Eye tracking, a complementary tool for design evaluation

Eye tracking, una herramienta complementaria para la evaluación del diseño

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◈ Abstract

This text aims to show the different uses of the eye tracking in the evaluation of various areas of graphic design, such as the perception of the form, the legibility of the text, and the usability and design of experience in various media used by that graphic design. In the same way, concepts, tools, and methods that can be used in the investigation of visual perception applied to that discipline are enunciated and some cases developed in the Multimedia Experimentation Laboratory are mentioned. The methodology used for this research is of a documentary type, which was carried out through the collection, review and selection of various investigations related to visual perception and the use of eye tracking found in various areas of knowledge, such as psychology, ergonomics, computing, optometry, among others. The relevance of this study lies in the fact that it contributes to consider visual perception as another method of evaluating graphic design from a scientific perspective. This research is an opportunity to discuss the possibilities that technology allows us to carry out in terms of visual perception studies related to the work of the discipline.

◈ Resumen

El presente texto tiene como objetivo mostrar los diferentes usos del eye tracking en la evaluación de diversas áreas del diseño gráfico, como son la percepción de la forma, la legibilidad del texto, y la usabilidad y diseño de experiencia en diversos medios que utiliza el diseño gráfico. De igual manera, se enuncian conceptos, herramientas y méAtodos que pueden ser utilizados en la investigación de la percepción visual aplicada a la disciplina y se mencionan algunos casos desarrollados en el Laboratorio de Experimentación Multimedia. La metodología utilizada para esta investigación es de tipo documental, la cual se llevó a cabo por medio de la recopilación, revisión y selección de diversas investigaciones relacionadas con la percepción visual y el uso de eye tracking, encontradas en diversas áreas del conocimiento, como psicología, ergonomía, computación, optometría, entre otras. La relevancia de este estudio radica en que contribuye a considerar la percepción visual como otro método de evaluación del diseño gráfico desde una perspectiva científica. Esta investigación es una oportunidad para discutir sobre las posibilidades que la tecnología permite realizar en cuanto a estudios de percepción visual relacionados con el quehacer de la disciplina.

Keywords: Visual perception, graphic design, eye tracking, methods, techniques

Palabras clave: Percepción visual, diseño gráfico, eye tracking, métodos, técnica

◈ Introduction

The use of eye tracking as a tool for analyzing human attention dates to the late 1800s, when the German psychologist Franz Christian Gall used the technique to study the location of attention in the brain (Duchowski, 2007). Ever since, the eye tracking has been used in a wide variety of fields, including psychology, neuroscience, and ergonomics. Later, in the 1960s, with the advancement of technology, more accurate eye tracking systems began to be developed and its use expanded in research on attention and visual perception.

During the second half of the century xx, the use of eye tracking in graphic design studies he came up with the first eye-tracking systems, which were used to investigate human visual perception. Since then, this technique has been widely used in this field to assess the effectiveness of different design elements, such as typography, color, image, and information layout (Levy & Critchley, 2018). By the 1990s, with the rise of the information technology industry, the eye tracking began to be used in the evaluation of user interfaces and in interaction design (Duchowski, 2007).

In particular, the eye tracking has been valuable in evaluating the readability and attractiveness of different typography styles, and in identifying the areas of the screen that are most attractive and appealing to users (Duchowski, 2007). In addition, it has been used to assess how different design elements affect the perception and comprehension of information, such as the arrangement of elements on the screen, the organization of information, and the clarity of navigation (Nielsen, 2000).

Since then, the use of eye tracking in the disciplinary field has evolved to include applications in multiple areas, including advertising, packaging, magazine and newspaper design, and web design. For example, in market research, it helps to obtain information about what is most relevant to improve visual attention, as well as fixation patterns (Fiszman, Velasco, Salgado-Montejo, & Spence, 2013). In packaging design, it has been used to assess the attractiveness and effectiveness of designs and to identify the areas of the packaging that are most appealing to consumers (Wikström Williams, Verghese & Clune, 2014). From the above, it can

be said that eye tracking has been proven to be a valuable tool for understanding how users interact with design elements and for evaluating their effectiveness.

