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Influence of Olfactory and Visual Sensory Stimuli in the Perfume-Purchase Decision

Fabián Cuesta*, Gabriela Paida, Irene Buele

Universidad Politécnica Salesiana, Ecuador. *Email: fcuesta@ups.edu.ec

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ABSTRACT

Neuromarketing has evolved in marketing practices, especially in the study of consumer behavior; however, in Ecuador this technique is still unknown, because they are limited to traditional marketing. The current research aims to determine the influence of olfactory and visual sensory stimuli in the decision making to purchase perfumes, using an experimental and conclusive investigation. 5980 students at Politécnica Salesiana University in Cuenca participated in this study. Through the application of 361 surveys, fragrance preferences were determined by gender, obtaining that, women prefer floral fragrances, men prefer caramelized fragrances and the LGBTI group prefer woody ones. In addition, through the BIOPAC tool (applied to 10 students), the influential zone was established in the decision when buying perfumes. In the case of women, the findings revealed that in the frontal lobe there was a strong cerebral activation while they were exposed to different fragrances, contrary to how men reacted to them. Finally, with the EYE TRACKING, the study showed that, women go more into detail when acquiring a product than men, who just pay attention to basic characteristics of the product.

Keywords: Neuromarketing, Neuroscience, Purchase Decision, Sensory Stimulation
JEL Classifications: M31, M39

1. INTRODUCTION

According to Braidot (2009), the marketing activity was based on knowledge from other disciplines (Psychology, Sociology, etc.) and when neurosciences and Neuropsychology were advancing, an evolution had risen that resulted in the creation of a new discipline called Neuromarketing, which can define the sensory stimuli that a certain product must contain to meet customers' needs.

Researchers at "Escuela Superior Politécnica de Chimborazo University (2017) highlight that: "Neuromarketing consists in applying neuroscience research techniques to measure brain activity," whereas Braidot (2009) mentions that, "Neuromarketing can be defined as an advanced discipline, that investigates and studies the brain processes that explain people's behavior and decision making in the fields of action of traditional marketing"(p. 18), (…) also facilitates the understanding of customers true needs and can inform what is happening in the brain of a client to the different stimuli they receive, thus providing a much more successful field of study.

In Ecuador there is little experience in the study of Neuromarketing to improve marketing strategies guidance. Pástor et al., (2016) remark that Neuromarketing is unknown by Ecuadorian companies, because they do not have the necessary knowledge to implement it, which leads to limiting themselves only to managing traditional marketing as many companies have been doing so far.

For the aforementioned, the concept of Neuromarketing is little known in most national firms, and even more when using terms such as sensory stimuli and their activity in the brain, when observing, feeling or listening to the advertising developed by organizations through the different media, so that their study becomes interesting when these concepts are combined with fragrances.

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Over the years, for Geary (2008), various studies have been carried out on the mind, its origin and evolution, with the purpose of understanding it more and more; though, it is still a difficult topic to cover, Therefore, many of its functions and the way in which the brain areas react to the different stimuli (olfactory, visual) are still unknown.

Based on the document "Neuromarketing Analysis of the customers consumption on television-service companies in Quito" by Álvarez (2018) mentions that, the brain receives impulses that encourage to decide whether or not to obtain the service according to the publicity received; that is why, he emphasizes Neuromarketing as: "A valuable tool to define on decisions companies must take into account to study their current and future customers, and thus be able to influence better on them to increase their sales"(p. 13).

Accordingly, it can be observed that in Ecuador, companies have carried out little research related to Neuromarketing and Neuroscience, so it becomes an important area to be developed. Therefore, the current study seeks to determine the influence that olfactory and visual sensory stimuli have on the students' decision to purchase perfumes at "Universidad Politécnica Salesiana University in Cuenca. For fulfilling this objective, a bibliographic investigation has been developed related to the visual and olfactory sensory stimuli and the process of decision making. In addition, the brain areas that are activated to olfactory and visual sensory stimuli when buying perfumes, will be defined using the BIOPAC and EYE TRACKING tools, Finally, the level of influence of the olfactory and visual sensory stimuli will be established in the buying decision after laboratory tests experimentation and the application of surveys.

