

THE USE OF THE EYE-TRACKER AS A TOOL FOR INCREASED EFFICACY IN VIEWING TRADITIONAL EXTERNAL MEDIA (OOH)



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ABSTRACT

There is a very great disparity between the amount of information received from the environment by the brain and the human capacity for processing. Moreover, the digital boom in all the media has made the consumer's attention fiercer, which has cast doubt on the real effectiveness of traditional media. This exploratory study is limited only to external media (OOH) analysis, in three experiments, seeking to evaluate the visualization of the 48 participants, sitting on the right side of a vehicle in a predefined path. The results of the eye-tracker mobile point to the need for OOH creators to be attentive to the positioning, height and especially the layout of messages. The market wants to buy audience and capture the attention of consumers in environment of great visual pollution and competition from various media. A huge amount of resources is wasted because OOHs are not even noticed by consumers

KEY- WORDS: external media (OOH), viewing, eye-tracker, consumer attention, effectiveness

INTRODUCTION

Our senses are bombed every moment by environmental and sensory stimulation to be processed by the brain. However, there is great disparity between the amount of information received and the human capacity of processing. This way, the brain needs to determine which information should be processed and this almost always culminates with decision taking. Mechanisms

of attention modulate the selective concentration of specific stimulation, whether certain discrete aspects of stimulation or even ignore such stimulation and distractions. The great majority of environmental information received is visual. For this reason, the processing of vision is dominant among the other human senses (Falk, Berkman & Lieberman, 2012).

Stimulation that are visually more notable (for example, shinier, more colorful) are more rapidly perceived or perceived by a longer time than those that are not visually so notable (Milosavljevic, Navalpakkam, Koch, & Rangel, 2012), which directly affects the perception and the usage of external media (OOH, in English *out of home*).

External media (OOH) is routinely used by marketing products and services professionals and, in general, they are considered effective or culturally effective. According to (2000), external media is one of the so-called less traditional means, constituted by a vast group of supports that have in common the characteristic to be installed in the exterior, on the streets, in such a way that meet their audience and public use (street, vehicles and installation of public transportation, sport places, etc.). According to data gathered by Emarketer (2019) in the year of 2018 although the general volume of medias has grown 2.0 % regarding investments, the majority of traditional media presented fall: TV (-7.2%), impress media (-17.6%), radio (-4.2%), and as growth the institute mentions mobile media market (20.40%) and OOH (2.5%) as the only exceptions which justify this study. The fusion with digital technologies (content, dynamics and light, mainly), the so-called digital OOH is leading the growth in digital panels all over the world and automation of buying and selling of Digital Out-Of-Home (DOOH) has been advancing and becoming scale of production and taking place in the market.

OOH is the media of intelligent cities. Since the concept of smart cities is each day stronger and includes since technology solutions and innovations in urban mobility to real-time service offers, the advance of Digital Out-Of-Home (DOOH) makes this media the lead role in smart cities. Through digital and



interactive screens, the population may have access to information about the weather, traffic and infrastructure, bringing benefits to residents and tourists with connectivity, information and interest messages. Other forms of traditional digital medias such as smartphones, banners in channels such as Youtube and LinkedIn are everyday more present in the market (Digital Marketing Expo & Conference, 2019). Lopez Aranda (2011) explains that digitalization enables the perfect combination of Marketing and Publicity in the globalized world of commercial communication, introducing new concepts and methods for the adaptation of routine practices to the consumer.

This study is limited to the analysis of static external media (does not include external digital media – DOOH or external mobile media such as busdoor or taxis). There are few studies that test the efficacy of external media of services and consumer goods. Generally, the measures are focused on location, cont of vehicles that circulate in the surroundings of the streets where the external media is located and posterior, recall studies. Still, external media has begun to demand greater creativity from art creators since the implementation of the Clean City Law in São Paulo and after taken to several Brazilian cities, which searched for a bigger law severity and greater traffic safety.

Companies became obligated to adequate their media to the new law (quantity and dimensions) in permitted places to put publicity supports considering that individuals move themselves inside vehicles or on foot. All of this came to make the measuring of its efficacy harder. With this, some questions are raised within the context: which are the elements that the public, user of public transportation, or passengers, for instance, can really visualize? In how much time can the message actually be read? What is the efficacy of such media? The purpose of this research is to search for a higher efficacy of visualization of the external media (OOH) with the usage of the eye-tracker as a complementary tool of measure.

REVIEW OF THE LITERATURE

There are very few academic studies in this area. Cenp -Meios (2019) showed the growth of internet share from 14.4% to 20.2% and the advance in the



participation of out-of-home media from 7.6% to 10.9% in 2019. Lopez Aranda (2011), explains that digitalization enables the perfect combination of Marketing and Publicity in the globalized world of commercial communication, introducing new concepts and methods for the adaptation of routine practices to the consumer.

Pioneer studies (Silberstein, 2000; Silberstein & Nield 2008, 2012; Fabbri-Destro & Rizzolatti, 2008; Mukamel, et al, 2010) in the cognitive and clinical neuroscience area have shown that these tools were practicable in research of market and evaluation of consumer's answers. The evaluation of the efficacy of OOH measured with the usage of image technology was applied in the verification of emotional states interactions, sub-conscious answers from individuals exposed to different forms of OOH, statics, paper up to multisensorial screens (Andrews; Haines, ; Seixas, 2019).

