

Eye Tracking in Consumer Research

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Abstract: This paper investigates the potential use of Eye Tracking as a tool in marketing to better understand and analyze the subconscious thoughts and decisions taken by consumer which reflects their purchasing pattern. The objective of this research was achieved by means of conceptual, in-depth literature review, a way of assessing and interpreting all recently available research in the given area. The results indicate that Eye Tracking is associated to have a high influence on consumer buying behavior, advertising, pricing, and distribution of products, branding and decision-making as marketing inputs. It is believed that in the near future, Eye Tracking as a tool will be part of mainstream marketing studies.

Keywords: Eye tracking, consumer research

1. Introduction

Eye tracking is a neuromarketing tool used to objectively analyze the unconscious and spontaneous responses of consumers towards different products, marketing messages and other areas of advertising such as online, print media and television. It is the process of monitoring and measuring eye activities, including point of gaze, which is where the person is looking, movements of the eye in relation to the head and pupil dilation. Eye tracking allows marketers and researchers to identify which elements of an item or advertisement capture consumer's interest and attention, understand how customers perceive the surrounding environment, and determine what actually drives their decision making and buying pattern. The device used for measuring eye positions and eye movement is called an eye tracker. It helps us process visual information, and measure attention, focus and consciousness, making it an important tool for research on consumer behavior. Any eye tracking device includes two common components, a light source and a camera. The light source projects infrared beams through the cornea of the eye. A special camera mounted on the glasses, tracks the reflection of the light beam and records the eye pattern. The computer system connected to the eye tracker receives the data, which uses algorithm and a series of calculation to determine eye position, gaze direction and pupil dilation.

Researchers typically analyze two concepts of eye movements in eye tracking, fixation and saccades. Fixation refers to the moment when the eyes stop moving and are fixed on an object. Within the duration of the fixation, the visual image seen by the eye is communicated to the brain, which then process the information to our understanding. Long fixation duration is correlated with high cognitive workload and effort.

On the other hand, saccades refer to eye movements in between two fixations, or jump from one fixation to another. The duration in saccade movement is very brief, hence there is no communication and processing of the visual information by the brain. The resulting series of fixations and saccades is called scan path. It is used to analyze visual perception, cognitive intent, interest, and relevance.

Conversely, some argue that during decision making process the eyes' movement are partially driven by people's responses to marketing stimuli. Top-down and bottom-up are two factors that contribute to attention and influence the meaning of a stimulus. Bottom-up factors are the characteristics of the stimulus itself, and they are a rapid form of attentional capture. Whereas, top-down factors refers to previous ideas about the product that consumer already had.



Fig. 1. Eye tracking

A. Background

Eye-trackers were first developed in the late 1800's, one of its earliest applications was in the field of psychology. Edmund Huey, an American psychologist, built an early eye tracker device to analyze eye movements in reading. The device was used to observe where a reader was looking while reading and study which words the reader would pause on. This helped in understanding eye movements within different ages and levels of schooling. Huey's findings were soon published under the title, *The Psychology and Pedagogy of Reading*. It was in the 1980's, when researchers and marketing groups realized the usefulness of eye tracking to measure the effectiveness of advertisements in magazines. The device was used to study how customers read, view and process advertisements in magazines and determine what parts and elements of the page were seen, and how much time was spent on each part. Soon, the technology was also adapted to screen design which was used in football games to learn where the viewers were looking the most. Later, eye tracking was used to measure and understand how consumers view and react to the information on the internet.

In the recent years, the application of eye tracking has become very useful in various fields of research in the commercial sector, including education, sponsorship, product design and development, medicine, automotive engineering and marketing. In marketing, eye tracking has been increasingly used to determine and study the behavior of customer and their decision making pattern. By examining fixations, pupil dilation, blinks, saccades and other eye movements, researchers are able to determine the effectiveness of a particular product. As a result, an advertiser can quantify the success of a given campaign in terms of actual visual attention.

B. Description of situation

The landscape that businesses operate in today is constantly changing. There has never been a more crowded range of products, retailers, websites, apps, media, and other content for the modern shopper to choose from. Therefore, businesses must compete to keep up to speed and updated about their customers. For this purpose, it is important to conduct consumer research that elucidates how to optimally capture the interest of potential customers. Traditional market research methods such as interviews and surveys are useful tools to understand consumer behavior, but they are limited, since they solely rely on explicit consumer response, there is no guarantee they are honest, accurate and free from bias. Hence, it results in inability to articulate underlying decision drivers. To add on, many decisions are made subconsciously, making it difficult to explain about certain behaviors.

