention, to the smallest detail. In the information analysis phase, we will be able to provide behavioural information that the respondent unconsciously acquired in the context of the investigation, while another questionnaire without the aid of equipment with this type of function allows us to only Collecting information that was consciously given, that is to say, according to what the respondent wanted to answer, which corresponds to what he thinks he will feel and not to the way he actually reacted.

Each participant followed the instructions and filled in the questionnaire in front of the passive monitors supervision, allowing collecting eye tracking information and memorized Brand marks.

Organized in four parts, the study was divided in 18 steps considering instructions and tasks to execute by participants, monitoring responses in terms of assertion and time, as well as by eye-tracker.

Fig.1 – Study steps

Step 1 Observe as seguintes marcas com atenção!	Step 2 	Step 3 Concentre-se e complete os seguintes ditados populares!	Step 4 A pressa é inimiga • da Felicidade • da Perfeição • do Caminho
Step 5 Ditado 2	Step 6 Filho de peixe • sabe andar. • não sabe nadar. • sabe nadar.	Step 7 Ditado 3	Step 8 Cada Macaco • no seu galho. • no seu ramo. • no sua árvore.
Step 9 Ditado 4	Step 10 Quem espera sempre • desespera. • alcança. • adormece.	Step 11 Considerando as seguintes marcas indique aquelas que se encontravam na primeira apresentação visualizada.	Step 12 
Step 13 Continuação...	Step 14 	Step 15 Última questão!	Step 16 
			Step 17 Demográficos
			Step 18 

The first part comprises step 1 (the instruction) and 2 (the task), where each participant is asked to watch a frame with the 15 Brand marks in study for as long as he wants.

Fig. 2 – Frame with the olive oil 15 Brand marks in study



A second part was organized between steps 3 to 10, requesting participants to complete four popular Portuguese sayings. This part has been defined to introduce a distracting element, which acts as noise element, adjacent to the visualization process, which might affect the memorization process.

During the third part (steps 11 to 14), two Brand marks boards were displayed and participants were asked to identify the 15 Brand marks in study among others five national Brand marks (Serrata, Gallo, Andorinha, Oliveira da Serra and Maçarico), also from olive oil, introduced in the panel as distracting elements to increase the recognition difficulty.

In the part (step 15 to 18) participants were asked to identify their prior knowledge of Brand marks, before his participation in the study. And the experiment ended after the collection of participant's demographic information.

Fig. 3 – Frames with Brand marks including those for distraction



The time was measured during all process and each task solving.

To collect data from eye tracker, was defined an AOI (Area of Interest, also known as ROI, Region of Interest) around each brand mark. This method was adopted in all frames with Brand marks, allowing comparing results in terms of Dwell Time (each visit in AOI, from entry to exit, Measur-Sum of durations from all fixations and saccades that hit the AOI).

Looking for the sequence of fixation of Brand marks, several metrics were considered, such as the number of fixation; the time of fixation; the last and first fixation and the number of times that each brand mark was reviewed.

Considering the need to compare diverse parameters with different nature, was used the non-parametric test Spearman's Rho, which allowed to measure the strength of association between two variables, where the value  $r = 1$  means a perfect positive correlation and the value  $r = -1$  means a perfect negative correlation.

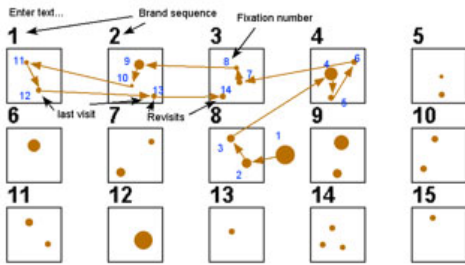
For example, permitted to observe possible correlations between the visualization ranking and the reading sequence or between the visualization ranking and the ranking of Brand marks memorization.

The memorization of Brand marks considered the correct correspondence between the Brand marks presented in the first frame (step 2. Also see figure 2) and the correct correlation in the frames from steps 12 and 14 (see figure 3). Therefore, the number of hits related to the memorization of the brands marks was counted and converted to percentage, for creating a ranking with the most remembered. The same process was followed to create a ranking of previously known Brand marks.

The study of eye tracking data was detailed through the use of the described metrics, Figure 4.

