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CONTRIBUTIONS OF NEUROSCIENCE IN MEASURING EMOTIONAL IMPACT IN ADVERTISING CAMPAIGNS USING EEG

CONTRIBUIÇÕES DA NEUROCIÊNCIA NA MENSURAÇÃO DO IMPACTO EMOCIONAL EM CAMPANHAS PUBLICITÁRIA COM O USO DO EEG

CONTRIBUCIONES DE LA NEUROCIENCIA EN LA MEDICIÓN DEL IMPACTO EMOCIONAL EN CAMPAÑAS PUBLICITARIAS CON EL USO DEL EEG

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ABSTRACT: Measuring advertising impact has always been a challenge for the field of study. In this case, consumer neuroscience contributes significant scientific solutions by introducing evaluative metrics for attention and interest processes. This article presents the analysis of a beer advertisement using low-resolution EEG (electroencephalography), aiming to assess the emotional impact when subjects are exposed to the advertising stimulus. The advancement of Brain Computer Interface technology has led to devices that can capture the brain's superficial electrical frequencies and offer an opportunity to use these data in the evaluation of advertising. The results obtained from the study demonstrate that it was possible to capture significant effects on the brain's electrical activity among consumer groups, contributing to marketing decision-making. The purpose of this research is to demonstrate different possibilities of advertising metric analyses, when applied from a multidisciplinary perspective, in this case with the use of neurobiology in the field of social sciences.

KEYWORDS: Consumer Neuroscience. Neuromarketing. Communication Impact. Advertising. EEG.

***RESUMO**: A mensuração de impacto publicitário sempre foi um desafio para o campo de estudo. A neurociência do consumo contribui, nesse caso, com soluções científicas importantes quando traz métricas avaliativas para os processos de atenção e interesse. Este artigo apresenta a análise de um filme publicitário no segmento de cerveja utilizando EEG (eletroencefalografia) de baixa resolução, visando a avaliação do impacto emocional quando os pesquisados são expostos ao estímulo publicitário. O avanço da tecnologia Brain Computer Interface levou a dispositivos que conseguem capturar as frequências elétricas superficiais do cérebro e oferecessem uma oportunidade para utilização destes dados na avaliação da propaganda. Os resultados obtidos com o estudo demonstram que foi possível capturar efeitos significativos nas atividades elétricas do cérebro entre grupos de consumidores, contribuindo para a tomada de decisão mercadológica. A proposta desta pesquisa é demonstrar diferentes possibilidades de análises métricas publicitárias, quando aplicadas perspectivas multidisciplinares, neste caso com o uso da neurobiologia no campo das ciências sociais.*

***PALAVRAS-CHAVE**: Neurociência do Consumo. Neuromarketing. Impacto Comunicacional. Publicidade. EEG.*

***RESUMEN**: La medición del impacto publicitario siempre ha sido un desafío para el campo de estudio. La neurociencia del consumo contribuye, en este caso, con soluciones científicas importantes al aportar métricas evaluativas para los procesos de atención e interés. Este artículo presenta el análisis de un anuncio publicitario en el segmento de cervezas utilizando EEG (electroencefalografía) de baja resolución, con el objetivo de evaluar el impacto emocional cuando los encuestados están expuestos al estímulo publicitario. El avance de la tecnología de Interfaz Cerebro-Computadora ha llevado a dispositivos que logran capturar las frecuencias eléctricas superficiales del cerebro y ofrecen una oportunidad para utilizar estos datos en la evaluación de la publicidad. Los resultados obtenidos con el estudio demuestran que fue posible capturar efectos significativos en las actividades eléctricas del cerebro entre grupos de consumidores, contribuyendo a la toma de decisiones de marketing. La propuesta de esta investigación es demostrar diferentes posibilidades de análisis métricos publicitarios, aplicando perspectivas multidisciplinarias, en este caso con el uso de la neurobiología en el campo de las ciencias sociales.*

***PALABRAS CLAVE**: Neurociencia del Consumo. Neuromarketing. Impacto Comunicacional. Publicidad. EEG.*

Introduction

The excess of information and attention diversion are significant challenges in advertising communication. Consumption goes beyond the concept of owning goods when we consider access and the intrinsic social and cultural relationships during individuals' decision-making processes. Many companies invest in media alternatives in an attempt to occupy a small portion of this attention. However, measuring these efforts is always an uncertainty for planners. When consumers declare a consumption preference, they have already undergone significant cognitive processing that may have been influenced by socio-cultural experiential variables susceptible to a response manipulated by the consumers themselves and, to some extent, may not correspond to the original biological impulse, whether due to conscious or unconscious factors. Therefore, measuring results in advertising is still considered a challenge.