2. REVIEW OF LITERATURE

2.1. Neuroscience and Marketing

Kotler et al., (2013) claim that Marketing is a set of processes that create, communicate and deliver value to customers, establishing strong relationships among them, in a way that benefits the organization and its stakeholders therefore, it is important for a company to know the customer decision process of buying. Thereby, Sellers and Casado (2013) describe 5 steps: problem recognition, information search, evaluation of alternatives, decision making, and post-purchase evaluation.

Moreover, Campos, the author, (2014) maintains that Neuroscience studies the nervous system and its functions, for instance, the neuronal study, its chemical and electrical interactions, as well as the synapse, which causes the different reactions to the human body. At present, Neuroscience is a multidisciplinary field, where psychologists and even computer scientists, among others, work in order to have a much broader vision of the human brain. (…) Neuroscience explains how thoughts, feelings and behaviors work out, and how it is influenced by experiences and situations in which individuals are; that is why, more information has been obtained to have a better understanding (Table 1, Figure 1).

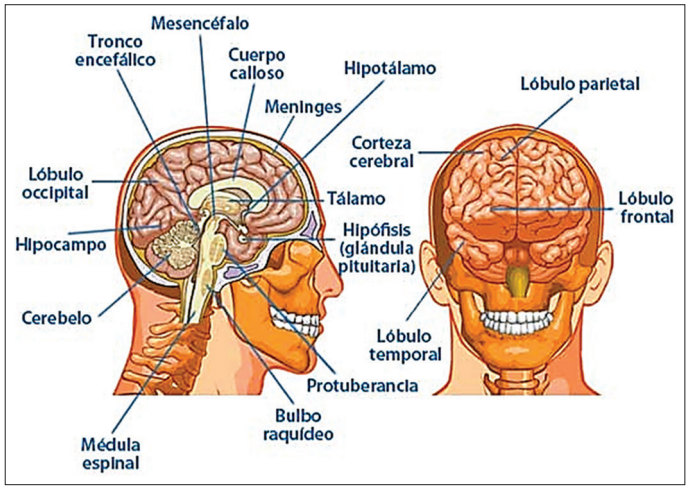
The relationship between Neuroscience and Marketing, results in Neuromarketing, which according to Pástor et al., (2016) guides market research, based on the consumer reaction to the different stimuli. (.) Furthermore, it searches what the areas of the brain are involved in customer behavior when choosing a product, brand, or when receiving and interpreting the messages which brands send, trying to find the purchase button in the brain.

Table 1: Zones and brain functions (Functional description of the human brain areas)

Zone	Function
Occipital lobe	Receives and analyzes visual information
Temporal lobes	Certain visual and auditory sensations govern, the voluntary movements of the muscles are given by the neurons in the back of the frontal lobes
Frontal lobes	Related to language, intelligence and personality
Parietal lobes	They are associated with touch and balance
Brainstem	Located at the base of the brain, it governs breathing, cough and heartbeat
Cerebellum	Located behind the trunk, it maintains posture and balance
Hippocampus	Control emotions in general

Prepared by the authors, taken from the book "Cognitive Neuroscience and Education of Gómez 2004" (p. 33)

Figure 1: Structure of the human brain



Source: Taken from the Health and Medicine page 2017

Romano (2016) considers that in order to know the consumer tastes and preferences, it is essential to develop traditional marketing strategies where questions are asked to individuals, though more than 80% of the buying behavior comes from the unconscious. Therefore, companies need to know what drives purchasing decisions. Neuromarketing can offer a better understanding of human behavior and show the real reasons why they buy, through tools such as encephalograms, eye tracking, among others, which makes possible the study, in detail, of the brain characteristics.

2.2. Sensory System

Cardinali (2015) states that the sensory system is a "set of neurons linked in series, which interconnect the periphery with the spinal cord, the brain stem, the thalamus and the cerebral cortex" (p. 77). (...) this system is in charge of the senses perception that the human being has, as well as the movements of the body and pain. Alternatively, for Quintanar (2011), the sensory system is the functional organization by which an organism processes

information from the external and internal environment, consisting of sensory receptors and regions of the central nervous system involved in the reception and processing of such information.

2.2.1. Touch

It identifies the shape and surface of the objects, this sensation is perceived by mechanoreceptors, located subcutaneously. The sensation travels through the posterior cords and through the spinothalamic fascicles, until reaching the thalamus and from there to the somatosensory cortex (parietal lobe) (Quintanar, 2011. p. 76).