Eye tracking is a powerful implicit market research tool used to capture data that is unbiased and difficult to manipulate. The actual and real behaviors of customers are recorded when watching a commercial, shopping for a product or browsing the internet. Because they are perceived directly from the point of view of the customer, the data obtained are considered to be more precise, accurate, reliable and authentic. This, allows researchers to gain deeper insight on how consumers react to different products, brands and marketing messages, without any conscious filtering.

Traditional methods show consumer desire and actions. Whereas, eye tracking reveals hidden consumer interest and what is truly capturing their attention. Simply put, one may not be able to trust what a consumer is telling you. However, one can always trust what they are showing you. Eye tracking technologies are becoming standard for advertisement measurement and package design. Eye tracking fits into this overall trend as a powerful implicit method

2. Methodology

As this study has a conceptual and qualitative approach, the paper systematically analyses numerous relevant scientific literature concerning the topic of eye tracking in consumer research. A literature review is chosen as a method because in the last few years a lot of research has been conducted on the topic of eye tracking, also, it is possible to combine discovered

findings of previous research and condense the experiences and findings of other researchers. However, an entire research cannot be conducted concerning the topic due to tremendous time and cost exposure.

The raw data for the critical literature review is mainly collected from electronic search engines like Google Scholar and Research Gate. The most important key terms searched were 'eye tracking', 'neuromarketing', 'consumer buying behaviour', 'eye tracking matrix', and 'traditional marketing tools'. After reading the title and abstract, relevant and interesting literature papers were chosen. Then, the whole paper was read and summarized for our better understanding.

The article 'Eye Tracking in Neuromarketing: A Research Agenda for Marketing Studies' by Renê de Oliveira Joaquim dos Santos, Jorge Henrique Caldeira de Oliveira¹, Jéssica Bonaretto Rochal and Janaina de Moura Engracia Giralde, was very interesting and the main literature reference. This article explores how eye tracking as a neuromarketing tool can be used by marketers and researchers to understand consumer buying pattern and their sub-conscious decisions. Furthermore, the article by Vivian Alexandra Roth, titled 'The Potential of Neuromarketing as a Marketing Tool', were useful because they reviewed the history of neuromarketing and the emergence of eye tracking as a tool.

A. Eye tracking metrics

Eye tracking metrics are valuable tools that are used by marketers and researchers to explore and uncover key insights regarding participant mindset and underlying behavior during various situations, which are otherwise hard to be detected leveraging conventional means. Some of the eye tracking metrics include;

1) Gaze points

Gaze points show what elements that the user's eyes are focused on. A series of very close gaze points denotes a period where the eyes are locked towards an object and shows that more visual attention has been directed there. This helps marketers in understanding which aspects best capture and sustain the attention.



Fig. 2. Gaze points

2) Heat maps

Heat maps examines key areas which show the distribution of fixation and gaze points. They are usually displayed in color gradients of green, yellow and red. The color on a heat map becomes hotter (red) when user's gaze points cluster around certain areas, this indicates which elements attract more

attention than others. Heat maps can also be used to compare single respondents and group participation, in order to understand views across different population.

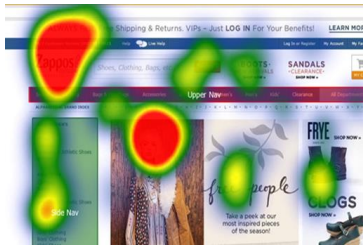


Fig. 3. Heat maps

others. Therefore, it might be relevant to optimize an advertisement in that area of interest and high ratio so that more people notice and are drawn.



Fig. 6. Ratio

3) Scan pattern

Scan pattern evaluates initial fixation sequence. The sequence tells the order of attention, which reflects the user's interest as salient elements in the display. It validates whether the product design was on the typical scan path. Plus, with this metrics, web and mobile designers could have access to elements and stimuli on a page that could affect user behavior subliminally.

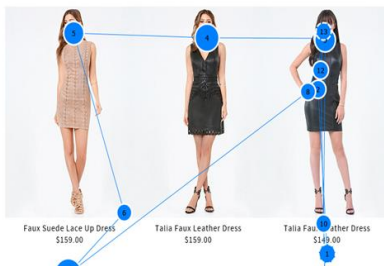


Fig. 4. Scan pattern

3. Limitations

Every method or process involved in market research comes with its own problems, complexities and inefficiencies. The companies which claim to read their consumers' mind with technological aid have their own shortcomings and difficulties. Eye tracking is an example of such a technological aid which helps companies in conducting effective market research and reaching the right, potential customers. Every method or process involved in market research comes with its own problems, complexities and inefficiencies.