This text contemplates various applications of the use of eye tracking as part of the evaluation of graphic design in various fields, as well as a detailed explanation of the concepts, tools and techniques involved in the development of experimental tests. Finally, we reflect on the use of the eye tracking as a tool that can be used in the design process, as well as about its relevance in the teaching of graphic design.

◈ Uses of eye tracking in graphic design

The eye tracking is a tool that supports the research process with the use of technology to monitor and record the position and movement of the human eye while an individual performs a visual task, as shown in figure 1. For example, it is used to study visual perception, information processing, and gaze behavior in a variety of contexts, including research in psychology, ergonomics, neuroscience, engineering, market research, medicine, as well as graphic and interface design, among others.
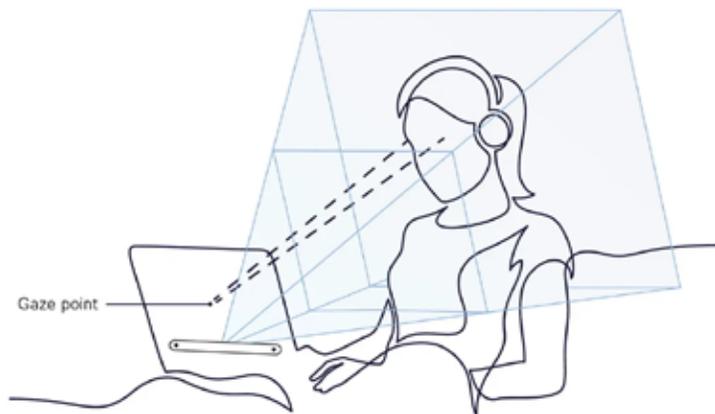

Figure 1. *Tobii Eye Tracking. How it Works.*
Source: Tobii Corporate, s. for.

In the field of interface design, the eye tracking has allowed designers to understand how users navigate and interact with visual content on the screen. For example, it is possible to identify which elements attract the attention of users and which do not, while it is possible to identify patterns of behavior in browsing and searching for information. This can help designers optimize the organization and presentation of

information on the screen to improve the usability and effectiveness of the interface (Norman and Draper, 1986).

The eye tracking allows designers to understand how users interact with design elements and how they are attracted to certain visual elements (Duchowski, 2007). It also allows the effectiveness of a design to be evaluated, as designers can see if elements are being found and used effectively by users. This is especially important in designs that require a high attention span, such as medical, security, or driving interfaces.

The studies with eye tracking have also been used in user experience research. For example, they can be used to assess how users perceive the visual quality of a design, as well as to measure their satisfaction and preference towards different design options (Norman and Draper, 1986). This way, designers can make informed design decisions and improve the user experience.

In general, the operation of eye tracking devices operates by capturing the subject's eye movements and identifying its fixation point during a specific task or activity. This can be accomplished through various methods, such as monitoring electromyographic signals (EMG) generated by the ocular muscles, measuring the reflectance of infrared light, or identifying the optical characteristics of the retina (Minakata and Beier, 2021).

In research, the eye tracking devices can be categorized into two types: hardware-based systems and software-based systems: 1) Hardware systems of eye tracking use technologies such as the camera, infrared light, and infrared for tracking eye movements. These systems can be head-mounted, tabletop, or desktop, and can be used in a variety of settings, such as laboratories, clinics, and natural settings. 2) Software systems of eye tracking use the webcam or the camera of a mobile device to record the movements of the eyes. These are more accessible and economical systems than hardware, but may have lower accuracy and reliability.

◆ **Eye Tracking Devices**

Among the eye tracking devices, the most used for research include the following:

◆ Eye monitors (open-source devices), which are infrared cameras that record the position and movement of the eyes. Tobii (Tobiiab, Danderyd, Sweden), which is a Swedish company that offers a wide range of devices, both for scientific and commercial use. An example of this is the device shown in Figure 2.

◆ EyeLink (SR Research Ltd. [s. f.], Ottawa, ON, Canada), which is a device developed by SR Research, which is widely used in scientific research and commercial applications.