2.2.2. Taste

Taste acts by contact of soluble chemical substances with the tongue. The surface of the tongue is covered by the lingual mucosa, in which elevations called papillae are found. The papillae perceive the flavors through microscopic organs. They transmit the sensation of taste to the medulla oblongata, reaching the limits of the frontal and parietal lobe. It only perceives basic flavors: sweet, salty, sour and bitter (Bernard, 2009. p. 5).

2.2.3. Smell

It perceives chemical substances transported by air. The olfactory nerves are the main organ of smell that helps differentiate the taste of some substances that are inside the mouth. That is to say, many sensations that are perceived as taste sensations, are originated in the sense of smell. The perception of odors is related to memory; a certain scent is able to make individuals remember childhood situations, places already visited or a loved one (Bernard, 2009. p. 7). Through various investigations it has been possible to discover seven primary odors: camphor, musk, flowers, mint, acrid and rotten, corresponding to seven types of receptors located in the cells of the olfactory mucosa. Substances with similar odors have molecules of the same type (Savolainen, 2012. p. 28).

A ration of an olfactory receptor cell is sent to the surface of the nasal epithelium and the other end connects directly through a long axon to one of the two olfactory bulbs of the brain. From here, the information is sent to the brain. Odorous substances should contact the olfactory receptor so that the perception of the smell occurs. Each neuron responds to odorous substances according to the level of concentration. After stimulation, receptor proteins activate intracellular processes by transforming sensory information into an electrical signal. (…) The portions of the olfactory receptors that connect directly to the brain are fine nerve filaments that cross a bone plate. The olfactory receptor is a nerve, it comes into physical contact with the odorous substances and connects with the brain, the substances enter the olfactory cells, traveling along the axon until reaching the limits of the frontal and parietal lobe (Savolainen, 2012. p. 28)

2.2.4. Hearing

External ear: It channels and directs the sound waves towards the middle ear. It contains the auricular pavilion, the ear and the external auditory canal. Middle ear: Duct filled with air, limited by the eardrum. It communicates directly with the nose and throat, letting the air in and out from the middle ear to balance pressure differences between the middle ear and the outside. Internal ear: It is inside the temporal bone that contains the auditory and balance organs. It is full of liquid and has three cavities: the vestibule, the three semicircular canals and the cochlea, where the sound receptor cells are located, each one adapted for the reception of sounds of a certain tone (Bernard, 2009). As far as Aragort is concerned (2009), the ear is connected to the temporal lobes (p. 18).

2.2.5. Sight

The outer part of the eye is composed of three layers of tissue: the outermost (sclera) layer is protective, the middle layer (uvea), and the innermost layer is the retina, sensitive to light, (...) The vision process is carried out by the brain. The eye interprets the electromagnetic vibrations of light into a certain type of nerve impulses that are conveyed to the brain (Bernard, 2009). For Aragort (2009), the sight is connected to the occipital lobe (Table 2).

2.3. Brain Waves

Brain waves have three parameters: amplitude, frequency and phase. For De Montes and Montes (2019) the electrical activity of the brain is characterized by creating different forms of waves in the brain known as brain waves, generated from different stimuli that are produced through the senses.

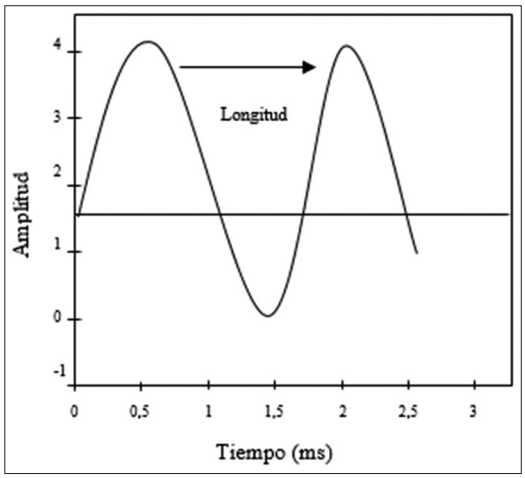
Riaño et al., (2018) define that functions such as attention, perception, memory and language are involved in the daily learning of the human being, whose stimuli come through the different senses that human beings possess. Thus, they activate the neural networks related to the stimuli received by recording new sensations and classifying those that are already in memory, each sense will create different types of brain waves (Figure 2).

