

Neuromarketing: a systematic review

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Abstract

The aim of this systematic review is to elucidate how the Neuromarketing field has been studied in terms of consumer behavior through experimental protocols that make use of statistics (quantitative analysis). At the same time, it aims to verify how new Neuromarketing protocols can better clarify consumer behavior patterns, as well as understand the decision-making process and how to meet consumer needs. Articles dated between 2016 and 2020 were initially collected in the PubMed, Science Direct and DOAJ databases and subjected to a filtering to remove duplicates and apply the exclusion criteria, which resulted in 13 final articles selected. Although studies suggest it is necessary to customize ads, generate positive emotions, use the image and speech of famous people and attractive packaging to be able to capture the consumer's attention, a methodological standardization is necessary among neuromarketing research so that they can be replicated and their hypotheses become capable of being validated.

Keywords: Neuromarketing; Neuroeconomics; Cognitive neuroscience; Behavioral neuroscience; Consumer.

Resumo

O objetivo desta revisão sistemática é elucidar como a área de Neuromarketing tem sido estudada no que pauta o comportamento do consumidor através de protocolos experimentais que fazem uso de estatística (análises quantitativas). Paralelamente, visa-se verificar como novos protocolos de Neuromarketing podem melhor esclarecer padrões do comportamento do consumidor, assim como compreender o processo de tomada de decisão e como atender às necessidades do consumidor. Artigos datados entre 2016 a 2020 foram inicialmente coletados nos bancos de dados PubMed, Science Direct e DOAJ e submetidos a uma filtragem para remoção de duplicatas e aplicação dos critérios de exclusão, o que resultou em 13 artigos finais selecionados. Embora os estudos sugiram ser necessário customizar anúncios, gerar emoções positivas, usar a imagem e fala de famosos e embalagens atraentes para conseguir prender a atenção do consumidor, uma padronização metodológica se faz necessária entre as pesquisas de neuromarketing para que estas possam ser replicadas e suas hipóteses se tornem passíveis de serem validadas.

Palavra-chave: Neuromarketing; Neuroeconomia; Neurociência cognitiva; Neurociência comportamental; Consumidor.

Resumen

El objetivo de esta revisión sistemática es dilucidar cómo se ha estudiado el área de Neuromarketing en cuanto al comportamiento del consumidor a través de protocolos experimentales que hacen uso de la estadística (análisis cuantitativo). Al mismo tiempo, tiene como objetivo verificar cómo los nuevos protocolos de Neuromarketing pueden aclarar mejor los patrones de comportamiento del consumidor, así como comprender el proceso de toma de decisiones y cómo satisfacer las necesidades del consumidor. Los artículos fechados entre 2016 y 2020 se recopilaron inicialmente en las bases de datos PubMed, Science Direct y DOAJ y se sometieron a un filtrado para eliminar duplicados y aplicar los criterios de exclusión, lo que resultó en 13 artículos finales seleccionados. Si bien los estudios sugieren que es necesario personalizar los anuncios, generar emociones positivas, usar la imagen y el discurso de personajes famosos y empaques atractivos para poder captar la atención del consumidor, es necesaria una estandarización metodológica entre las investigaciones de neuromarketing para que puedan ser replicados y sus las hipótesis se vuelven susceptibles de ser validadas.

Palabras clave: Neuromarketing; Neuroeconomía; Neurociencia cognitiva; Neurociencia del comportamiento; Consumidor.