Consumer neuroscience

Consumer neuroscience has added value to marketing for: (a) publicity and branding (*Brand favorability, brand associations, brand recall, and brand loyalty*) ((Plassmann, Ramsøy, & Milosavljevic, 2012); (b) consumer preference (Deppe, Schwindt, Pieper, Kugel, Plassmann, Kenning, & Ringelstein, 2007) (c) price, product, promotion and location (Kotler, 2017).

The process of human decision making is performed though a complex symphony of neural actions and functional circuits. The authors Shaw & Bagozzi (2018) consider four neural circuits as the most used for decision making process, which are: attention, memory, emotional processing and reward processing.

The Attention

Scientific literature quotes two primary modes of attention: from bottom to up (BU) and from top to down (TD) (Kastner & Ungerleider, 2000). The attention from bottom to up (BU) is driven by environmental signs (for example, a loud noise or unexpected smell (Duncan & Humphreys, 1989), meanwhile the attention top down (TD) is directed by objectives and internal motivations of an individual, external states or expectations (Shaw & Bagozzi, 2018). BU attention is



automatic, or unconsciously driven, being essential for the first impression and judgment of stimulation. For example, when visualizing stimulation, initial eye movements are impeded by perceived factors in BU, such as color, design and brightness (Huddleston, Bethe, Minahan, & Fernandez, 2015). On the other hand, in case of TD attention, the same is conscious and focus on the information, which is relevant according to the individual's purposes (Wolfe & Horowitz, 2004).

Memory, Emotional Processing and Reward Processing

The experiences and information occurred in the past influence future decisions. However, such information and experiences must be coded and recovered from memory. Defined by Redishe Mizumori (2015) as "any physical change that loads information about historical past", memory is the mechanism in the brain that is used to retain and recover information. This retention of information is essential to learn and to determine future actions. Thus, memory and decision making are intimately linked.

There are several memory systems within the brain (Eichenbaum, 1994). Categorically, there are three different types of memory: sensorial memory, (Sperling, 1963), short term or work memory (Baddeley, 2017) and long term memory (McGaugh, 2000). Within long term memory, implicit or process memories (that are processed unconsciously), are associated to the activation of the cerebellum (Doyon et al., 1998).

Ekman (1992, 1999) already explained that subjective feelings, such as happiness, sadness, fear, anger, surprise and repulse, had an important role in decision making and in the evaluation of post-decision. The literature explains that regarding neural level, there are two theoretical approaches to understand emotion within the context of memory: the location approach, which hypothesizes that discrete emotional categories are linked to specific brain areas, having the constructive approach a more psychological focus. This hypothesizes that emotional processes are constructed through interactions of general neural networks and they are not specific for emotion categories. The



psychological constructive approach has been gaining followers (Lindquist, *et al*, 2012), but in the literature the location approach is still expressive due to its interaction with other approaches. The neural activation resulting from studies using a location approach may provide the basis for inter-relational neural networks of non-categorized emotional answers, hypothesized by constructive approaches (LeDoux, 2015; Rilling & Sanfey, 2011).

The processing of rewards or circuit of rewards is activated as answer to resources and desirable experiences subjectively attractive and vastly used in publicity such as food (Berridge, 1996), money (Knutson, *et al*, 2001), sex (Pfaus, 2009) etc. The reward may be separated into two dissociated psychological components: to want and to like, the latter also related to hedonistic impact (Pool, *et al*, 2016). To want promotes the approach and consumption of rewards (instead of retraction), to like or to desire has a motivational aspect, an important incentive and neurobiologically different from taste. Although distinct, the systems of "to want and to like" are overlap in terms of brain regions and are combined to produce subjective feelings of pleasure. The systems "to want and to like" have obvious implications in decision making in costumers and are related to satisfaction (Kringelbach & Berridge, 2012)

Theoretical foundation: Theory of Mind (ToM)

Theory of Mind is related to the mentalization of communication contexts and is referred to as how people interfere with beliefs, thoughts, feelings, wishes, traces and decisions and intentions from other people (Frith & Frith, 2008)

The theory of mind explains and gives foundation to many phenomena in marketing. For example, people watching an interpersonal dialogue in advertisements, daily interfaces between costumers and salesperson, tracing a process of decision making by part of the individuals, always taking into consideration the needs and expectations of other people (a group decision may occur, for instance, during buying groceries for the family), which involves a generalized action of mental processes. As marketing professionals aim at influencing the behavior of purchase, the study of such processes is part of the



theory of mind (ToM), and may provide basic information regarding decision making of consumers, such as the formation of preferences, capture of attention and the choice of behavior patterns (Singer & Tusche, 2014; Shaw & Bagozzi, 2018) for example in the OOHs.

External media (OOH)

The importance of this source of media was impulsed by the change in customer's behavior. In the last four years, 7 million Brazilians stop watching television, 38 million stop reading magazines, 26 million started using the internet (Kantar Ibope TGI, 2016). During waiting periods (for example, inside a bus during urban traffic), the use of internet is mixed with the visualization of urban landscape. The prediction for the next years is the investment in online environment will grow more than 10% until 2020, with the inclusion of more than 20 million people in Brazil, which makes a bigger challenge for all traditional marketing channels. On the other hand, one of the difficulties in marketing is to compare traditional offline media to online media. In traditional offline media (our object of study), indicators such as coverage, frequency, *Gross Rating Point* (GRP), *Target Rating Point* (TRP) are the most used by media professionals. (Sethuraman, Tellis & Briesch, 2011).