Table 2: Brain zones and senses (Connection between brain areas and the senses)

	Frontal	Parietal	Occipital	Temporal
Sight			X	
Smell	X	X		
Touch		X		
Taste	X			X
Hearing				X

Produced by the authors

Figure 2: Brain waves



Produced by the authors

According to studies conducted with Electroencephalograms, Torres et al., (2014) express that brain waves can be classified into 5 different types, each with different characteristics:

2.3.1. Delta
Frequencies, between 0.5 and 4 Hz, considered the slowest waves and are associated when the person is sleeping or when there is some kind of physical movement.

2.3.2. Theta
Frequencies, between 4 and 7.5 Hz, linked to lack of sleep or daydreaming. They are also generated by emotional tension such as frustration or disappointment.

2.3.3. Alpha
Frequencies, between 8 and 13 Hz, associated with relaxation, such as thinking about something peaceful with the eyes closed, without any concentration.

2.3.4. Beta
Frequencies, between 14 and 26 Hz, classified as low beta and high beta, associated with concentration (mathematical exercise resolution). Also panic can increase this type of waves.

2.3.5. Gamma
Frequency, exceeds 30 Hz, with a small amplitude and its brain level is very low. When increasing, it could be associated with brain diseases. Together beta and gamma waves are associated with attention, perception and cognition in the human brain (p. 85).

2.4. Purchase Decision
When making a purchase, you have to make a decision. A decision is based on choosing, deciding and selecting a certain product over others. Different factors are involved, such as brand, price, shape, images, design, among others. (Hester, 2014)

As for Ospina (2014), Neuromarketing intervenes in the purchase decision process, since it measures the rational, emotional and instinctive part of individuals, to create effective marketing strategies, reaching the consumer's brain directly, arising their instincts, emotions and rationality.

On the other hand, Braidot (2011) asserts that during the purchase process, two important areas of the brain can be identified, in which sensory reactions to a certain product can be verified: the Somato-sensory cortex, whose reaction at the time of the decision can be inferred that the purchase intention has not been provoked, whereas the pre-frontal middle cortex, which can be considered as the purchase button, when activated, enable the person to buy a certain good or service. (…) Purchase decisions can be considered as non-rational, since the individual does not analyze, in detail, the characteristics and attributes before buying it, which is why, the presence of a blood flow in the pre-frontal area will immediately stimulate the purchase. The human brain is made up of two hemispheres: the left hemisphere (rational and analytical), and the right hemisphere (intuitive and imaginary). According to the marketing strategy to be implemented, you should look for ways to stimulate one of the hemispheres.

Based on a theory proposed by the author Braidot (2013), the purchase decision varies between men and women. In the case of the female gender, in order to acquire a product, they ask for reasons about it, going into so much detail, with emotional content about the good or service. Nevertheless, in the case of the male gender, when deciding their purchase, the amount of details or information will be minimal.

Because of the ability of the woman's brain to handle different types of situations or activities in their daily lives, they can be considered as hyperactive. In contrast, men perform their activities sequentially, as they find it difficult to give the same level of attention to each of the situations simultaneously.

2.5. Devices and Measuring Techniques
According to Meneses et al. (2013), psychometry is a branch of Psychology that develops instruments for measuring psychological characteristics (intelligence, learning, etc.). Psychometrics has different applications in Psychology, both in practical and research aspects. Thus, for the development of the current research some tools were used that belong to psychometry, such as questionnaires (tests), and brain reading devices (encephalogram).

2.5.1. Questionnaire
Rosendo (2018) points out that for the survey and interview, the questionnaire is a basic instrument for observing; allowing to measure variables that help obtain the desired information from a sample universe. For this reason, the respondent must answer a set of written or verbal questions.

2.5.2. Encephalogram (EGG) - Biopac Student Lab
The Biopac Student Lab system is an integrated life science teaching solution that includes hardware, software and curriculum materials used to record data on human bodies, animals or tissue preparations. It is used to "record and condition the electrical signals of the heart, muscle, nerve, brain, eye, respiratory system, and tissue preparations." The Biopac has three electrodes: 1 of reference and 2 of capture of electrical signals produced by the brain. (BIOPAC Systems, 2019)

2.5.3. Eyetracking
In words of Cuesta et al., (2017), the Eyetracking examines the patterns of visual attention in terms of ocular fixations, since the movement of the eyes is linearly identified with the visual attention and offers results on the communicative impact regarding power, attraction and effectiveness variables.