1. Introduction

Neuromarketing research has grown dramatically in recent decades, ranging from the direct effects on consumer behavior to the technological advances arising in the area (Babiloni & Cherubino, 2020; Lim, 2018; Crespo-Pereira et al, 2020; Nemorin, 2017; Schneider & Woolgar, 2012; Zito et al, 2021). Additionally, neuroscientific techniques have been shown to be effective in understanding the consumer's mind and elucidating brain responses such as emotions, motivation, memory and attention under marketing stimuli in a world where economy is in constant expansion (Rojas et al, 2015; Hsu & Chen, 2019; Hubert & Hubert et al, 2018). Neuromarketing is understood as the application of neuroscience studies to marketing components, for example the consumer behavior, in order to develop new strategies on consumption decision-making (Babiloni & Cherubino, 2020; Nilashi et al, 2020; Bridger, 2018). The term was introduced in 2002 by organizational theorist Ale Smidts, defining it as the study of the brain mechanisms responsible for consumer behavior in order to improve marketing strategies” (Boricean, 2009). In the competitive market, an assessment based on pupil dilation, muscle responses, eye movement and brain waves, to understand how attractive stimuli lead the consumer to a final sale, is crucial to the success of products, services and businesses (Boccia et al, 2019; Rawnaque et al, 2020; Nemorin, 2017). Attending the needs of current marketing, which is the generation centered primarily on human beings (Sato et al, 2010), the neuromarketing can be applied to testing different marketing stimuli such as product and packaging development, advertising, website creation and price tabulation (Babiloni & Cherubino, 2020). These studies can be used in areas of behavioral economics, psychology, decision-making theories and computational analysis (Babiloni & Cherubino, 2020; Bridger, 2018). Neuromarketing emphasizes the elucidation of fundamental responses from the consumer that would otherwise be hidden, since a significant portion of mental and emotional processes do not reach consciousness (Lim, 2018; Meyerding; Mehlhose, 2020). Neuroscience is a vast field of study that uses techniques and tools capable of analyzing the anatomical and functional aspects of the nervous system, such as electroencephalography (EEG), functional magnetic resonance imaging (fMRI), positron emission tomography (PET), magnetoencephalography (MEG) and functional near infrared spectroscopy (fNIRS). Therefore, Neuromarketing is combination of the traditional marketing methods with neuroscientific approaches (Babiloni & Cherubino, 2020; Çakir et al, 2018; Royo et al, 2018; Rawnaque et al, 2020; Yadava et al, 2017; Casado-Aranda et al, 2018).

Some equipment has been widely used in neuromarketing studies and are described as following: The EEG records the electrical activity of the cerebral cortex expressed through brain waves that are captured at different frequencies and amplitudes (delta, theta, alpha, beta and gamma). The Galvanic Skin Response (GSR) aims to measure the level of dominance between the sympathetic and parasympathetic autonomic nervous system. GSR is a type of electrodermal activity (EDA), which is used to verify alertness levels (arousal) under exposure to relevant stimuli through electrical conductance, resistance, impedance and/ or skin admittance. On the other hand, eye tracking (ET) captures eye movement through fixations and saccades to determine whether the subject holds attention to a stimulus or not (Moya et al, 2020; Yadava et al, 2017; Rojas et al, 2015; Wolfe et al, 2016).

In this context, a study should only be considered as belonging to the field of Neuromarketing when encompassing such neuroscientific techniques, otherwise, one may remain in the field of research of Psychology involved in consumer behavior, without considering physiological parameters (Stasi et al, 2018; Venkatraman et al, 2015). Unfortunately, the growing misuse of the term “Neuromarketing” has made it difficult to clearly differentiate this field from others and, subsequently, consolidate its scientific applications and implications (Lim, 2018; Plassmann et al, 2010; Stasi et al, 2018). Due to the lack of consolidation of this field, little is known about the modulation of nervous system activity by marketing stimuli (Plassmann et al, 2010; Stasi et al, 2018). This systematic review aims to elucidate how Neuromarketing has been used as a tool for studying consumer behavior, in the strict sense of the term, through experimental protocols and statistical analyses.

Moreover, we seek to verify how new Neuromarketing protocols could better clarify consumer behavior patterns, as well as understand whether the market can be more effective in decision-making processes and attend to the needs of consumers using Neuromarketing strategies (Figure 1).

Figure 1. Areas that contribute to Neuromarketing studies.



Source: Elaborated by the authors.

