EXPLORING THE SUBCONSCIOUS DECISION MAKING IN NEUROMARKETING RESEARCH USING EYE TRACKING TECHNIQUE

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ABSTRACT: This manuscript investigates the relationship of the effects and cognitive consumer purchase behaviors when making decisions. The study of consumer purchase behavior, which is known today as Neuromarketing, is one of the emerging multidisciplinary fields that link studies such as psychology, cognitive science, business planning, marketing and electronics systems. In contrast, traditional marketing business only based consumers' responses on surveys with no direct quantification of their behavior. Hence, the study objectively focused on tracking the gazing behavior to measure and analyze its correlation to the behavior of the mind. We further investigate to determine the subconscious of consumer behavior in decision making and their purchasing process. In this experiment, the Tobii TX300 eye tracker was used to track and record the eye gaze. Sixteen mentally and physically healthy participants took part in this experiment. Men and women clothes collections from online shopping were chosen as the stimuli. The gaze behavior of each individual was observed and analyzed. A post experiment questionnaire was given to the participants to confirm their subconscious' decision. The results showed that the gazing behavior of participants were significantly and subconsciously influenced by the bold, highlighted, and big elements of each stimulus. Hence, most of the respondents have their own decision when purchasing a product which does not depend on the amount of their eye-fixation on a product.

KEYWORDS: *Eye Tracking; Neuromarketing; Decision-Making; Subconscious*

1.0 INTRODUCTION

This manuscript presents an investigation of subconscious influences in decision making through eye tracking technology. Eye tracking measures to where the individual is looking (gaze or fixation point), the time that the individual took a gander at a certain area, the movement of eyes which is the sequences when the eyes move from one spot onto the next, the number of blinks and pupil dilation [1-3]. As human eyes are always looking at what's most important, the eye tracking is built as a device that helps the world to find what exactly is important and respond to it. For example, if a person went through the text and wanted to know where his gaze was, the eye tracker will produce that data information. The photograph will then analyze the position of the eyes.

Eye tracking technology history dated back in the late 19th century when Louis Émile Javal first used eye tracking to study a concept of reading [4-5]. As its innovation advances, its application outspread to every single aspect of daily life. Eye tracking organizations all over the globe have some expertise and capability in giving experiences into human conduct, to business and logical reason [5-6]. For example, Cognitive psychologists today rely on eye tracking to investigate basic processes like attention, perception, memory, and decision-making [7].

This study particularly applied eye tracking to investigate the cognitive consumer purchase behaviors which commonly known today as Neuromarketing [8-11]. The goal is to connect visual attention [12] with the psychological and passionate reactions of buyers. Previous work had shown the benefits of eye tracking application in human psychological emotion analysis [13-14]. However, none has gone deeper into relating the subconscious and conscious mind to the gaze behavior. Although an article on "Pizza Hut subconscious menu" has been published on the media [15], much exploration is still necessary both in academic and industry. As consumer reactions and perception of visuals and other cues in the real environment are of interest in marketing strategies, it is hypothesized that the visual attention attracts the human gaze behavior which may give a positive impact towards the outcome of subconscious decisions when buying product. Hence, the objective of this study involved in quantifying individual gaze point to see how the brain processes the visual data information and selectively filter out or store it into the subconscious memory which allow a greater insight into people's subconscious. Thus, the proposed eye tracking technique may be strategic or could prove a superior answer for business productivity.

2.0 METHODOLOGY

2.1 Participants

Sixteen respondents consist of 8 men and 8 women participated in this experiment which was conducted inside a closed room at Bio Cognition Laboratory, Bio-Inspired System and Technology iKohza. All respondents are students from Malaysia-Japan International Institute of Technology (MJIIT). Since this study targets to find the gazing effects of common consumer behavior, participants are randomly selected. However, all of them are mentally and physically healthy without any diseases related to the eye. The range of their ages is between 20-23 years old. All participants received a payment or token of appreciation of RM10 as a gift of their participation after doing this experiment. They were given an informed consent about the process of the entire experiment. The experiment start after they had understood and signed and the information provided.

2.2 Materials

The experiment is conducted using the eye tracker, Tobii Pro TX300 (Figure 1) located at Bio-iST laboratory in order to collect and analyze the gaze data. Tobii TX300 eye tracker is also synchronized with another computer installed with Tobii Studio 2.2 software, Tobii Toolbox for Matlab and E prime extension for data collection and analysis.