1. **Brand sequence:** Number assigned to each mark that also corresponds to the reading sequence that the Western reader would use to read a text.
2. **Visualization sequence:** order of gaze hits into AOIs based in entry time, obtained during the analysis of the frame with Brand marks.
3. **Fixation number:** number of fixations each participant made on each brand.
4. **Memory sequence:** sequence of the most remembered Brand marks at the end of the test by consumers;
5. **Time stamp fixation:** is the start time of each fixation.
6. **Revisits number:** is the number of revisits corresponds to the number of times a given participant looked at inside of brand.
7. **Last visit:** The last visit corresponds to the last instant that a participant visited a particular brand.
8. **Dwell time:** A dwell time is defined as on visit in AOI, from entry to exit or time period taken by each fixation.
9. **Active fixation:** It corresponds to the existence of a great variability of times of different fixations in the same AOI.
10. **Focus.** The focus was defined as the highest fixation done on a given AOI.

Fig. 4 – Schematic presentation of some parameters used in the study.



### 4. Study results

Considering the number of checks of memorized Brand marks was obtained the percentage results and converted in ranking.

<b>1°</b>  79,4% 50	<b>10°</b>  49,2% 31	<b>13°</b>  44,4% 28	<b>11°</b>  47,6% 30	<b>4°</b>  71,4% 45
<b>3°</b>  71,4% 45	<b>8°</b>  53,9% 34	<b>5°</b>  68,3% 43	<b>14°</b>  42,9% 27	<b>16°</b>  22,2% 14
<b>7°</b>  63,5% 40	<b>6°</b>  65,1% 41	<b>12°</b>  46,1% 29	<b>2°</b>  74,6% 47	<b>9°</b>  50,8% 31
<b>15°</b>  22,2% 14	<b>20°</b>  7,9% 5	<b>18°</b>  11,1% 7	<b>17°</b>  11,1% 7	<b>19°</b>  4,8% 3

It's possible to observe, through the percentages, that there exist some Brand marks with equal checks such as Portas de Rodão (71.4%) and Fio da Beira (71.4%), Quinta da Caldeirinha (22.2%) and Oliveira da Serra (22.2%), Serrata (11.1%) and Gallo (11.1%). In order to unblock this tie in the ranking we considered the brands for alphabetical order.

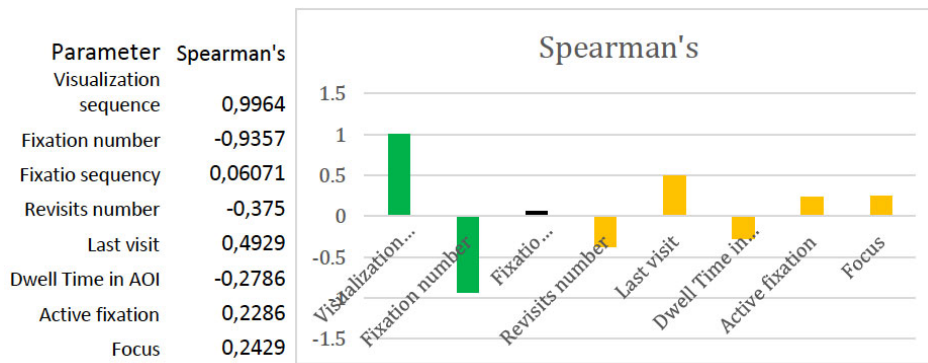
Is possible to understand that in this phase where the 15 brands were mix with the 5 foreign brands, the latter brands were not let do considered even though they had never been previously observed in the questionnaire. However, there was a tie between Quinta da Caldeirinha (22, 2%) - case study, with Oliveira da Serra (22.2%) - outsider brand.

We may suppose that the fact that foreign brands have a very significant presence in people's daily lives are easily associated or suggested until they have not been visualized, perhaps for reasons such as the association of form, color, typography.

Through the analysis of Hit map, we can see where occurred the largest center of attention during the panel observation process. This information is very useful since it allows us to perceive which regions were more focused on deterring others. In a study about the design of Brand marks is relevant to perceive what draws the participants attention and what is ignored, as well as the degree of dispersion of the look in design details. We can see there is a certain tendency to read the symbol and the center elements in the brand mark, ignoring extremity details, allowing a qualitative analysis of brand design.

Fig. 5 – Hit Map of all participants





## 5. Analysis of results

### Study results related to the visualization sequence process

H1) The data showed that the visualization sequence (the order of gaze hits into AOI, based on entry time) is related to occidental reading process, has correspondence to brand numbers sequence (1,2,3,4,5,6,7,8,9,10,11,12,13,14,15) with  $r(0.9964)$ , on the other hand that the fixation sequence is correlated with the visualization sequence and is statistically significant. The fixation sequence is strongly related to the visualization sequence. So it's indicates that the consumers followed the visualization sequence to observe the Brand marks.