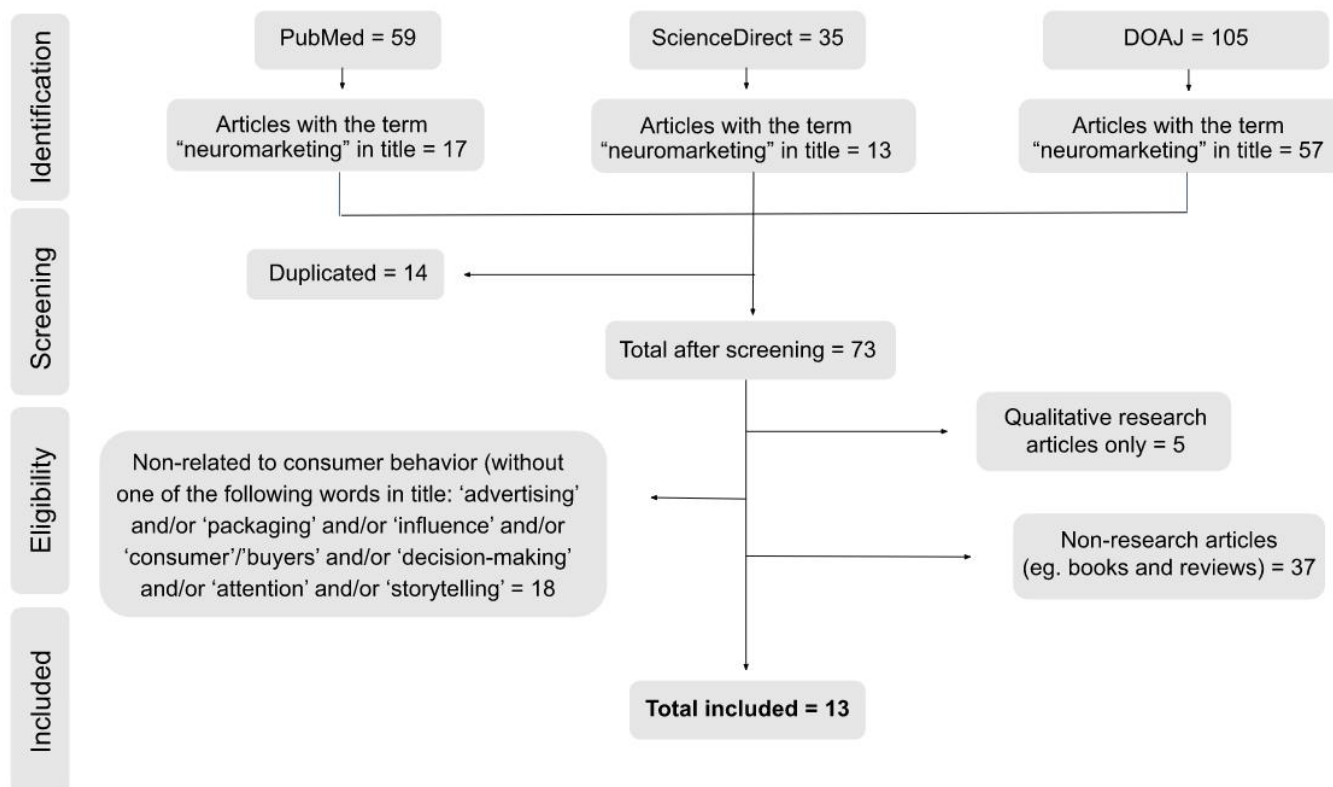
2. Methodology

This article is a Systematic Review of Literature and ‘How is neuromarketing being applied to consumer behavior studies?’ this was the main question of this review, based on the increasing use of neuromarketing techniques to attract the attention of individuals at the time of purchase. It is explained that a Systematic Literature Review aims to go beyond the usual activity of carrying out a common literature review, due to its fundamental characteristic of giving some more meaning to many documents found. In addition, it is important to observe the use of clear criteria regarding the databases used and the search strategies in each of them (Jesus & Jesus, 2022).

This study was carried out between January and June of 2021 and followed the PRISMA recommendations - a methodology that use a checklist with 27 steps and a flowchart with 4 steps (Figure 2), whose objective is to improve the reporting of systematic reviews and meta-analyses (Galvao et al, 2015). Articles from 2016 to 2020 were initially collected in PubMed, Science Direct and DOAJ electronic databases (Table 1). Inclusion criterion was to have “neuromarketing” as a predictor in title, while exclusion criteria were: qualitative studies (subjective analysis); non-original researches (eg. books and

reviews); studies non-related to consumer behavior (without one of the following words in title: ‘advertising’ and/or ‘packaging’ and/or ‘influence’ and/or ‘consumer’/’buyers’ and/or ‘decision-making’ and/or ‘attention’ and/or ‘storytelling’).