3. METHODOLOGY

For the development of this project a methodology of bibliographic, experimental and conclusive type was employed.

Firstly, the State of Art Method was developed because, through it, important information can be obtained from the current situation prior to the development of the subject.

In authors Londoño et al. (2016) view, the State of Art is a critical compilation of various types of text from an area or discipline, which in a written way validates the cognitive process of an

Table 3: Methodology (Data collection techniques for the current research)

Conventional techniques	Ad hoc studies	Quantitatives	Surveys	Application form of 25 questions (open, closed and mixed questions)
Non-conventional techniques	Neuromarketing Techniques		Electroencephalogram experimentation	Through electrodes in the scalp, brain waves and electrical variations of the brain were analyzed
			Eye tracking	Eye tracking

Source: (García, 2018). Produced by the authors

investigation through reading the bibliography found during the investigation of the problem, issues and contexts (p. 10).

Secondly, two types of research were carried out: A field research through structured surveys, and a laboratory research with the participation of 10 students from different subjects of knowledge at the Politécnica Salesiana University through electronic devices such as BIOPAC and EYE TRACKING.

BIOPAC is used to capture signals about physiological state, heartbeat, brain, among others. It identifies processes like emotions, cognitive analysis and facial expressions (BIOPAC Systems, 2019). Eye Tracking, according to Astudillo et al., (2013) is a technology that allows us to know where the human being is looking at, since it receives information from the brain.

Lastly, a comparative analysis was developed based on the results obtained from the field and laboratory research, through which, conclusions were established to obtain the level of influence of the olfactory and visual sensory stimuli in the decision-making to purchase perfumes.

Sample: In the current research a stratified sample was carried out according to the different knowledge subjects of the Politécnica Salesiana University in Cuenca, considering an equal percentage of participants between men and women (Table 3).

The finite equation formula was used to obtain the sample, with a population of 5,980 students, a 95% confidence level (z = 1.96), a 50% heterogeneity and a 5% margin of error, obtaining a sample of 361 people (Table 4).

Table 4: Surveys conducted according to knowledge subjects

Careers	No. students	Percentage	No. surveys
Administration and economy	1.371	22,93	83
Science and technology	2.958	49,46	179
Life sciences	839	14,03	51
Social and human behavioral sciences	473	7,91	28
Education	339	5,67	20
Total	5.980	100	361

Produced by the authors. Source: (Politécnica Salesiana University -UPS, 2017)

4. RESULTS AND DISCUSSION

The surveyed students, according to their type of personality, with regard to introverts, show a greater incidence: the female gender with 20.5% for floral fragrances, the male with 18.8% for caramelized scents, and finally, those of the LGBTI group shows 0.4%, who choose the wood-type fragrances (Table 5).

In the case of people with an extroverted personality, women prefer floral scents with 17.5%, representing the majority with this taste. On the contrary, men prefer caramel scents in 13.6%, and the LGBTI group prefer floral and woody scents with a total of 0.9%, in both cases, they represent the majority of the surveyed students.

University students of female gender (77%), male gender (72%), and the LGBTI community (60%) say that the fragrance is the most important feature when purchasing (Table 6).

35% of female gender, 33% of male gender, and 27% of the LGBTI group remark that advertising is easier to remember by displaying images (Table 7).

Regarding the preference of place for purchasing, in terms of introverted and extroverted personality type, we can determine that females and LGBTIs prefer to purchase by catalog. Also, depending on the type of personality, both introverted and extroverted men prefer to purchase in perfume stores (Table 8).

In base of the data obtained, they reveal that female (81%), male (56%) and those belonging to the LGBTI group (100%), have a higher frequency of perfume use, since they employ it daily (Table 9).

According to laboratory tests carried out through the BIOPAC tool, they reveal that, 5 female students, between 18 and 25 years old, prefer a citrus fragrance, whereas 5 male students, between 19 and 26 years old, prefer the caramel fragrance (sweet) (Table 10).

On the other hand, when comparing the results obtained from the survey in contrast to the neuroscientific tests (BIOPAC), it shows that 3 out of 5 male students and 1 out of 5 female students coincide.