◈ smi (SensoMotoric Instruments GmbH, Teltow, Germany), which is a German manufacturer of eye-tracking devices which offers a wide range of products for different applications, including scientific research, entertainment and marketing.

Figure 2. *Front view of Tobii Pro Glasses 3.*
Source: Tobii Corporate, s. f. a

◈ **Software for data analysis**

On the other hand, the choice of software depends on the needs and objectives of each particular study. Among the most common programs used in the development of research of this type are:

◈ Tobii Pro Lab (Tobii Technology AB [s. f.], Sweden). This software allows for the collection, analysis, and visualization of data and offers a wide variety of tools for analyzing the obtained information, as shown in Figure 3.

◈ Tobii Pro Lab also allows integration of eye tracking data with other types of data, such as demographics, verbal responses, and behavioral data.

◈ EyeLink (SR Research Ltd. [s. f.], Canada). EyeLink is an analytics software platform that allows for the collection, visualization, and real-time analysis of data, as well as for advanced analytics and creation of detailed reports.

◈ Gazepoint is web-based software that allows for the recording and real-time analysis of data.

◈ Pupil Labs is software that allows for the recording, analysis, and visualization of data from eye tracking.

Figure 3. *Heat map generated by Toby Pro Studio.*
Source: Tobii Corporate, s. f. b.

⬥ **Visual attention studies using software (*saliency*)**

It is important to point out that visual attention studies can be carried out based on mathematical models, which seek to identify points, areas and objects that are striking or relevant to the subject. These algorithms use different techniques to predict a subject's attention and, from there, analyze and visualize the information obtained. Their main characteristic is that they do not require subjects to carry out the analysis of visual perception.

In the literature, there are different models and techniques that have been used to conduct studies of visual attention. Some of the most popular models include:

⬥ Physiology-Based Models: These are based on research on the physiology of vision and visual attention to predict a subject's attention. Among them is the model of bottom-up attention (Itti, Koch and Niebur, 1998) and the model of *saliency map* (Walther and Koch, 2006).

⬥ Machine learning-based models use these techniques to train algorithms that can predict a subject's attention, which include the model of *Deep Gaze I* (Kümmerer, Theis and Bethge, 2014) and the model of *Deep Saliency* (Wang and Shen, 2017).

⬥ Models based on psychological theory: they are based on psychological theories about visual attention to predict the attention of a subject. Similar to visual attention models, they are based on the maximization, unification, and normalization of information (Borji and Itti, 2013).

The hardware and software devices mentioned above are considered the most popular and, in many cases, the most expensive due to their positioning in the market. However, it is worth mentioning that some universities have developed open-source software and hardware types that provide the necessary data to carry out an investigation with a sufficient level of precision and reliability.

◈ Handling of data in the use of the eye tracking

In studies of visual perception, the eye tracking data is used to assess human visual perception, this data includes information about the location of the eyes, the direction of gaze, the speed and frequency of eye movements, and the time users spend looking at different items on the screen (Duchowski, 2007). In addition to the above, additional data such as heart rate, brain activity, and emotional response from users can also be collected (Nielsen, 2000), all of which complement the eye-tracking information and provide a more comprehensive view of the perception and understanding of users.

In this type of study, different indicators are used to account for eye movement, which serve to evaluate human visual perception (Rayner, 1998). Some of the more common movements include:

1. **Fixation:** It is the eye movement in which the eyes stop at a specific point on the screen. The minimum duration of a fixation is in the range of 20 to 220 ms. An important indicator of the attention and interest that users have for a certain element is the duration of the fixations.

2. **Saccadic movement:** It is the rapid and voluntary eye movement that occurs when the eyes jump from one point to another on the screen. It is determined by the sequential order of fixations on a stimulus. Saccades are an important indicator of gaze direction and visual search.

3. **Regressions:** It is the eye movement in which the eyes return to a previously visited point on the screen. Regression is an important indicator of the relevance and memorability of elements on the screen.