Recently, an experiment was conducted by a group of Korean students to check the efficiency of eye tracking. Shoppers were asked to wear eye tracking headsets at a grocery store while they did their shopping. The eye-tracking headsets relayed data back to the researchers and students about what the consumers were looking at while scanning shelves, which brands were given more preferences, and which elements of the packaging attracted the consumer. This, was coupled with traditional research methods and intercept surveys to provide the client with a comprehensive review of findings and takeaways.

4) Opacity map

Opacity map is something of a negative image of a heat map. All the areas that have not been viewed are obscured whilst only the bright areas get the attention of the users. This metrics is used to measure the effectiveness of a new package and shelf location based on the packaging design's performance.



Fig. 5. Opacity map

The results obtained showed that the customers were conscious that they were being monitored by the eye tracking machine. This might have led the consumer looking and focusing on details that they think they're expected to see. In addition, most eye tracking technology cannot account for peripheral vision either, and that can potentially take a great deal of information away and affect the data indirectly.

5) Ratio

Ratio measures noticeability and shows which areas of an element draw the most or least attention. An areas with high ratio obviously indicates that the target group is consistently looking towards a specific area of interest while ignoring

The main confusion which arises in eye tracking is we have not yet seen a correlation between what attracts the eye and what seemingly stays in the mind of the user. Research does not only involve procurement of the necessary data, its science as well as an art. A thorough study, understanding and interpretation has to be established to get better results. But eye tracking doesn't provide much information to carry out such a kind of a research. Coming to the technical aspects of eye tracking, all eyes cannot be tracked by the eye tracking system. Contact lenses, glasses, and pupil color can all impact the eye-tracking camera's capability to record eye movements. Consequently, not everyone, only around 10–20% of the sample can participate in an eye-tracking study. As a result,

generalization from a small sample will result in biasness. Moreover, only one person can be recorded and studied at a time. Individual participation instead of group participation takes considerably more time, effort and labor. The use of multiple eye tracking devices could help reduce the total experiment time, but could be more labor intensive and consolidating individual sets of data may result in some information being lost.

4. Conclusion

Businesses that leverage eye tracking in their consumer research better understand the consumer and what they are thinking, hence capturing consumer attention and ultimately, converting them into sales. Eye tracking is the only unobtrusive way to gain access to valuable subconscious thoughts and decisions, which is why it has become an indispensable research tool implemented by companies and research agencies around the world. The costs are that it is somewhat time-consuming to analyze the richness of the data and expertly trained researchers are required to conduct the study. Despite the very few drawbacks, increasingly frequent use of this tool and the line of research, is soon to become a part of mainstream marketing.

References

- [1] Anastasia. (2016, October 24). How to Use Eye Tracking to Learn about Your Customers. Retrieved from <https://www.cleverism.com/use-eye-tracking-learn-customers/>
- [2] Bryn Farnsworth. (2018, August 14). 10 Most Used Eye Tracking Metrics and Terms. Retrieved from IMOTIONS: <https://imotions.com/blog/7-terms-metrics-eye-tracking/>
- [3] Nielsen, K. P. (2009). How to Conduct Eyetracking Studies. Retrieved from Nielsen Norman Group: https://media.nngroup.com/media/reports/free/How_to_Conduct_Eyetracking_Studies.pdf
- [4] Rationale for Using Eye Tracking. (2016, October). Retrieved from Explorer Research: <http://explorerresearch.com/wp-content/uploads/2016/09/whitepaper.pdf>
- [5] Renê de Oliveira Joaquim dos Santos, J. H. (2015, February 17). Eye Tracking in Neuromarketing: A Research Agenda for Marketing Studies. Retrieved from Research Gate: https://www.researchgate.net/publication/282511668_Eye_Tracking_in_Neuromarketing_A_Research_Agenda_for_Marketing_Studies
- [6] Rihn, H. K. (n.d.). Eye-Tracking Methodology and Applications in Consumer Research. Retrieved from EDIS: <http://edis.ifas.ufl.edu/m/#publication?id=FE947>
- [7] The Best Eye Tracking Metrics used by Marketers. (2018, April 24). Retrieved from Medium Corporation: <https://medium.com/@gazeifycanada/the-best-eye-tracking-metrics-used-by-marketers-877719084468>