Based on the EYE TRACKING tests, in a perfume advertising, we learned that, women tend to be more observant and emotional, who, in this case, paid more attention to the flowers, colors and the design of the container, however, men paid more attention to the perfume cap shape and the brand logo (the horse) (Figure 3).

Through a visual stimulation of an advertising applied to 10 students from different subjects of knowledge, we determined that, colors and characters tend to be remembered in the same way in a 33%; nevertheless, from the surveys, it was observed that the main characteristic when remembering a certain advertising was the character in a 50% (Table 11).

Table 5: Relationship among gender, personality type and fragrance preference

Preferences	Personality type (%)					
	Introvert			Extrovert		
	Female	Male	LGBTI	Female	Male	LGBTI
Floral fragrance	20,5	12,0	0,0	17,5	11,8	0,9
Caramelized fragrance	8,5	18,8	0,0	13,2	13,6	0,0
Oriental fragrance	1,3	9,4	0,0	2,2	9,2	0,4
Wood fragrance	1,3	13,2	0,4	3,1	11,0	0,9
Citrus fragrance	5,1	8,1	0,0	3,9	10,1	0,4
Other fragrance preferences	0,4	0,9	0,0	0,0	1,8	0,0
Total		100			100	

Produced by the authors and based on surveys applied to university students

Table 6: Relationship of gender with product components (Purchase decision against the different components of the product)

Product components	Female (%)	Male (%)	LGBTI
Price	15	15	40
Packaging design	2	2	0
Label design	0	2	0
Product color	1	2	0
Fragrance/Scent	77	72	60
Customer support	4	4	0
Recommendations	1	1	0
Total	100	100	100

Produced by the authors and based on surveys applied to university students

Table 7: Relationship between advertising and gender

Advertising	Female (%)	Male (%)	LGBTI (%)
Through images	35	33	27
Through music	18	18	20
Through tastings	18	21	13
Through the testimony of celebrities	11	9	20
Through testimony of relatives	9	8	7
Through testimony of friends	8	10	13
Others	1	2	0
Total	100	100	100

Produced by the authors and based on surveys applied to university students

Table 8: Relationship between place of purchase, personality type and gender

Place of purchase	Personality type (%)					
	Introvert			Extrovert		
	M	H	LGBTI	M	H	LGBTI
Mall	4	18	0	6	13	1
On-line	1	5	0	3	6	0
Perfume stores	7	17	0	9	18	0
Catalogs	24	16	1	10	17	1
Abroad	1	6	0	4	5	0
Beauty salon	0	0	0	0	0	0
Clothing store	0	1	0	1	2	0
Pharmacy	0	0	0	0	1	0
Gifts	0	1	0	1	1	1
Cosmetics store	0	0	0	1	0	0
Total		100			100	

Produced by the authors and based on surveys applied to university students

Table 9: Relationship between the frequency of perfume used and gender

How often do you use perfume?	Student gender (%)		
	Female	Male	LGBTI
Daily	81	56	100
For work	2	7	0
Special occasions	16	35	0
Other	1	3	0
Total	100	100	100