A GRP or gross rating point is the percentage of people that watch a program of television multiplied by the frequency. However, not everybody watching the program is a potential candidate to consume the product of a specific company, therefore the TRP is always more searched (and harder to obtain) to determine audience. TRPs is the percentage of the target public of a company that watches the commercials or ads. Target public are groups of clients with higher probability to acquire products and services of a company. Most companies aim at measuring TRPs for each type of publicity, including television, impress media, radio and exterior publicity.

GRPs and TRPs are calculated by media using a specific formula. For example, if 25% of the public watches a specific television program with frequency 1, the GRP is 25. Which is, the GRP is the reach of the company within the general population, or the number of unique people that a specific



campaign has reached, divided by the total population, multiplied by the mean frequency. The analytics are:

GRP = % of the audience reached x mean frequency. Example, a campaign has reached 20% of the Brazilian population with frequency 1, generating 20 GRPs. However, if only 10% of the total audience were target public of a company, the TRP will be 2,5. In other words, TRP uses the same formula but alters the denominator from "Total Population" to "Target Population", which is part of the total population.

TRP= % of the audience of the target reached x mean frequency.

TRPs are usually calculated for each market, for which such publicity of a company is released. Regarding external media, it can be more complicated. In big avenues, this is nearly impossible to be measured. The most common way to obtain such information is by simply asking the new clients where they had heard of the company or the promotion (IAB Brasil, 2014; Farris, Bendle, Pfeifer, & Reibstein, 2010)

The use of neuroscience techniques in marketing has generated considerable interest and excitement due to the possibility of having new tools too measure audience in the last years, highlighted by a crescent number of publications and review articles in the area (for example, Smidts, Hsu, Sanfey, Boksem, Ebstein, Huettel, & Yoon, 2014; Solnais, Andreu-Perez, Sánchez-Fernández, & Andréu-Abela, 2013), as well as significant investments by leader agencies, in the research of market and publicity scope, including the main Nielsen, Ipsos and Millward Brown (Camerer & Yoon, 2015; Hsu & Yoon, 2015). OOH digital media has been growing above the mean numbers due to its dynamism (for instance, circulating in traffic with busdoor, taxis, ice cream carts, etc), digital technology used (colors, lights in movement), which capture more the individual's attention (Hsu & Yoon, 2015).

Location of external media

The OOH location is obviously a factor of major importance (this includes size, height, design and message content, etc), since some locations may attract



more attention than others (Pieters & Warlop, 1999). Eye-tracking studies have shown that there is visual automatic predisposition. For example, among the products on a shelf, there is attention bias directed to a superior visual camp and to direct visual camp (Efron & Yund, 1996). The products placed on superior and to the right shelves, within a specific category, receive longer eye fixation (which means, received more attention and, subsequently, were chosen more frequently). The authors Taylor, Franke, Hae-Kyong, and Brang (2013) identified six factors that are associated to success of billboard campaigns: brand awareness, location, visualization to read, attractive visualization (design), information relevant to the public, creativity.

The authors Hiranuma, Doizaki, Shimotai, Sato, Iwamoto, Okana, Toriyabe, & Sakamoto, (2017) have studied the effects of impression, attention, memory of OOHs. The main findings of such study were the degree of attention and the memory are positively correlated. In addition, the announcement of vivid color exhibited at the eye level received more attention, big and brighter advertisements were more remembered and ads that naturally fit in the environment presented better impression. These results suggest the importance of design in outdoor publicity being in accordance to the purpose of the publicity. However, the big diversity of OOH (visual pollution), whether height, design and location has made measurement of the efficacy of OOH each day harder, for a more demanding and with multiple possibilities of media market. And this is how we have arrived to the first hypothesis of this study.

H1- the location of OOH showed significant differences of visualization of data from eye-tracker among the OOH types evaluated.

Publicity Engagement

At the end of 2012, the IAB USA (*Interactive Advertising Bureau*), jointly with *Radar Research*, emitted a report untitled "Engagement in digital advertising: a general vision of the industry and re-conception". The report was a starting point to outline questions, opportunities and mainly the challenges regarding publicity engagement in a consistent form. This report that was based on 3M2 (2016)



model (*Making Measurement Make Sense*) and identified the three main forms of engagement.

- *Cognitive*, that maps alterations in the awareness, interest and intention. Cognitive engagement includes a positive change in the message decodification and an association of attributes, with a possible change in acknowledgment or familiarity of the brand (*brand awareness*), and changes in the consideration regarding the purchase.

- *Emocional*, or affective, how the publicity makes the costumer feels about the brand. Emotional engagement can be manifested in a positive change regarding the brand's perception, as well as preference and fidelity. Physiological changes may be a sing of emotional engagement, capable of being measured through biometry and neuroscience tools.

- *Physical/Behavioral*, which deals with interactions started by the user. Physical or behavioral indications include any eye-tracking measurements (Time and Degree of Visualization), total number of digital interactions, time spent interacting, activities in commercial videos, search for more information on a brand, or any offline conversation after an ad has been seen (IAB Brasil, 2016a).

Publicity engagement has always been something difficult to solve. It is not about a unique concept, but it is about a spectra of interlinked dynamics that, ultimately, have a positive impact on the connection between the brand and the consumer. If, on one hand, engagement has an active participation, it does not necessarily demand an action. It may, actually, describe an emotion connection or even physical connection. Indeed, engagement is presumed to be a prerequisite for the efficacy of publicity. However, it does not always results in immediate and tangible efficacy. This way, the "engagement" became known as "a spectra of experiences and activities of publicity to the costumer – cognitive, emotional and physical – that will generate a positive impact on the brand." (IAB Brasil, 2016b).