The words of Lord Leverhulme spoken in the 19th century are still relevant: "Half the money I spend on advertising is wasted, but I don't know which half" (Correia, 2015, our translation). Measuring the impact of advertising is not trivial and/or simple. One of the first forms of measurement was ad recall, introduced in the 1940s (Du Plessis, 1994) which still persists today. Does the fact that someone claims not to remember seeing an advertisement, for example, mean that it was not effective? Could cognitive processes activate the advertisement

in situations more favorable to memory recall? If an advertisement is not remembered, does it mean it was not successful? How can we ensure that a commercial will be remembered in the future? These are guiding questions of various studies seeking to relate advertising and cognition.

Reactions to advertising messages constitute a complex phenomenon, being developed with a focus on a particular target audience's emotions and cognitive aspects. The composition of images, music, and audiovisual resources that make up advertising campaigns can reach deep emotional and cognitive levels, ensuring a more enduring assimilation of the advertisement. This 'emotional arousal' favors attitudes toward the product or brand, recall, and purchase likelihood (Belanche; Flavián, 2014). Certain television commercials can increase brain activity, especially when they activate the theta and gamma bands in the left hemisphere of the brain, facilitating the memorization process of communication (Vecchiato *et al.,* 2010a; 2010b).

However, evaluating the impact and response measures of individuals to communication is problematic because conventional measurements cannot reflect the process that occurs between stimulus reception and behavioral response (Barnes; Pressey, 2008). Communication evaluation is typically conducted through research involving the application of self-assessment questionnaires (or self-reports) supported by psychological techniques. Although widely used, this approach cannot comprehensively measure underlying mental processes demonstrating how communication modulates viewers' cognitive aspects (Barnes; Pressey, 2008). There is growing skepticism about this type of communication evaluation, especially because verbalized responses have limitations and do not provide a clear perspective on internal (mental) reactions to advertising (Ohme *et al.,* 2010; Ohme; Matukin; Pacula-Lesniak, 2011).

Unlike opinion surveys regarding advertising campaigns, where questionnaire scales represent a relative meaning for each individual (certainly, a rating of seven assessed by two different subjects has different representations), neurophysiological responses occur similarly among individuals, and from them, it is possible to identify cognitive patterns of reactions to advertising (Orzan; Zara; Purcarea, 2012). Neurophysiological measures are an objective complement to subjective declarative data, which may allow marketing professionals to portray not only the conscious but also unconscious elements of communication (Ohme *et al.,* 2009).

In the context of neuroscience studies, a new discipline has recently emerged that examines the brain and its functioning and enhances understanding of cognitive processes (Ohme; Matukin; Pacula-Lesniak, 2011), called "neuromarketing." It is a marketing discipline that utilizes neuroscience techniques to understand how the nervous system reacts to marketing

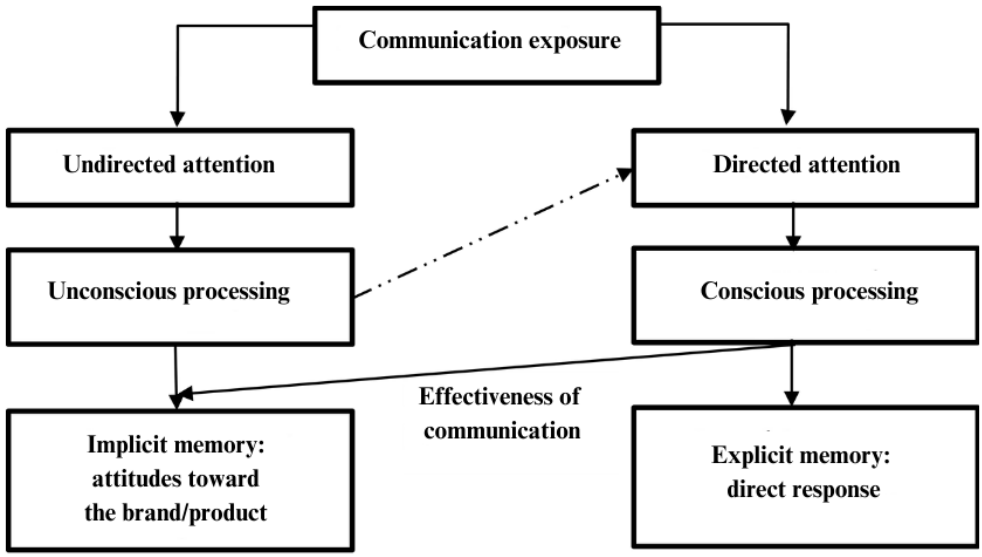
stimuli. The term was initially coined by Ale Smidts in 2002, who defined it as: "the study of the brain mechanism that seeks to understand consumer buying behavior with the purpose of improving marketing strategies" (Orzan; Zara; Purcarea, 2012, our translation). While neuromarketing seeks to apply neuroscience concepts to market research, consumer neuroscience has a broader and more academic perspective, focusing on consumption studies. For this reason, it was chosen to work with this term in the present article.