Figure 2. Flow diagram based on PRISMA recommendations.



Source: Elaborated by the authors.

Table 1. Databases and predictors used to collect eligible articles.

Database	Strategy
Pubmed	Neuromarketing [Title/Abstract]; Journal articles, 2016-2020.
ScienceDirect	Title, abstract or author-specified keywords: “neuromarketing”, research articles only, 2016-2020.
DOAJ	Neuromarketing in “keywords” filter, 2016-2020.

Source: Elaborated by the authors.

3. Results

After removing duplicates and applying the exclusion criteria, 13 papers were selected for further analysis (figura 1) and organized by authors, objectives, techniques and outcomes (Table 2).

Table 2. Selected papers published between January/2016 and December/2020.

Author (country)	Objective	Techniques	Outcome
Moya et al, 2020 (Spain).	To analyze the use of neuromarketing on food packaging and to examine its reproducibility under similar methodologies.	Electroencephalogram (EEG), galvanic skin response (GSR) and eye-tracking (ET).	No relevant changes between the perceptions of each package, but several factors interfere when making packaging analysis.
Hsu & Chen, 2020, (Taiwan).	To understand how hotel videos embedded with a smiling face emoji as a subliminal message affect consumers' selection of hotels.	EEG.	A subliminal stimuli of a smiling face emoji may significantly affect the participant's selection of hotels.
Calvert et al, 2019 (Singapore, Scotland and England).	To examine the implicit emotional responses associated with receiving and providing excellent service.	BIOPAC physiological equipment (for heart and breathing rates) and skin conductance.	Both giving and receiving good customer service was perceived as pleasurable (Study 1) and at the same time, was implicitly associated with positive feelings (Study 2).
Hamelin et al, 2020 (Australia, UAE e Kyrgyzstan).	Storytelling styles have been examined for their effectiveness in terms of attitude change and retention.	Biometrics data, ET, facial expression analysis and GSR.	Participants pay more attention to emotional and affective stories and that overuse of emotional storytelling can generate negative emotions such as contempt.
Juarez et al, 2020 (Spain).	To propose a model that optimizes the design of educational toy packaging.	ET and GSR.	The most important elements are the graphic details of the packaging.
Viniegra et al, 2020 (Spain).	To determine the cognitive perception that Spanish adolescents and young people have of the stimuli transmitted by influencers on Instagram.	ET and GSR.	The brands did not attract much attention from young people, however the eyes are the part that provides more attention and the face draws attention more quickly when a smile appears.
Nik et al 2019 (Iran).	It has been investigated whether the EEG power spectrum features can be used for prediction of consumer references and the incidence of decision-making.	EEG.	The results between likes and dislikes can be predicted by the EEG, but it is not possible to predict whether the consumer will make the purchase.
Nuñez-Gomez et al 2020 (Spain and Mexico).	Understand whether the perception of advertising differs between individuals with asperger syndrome (AS) and a neurotypic population.	Electrodermal activity (EDA).	Low-complexity commercials affect the two groups (AS and neurotypic) differently. Those of high and medium complexity are not clearly understood by the AS group.