4. **Blinking:** It is the rapid and temporary closing of the eyes. Flickers are an important indicator of users' fatigue and cognitive load.

5. **Micro saccades:** It is a very small and frequent type of saccade that occurs when the eyes move rapidly and involuntarily in a specific direction. Its duration ranges between 10 and 20 ms. Micro saccades are an important indicator of attention and visual scanning.

6. **Dispersion of fixations:** It is the spread of fixations in different parts of a visual element. The scatter of fixings is an important indicator of the complexity and comprehension of the elements on the screen.

Each type of eye movement provides valuable information about human visual perception and helps researchers better understand how users interact with the design. The use of one or the other type of data will depend on the purposes sought when conducting visual perception studies.

On the other hand, there are other concepts that correspond to the graphic representations used to visualize and analyze the data obtained from studies of this type (Duchowski, 2007), among which are:

1. **Heat map:** is a color map showing the distribution of eye fixations on a screen. The heat maps represent visually the areas of the screen that receive attention from users, allowing researchers to easily identify patterns and trends in user interaction with a visual design.

2. **Saccadic route or scan path:** Refers to the path that shows the order in which users look at different elements on a screen. The scan paths represent visually the sequence of eye fixations and allow researchers to understand how users are exploring and processing the information in a visual stimulus.

3. **Areas of interest (aoi):** They allow to identify and mark in an image or screen the areas that are relevant for the studies of eye tracking, with the aim of analyzing how users interact with different areas of a visual stimulus.

4. **Fixation rate graphs:** These are graphs that show the duration of eye fixations on different elements of a screen. These graphs allow researchers to quickly identify the areas of a design that receive the most attention and how much time users spend on each element.

5. **Click Rate Graphs:** These are graphs that show the relationship between eye fixations and clicks on a screen. These graphs allow researchers to identify which elements in a design are most likely to drive clicks and how users interact with them.

6. **Scroll rate graphs:** These are graphs that show the relationship between eye fixations and screen displacements. These graphs allow researchers to identify which elements in a design are motivating users to scroll on the screen and how they relate to the rest of the elements.

Despite the importance of using the eye tracking, it must be recognized that it is not the only tool that designers must use to evaluate the effectiveness

of a design. It is important to comment on the need to complement the results obtained with this tool with other research techniques, such as:

◆ Interview: It is a tool that allows obtaining more information about the experience of the participants, since it allows delving into the motivations, thoughts and perceptions of the users (Dodd and Taylor, 2018).

◆ User tests: Allow us to evaluate how easy it is to use a product or service, identify problems and improve the user experience (Nielsen, 2000).

◆ Task analysis: It allows us to identify the problems related to the performance of specific tasks and to improve their efficiency (Card, Moran and Newell, 1983).

◆ Survey: A valuable tool to collect information on user perceptions, attitudes and preferences (Dawes & Carbone-Lopez, 2018).

◆ **Types of studies related to the use of eye tracking**

For decades, eye tracking studies have been used to evaluate various areas related to design, including legibility, user experience, usability, and perception of form, which can be observed in the analysis of posters, packaging, logos, editorial design, websites, interface design, and other important areas.

Regarding legibility studies, they can evaluate the speed and order in which a person reads or views a page, as well as identify the areas that attract the most attention and those that are ignored. Among the different legibility studies are: 1) studies that evaluate the legibility of different types of fonts and sizes in printed and digital documents (Russell-Minda et al., 2007; Minakata and Beier, 2021); 2) studies that evaluate the legibility of texts on the screen with different resolutions and contrasts (Minakata and Beier, 2021; Torres et al., 2021); 3) studies that evaluate the legibility of different types of billboards in different contexts (Mancilla-González, 2022), and 4) studies that evaluate the legibility of user interfaces and on-screen information systems (Hornbæk and Law, 2009; Goldberg and Wichansky, 2003).