Advertising and Cognition: Challenges of Memorization

The ultimate objective of all advertising is to influence consumer behavior. To achieve this, it must be memorized and activated in working memory at the time of purchase. Working memory (also known as short-term memory) consists of a temporary storage structure where information from long-term memory and the environment is brought in for processing, responsible for guiding a person's behavior and decision-making process(Finn, 2001; Pearson et al., 2014; Yan *et al.,* 2014). Two other mnemonic structures are involved in the processing of advertising: implicit and explicit. Explicit involves consciously known information retrieved due to particular experiences. Implicit is usually the result of learning from a previous passive, non-conscious, and non-intentionally recallable experience (Baird; Wahlers; Cooper, 2007).

The process of memorization can occur consciously or unconsciously through the individual operating the focus of attention (through working memory) (Krishnan; Trappey, 1999; Krishnan; Chakravarti, 1999). Consumer's unconscious processing can be quick, involuntary, and automatic, not subject to working memory capacity limitations, and always triggered by certain cognitive cues (Yoo, 2008). As shown in Figure 1, there is a route that communication can take unconsciously, where information enters through non-directed attention. A second route can be conscious, where attention tends to be limited and selective, a result of the attentional process itself (Yoo, 2008). This means that conscious operations may be subject to working memory processing.

Figure 1 – Conceptual Model



Source: Authors, adapted from Yoo (2008).

Thus, measuring consumer reactions with non-verbal resources simultaneously with stimulus presentation provides a more precise measure of responses derived from advertising stimuli. It is important to note that the consumer's opinion, when verbalized, will always be essential to give 'shape and color' to what is thought of the advertisement. With the use of neuroscience tools, it is possible to identify moments of activation that the subject is not always aware of (usually, the evaluation is done through a global advertisement judgment). The application of neuroscientific methods enables the understanding and analysis of human behavior in the market(Lee; Broderick; Chamberlain, 2007).

The contribution of neuroscience methods to marketing has been significant, considering the work done in the last two decades. Particularly, self-assessment has been a commonly used resource in marketing for studying consumer behavior, and its accuracy is related to individuals' ability to accurately report their behavior and attitudes(Lee; Broderick; Chamberlain, 2007), which does not always occur. Advances in technology and the increased knowledge in neuroscience in general, specifically in affective neuroscience, have provided insights into how the brain functions, processes information, and the power of emotions to influence complex behaviors (Marci, 2008).

The potential of neuroscience has attracted the attention of marketing researchers and, especially, the advertising industry to apply principles and techniques of neuroscience (Marci, 2008). This is because physiological measurements are captured when subjects are responding

to stimuli, making it difficult for them to control these reactions. However, certain individual variations in physiological response patterns may reduce the accuracy of these measurements (Lee; Broderick; Chamberlain, 2007).

The field of affective neuroscience has made its mark on advertising and led to significant advances in the study of emotions in communication. The advancement of biometric technologies, such as electroencephalography (EEG) and functional magnetic resonance imaging (fMRI), opens up new horizons in the advertising landscape. This is because the brain's emotional center processes information before the cognitive system and significantly influences this process. Emotional processing plays a powerful role in directing attention, and in the formation of memories, and in many emotional aspects, information processing and learning occur automatically, without direct awareness, involving distinct areas of the brain separate from language centers, making it difficult for consumers to accurately report their emotional experiences (Marci, 2008).