Ferrer-Lopez, 2020 (Spain).	Objective 1: to identify whether influencer-advertising contents are more effective (in terms of attracting the attention of the subject or eliciting a more intense emotional response) than other digital advertising contents such as advertising spots. Objective 2: to find out whether there are significant differences between the advertising formats of the influencers.	EDA with a post visualization survey.	Using influencers may increase engagement and the emotional response to the advertising contents. Additionally, the contents that had the most points of attention and emotion were those that were acquired by the influencer himself at home.
Němcová & Berčík, 2019 (Slovak Republic)	To identify the factors influencing the decision-making process of the Generation Y customers in the selection of wine in the Slovak Republic.	ET and a questionnaire survey containing questions that resulted from eye-tracking testing.	The most important factor identified by the questionnaire was the variety, but physiological response indicated that the design of the label was the most important aspect. Regarding the shape of the bottle, the most preferred was the Bordeaux type.
Juarez-Varon et al, 2020 (Spain)	To analyze parents' perception of elements contemplated in the design of toy packaging that are educational and age appropriate for their children.	ET and GSR.	The most important elements are the graphic details of the packaging.
Mañas-Viniegra et al 2020, (Spain)	To determine the differences in attention and intensity of the emotions experienced when viewing two pieces of audiovisual news.	ET and GSR.	The scenes filmed with drones are very detailed and promote more emotion than attention of the spectators.
Gonchigjav, 2020 (Mongolia)	To identify customers' reaction, emotions and feedback in a store.	ET, EEG, face reading technology (FA) and internal position system.	Customers concentrated for a longer time in locations with red wine and the highest arousal values were found in the candy department.

Source: Elaborated by the authors.

From the evaluation of food packages using electroencephalography (EEG), Moya et al (2020) concluded that several factors interfere when analyzing a package. When exposed to an image, the individual will first process it by the visual system and then organize and assess it by the brain's working memory and cognition centers. However, it was not possible to find a pattern between the viewing time on a product and the fixation number on the package. In the study by Němcová & Berčík (2019), volunteers completed questionnaires and underwent Eye-Tracking (ET), which identified that there was a difference in the perception of wines according to the position in which they appeared in the images provided by the scientists. The results showed that the label drew more attention in the decision, while the shape and color of the bottle were scored as less important. However, analyzing the questionnaire, the participants' responses indicated that they were more interested in the shape/color of the bottle compared to price or discount.

Analyzing the EEG of 8 men and 13 women, their recognition of facial microexpression and eye movements through ET, Gonchigjav (2020) noticed that customers focused longer on the red wine sector of a supermarket. Furthermore, the values of higher excitement were found when people were in the candy department. In addition, women spent more time shopping than men. Nik et al (2019) used EEG to examine how the brain reacted to some ads, where the participant marked 'like' and

'dislike' in each ad. Scientists also altered the colors of the background of the ad to see if there would be a change between preferences, (which significantly modified the pattern of 'likes' to 'dislikes'). No difference in cortical areas' activity of the brain was found between the behavior of 'like' and the 'buy' decision.

The two studies of Juarez et al (2020) and Juarez-Varon et al (2020) analyzed educational toy packaging. They showed that the fixation time in women is longer than in men and that the cover image draws attention first, followed by the name of the game, and other visual elements contained in the packaging. The first study showed that in this context, attention and fixation is the same for both men and women and, in the case of a gift purchase, higher-priced products are more easily chosen. The second study found that the background image of the 'Educa' toy and the children are what attracted more attention on the cover, along with specification of the themes. In the 'Diset' toy, what drew more attention was the image of the toy and other things related to its specifications, such as the number of questions, a phrase on the cover and the product reference. No attention to the brand or recommendation of age or name of the game was observed.

Nuñez-Gomez et al (2020) evaluated the impacts that commercials have on individuals with Asperger's syndrome (AS) when compared to neurotypical individuals. They identified that low-complexity commercials affect both groups (AS and neurotypical), but in different ways. Those of high and medium complexity, on the other hand, are not clearly understood by individuals with AS, but they are more able to focus on their feelings. They concluded that direct messages are more assertive for them (AS). As for neurotypicals, the more complex the commercial, the more attention and excitement it generates. In another study, Hsu & Chen (2020) recruited people with normal physical and mental conditions to watch 16 videos advertising five-star hotels and then rate them with grades from 1 to 10. In some videos, emojis with a smiling face were placed as a subliminal message and curiously, these videos had better ratings than the others. Physiologically, the theta (brain) waves of the participants significantly increased when watching video with the subliminal stimulus of the smiling emoji, giving more evidence that the subliminal messages can influence consumer behavior.