The concept of engagement is a macro concept that transcends the pillars of *branding* and *performance* (that have nothing to do do with social



medial metrics), and aims at measuring all aspects of perception of the brand by the client. It is about a continuous gear that complements the funnel of traditional conversion (Barry, 1987) and gathers the metrics by affinity: cognitive, emotional and behavioral (Figure 1). Although the line is each day slimmer between sales and brand, it is fundamental to understand that there are metrics which are not, necessarily, measured in sales results, but are essential for the construction of the long term legacy of brands and companies (IAB US, 2014).

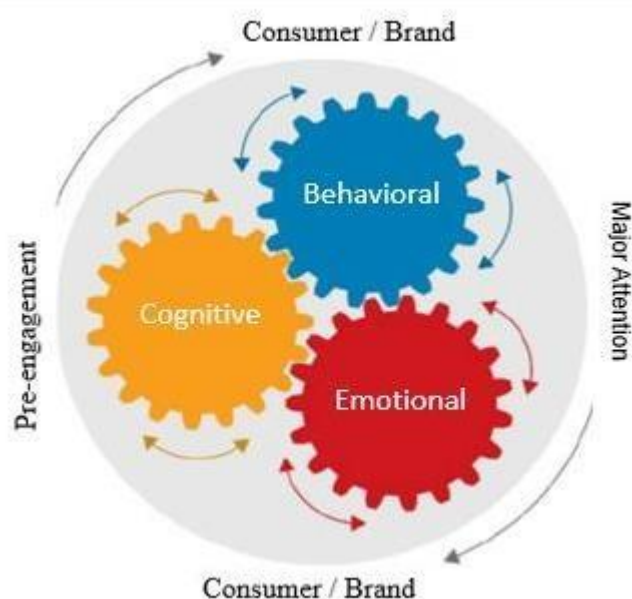


Figure 1
Metrics of Engagement Continuum
 Source: IAB Brazil Guide (2016)

Still, there is not a total consensus of publicity market actors about the best way to measure efficacy. Nowadays, media planners and buyers do not want to buy space in means, they wish to buy audience. What has to be considered always is that consumer is no longer a passive receptor of promotions and advertisement calls, since there is always a more active engagement in the process of value creation (Niada, 2015)

Innovating systems, like Geopath system, were conceived to measure the public that really sees external advertisements (OOH). Geopath (formerly known as Bureau of Audit of Traffic of Media Measurement Inc.), is an

integrated research method still in test, which incorporates research and specialization in areas of circulation, visibility and eye-track research, demography and travel modeling, and construction of reach and frequency systems integrated in Big Data (Geopath, 2017).

This way, the other hypothesis of this exploratory study were outlined:

H2- There is significant difference of engagement between the three types of external media presented.

H3- the visual angle (right side or passenger seat) of the participants allows a total reading of OOH.

H4- the recall of external media was significantly different.

METHODS

Materials

Tobii Pro Lab was used, which is a software platform installed in an Acer Aspire VX5 Plus high power notebook, used in researches about human behavior as eye trackers in screen and portable devices.

In the experiment, Tobii Pro Glasses 2 was used. The equipment analyses visual movement of the participants in the experiment and uses infrared light to light the eyes. Reflexes are captured by sensors to the Tobii software, which estimates the position, fixation and eye movements with 120 Hz frequency. These goggles are packed with two cameras directed to the eyes and pupils and one frontal camera that enables to see exactly what the person is looking at in real time while she/he moves freely in any set, enabling to see how people interact with the environment, what draws the attention, what directs their behavior and influences in decision making, (Tobii, 2018, Figner & Murphy, 2011).

During the phase of data gathering, it was assured by several pre-tests that the flow of data was real time synchronized. The fixation has been associated to intense cognitive processing (Tamorri, 2004) and it is seen as a reliable indicator of an individual's attention (Vickers, 1992). As in previous



studies, the fixation was defined by a look longer than 300 milliseconds (Piras & Vickers, 2011).

Concepts and eye-tracker measurements

The *eye-tracking* concept is referred to a group of technologies that allow to measure and the registration of eye movements of an individual before a real or controlled environmental stimulation, determining, this way, in what area his/her attention is fixed (volume of visual fixations generated), for how long and in what order the visual exploration occurs (existence of eventual patterns of visual behavior) (Timmis, Turner & Paridon, 2004).

The most used measures in the researches that use *eye tracker* are fixations and regressions. Fixations are referred to the moment of the eyes while they are relatively fixed, assimilating or decoding the information, having a mean duration of 218 ms, with an interval of 66-416 ms. However, it is important to mention that they can be interpreted differently depending on the context. For example, the initial time of fixation (TTFF) may be short because it was easily decoded, or long because it drew more attention and interest. The no codification happens during regression, which consists of eye movements that happen during the fixation, typically with duration of 20 to 35 ms. Visual process is automatically suppressed during regression to avoid the erase of the visual image (Jacob & Karn, 2003). Regression consists of what comes back and forth of the anterior position (for instance, directed to the text previously visualized or re-fixations), which can also be interpreted with difficulty scales during decodification, but can also be of greater interest to details (Rayner & Pollatsek, 1989).

From these situations, there is an important number of different metric depending on the type of research. For our study, the following metric of evaluation were chose:

- *Number of fixations on an area of interest: (NFAOI):* a bigger number of fixations indicate bigger importance for the user. This metric is intimately related to the duration of a look, being used to study the number of fixations in different tasks. The number of



fixations of a particular element generally reflects the importance of such element.