The area of Brain-Computer Interface (BCI) is an expanding field in research, and new equipment emerges as technology progresses (Peters; Asteriadis; Rebolledo-Mendez, 2009). Today, there are devices available that can identify superficial brain waves, such as the Neurosky EEG, which has three sensors in different positions on the head capable of distinguishing electrical activity from neural activity (Peters; Asteriadis; Rebolledo-Mendez, 2009). We used this type of equipment in our study, replacing conventional EEG. With this work, we aim to demonstrate the possibility of conducting neuromarketing studies using less complex devices to identify how it is possible to understand the evaluation of an advertisement using this resource.

Application of EEG in Advertising

The purpose of this work is to present a way to evaluate advertising films in a non-verbal manner, using low-complexity equipment that can be used in a scalable manner, meaning it can be applied to large samples.

This type of analysis brings important benefits in advertising evaluation. Firstly, from a statistical perspective: unlike self-reporting, which offers a discrete measurement scale, the use of biometric devices provides continuous data on a scale from 0 to 100, allowing for better analytical conditions, although this resource has restrictions, such as information resolution. Unlike EEGs with 32 or 64 channels that measure different levels of frequency and activated brain regions, the simple EEG device has limitations in its measurement accuracy, as it basically identifies two primary cognitive elements, originating from the frontal lobe: the level of attention (associated with beta brain waves) and the level of meditation (or relaxation, associated with alpha brain waves). Its use alone helps, but does not address a range of questions that arise when evaluating an advertising stimulus.

The first question is: what is the ideal level of measurement of attention (engagement) and meditation (affection) to be able to say whether a film will be successful or not? This is a question that will require a lot of study and, above all, the inclusion of response variables (one of which could be the financial return of campaigns) to feed an analysis of cause and effect that is very difficult to obtain. Other questions regarding the reliability of the measure should also be established. These variables will not be addressed in this study and will certainly be the subject of further research for further exploration.

The NeuroSky EEG is a non-invasive device that detects neurological electrical impulses to determine states of attention and meditation based on the interpretation of alpha and beta brain wave frequencies (Peters; Asteriadis; Rebolledo-Mendez, 2009). Unlike traditional electroencephalograms, which require multiple electrodes to be used with saline solution and are complex to install on subjects' heads, the Neurosky EEG provides the possibility of quickly capturing shallower brain data and, above all, enables data collection in large samples. However, it is important to note that the information provided is of lower resolution and with less precision.

The performance of the equipment was validated through the "Tower of Hanoi" task, which consists of a psychological test of selective attention, cognitive flexibility, and processing speed (Crowley *et al.,* 2010). Users wore the equipment headsets during the task to

measure the two variables mentioned. A higher level of relaxation was identified initially, which decreased as the task required more stress from the individual (Crowley *et al.,* 2010). In another study, it was identified that the alternations in electrical impulses generated during neuron operation could be captured by the device (Katona *et al.,* 2014).

The meditation measure identifies waves between 8-12 Hz (alpha), which induces a state of relaxation (Katona *et al.,* 2014). The higher the subject's level of relaxation, the higher the measured score, and vice versa: the lower the meditation score, the higher the level of stress (Crowley *et al.,* 2010). The second measure is attention, based on beta brain waves with frequencies between 14-30 Hz (Cho; Kim; Lee, 2014). It corresponds to a measurement of concentration (Katona *et al*., 2014) and attention to a particular scene (Peters; Asteriadis; Rebolledo-Mendez, 2009). Attention establishes the prioritization of elements to be processed and significantly impacts the memorization process (Frazão; Fernando, 2003). These two frequencies are particularly important in evaluating advertisements, as they are related to emotional elements (Khushaba *et al.,* 2013).

Depending on the plot of the advertisement, it is possible to evaluate with the device the level of cognitive demand which, at an extreme level, can result in mental confusion, as well as the level of involvement or stress, which is directly related to the viewer's affective state. This relationship is very important, as imagine a campaign against sexually transmitted diseases, whose narrative focuses on creating fear of unsafe sex. This content should register on the low-resolution EEG a high level of stress, with a high level of directed attention.

The NeuroSky provides a specific score using a range of 0-100 to represent the level of attention and meditation of the person being tested. When the value is in the range of 40-60, it means that the condition is moderate; 60-80 means that the parameter is currently elevated, that is, slightly higher than the normal level; 80-100 means that the scores are at the highest level (Wu; Ju; Tzeng, 2011).