On the other hand, there are studies that have served to evaluate the user experience and allow design to optimize its functionality. These studies include: 1) studies that evaluate the attention of users to different elements on the screen (Nielsen, 2000); 2) studies that evaluate the impact of the location, size, and format of the elements on the screen on users' attention (Duchowski, 2007); 3) studies that evaluate the efficiency of navigation and the accessibility of information on websites (Nielsen, 2000); and 4) studies that evaluate users' attention and satisfaction with different types of user interfaces (Duchowski, 2007).

Likewise, eye tracking technology has found applications in the field of usability studies, providing important contributions on how users interact with visual information on the screen, including the identification of common patterns in navigation, information perception, and the effectiveness of information presentation (Nielsen, 2000; Tullis, 2008).

Eye tracking has also been used in various studies of shape perception in design to understand how users perceive and process visual information when faced with different stimuli. For example, it has been used in studies on the perception of symmetry, the relationship between form and content, the perception of complexity, and clarity in the presentation of information and images (Mancilla-González, 2022).

These studies are valuable to graphic and interaction designers who are looking to create effective and memorable visual experiences for users or who are seeking to evaluate design proposals to improve the design and presentation of information, making it clearer and more effective for the user.

◈ Multimedia Experimentation Laboratory

The Multimedia Experimentation Laboratory of the Autonomous University of San Luis Potosí was established in 2018 as a space for experimentation; Its purpose is to explore theories and processes related to avant-garde design, as a bridge between science and design products, delving into the study of processes and the creation of forms, as well as exploring new theories derived from of the technological advance of the 21st century.

Currently, the laboratory has various equipment that allows recording eye tracking, interaction through hand gestures, 3D printers, and virtual reality immersion equipment.

Since its creation in this laboratory, various studies have been carried out, among which are: those on the perception of form, those related to the usability and interaction of applications and websites, and others on the readability of text and typography, to name a few.

Among the studies carried out in this laboratory is "The role of technology in visual perception studies in graphic design", published in the *International Journal of Design Principles and Practices* (Mancilla González, Guerrero Salinas and Cuevas Riaño, 2019), where it is discussed how technology has contributed to the development of visual perception studies in graphic design and the study carried out on the work is taken as an example of Color Additive: 2000-2009: 2009. Series Fundación March B2, by the artist Carlos Cruz-Diez (1999), characterized by the use of color and the resulting optical effect.

The purpose of this research was to monitor the process of perception of an image (number of fixations, exploration routes, duration of gaze in

an area of interest and the spatial density of fixations) to analyze it under the principles of Gestalt Theory and understand how the visual perceptual process of color and shape occurs.

The Eye Tribe eye tracking device was used for this study, and it was applied to a total of 30 people, with an age range between 18 and 21 years, with similar conditions of visual acuity. In addition, two types of analysis were carried out: the recording of fixings by means of heat maps and the recording of the density of fixings by areas of interest.

The recording of fixations through the heat map allows us to know the areas and elements of Cruz-Diez's work that generate greater visual attention in the subjects, which is represented by color tones that indicate the areas of greatest interest (warm colors) and the areas of less interest (cold colors), as shown in Figure 4.
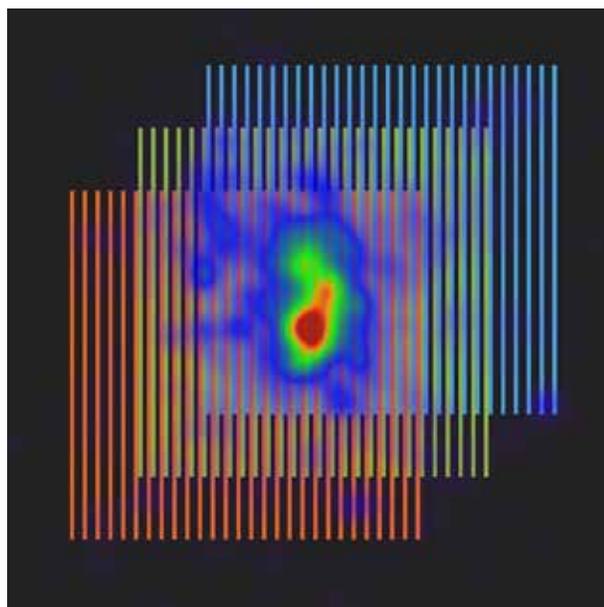

Figure 4. *Heat map of the work.* Additive Color: 2000-2009: 2009.
March B2 Foundation Series *analyzed using the eye tracking method.*
The image shows the average result of all the subjects participating in the
experiment.
Source: Multimedia Experimentation Laboratory (lem), 2018.