- *Time elapsed until the first fixation (TEFF)*: the less the time until the user fixes his/her interest in an area, the better the capacity of such area will be to draw visual attention. It is a useful measurement when there is a specific research of a target.
- *Duration of the fixed look over an area of interest (DFOAI)*: a longer duration (long fixations) may be considered as indicators of difficulties from a participant or a higher cognitive interpretation, but it can also be related to a higher interest/attention over the area of interest (Goldberg & Kotval, 1998).
- *Re Fixations*: The number of times that the reader has bounced back in his/her sequence of look. This can be an indicator of not understanding the message, but it can also be an indicator of a bigger interest in the content of the message, bouncing back to reinforce the understanding.

Design of the project

The study was divided into three experiments (according to the different studied media), 6 sessions of 3 hours were performed, during the months of July, August and September of 2018, using a sample of 48 participants (20 female and 28 male), with ages from 20 to 30 years. In both groups (participants and later, control group), 12 incomplete data were excluded, either because the participant did not focus on OOH, or because he/he did not have fixations.

All individuals from the sample signed a free and informed consent, approved by the Research and Ethics Committee from UFRGS under the CAAE. No 46853715.9.0000.5347.

Each experiment was planned so that participants would go through the chosen path inside a van, individually, simulation ordinary passengers from a bus or in vehicle's ride, with vision from only the right side of the avenue.



Each participant was using a Tobii Pro mobile eye tracker, appreciating the urban landscape where all sort of external media was positioned.

The chosen path for the experiment was a stretch of 4.6 km from Assi Brazil Avenue in Porto Alegre (Figure 2), in one of the main commercial avenues of the city, which connects the metropolitan areas, with great vehicle flow of all types. According to the company of Transport and Circulation from Porto Alegre (EPTC, 2018), on this avenue over 1.5 million bus passengers circulate and in the hours of greater movement, a total of 200 vehicles per hour. At the end of the path, each participant answered a questionnaire based on the Turley & Shannon (2000) scale, which evaluates the impact of perceived advertisements, through recall rate and influence in the intention and behavior of purchase.

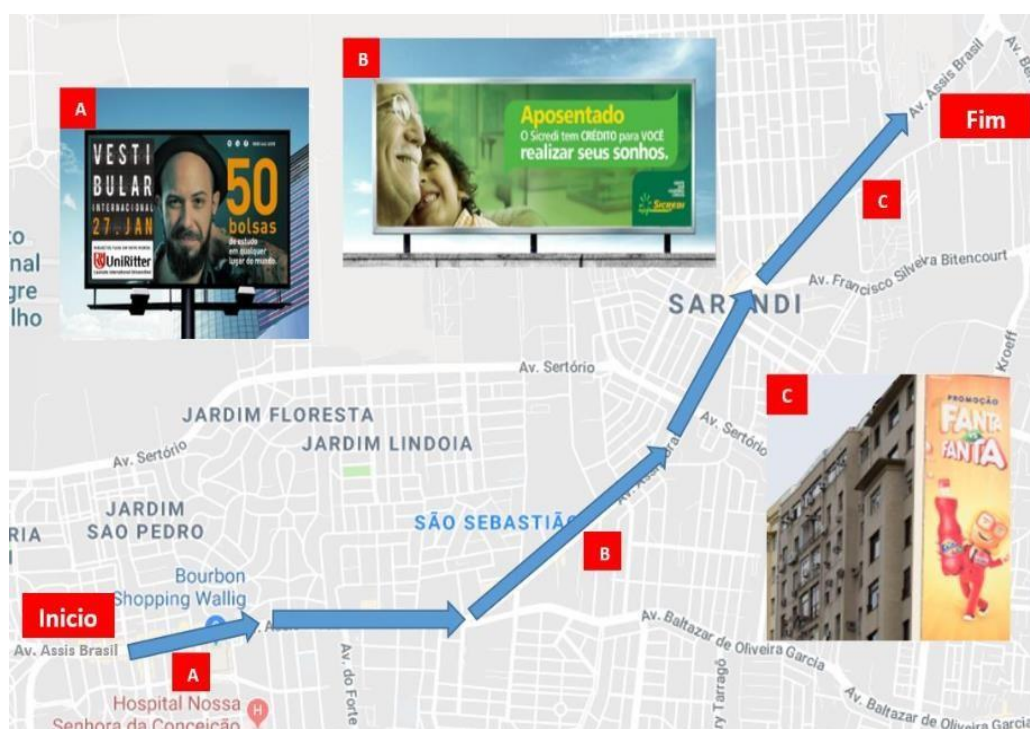


Figure 2
Location of the analyzed external media points
Source: the author (2019) adapted from OOH from H Media

Within this path, 43 external media of several types, sizes and shapes were counted. Due to the great diversity, a choice of three experiment number of external media (OOH) was limited, which were chosen since they were



perfectly fit to the IAB Brazil standards. The time used was from 2 pm to 5 pm, aiming at a normal pattern outside the peaks, although it was verified that the mean velocity of circulation was of 30 km/h, characterizing a slow traffic. Other definitions were necessary such as the time of measurement of the eye tracker, which was manually measured from the moment that the participant had full reading of the OOH until the moment that this was no longer available. Obviously, big OOH such as billboard walls in a building can be seen from far away. Thus, to give the reading of the message, and the details of the design, and still, the reading being strongly influenced by the visual angle of the participant.

This way, the visual angle of the participant was defined as being of 45 degrees. In figures 4, 5 and 6, the parameters used in the three performed experiments are described. In experiment 1, the full reading distance (24 meters), the time elapsed (28 seconds), and assuming a visual angle of the participant of 45 degrees. The High Billboard (HB) follows the measurements standardized by the IAB Brazil Metrics (2016) according to figures 4, 5 and 6, as follows.