Receptive Process in Audiovisual Beer Advertising

Data collection was conducted through a partnership with a research company (Popmind Research), which was responsible for recruiting respondents, conducting interviews, and collecting data. This company developed a synchronization solution between the device and the advertisement display. A trigger was programmed for the start of the film, which was activated at the same time as the EEG device recorded the reading, ensuring synchronization between the data recording time and the film display.

The study involved 63 interviews selected with profiles defined based on the target audience of the advertisement. The evaluated film was a beer commercial, lasting 30 seconds (for ethical reasons, its identification will be reserved). The subjects were shown the advertising film for 30 seconds using the mentioned equipment. The participants' average age was 30.5 years (SD = 4.5), with 25 (40%) subjects belonging to social class B and 37 to social class C (60%). To identify the social class to which the individual belonged, the Brazil Criterion was applied, as suggested by ABEP (Brazilian Association of Research Companies). The selection also took into account the marital status of the participants (65% single and 35% married) and their buying behavior (48% consumed another brand of beer, and 52% consumed the beer from the commercial). Considering the participants' buying profile, 19% did not reject any beer brand, 60% rejected brands other than those in the advertisement, and 21% rejected the brand in the advertising film.

Sample selection involved balancing between men and women; however, for the purposes of this study, the analysis element is considered to be the attitude toward the product, regardless of the consumer's gender. The segmentation between consumption profiles and gender would provide insufficient records for statistical tests, so the analysis between genders was disregarded. Subjects were recruited using an interception methodology, approaching individuals in high-traffic areas. Those who fit the intended quotas were invited to participate in the study.

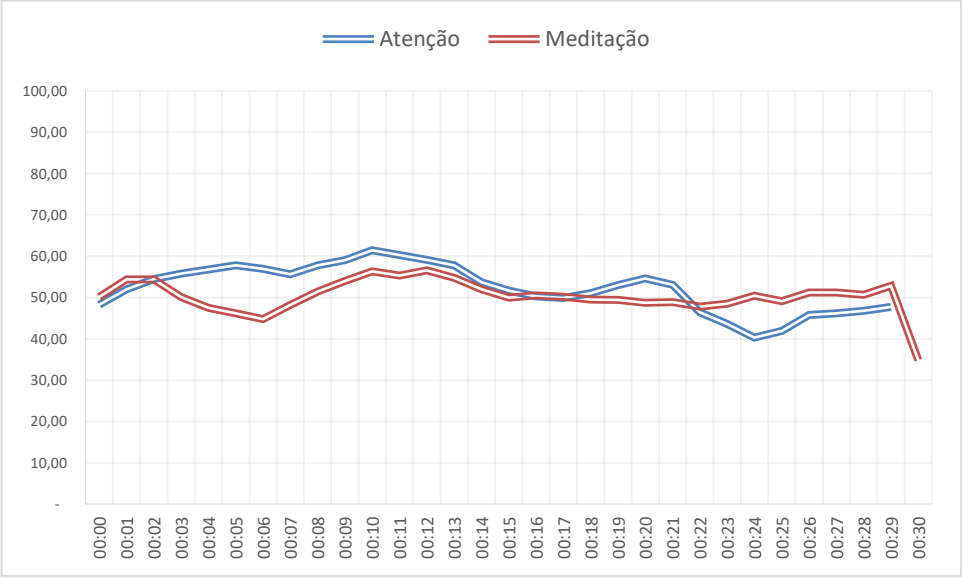
The results were analyzed from two perspectives: qualitatively, through the graph presented in Figure 2 (average scores of attention and meditation); and statistically, through tests between the different groups used in the study. The attention curve of the graph expresses the average obtained throughout the study. The narrative manages to capture increasing attention until the twelfth second, dropping until the eighteenth second, with a slight recovery thereafter and a new drop. This shows that certain sections of the film capture the subjects'

concentration, but this attention undergoes a process of dilution between the tenth and twenty-fourth seconds. As mentioned, these data are not sufficient to explain what happens in this interval, and it would be essential to interview these subjects to make sense of what should be done to improve the impact of the advertisement. However, there is certainly data identifying a clear loss of attention and at which moments this occurs.

The second curve demonstrates the level of meditation during the film. It is interesting to observe that between the fifth and eighth seconds, there is an increase in the level of stress (inverse of meditation) and attention. This is not necessarily a negative effect, as it depends on what is expected from the film's narrative. The same can be said about what happens at the end of the film: in the final two seconds, there is a clear increase in the level of stress.