Produced by the authors and based on surveys applied to university students

5. DISCUSSION

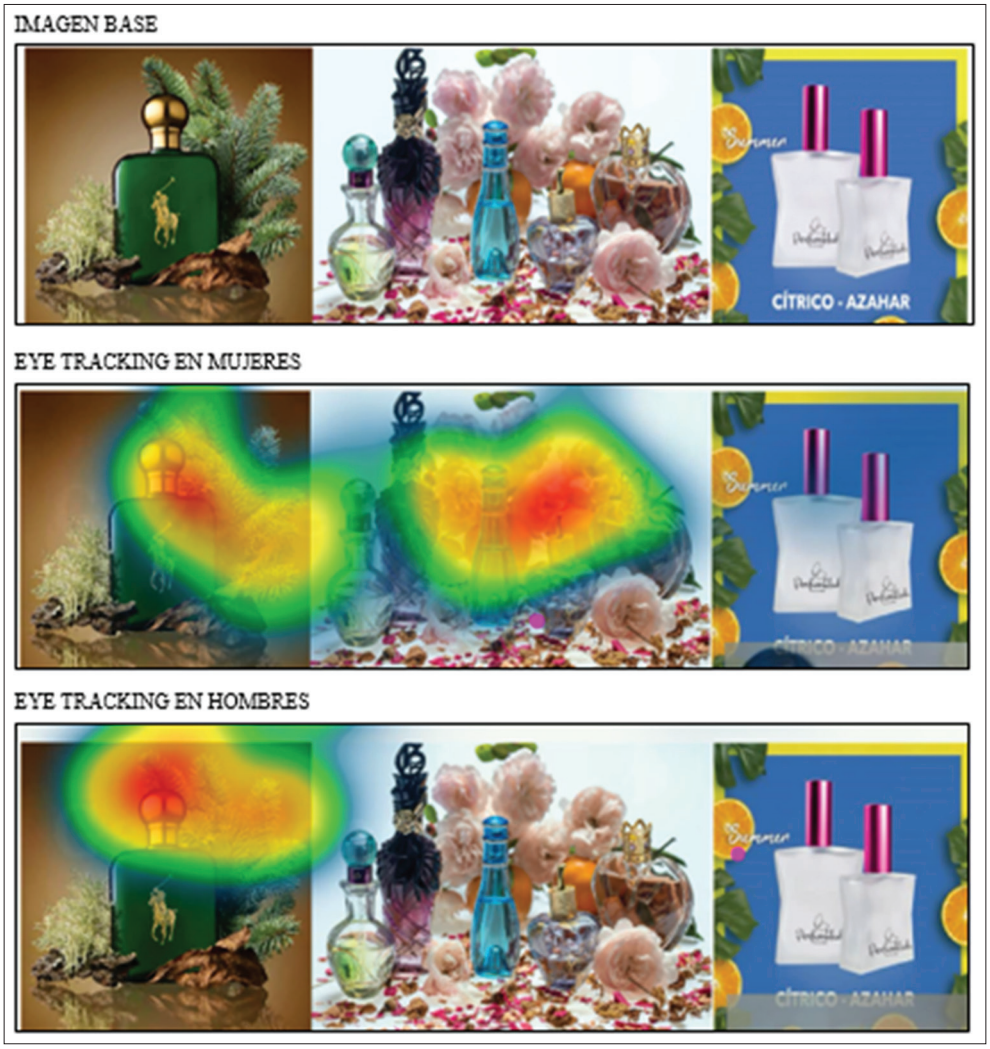
According to information by Pástor et al., (2016), about the areas of the brain involved when deciding on a certain product, by using the BIOPAC tool, applied to 10 students, who smelled different types of fragrances. Afterwards, they were asked which of those scents they had liked best. Regarding to women, we observed that, 3 out of 5 agreed exactly in the results, both in the experiment and in the verbal survey, being able to determine that the area which interacts when deciding to buy a product is the frontal part, in the case of products related to fragrances.

On the other hand, Braidot (2011) states that the purchase can be considered as non-rational because people do not analyze its characteristics in detail before acquiring a product or service. In base of this, through this research, as far as men is concerned, it can be determined that according to neuroscientific tests, individuals responded positively to 1 of 5 fragrances, compared with their verbal response, without coinciding in the results. Consequently, it reveals that, in this genre, in terms of fragrances, the frontal part does not intervene to a large extent when choosing this type of product.

In terms of Braidot (2013), he remarks that, in the case of women, when buying a product, they will ask for information related to it. On the contrary, men asking questions on the product will be minimal. This is confirmed by the tests carried out using the EYE TRACKING tool with advertising images, where it was possible to observe both men and women's behavior. As for the female gender, the study reveals that they analyze almost all the characteristics shown in the advertising, although in the case of men, they only observe basic details; that is, they just look at the most obvious and simple characteristics of the product. In this way, what has been described by the expert can be confirmed.

Furthermore, for Braidot (2013), women's brains have the ability to process different types of information produced by several

Figure 3: Tests carried out by the eye tracking



Designed by the authors and based on laboratory tests applied to university students

Table 10: Brain activation by fragrances

Energy (Stimulation)									
Beta waves									
No.	Name	Floral	Citric	Wood	No.	Name	Citric	Wood	Sweet
1.	Guadalupe Vega	0,0385	0,0289	0,0213	1.	Alexander Mendieta	0,0078	0,0087	0,047
2.	Doménica Peñafiel	0,014	0,0206	0,014	2.	Diego Duy	0,0808	0,174	0,2657
3.	Carolina Mendoza	0,0167	0,0224	0,0196	3.	José Vallejo	0,0539	0,0443	0,0657
4.	Mónica Aucapiña	0,055	0,0676	0,0558	4.	Henry Fernández	0,0071	0,0131	0,0345
5.	Pamela Andrade	0,0095	0,0082	0,0075	5.	Kevin Pérez	0,0068	0,005	0,0065