Subsequently, the areas of interest were delimited (aoi) to carry out the data mapping of the areas where the subject fixes his attention on the presented stimulus and was divided as follows: A1 (central), A2 (upper right corner), A3 (lower left corner), A4 (lower left corner), top left) and A5 (bottom right corner).
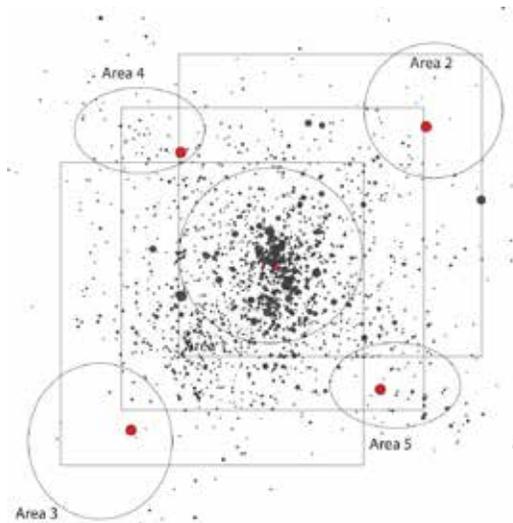
Figure 5. *Schematization of the density of fixations by area of interest.*
Source: lem, 2018.

Once the areas of interest were determined (see figure 5), an analysis of the density of fixations greater than 220 ms was carried out (Van der Lans, Wedel & Pieters, 2011), and the number of fixations made in each area was compared, obtaining comparative data: number of fixations, average duration, area, and density of fixations. The resulting values were A1:0.00082fix/px; A2:0.00005 fix/px; A3:0.00005 fix/px; A4:0.00006 fix/px, A5:0.00005 fix/px, where a higher density can be observed in area 1.

This study concludes that form predominates over the background, and from this, the process of perceptive exploration begins. With respect to color, the organization of the image based on visual balance makes it possible to generate an exploration pattern that goes towards the center.

A second case carried out in this same laboratory in 2018 is related to the analysis of symmetry and balance. In the experimental phase, two visual stimuli were used: one simple and the other complex. On the one hand, the poster Victory from 1975, made by the Japanese designer Shigeo Fukuda, characterized by the simple use of form, and on the other hand, the poster The Public Theater from 1995, made by the American designer Paula Scher, which is characterized using different planes, texts of different sizes, and orientations.

For this study, an analysis of the organization and visual exploration processes was carried out to make a record of the visual perception process that occurs before an image of a different level of composition. As part of this study, the Eye Tribe device, a Dell XPS PC, a Dell E2414H monitor, and the software Ogama v.5.05614 were used.

A total of 30 subjects with an age range between 18 and 23 years participated in the tests, with similar conditions of visual acuity. Two types of analysis were carried out: the recording of the duration of fixations by means of heat maps and areas of interest (AOI), and the recording of saccades (scan path) (see figure 6).

Through an analysis of the duration of fixations, data obtained according to the different elements that make up the poster were compared, which allowed us to find the most prominent elements and their interaction with the rest.

Regarding the analysis of saccadic routes (scan path), the order followed by the fixations during the perceptual process was determined to find out if there is a common exploration pattern before these two stimuli.

Figure 6. *Heat maps and areas of interest (AOI) of the poster Victory, of Shigeo Fukuda, analyzed using eye tracking.*
Source: LEM, 2018.

Finally, the result derives from the analysis of the principles of balance and symmetry proposed in the organization laws postulated by the Gestalt Theory to understand how the perceptual process occurs from its organization. Broadly speaking, this study concludes, through visual perception tests, that the organization of the image, based on visual balance, makes it possible to generate an ordered exploration pattern, which is visible in the two cases studied in the laboratory.