It is crucial to emphasize that we are evaluating a narrative in general terms, and there are certain limitations both in the use of simple averages and in the temporal association between the film and the brain's response, especially considering a low-resolution EEG. On the other hand, it can better illustrate cognitive modulation compared to traditional questionnaire applications.

Figure 2 - EEG Data at each second according to the duration of the film[3]



Source: Developed by the authors.

A second perspective is the statistical analysis of the film as a whole and the comparison between groups. The data were analyzed based on the measures obtained, using the t-Student

[3] Translation of the color blue: Attention; Translation of the color red: Meditation.

test to evaluate the differences between the scores in each of the groups. In several cases, significant effects were obtained, both for the level of attention and for the level of meditation.

The variable 'attention' will henceforth be replaced by the term 'engagement'. This is because both concepts are based on the activation of the same electrical frequency. Engagement consists of cortical activation characterized by the predominance of beta-wave activity, which is more associated with cognitive enhancement (Mauri *et al.,* 2014). Another term, 'affectivity', will succeed the concept of meditation in a positive valence sense (given that the measures adopted relate to an increasing scale of alpha). Advertisements with higher recall scores are those with high levels of brain wave activity, for example, more alpha wave time (Mitchell, 1981). Studies involving complex EEGs show that alpha activity is related to observing pleasant or unpleasant ads in the left or right hemisphere of the brain (Vecchiato *et al.,* 2011).

The comparison between the mean data of the subjects, considering marital status, yielded a statistical effect. Singles ($\bar{x}$ = 54,78) had a higher level of affectivity towards the film than married individuals ($\bar{x}$ = 51,11; p=0,011). This means the advertisement was more engaging for singles than married individuals. Another profile analyzed was age, divided into two categories: age groups younger and older than 30 years. The adoption of this cutoff point is based more on marketing strategy than scientific criteria: the film would be targeted at a younger audience. These groups had a statistical effect for both engagement and affectivity.

The engagement score for the younger group ($\leq$30 years) was higher ($\bar{x}$ = 57,00; p=0,040) than for the older group ($\bar{x}$ = 52,49). This difference also occurred for the affectivity score, where the older audience ($\geq$30 years) obtained a lower score ($\bar{x}$ =51,79) than the younger audience ($\bar{x}$ = 56,90). These differences offer an exciting insight into communication: in terms of effectivity, the film performed better among singles and younger individuals, who also showed a higher level of engagement. These results characterize the potential target audience that the film can impact, which in this case are young and single individuals.

Another observed effect was the difference between brand drinkers and non-drinkers, both for engagement and affectivity data. Non-drinkers of the beer brand had a higher level of engagement ($\bar{x}$ = 59,09; p=0,000) than the product drinkers ($\bar{x}$ = 52,25). For the level of affectivity, non-drinkers also had a higher activation ($\bar{x}$ = 56,80; p=0,000) than those who appreciated the beer from the commercial ($\bar{x}$ = 50,64). If the advertising strategy is to sensitize new users, the film in question shows that it would work properly.

Differences were also identified for the social classes considered in the study. Representatives of class C ($\bar{x}$ = 57,04) had higher engagement in the film (p=0,000) than representatives of class B ($\bar{x}$ = 53,16). This is important information for communication segmentation, especially for message dissemination, since engagement is a measure that demonstrates which audience may be more susceptible to the advertising message. The advertising in question finds a higher level of engagement among the lower socioeconomic class (class C) than in class B.

Therefore, the evaluated film enables a clear segmentation of its effect: individuals below 30 years old, singles, non-drinkers of the brand, and belonging to class C. This segmentation is based on capturing the brain's superficial electrical frequencies. The advertising film triggers, in many of these segments, a higher emotional activation that may be related to the film's rhythm, as well as a higher level of engagement, which can favor the understanding of the plot and the film's message.

The results obtained with the Neurosky device offer a significant advantage over self-assessment interviews. They are obtained through scales and constitute non-parametric data, as they derive from ordinal scale responses(Rocha; Delamaro, 2011), which makes it difficult to use statistical tests. However, with equipment data, they follow a measurement parameter based on brain electrical frequencies and provide a scalar measure, which may facilitate the performance of parametric tests. The normality test for the data (KS normality test) allowed for the identification of the normality of the distribution.