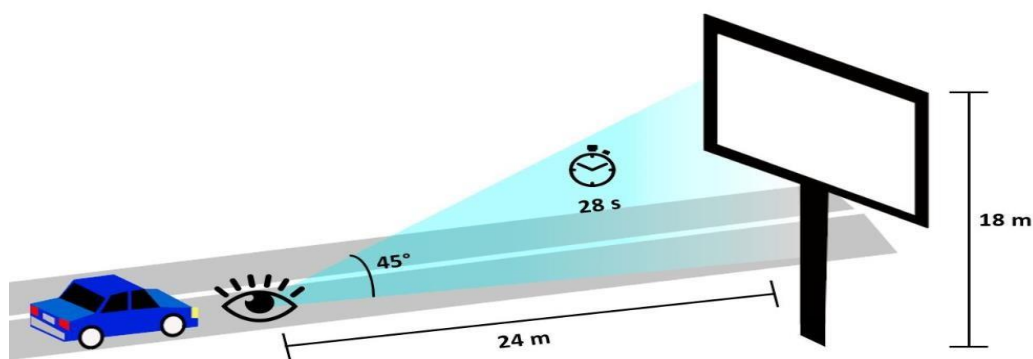


Figure 3
Graphic representation (high billboard) of the visual sight of a passenger Experiment 1
Source: the author (2019) adapted from IAB Brazil Metrics (2016)

In experiment 2, we have a low billboard, located right above a wall at the end of the sidewalk (16 meters from the avenue), In the same way, the full

reading was measured horizontally and had a duration of 15 seconds according to figure 4, as follows.

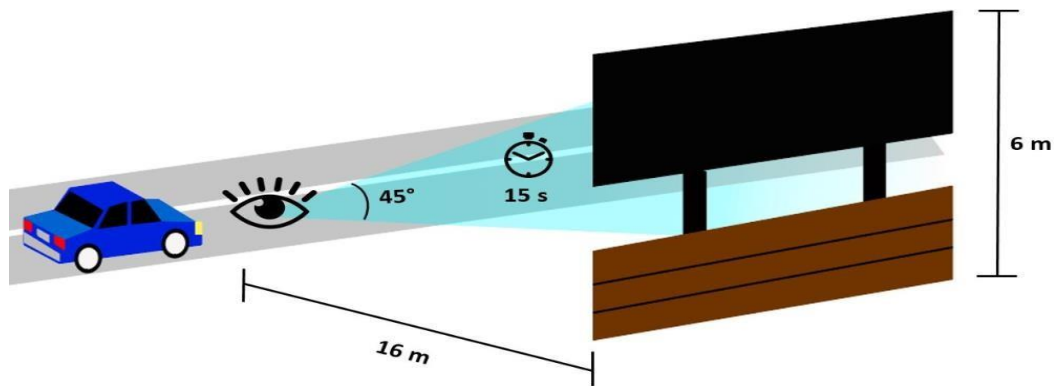


Figure 4
Graphic representation (low billboard) from the visual sight of a passenger Experiment 2.
Source: the author (2019) adapted from IAB Brazil Metrics (2016)

In experiment 3 (figure 5), although the billboard wall (BW) was high (30 meters) and it was possible to be seen from over a 50 meters distance, the full reading was measured at 38 meters, provoking a visualization time of 47 seconds.

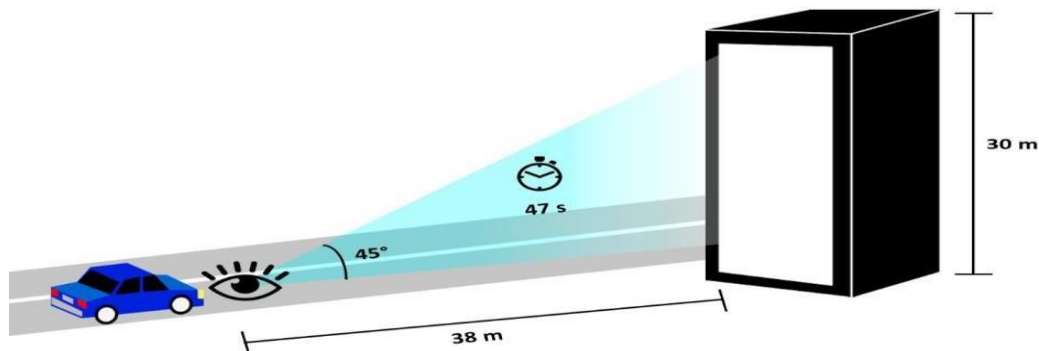


Figure 5
Graphic representation (wall) from the sight of a passenger Experiment 3
Source: the author (2019) adapted by IAB Brazil (2016)

AOI and other definitions

In studies using the eye tracker equipment, it is necessary to define the areas where the attention of the participants will be measured, the so-called Areas of Interest (AOI). In our study, we have three experiments (three



different types of OOH), with a total of 7 AOI and defined as follows (figures 6, 7 and 8).