Produced by the authors and based on laboratory tests applied to university students

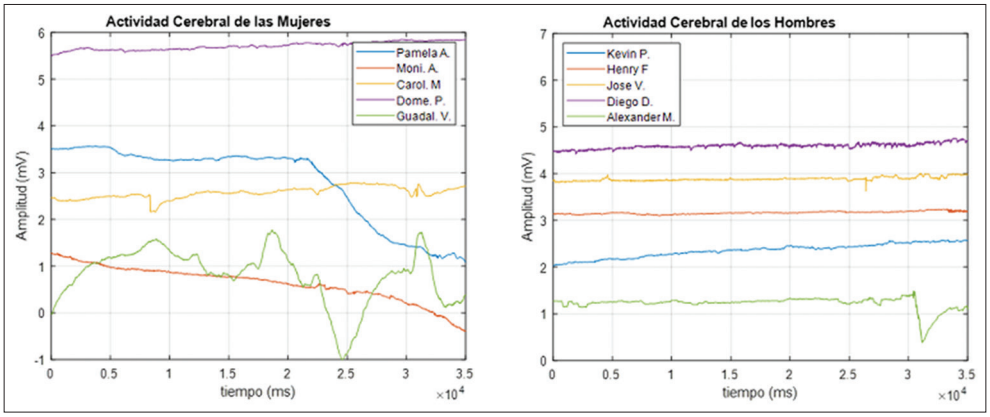
activities simultaneously, so they can be called hyperactive, unlike men, who perform activities sequentially. This can be noticed in Figure 4 (results obtained in the BIOPAC), where the brain activity of both men and women is shown, demonstrating that the female brain behavior has a much larger variation in amplitude than in the corresponding male brain. This is due to the different faculties that men and women have when reacting to different stimuli and processing received information.

6. CONCLUSION

At the end of this research, the following conclusions were determined:

Nowadays, there is a large amount of information related to neuroscience, marketing and neuromarketing, which has been generated as a result of different types of studies through various tools that have allowed brain areas to be analyzed. Nonetheless, in Ecuador there has been little experience in the application of neuromarketing, due to different factors, such as lack of

Figure 4: Comparison of the female and male gender brain activity



Produced by the authors and based on laboratory tests applied to university students

Table 11: Comparison of the most remembered variable in an advertisement between a visual stimulation and surveys

Characteristics of advertising	Direct visual stimulation (%)	General survey (%)
Colors	33	20
Character	33	50
Brand	13	10
Packaging design	17	10
Others	3	10
Total	100	100

Produced by the authors and based on surveys and laboratory tests applied to university students

knowledge, lack of budget, fear of taking risks. Thus, Companies just confine themselves to managing traditional marketing, losing the opportunity to really understand from a brain behavior perspective the real individuals' needs.

According to the bibliographic information, the data collected in the amygdala, the hypothalamus and some nuclei of the brain stem are transmitted to the frontal lobe to incorporate such information and use it in the purchase decision-making, letting us know that in this way, the frontal zone of the brain is the one that mainly influences on the decision making. It was proved during the testing with students by using the BIOPAC tool, in which the electrodes were placed in the above-mentioned lobe.

After the experiment (in the laboratory), it was observed that, in the case of women, decision making is greatly influenced by the frontal lobe of the brain, since the brain waves received by the BIOPAC tool through the electrodes showed a large amount of brain activity in that area. However, as far as men is concerned, their brain activity was low and did not even coincide with what they have said verbally. Moreover, with the EYE TRACKING application, it was possible to determine that women are more observant in terms of product details, considering all the details. Conversely, men´s perception or visual stimulation was minimal, in other words, the masculine gender focused on the simplest characteristics of the products.

In conclusion, we can determine that the characteristics of the perfumes are influential in the purchase decision because they are received by the olfactory and visual senses, which stimulate the brain by emitting electrical signals, the majority of which focuses on the frontal area, that indicates the final decision on purchasing.

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