Being able to identify activated brain waves helps to get an idea of what is happening in the brain in real time. Alpha and Theta frequencies, according to the literature, are the most activated during observation and memorization processes compared to Beta and Gamma (Astolfi *et al.,* 2009), however, they cannot be captured by the equipment used. If a conventional EEG has limitations in terms of spatial resolution due to the number of electrodes used, as well as the limited capacity to process a complex phenomenon (Astolfi *et al.,* 2009), it is expected that an EEG with a lower resolution will have greater uncertainty in terms of data. The mentioned electrical frequencies reach different parts of the brain and activate different cortical activities (Vecchiato *et al.,* 2010a; 2010b), which can lead to different mental processes. However, despite these inaccuracies, it is possible to identify likes and dislikes using certain brain frequencies (Vecchiato *et al.,* 2011).

The application frequency of EEG for advertising research will grow rapidly, and with the evolution of technological and computational capabilities, it will be possible to conduct more sophisticated experiments (Ohme *et al.,* 2010). There is also the possibility of integrating this measure with other biometric measurements, such as eye tracking and skin conductance, which may offer greater precision to the studies (Ohme; Matukin; Pacula-Lesniak, 2011).

Ethical issues may arise regarding the use of this type of resource as a means of consumer investigation. While it may aid in the research process, it is worth questioning how invasive this resource may be. Compared to studies involving functional resonance or clinical electroencephalograms, the resource used is much less invasive. However, when compared to a questionnaire, ethical considerations will certainly be necessary for studies conducted in market research.

The exciting aspect of this technique is the ability to identify, second by second, the brain's electrical responses in a synchronized stimulation process. Reading reactions to cognitive stimuli, in addition to being applicable to samples with a relatively large number of people and the easy-to-use Neursky equipment, allows for sample scaling.

Two directions are necessary for future studies: the first concerns more exhaustive experiments with the Neurosky EEG to cross-reference its data with those obtained from complex EEGs. This equipment is increasingly being used in international experiments for educational, marketing, gaming, robotics, among other purposes (Peters; Asteriadis; Rebolledo-Mendez, 2009; Crowley *et al.,* 2010; Vourvopoulos; Liarokapis, 2011; Wu; Ju; Tzeng, 2011; Ducao; Tseng; Kapri, 2012; Mohammad, 2013; Onunka; Bright; Stopforth, 2013; Varada; Moolchandani; Rohit, 2013; Folgieri; Lucchiari; Marini, 2013; Yoon *et al.,* 2013; Bozkurt, 2014; Cho; Kim; Lee, 2014; Katona *et al.,* 2014). The second direction involves the cross-referencing of data with self-assessment scales. Although people may have limitations in expressing their feelings and thoughts more specifically, they can make absolute judgments about certain communication characteristics, which can be used to evaluate whether the impact of the data obtained is consistent with the conscious data manifested by the subjects.

Final considerations

Assessing the receptive processes of communication has always been a challenge in the field of advertising. In declared surveys, such as *top of mind* or *share of mind*, for example, consumers are aware that they are undergoing a questioning process and have cognitive time to process and even polish their responses in a way that may undergo modulations and external influences. In this sense, survey statements may not faithfully reflect the stimulus incited at the moment of contact with the message, precisely because they are susceptible to interferences during the stimulus and response journey.

In an attempt to gauge the post-communicational impact stimulus, focusing on the cognitive process, neuroscience was sought as an alternative to biologically measure consumption choices, considering that it is from the body's sensory receptors, in this case, vision and hearing, that sensory inputs occur, establishing synaptic connections manifested by signals captured by EEG.

These different research possibilities, founded on consumer neuroscience, prove to be an essential path for the development of the advertising field, mainly due to the challenge of measuring possible advertising outcomes in cognitive terms. Today, advertisements broadcast on digital platforms are calculated based on statistical data that measure the possible number of people impacted by the frequency of message exposure, such as metrics worked on in social media. Factors like engagement and involvement are gauged through the recording of comments on posts and link shares, but they do not fully comprehend the absorption of the content disseminated.

Far from seeking clinical precision in the cognitive measurement process in response to advertising, the device used in this study may provide a significant complement to the data traditionally obtained in quantitative and qualitative research. The results demonstrate that it was possible to capture significant effects on brain electrical activities among the people studied. The use of this device may be promising, but further studies are needed to enhance how Neurosky EEG data can be used in the advertising evaluation process.

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