On the other hand, a third case analyzed in the laboratory is the reading study carried out to evaluate the design proposal of H+D, a national circulation magazine focused on design issues published by the Faculty of Habitat of the Autonomous University of San Luis Potosí.

The purpose of this study was to evaluate whether the design proposal of the magazine H+D is optimal for reading, through the selected micro-typographic elements, its editorial composition, and the design of its cover.

For this test, the Gazepoint device, a Dell XPS PC, a Dell E2414H monitor,

and the software Gazepoint Analysis Professional Edition 4.2.0 were used. This test was carried out with six subjects (Nielsen, 2000) between the ages of 18 and 24, with similar visual acuity conditions.

The test was developed in two moments: the first, a test of eye tracking that used as a visual stimulus a sequence of images from the magazine together with pertinent indications of what they wanted to know in the experiment, which the subject followed during the experiment, and later, a questionnaire to corroborate whether the cover proposal was attractive to the user, as well as the composition and the use of typography on the pages for reading (see figures 7 and 8).
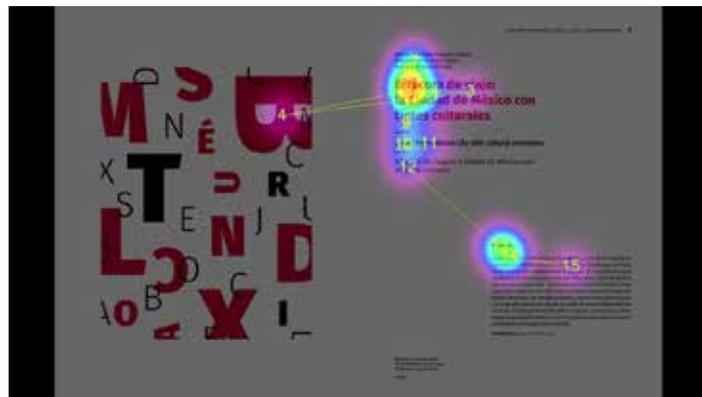

Figure 7. *Heat maps of the proposal for an article title in the magazine H+D, analyzed by eye tracking.*
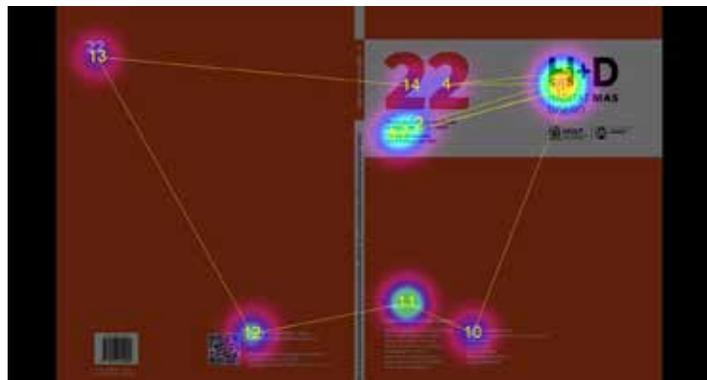*Source: LEM, 2019.*

Figure 8. *Heat maps of the proposal for an article title in the magazine H+D analyzed by eye tracking.*
Source: LEM, 2019.

Based on the visual perception tests and the applied survey, adjustments were made to the design, such as the location of pages, footnotes, and secondary information, in order to highlight the perception of graphic

elements, seeking to visualize them in a more hierarchical and ordered way.

A fourth case that was carried out in the laboratory has to do with the use of eye tracking to evaluate the usability of an interface for therapeutic use. The project consisted in the development of a web application to carry out Desensitization and Reprocessing therapies by Ocular Movements, known as emdr, and in the follow-up given to the patients. This therapy is carried out through eye movements that are guided by a qualified therapist, which can also be accompanied by sound stimuli to generate a greater connection between the pathways of the two hemispheres.

As part of this case, user interface tests were carried out under the usability principles described by Nielsen (2000), and through the use of heat maps it was possible to verify whether users identified key navigation elements (see figure 9).