On the other hand, Ferrer-Lopez (2020), found that emotion is not as strong as attention in advertisements for brands that uses famous people to promote products. The content produced by digital influencers generates more spikes in attention among young people. Thus, the contents that had the most attention and emotion peaks were those produced by the influencer in a homemade way. These results contrast with the study by Viniegra et al (2020), who showed that the ideal image draws more attention than photos with imperfections, and by Mañas-Viniegra et al (2020) who noticed in their experiments that the resolution of the image capture in a video is very important to attract attention. While Ferrer-Lopez (2020) showed that highly produced videos do not generate results for brands, the study by Viniegra et al (2020) concluded that a woman with makeup and a well-dressed man retained the most attention during the experiment. Furthermore, it was identified that the eyes are the part that receive more attention and that a face attracts attention more quickly when a smile appears.

This factor reinforces the idea of the study described above about using emoji in video advertisements in hotels. Viniegra et al (2020) also consider a good marketing strategy to take into account that women have more emotional expressiveness than men, when exposed to content promoted by influencers. Parallely, Mañas-Viniegra et al (2020) concluded that scenes shot with drones offer a lot of detail and promote more emotion than attention in viewers. The drone helps to bring a different point of view that normally is not possible to look from the angle only it can show us.

The Calvert et al (2019) study concluded that viewing footage of people delivering or receiving excellent customer service resulted in a significant increase in arousal levels, based on galvanic skin response, and a significant decrease in heart rate (in comparison with viewing scenarios of daily pleasures). It indicates that positive customer service interactions can have a stress-reducing and calming impact on the service provider and the surrounding viewers. The study also identified that receiving and providing good care is directly related to positive feelings and providing and receiving negative care is related to

negative feelings. Younger participants have more positive feelings when receiving than when providing excellent customer service, while older participants have more positive attributes in providing rather than receiving excellent service.

Hamelin et al (2020), in turn, demonstrated that participants pay more attention to emotional and affective stories, so it is interesting that advertising campaigns contain more emotion in their stories. However, depending on the context, excessive use of emotional storytelling can generate negative emotions such as contempt. As participants focused more on the beginning and middle of the stories presented, it is interesting to put important information early in the material and use shorter texts for helping to increase retention capacity.

4. Discussion

Based on the selected papers, it is possible to observe that recent neuromarketing studies basically address product packaging of various types, mainly in purchase environments. Other studies look at the impacts that videos have on people, emotions related to storytelling, and how advertising with famous people affects potential consumers. Neuromarketing is not only about understanding packaging labels, but also comprehends knowing consumer preferences so companies can give a better service and/or product in accordance with the market and customer's needs, considering the physiological, cognitive and behavioural aspects (eg. attention, emotion, decision-making).

4.1 Packing

Attention is a crucial aspect in neuromarketing studies and has been analyzed when the subject is exposed to different packages, such as products on the market, toys and wines (Moya et al, 2020; Juarez et al 2020; Juarez-Varon et al, 2020; Němcová; Berčík, 2019). In all of them, what draws more attention is the image that the product has. In this case, the label is seen as a crucial factor in attracting an individual's attention, while the imagery elements contained in the labels are processed primarily by the brain. The text, colors and other elements of the packaging itself (not just the label) generate attention after the initial analysis of what is labeled. In this sense, it is understood that the aesthetics of the packaging will significantly influence the choice of products from one brand over another. Even if they are well-known brands, if they are in packages that are not attractive, consumers probably will not buy them. Neuromarketing researches may help in optimizing packaging design and product presentation, bringing valuable information that can activate brain areas in different ways, so that positive emotions may emerge in the individual (Lim, 2018).

Many brands try to understand what creates consumer desires and needs using experiences that involve their products, even knowing that many of them will not attract attention (Slijepčević et al, 2019). Attention is a cognitive function that plays a central role in the individual's interaction with the world, and for this reason it is one of the main objects of study. Understanding how the neural mechanisms of attention operate is essential for the development of effective strategies in different contexts (Mangun, 2012). From a neuroscientific perspective, attention is not not limited to a single neural process, but by the coordination of different synaptic pathways and brain oscillations operating in a short period of time (Hopf et al, 2012).