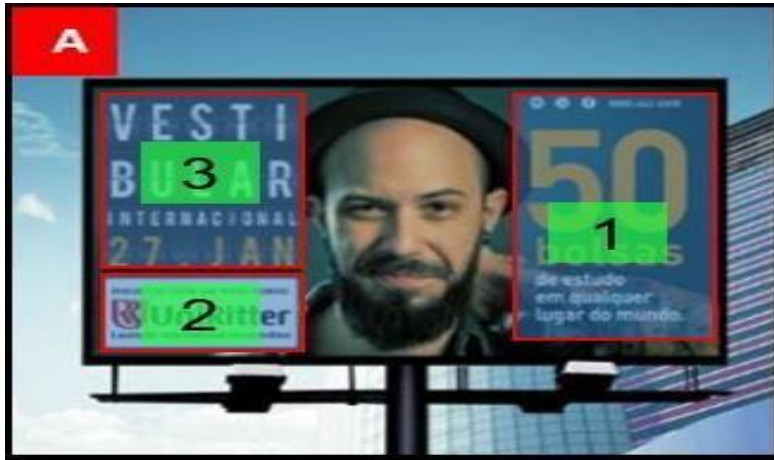


Figure 6
AOI Experiment 1 High Billboard (HB)
Source: the author (2019) adapted from OOH H-Media



Figure 7
AOI Experiment 2 Low billboard (LB)
Source: the author (2019) adapted from OOH H-Media



Figure 8
AOI Experiment 3 High wall (HW):
 Source the author (2019) adapted from OOH H-Media

RESULTS

Statistical Testing

The obtained mean numbers for each indicator of the eye tracker for each AOI are presented as follows. In all analysis, the software SPSS version 20.0 (Table 1) was used:

Table 1
Eye tracker's mean data
tracker

	AOI 1	AOI 2	AOI 3	AOI 4	AOI 5	AOI 6	AOI 7
TEFF m/s	17	4.5	6.3	8.4	2.3	15.1	5.5
NFAOI	6.2	2.5	4.5	6.5	2.5	4.1	2.6
DFAOI m/s	189	119.5	151	165.5	90	168	163
Re Fixations	7.5	2	5.5	4	2	1.5	1.3

Source: the author (2019)



The homogeneity of the variances was tested through Levene's test and in these experiments, the test did not show violation of the hypothesis in homogeneous variances (Table 2)

Table 2
Levene's test of homogeneity of variance

	Levene			
	stat.	df1	df2	Sig.
TEFF	12.872	6	329	0.000
NFAOI	7.551	6	329	0.000
DFAOI	30.894	6	329	0.000
Refixations	7.841	6	329	0.000

Source: the author (2019)

The analysis of variance (ANOVA) was performed to verify whether systematic difference between the mean results was found, mainly distributed from experiences to one variable (visualization). All participants received the same treatment, assuring that the differences between the mean results of groups, if existed, could be attributed to the effect of the treatment, in this case the same pattern of visualization of all OOH was found (Hair et al, 2009). Twelve incomplete data (12 participants) were excluded from the study, whether because the participant did not see the OOH, or because there was no fixation. As a result, no significant differences were found "in groups" for each OOH. However, "between" groups with different OOH there were significant statistical differences. The control group was not equipped with eye tracker, only self-related results were consulted.

Table 3
ANOVA test



		Sum of squares	df	Mean of squares	F	Sig.
TFFF1	Between Groups	7418.25	6	1.236.375	613.371	0.000
	In Groups	663,167	329	2.016		
	Total	8.081.417	335			
NFAOI	Between Groups	856.369	6	142.728	158.495	0.000
	In Groups	296.271	329	0.901		
	Total	1152.64	335			
DFAOI	Between Groups	252.169.458	6	42.028.243	416.455	0.000
	In Groups	33.202.396	329	100.919		
	Total	285.371.854	335			
REFIXATIONS	Between Groups	1.080.417	6	180.069	220.849	0.000
	In Groups	268.25	329	0.815		
	Total	1.348.667	335			

Source: the authors (2019)

Self-related test

At the end of the chosen path, the participants answered an interview performed by the researchers. When the theme of evaluating media results is referred, the literature presents some techniques of measurements, such as the "share of voice", the "share of mind", brand awareness, the recall rate of ads, the audience of an ad, the mean frequency of exposition to the ad, and the degree of intention of purchase in the target-public. In the study, we develop a script for the interviews, based on Dias et al (2003, p.298), which suggests that recall is the best measurement to effectively measure advertisements post-tests recall, divided into aided recall and spontaneous recall. In spontaneous recall, asking directly to the participant whether he/she remembered the OOH of the experiment, meanwhile in aided recall,



showing the map (figure 3), that shows the location and the OOH of the path of the experiments.

The interviews were complemented with questions about brand awareness and sales testing (if the interviewee would buy or not). This tool is justified because according to Schultz (1998, p.49):

“The only place where there is real product value is inside the mind of active or potential clients. All the other marketing variables, such as projects of the product, price formation, distribution and availability, may be copied or overcome by competitors.”

Still, the author explains that marketing's real value is in the perception of what is called 'mind network' of the customers on the brand, since this is, in fact, what they believe and dream of. It is considered, therefore, that the only competitive and sustainable competitive advantage is the integration of marketing communications, defined as "all the concept of integrated communication is based on the mode that consumers keep information of the product and brand. (Schultz, 1998, p.53). It was chosen as the control group, for comparison effect, 15 participants of several ages and gender, who did not participate in the experiments with the eye tracker, but only performed the path of the experiments.

- a) *Spontaneous Recall* : 26% of the participants in experiment 1 remembered the high OOH of Unirriter (possibly because it was informative about SAT's data and scholarships); 5% remembered the low OOH from the experiment 2 from Sicredi; 10% remembered the high all of experiment 3 (remembered the drawing and characters from Fanta).
- b) *Aided Recall*: 42% of the participants of experiment 1 remembered the high OOH from Unirriter; 7% remembered the low OOH from experiment 2 from Sicredi; and 15% remembered seeing the big wall with the doll and cartoon drawings from Fanta (experiment 3).
- c) *Brand Awareness*: participants that remembered Spontaneous Recall recognized and remembered the brands (some very known). The ones that



had “aided recall” in great majority also remembered the brands after being “aided”.