For this test we used the Mirametrix device, a Dell XPS laptop, a Dell E2414H monitor and the software Ogama v.5.05614. The test was carried out with six subjects between the ages of 18 and 23.

Figure 9. *Heat maps of the application user interface* emdr, *analyzed by eye tracking.*
Source: *lem, 2019.*

On the other hand, it was sought to verify the effectiveness in eye tracking during the emdr therapy session and, by means of heat maps and monitoring of the saccadic route, it was confirmed that the user performs the necessary movements and displacements for the effects of this type of therapy, as can be seen in figure 10.
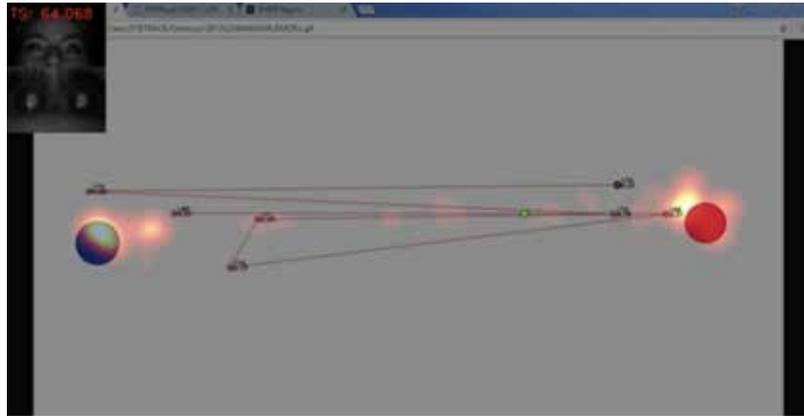
Figure 10. *Heat maps and saccadic route (scan path) of the user interface in therapy emdr, analyzed by eye tracking.*
Source: LEM, 2019.

Currently, the Multimedia Experimentation Laboratory addresses projects proposed from the specialty and master's programs of the Faculty of Habitat of the Autonomous University of San Luis Potosí, such as those analyzed here, and, on the other hand, multidisciplinary projects are developed where disciplines such as science, literature, psychology and design are involved.

⬦ Conclusions

Eye tracking is a valuable tool in the study of graphic design, as it allows researchers to understand how users perceive and process visual information. With this technique, eye movements and fixation time of a subject can be recorded and analyzed while browsing a web page, reading a magazine, or watching an advertisement. This can improve the effectiveness of visual communication and the usability of information, which, in turn, can increase user satisfaction and brand loyalty.

Another important aspect of using the eye tracking in graphic design studies is that it provides a deeper understanding of human perception and cognitive processes. This can allow designers and researchers to identify visual barriers and solve design problems, and also gives researchers the opportunity to evaluate the effectiveness of various design proposals in real time, allowing them to make immediate adjustments and improvements. This, in turn, saves time and resources in the long run, as designers can avoid creating designs that don't work before implementation.

As for the future of graphic design, the use of eye tracking presents several challenges that need to be addressed. One of the biggest challenges is to improve the accuracy and reliability of eye tracking devices, especially software tracking systems, so they can be used with confidence in research and commercial applications. On the other hand, it is

also necessary to develop new methods and techniques to analyze and use the data collected by the monitoring eye tracking devices so that designers can take advantage of them to improve their practice.

In another aspect, regarding the eye tracking in the educational field, it stands out that the implementation of eye tracking in graphic design processes can improve design teaching processes in various ways. First of all, the eye tracking provides valuable information about how users perceive and interact with the design, information that can be used to guide decision-making in the process and to improve the effectiveness and efficiency of designs.

Second, the eye tracking devices allow Graphic Design students to experiment with different design proposals and see how they affect user perception and interaction. This can help them develop skills in creating attractive and effective designs, and better understand the implications of their decisions on projects.

Third, the eye tracking can be used as a tool that allows students to evaluate the functionality of their proposals, which can help them to better understand the fundamental principles of graphic design and to develop self-correction and continuous improvement skills. ⓖ

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