4.2 Supermarket purchase

People seem to have the highest levels of excitement in the sweets department, but it is the wine department where they tend to spend more time (Gonchigjav, 2020). There was a display with a video showing the production process of wines, where emotional involvement was constant, except for the excitement (which had a drop, probably due to the lack of an attractive display). In relation to sweets, the authors believe that they reached a high emotional engagement because they are

daily consumption products. However, sweets did not generate much attention and this fact leads us to think that what we have as a constant in our daily lives generates more emotion than something new. The attention is apparently more related to something that is new for our eyes, as was the case in the wine department.

Furthermore, since high-calorie foods helped our ancestors to obtain calories and ensure survival in calorie-scarce environments, humans have psychological mechanisms that respond positively to sight, smell and to the taste of foods rich in sugars and fats (Griskevicius; Kenrick, 2013). Thus, sugary foods are often chosen more than other tastes because they have a correlation with the evolution of the species and offer an immediate satisfaction. From the point of view of neuroscience, attention is an elementary mental function due to its directional and selective character and is more commonly focused on new stimuli, as it allows for rapid situational discrimination, enabling detection of threat and danger (survival) or energy savings in responding to stimuli that correspond to the need of the moment (Ivey et al, 2017; Lindsay, 2020). In the context of neuromarketing, there is no evidence of what is actually more salable: attention or emotion (Rasyid & Djamal, 2019).

One should also consider the limitations of some studies in neuromarketing. According to Gonchigjav (2020) for analyzes of supermarket purchases, time and financial conditions are major factors that influence the availability of participants, as well as the degree of emotional instability of each individual, which brings inaccuracy to results. Due to this, neuromarketing protocols should seek to achieve a reliable sample and reduce the degree of subjectivity in the analysis of research data.

4.3 Announcement

Another impact factor for advertising success that has been identified by neuromarketing techniques is the use of famous people in ads (Ferrer-Lopez, 2020; Viniegra et al, 2020), which is in accordance with the previous subsection, where sweets ended up generating more emotion because they probably are daily consumed and considered something well-known. Here it was also concluded that the eyes are the part that receive the most attention in a photo, and that a face attracts attention more quickly when a smile appears (Viniegra et al, 2020).

In this case, a process of humanization of advertising can be seen, since the contents that had the most attention and emotion peaks were those produced by the influencer in a homemade way (Ferrer-Lopez, 2020). Since in these articles it is also mentioned that photos that were not considered beautiful caused more emotional reaction in young people, non-home videos probably bring up the same issue of images without professional treatment (photo editing type): it generates identification because they seem more real.

However, in the studies mentioned here, the FEMG - Facial Electromyography (fEMG) was not used, which is a strategy that measures and records the intentional and automatic development of facial muscles to understand the feelings associated with certain external appearances (Gill & Singh, 2020). And, even if the individual has a neutral facial expression, the fEMG can identify emotions, as the equipment measures muscle impulse. Thus, facial mapping is seen as something that can provide a broader view of neuromarketing studies, complementing other neuroscientific equipment (Lim, 2018).

4.4 Filmmaking

Videos can be a great resource for optimizing an advertising campaign, as long as they provoke emotion (Cohen et al, 2017). Drone images are unusual and make people pay more attention to the news (Mañas-Viniegra et al, 2020). Once again, something that is out of the ordinary is seen as a factor to generate more interest in individuals, points that are emphasized in the market study, as they have a new display, the wine sector drew attention (see Supermarket purchase section). It is also in accordance with the study where famous people drew more attention in publications (see Announcement section). In addition,

Hsu & Chen (2020) pointed out that displaying smiling emojis in videos, as a subliminal message, encourages people to rate hotels more positively.

The use of subliminal messages in marketing has been a controversial subject since the 1980s, due to ethical implications (Madan et al, 2021). While a meta-analysis carried out in the 1990s (Trappey, 1996) found that the effectiveness of subliminal advertising is very low since each individual has different perceptions, the study by Hsu & Chen (2020) found this effect quite significant, using neuromarketing techniques. Furthermore, recent studies have found the influence of subliminal messages on the purchasing behavior of consumers, making them make purchases after being exposed to these messages in advertisements (Sofi et al, 2018), as well as indicating that the field of subliminal stimuli needs continuous research to really get a deeper understanding of how reliable this methodology can be (Madan et al, 2021). Thus, it can be understood that not only video can influence consumer behavior, but also the subliminal messages that are linked to it.