- d) *Would you buy?:* only 10 % of the participants manifested interest in knowing more about the scholarship from Uniritter, meanwhile in other OOH experiments, the answers were indifferent to the stimulation. .
- e) *The Control Group* was not capable of remembering a single OOH.

It became clear that the big visual pollution of OOH in the path restricts the participants’ attention, many of them claimed not having even fixed or seen the message.

DISCUSSION

It is clear that these experiments have an exploratory experimental character, being impossible to make generalizations due to the big complexity of variables. Many limitations were necessary, since the choice of different OOH types, time measurements and distance for each type of OOH, and to define a mean standard angle of visualization to the passengers inside the vehicles. However, the introduction of the eye-tracker to measure the efficacy of OOHs opens up new horizons to neuroscientific explorations, as complement of traditional metric to measure efficacy in a moment when online medias have been growing. In the study, the following hypothesis were tested:

H1- the location of the OOH has shown significant differences in eye-tracker’s data visualization between the analyzed types of OOH. ACCEPTED.

In general, all media data from the eye-tracker had significant different from participants to a same OOH. The location of the OOH is still one of the main factors considering traditional medias, which corroborates with Pieters and Warlop, (1999). The visualization and capture of interest were significant considering each experiment in particular.

H2- There was difference in engagement among the three types of external media presented. ACCEPTED.



Engagement in publicity is a theme with difficult solution, since it is not about a unique concept, but, a spectra of interlinked dynamics that groups metrics by affinity: cognitive, emotional and behavioral. In the examples of the OOHs used, the AOIs 1, 4 and 6 had the bigger engagements (TFF and DFAOI means), possibly due to the symbolism and emotional connection presented: AOI 1 highlights university scholarships (majority of the participants were young people in their 20's and 30's). AOI 4 has an emotional connection, since it portrays the picture of a retired grandfather, happy and in peace with this grandson, and AOI 6 shows a color and modern graphism that the brand Fanta has been using in its publicity. Still, it can be inferred the possibility that the participant is thirsty and the picture sends the message of the wish to drink a soda.

H3- the visual angle (right or left side) of the participants allows a total reading from OOH – REJECTED

Although in the present study only OOHs with previous measurements were chosen, which, in thesis, allow all of them to be read at a certain distance and in the angle of 45 degrees, we had 12 rejections for incomplete data from the eye-tracker due to lack of attention and/or time of reading in the OOHs of the experiments. Still, the self-relate interviews have shown that several participants did not even notice or remembered the OOHs of the experiment, possibly because the attention was driven to the general traffic, store windows and visual pollution in the path. In a non-experimental condition it is expected a higher percentage of OOHs not seen either by the angle or by the dispersion in attention.

H4- external media recall was significantly different – ACCEPTED

Only AOI 1 and AOI 3 had, respectively, 7.5 and 5.5 refixations indicating a greater interest, since the texts presented no doubts of interpretation in the message (scholarships and STA data), and AOI 1 and 2 had the biggest



percentage of spontaneous recall and aided recall (26% and 42%, respectively) and in the control group there was no memory of any OOH.

CONCLUSIONS

This study was divided into three experiments, but which were simultaneously applied, during the path traveled. It is important to mention the need to limit the type of external media as well as define evaluation measurements and distances from OOH. Fundamentally, the study was divided into three experiments, since it is about three different OOH, some metrics had to be individually measured and adjusted to each type of OOH. It was an attempt to standardize the angle of vision from the ride in 45 degrees, obviously this not always happens in a real life situation on the field.

However, this study has important contributions, which if not conclusive, open a new path to research. In methodological terms, the acknowledgment of the problem of measuring efficacy of traditional medias (which are being hardly affected by the advance of online media) suggests that new expectations may occur due to the introduction of neuroscientific tools in traditional metrics. For traditional media professionals, needy of a more accurate measurement, this represents an important new argument to sell their products of external media.

Visual pollution and countless possibilities of capturing the attention from consumers makes this experiment of great importance also to the creators of OOHs from publicity agents in terms of layout, colors and message and, still, to a higher efficacy in the use of resources by traditional buyers.

In general terms, the results suggest that the use of the eye-tracker for analysis of the visualization of OOHs may indicate a higher assertiveness in the allocation of resources and recall by part of the consumers. This study represents a contribution to the academy since it approaches a little explored subject, but of great economic importance, which has been suffering profound transformation coming from a new profile of consumer each day more focused on the digital. There is a large avenue to deepen the theme of better efficacy in the allocation of resources whether in digital



media (DOOH) or other types of external medias, including mobile media like *bus doors, taxis, carts* etc., which should be object of new future researches.

MANAGEMENT IMPLICATIONS

Still, there are questions to be answered. Once the media scenery is evolving, the way that the DOOH interacts with other media will also change. For current and new generations of managers, the creative role of DOOH needs to be better understood, com the existence of a new generation of technologies available for OOH, new suppliers (such as live transmission and interactivity) that will change the scenery and the implications for the future development of OOH. However, the results of the research at the moment allow us to say that the OOH and DOOH are means that will continue to have an important and relevant role in the more broaden media universe, which suggests to deepen the studies on how consumer perceives such media by the geographic and spatial characteristics of this type of marketing channel.

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