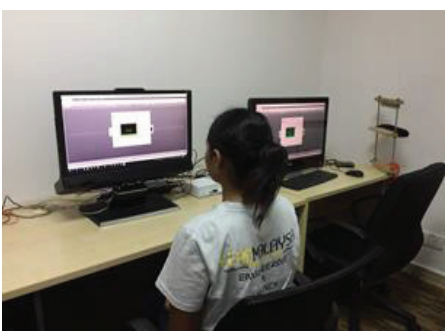

Figure 1: Subject position in the experiment

2.3 Procedure

Before the test began, every participant needed to undergo the calibration system wherein the geometric traits of a subject's eyes are predicted as the idea for a fully-custom designed and accurate gaze point (Figure 1).The experiment was intended to occur under the most practical conditions as though they were shopping in a retail condition from an online shopping website. Two series of images were displayed

on the Tobii TX300 screen for 10 seconds per image. After that, the respondents needed to answer two short questions based on the previous images. The images were presented in a 3x2 matrix arrangement to view the gaze interaction of the consumer's eye on products.

2.4 Data Analysis

After the respondents' eye developments were recorded, areas of interest (AOI) were drawn utilizing the Tobii Studio 3.4.1 programming. This is to extract fixations for a particular area in the stimulus given. It enables specialists to analyze the different parts of a visual scene. Each AOI is a rectangle enclosed in an attribute of interest within the image. After the AOIs were characterized, the information was sent out to the measurable programming of the Tobii Studio 3.4.1 for each AOI. The eye tracker gathered a few measurements, such as first fixation duration (duration of the first fixation), total fixation duration (duration of all fixations within an AOI), total visit duration (former observation length) and percentage fixated (percentage of participants that fixated at least once) for each AOI. The parameters of different color, design of product, and brands were characterized as the Area of Interest (AOI). Every image showed a genuine item accessible at a shopping website online from an international market. But, there were some products and brands that are not familiar to the respondents based on popularity in Malaysia.

3.0 RESULTS AND DISCUSSION

The result of the experiment from each participant was collected by giving two stimuli of men (Figure 2) and women clothes collections (Figure 3). The bar chart consists of various types of color depending on each different AOI in each stimulus.

Figure 2: Men collection

Figure 3: Women collection

3.1 Men Collection

An area of interest (AOI) of men collection for each target items as shown at Figure 4. C1, C2, C3, C4, C5 and C6 represent the design and color of the clothes while B1, B2, B3, B4, B5 and B6 represent the brand of clothes. Figure 5 presents the summary of First Fixation Duration (duration of the first fixation) that obtained from the eye tracking data metrics.

Figure 4: Area of Interest of men collection

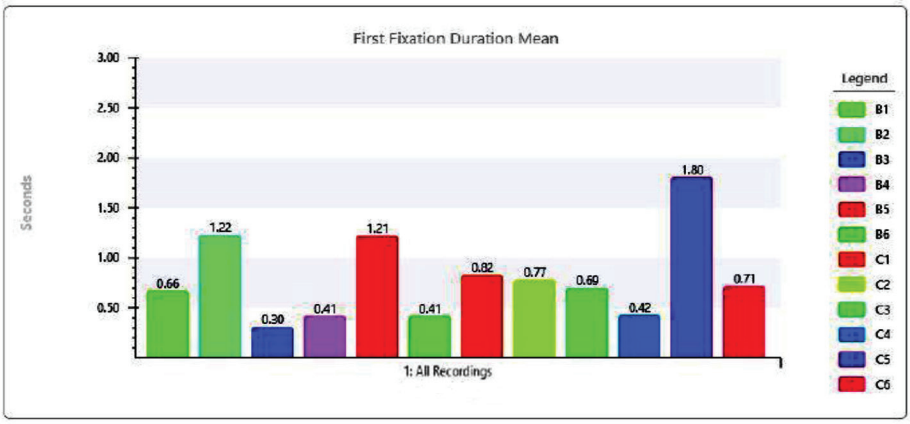

Figure 5: First fixation duration of men collection

As shown in Figure 5, C5 got the highest for the first fixation duration (1.80s), followed by C1, (1.21s) and (C2) with (0.77s) while for the brand of men collection, B2 got the highest first fixation (1.22s), B5 with (1.21s) and B1 with (0.66s). The products with bright and bold colour such as (C2, C6) are become consumer's gaze choice for this men clothe collection.

3.2 Women Collection

Figure 6 shows the interested areas for women collection. C7, C8, C9, C10, C11 and C12 represent the design and color of the women clothe collection while B7, B8, B9, B10, B11 and B12 represent the color for women clothes collection. The average of first fixation duration of women clothes collection as shown at Figure 7.