4.5 Storytelling

Calvert et al (2019) also corroborate the fact that positive feelings are linked to videos that show positive contexts, such as receiving and providing good customer service. Additionally, Hamelin et al (2020) found that participants pay more attention to emotional and affective stories, so it is interesting that advertising campaigns contain more emotion in their stories. The use of narratives in neuromarketing has its limitations based mainly on the fact that the results obtained can be very different depending on the context and particular cases, which makes it difficult to generalize the results. This generalization may vary in relation to the business niche being studied, the conditions of the research environment and even cultural issues of the individuals analyzed (Calvert et al, 2019).

Yueh & Zheng (2019) in the elaboration of the scale for measuring the effectiveness of narratives in agricultural marketing, obtained positive results in standardizing the way storytelling is applied in this niche. This scale consisted of 13 items with four subscales: narrative processing, affect, brand attitude, and purchase intent. However, one should consider the limitations of storytelling studies due to a subjective approach. There is a consensus among the scientists that a neuroscientific method enabled a more accurate detection of the way in which narratives impact the consumer, indicating that while narratives produce more immediate behavioral changes, cognitive information produces more lasting changes and the effectiveness of campaigns advertising with storytelling can be increased based on the objective you want to achieve.

4.6 Advertisement

Mental processes to distinguish consumer interest and buying behavior still need to be better elucidated. In this sense, decision-making and the differences between what attracts and what generates emotion in the potential client are inherent in neuromarketing studies. A good strategy measures the consumer's emotional reaction to advertising activity, leading advertisers to make the best advertising system to attract the customer (Gill & Singh, 2020). Nik et al (2019) investigated precisely the effects that online ads had on people, and the first one was able to infer that, by changing the color of the ad, preferences in decision-making changed, as well as there was no difference between the sense of liking a product and to effectuate the purchase.

In other words, to like a product and to make a purchase generate the same mental processes. The authors claim that there are differences in the understanding of advertisements related to people with Asperger's syndrome and that, for this audience, advertising needs to be more direct. Considering this fact, we can reflect that the click to like and buy are similar actions: click. With in-depth neuromarketing studies, it is then possible to better plan advertising campaigns for a closer targeting of the company's niche of activity (Nuñez-Gomez et al, 2020).

4.7 Perspectives

Each study is done in a unique way to meet its demands within its own limitations. However, a minimum standardization is necessary and applies to practically all behavioral studies with human beings: a sample number of volunteers of at least 30 per group (Fink, 2003; Wisz et al, 2008; Wolf et al, 2013), presence of control group and test group (randomized if possible), sociodemographic data of the study population, well-defined protocols that consider the recordings of physiological data (eg. EEG, GSR, ECG and ET) and the application of psychometric scales (which are scientifically validated). The choice of equipment or the combination between them must take into account what is intended to be investigated (eg. attention and emotion). Additionally, in order to be able to correlate and standardize the different neuromarketing studies, the development of a validated neuromarketing questionnaire is suggested, so one may compare the conscious responses of participants across surveys in this expanding area.

5. Conclusion

Although studies suggest that it is necessary to customize ads, generate positive emotions, use famous people and attractive packaging to be able to retain the consumer's attention, it is questioned whether this evidence could bring a really effective result, since there is no standardization in the way neuromarketing research is done yet. In addition, when verifying a purchase in the online environment, we realized that the way consumers reacted was different, considering face-to-face environments, which leads us to reflect the proposition to investigate in future studies what makes the click online have the same relevance as the purchase. A factor identified in this systematic review was that, despite the diversity in the studies, the surveys mostly have a relatively low sampling number, which directly impacts the results. In addition, what was most latent among the works reviewed is the need to understand the main difference between emotion and attention generated by the product, as well as to elucidate how the purchase decision takes place in this process. This is why the development of a conceptual model that consolidates research in this area has become so relevant. We hope future studies may highlight the contributions of Neuromarketing strategies for understanding consumer behavior patterns, needs and decision-making processes.

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