H2) Looking for number of fixation was possible to observe how the number of fixations decreases with the increase of the visualization sequence with  $r(-0.9357)$ . This means that there is a tendency to decrease the number of fixation of reading, making more fixations at the beginning and less at the end.

The average of the fixation sequence is strongly related to the visualization sequence. So, it's indicates that the consumers followed the visualization sequence to observe the Brand marks.

### Study results related to the memorization process

The order attributed to each brand resulting from its position in the ranking of the most remembered Brand marks by the respondent when responding to the survey was (1, 10, 13, 11, 3, 3, 8, 5, 14, 15, 7, 6, 12, 2, 9).

H3) Looking for number fixation sequence and memorization sequence, the results indicate that it is not possible to establish a correlation between the natural reading sequence and the memory process, since Spearman's indexes are too low  $r$ (less than 0.2). Although there is no correlation between the sequence fixation and memory it should be noted that the Brand mark that occupies the first place in the fixation sequence is also the first ranking in memory.

H4) The result show that the revisits number to AOIs increase the likelihood of Brand marks being remembered  $r(-0.375)$ .

H5) From results of last visit it's possible to conclude that the last visited (viewed) Brand marks are more easily remembered  $r(0.4929)$ .

H6) For the dwell time parameter, the Spearman coefficient was  $r(-0,2786)$ . So, the time spent (mean) in each AOI contributed to the brand memorization process. The fact that it is inverted indicates that more fixation time facilitates memorization.

H7) Active fixation  $r(0,2286)$ . An active view with focus and scan on the Brand marks (small and large fixations) has contributed to the memorization process.

H8) Focus  $r(0,23771)$ . The fact that there are longer fixations accelerates Brand marks memorization.

## 6. Conclusions and suggestions for future directions

Through this study, the researchers wanted to understand which metrics can be used to better understand how short-term memorization of Brand marks is processed, because this will enable future research to focus on which Graphic Features of Brand marks improve their memorization.

The study indicates that the application of neuroscience methods allows understanding on how short-term memorization of Brand marks is processed. First of all, because it able to observe how consumers eye processes Brand marks memorization, improving data quality and rigour of information that we would obtain through questionnaires.

Consequently, this study value resides in its validation of neuroscience as tool in the study of Brand marks memorization process, but also by establishment of metrics that allow studying marks memorization process through the eye tracking process.

The defined metrics of eye tracking allowed observing whit statistic significance, that participant's visualization sequence followed the occidental reading process, although we used Brand marks (not text) organized in a horizontal frame, with similar visual dimensions and arranged in rows and columns. We consider that this result gives validity to our metric, but that does not exist any correlation between the visualization sequence and the Brand marks memory process. Still, the first presented brand mark was the most remembered.

At the beginning, it was predicted that the memorization of Brand marks was higher with more number of Glances and whit longer eye fixations. And the results confirm partially this hypothesis, once they show a correlation, statistically relevant and according to Spearman's Rho, between the short-term memorization of Brand marks and the Glances. This means that a larger number of eyes review of the brand mark get a higher memorization. This gives relevance to the role of the brand mark graphic characteristic in terms of eye interest, but also gives the importance of displaying the brand on various media.

The study shows that the last seen Brand marks were the most remembered (latest views). This fact does not demonstrate the importance of brand mark design, but indicates how important is to granted the brand presence in consumer environment, so that it is remembered.

The importance of eye fixation to brand mark memorization is correlated by three of the defined metrics, as the higher average fixation time, large variation in fixation size and more longer fixations.

Some limitations of the study may be presented. First, there is a lack of correlation between eye tracking data and biological measurements by unconscious responses, whereby it is a work in process.

As far as this experiment is concerned, for the sake of accuracy, we believe that the first Brand marks display panel should allow them in a random order, to ensure that none is privileged by its position on the screen. Still, our data doesn't show that this created any interference.

Instead of the popular sayings, it's recommended to use a visual distracting element; witch represents a huger disturbance on memory, once it would act in the same cerebral area where the memorization of Brand marks takes place.

On the other hand, we consider that in a future study it should be used an equal number between Brand marks under study and distracting Brand marks.

The stratification of the respondents was done previously, and therefore does not guarantee that they are grouped according to a common behaviour. By expanding the sample of respondents, we can detect clusters, statistically relevant, that will allow us to deepen the reading of data by age, gender and other shared attributes.

Finally, we consider it's important to deepen the study about possible correlations between the features of distracting Brand marks and those of the 15 brands under study, considering the confusion matrix.

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