Figure 6: Area of interest of women collection

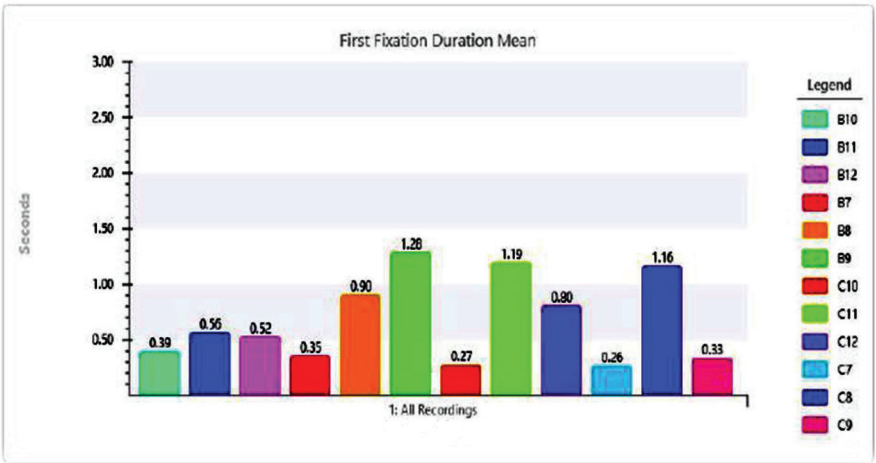

Figure 7: Average of first fixation duration for women collection

The result obtained from the average of first fixation duration are set out in Figure 7 and show that C11 as the highest first fixation duration (1.19s), followed by C8 with (1.16s) and C12 with (0.80s). While for the brand results show that B9 got the highest first fixation (1.28s), followed by B8 with (0.90s) and B11 with (0.56s). The products with bright and bold color such as C7, C8 and C11 are more likely to attract the consumer's gaze.

3.3 Purchase Decision

All 16 participants had to answer two basic post-questionnaires of the experiment. These questionnaires were composed just for comparison to the decision made through the gaze tracked as described in the previous section. The two questions were asked such as

Q1: Based on previous men clothes collection, which one would you like to purchase?
Q2: Based on previous women clothes collection, which one would you like to purchase?

For Q1, 6 participants selected clothing (A) by 37.5%, 3 participants selected clothing (C) and clothing (E) each by 18.75%, followed by 2 participants who selected clothing (F) by 12.5%. Meanwhile, for Q2, 5 participants selected clothing (D) by 31.25%, 3 participants selected clothing (C) and clothing (F) by 18.75 %, followed by 2 participants who selected clothing (A) and clothing (E) each by 12.5%. From the post interview and questions answered by participants, the choices made were based on the design suitable for daily routine.

3.4 Further Discussion

The findings from this study demonstrated and confirmed the capability of the eye-tracking technology in tracking the subconscious decision making in Neuromarketing studies. Thus, determined our research objectives as the gazing behavior are significantly related to cognitive process of the visual data information. The product and its design influence the attention, evaluation and ultimately will impact on the decision making while purchasing the product. The buying choice and time spent then show the conscious decision making while them purchasing the products which generally more preferred simple design rather than complex. The cognitive information that had prevented them from choosing the other clothing is probably due to the complexity of the design or was less confident in their choice.

It can be assumed that most of the participants are more attracted to the brand logo that is more bold, bigger and highlight and easy to be read rather than small, thinner and complicated. Observation from the experiments, detailed the results as the in-depth visual attention characteristics of gazing behavior comprehensively results in higher number of fixations which depicts more attraction to a certain criterion of the product or brand logo.

The results further demonstrate that in both the men and women fashion collections, most of the respondents were attracted to the clothes more than the brand when they are conducting online research in an online shopping website. The human eye subconsciously looks forward to something that is big, bold, highlighted, and sometimes complex.

It relates to the psychology of color and the persuasion of the human mind, especially in marketing. In term of branding, color perception is one of the most common factors of all company have to comprehend in order to attract their customer to buy their product. Additional studies have revealed our brains incline toward instantly recognizable brands, which makes color critical component while making a brand identity. It was also some tips for new brands to picks colors that ensure differentiation from entrenched competitors [16].

The eye movements scrutinize to gain perception into unconscious purchase decision. In addition, most of the respondents agreed that, even though they took time on a certain product, it did not mean that they agreed to purchase the product at the end. It may be due to some unfamiliar brand, unreadable font size, or complex design. The research findings also supported and strengthen the capability of eye tracking technology in targeting the emotional states of consumers [12-13].

4.0 CONCLUSION

The purpose of the study was to determine there was a significant relationship between data attributes and cognitive processes which conform the eye-mind relationship. Based on the first fixation duration of eye tracking data metrics, most of the participants repeatedly looked at the same points several times which suggests the weight of each option subconsciously. Hence, eye tracking application and technique are meaningful in Neuromarketing studies as ways to various advertising and marketing data visualization. Furthermore it may help and benefit entrepreneurs as well as researchers to become aware and address issues that affect the usability of their products.

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