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History and evolution of Neuromarketing

Historia y evolución del neuromárketing

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Abstract

The human brain has been studied for more than two thousand years, however, in our days, much of it is still a mystery. In the last century scientific contribution on human thought and behavior were limited, thanks to the multidisciplinary approach of neurosciences, the situation is changing rapidly and the last three decades have seen a considerable change, to the point that the 21st century is being described as "the century of the brain" (De Balanzó and Sabaté, 2007).

In order to establish the beginnings of neuromarketing it is necessary to address the history of neuroscience. Neuroscience starts from philosophy, which established the bases that founded and clarified the concepts and principles of the study of the brain. Taking philosophy as the foregoing of neuroscience avoids dissociating the scientific and philosophical spheres of a field in which there is a deep degree of relationship (C. Blanco, 2014).

Keywords: Human brain, neurosciences.

Resumen

El cerebro humano se ha estudiado durante más de dos mil años, sin embargo, en nuestros días, gran parte de él sigue siendo un misterio. Durante el siglo pasado los aportes científicos sobre el pensamiento y el comportamiento humano fueron limitados, gracias al enfoque multidisciplinario de las neurociencias, la situación está cambiando rápidamente y las últimas tres décadas han visto un cambio considerable, al punto que se está describiendo el siglo XXI como "el siglo del cerebro" (De Balanzó y Sabaté, 2007).

Para establecer los inicios del neuromarketing es necesario abordar la historia de la neurociencia. La neurociencia parte de la filosofía, la cual sentó las bases que fundaron y aclararon los conceptos y principios del estudio del cerebro. Tomar la filosofía como antecedente de la neurociencia evita disociar las esferas científica y filosófica de un campo en el que existe un profundo grado de relación (C. Blanco, 2014).

Palabras clave: Cerebro humano, neurociencias.

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Neuroscience

Neuroscience, "brain science", is defined by Kandel, Schwartz and Jessel (2000) as; "that which fuses various disciplines, including molecular biology, electrophysiology, anatomy, embryology and developmental biology, cell biology and behavioral biology". (Baptista, León, and Mora, 2010).

According to C. Blanco, the history of neuroscience began in Classical Antiquity and the Middle Ages, where there was a dilemma and debate about which organ was in charge of sensory and motor functions. Thus, the question was whether the organ in charge was the heart or the brain. Several thinkers and philosophers of the time, such as Aristotle, leaned towards the "cardiocentric" approach. This referred to the heart as the organ in charge of sensory and motor functions in the human body. Various cultures of the time, such as Hindu and Egyptian, also adopted this approach.

Later Hippocrates would postulate his position on this debate in the year 460 B.C. when he established that the brain was related to sensations and was where man's intelligence and "reasoning" emanated from, while the heart was the organ in charge of feelings.

Hippocrates is considered the father of medicine, and his contribution directed the course of human science. In the Middle Ages, the most relevant physician and philosopher was Galen, who, in addition to Aristotle and Hippocrates, constituted the pillars of medicine. Galen's importance lay in his experimental attribution of medical science, and it would not be until the Renaissance period that this would be taken up again. Later in the sixteenth and seventeenth centuries, during the stage of modern medicine Andrea Vesalius, questioned what was postulated by Aristotle and Galen and replaced it with empirical methods, with a "mechanistic" approach (C. Blanco, 2014).

In the field of philosophy, the main actor was Rene Descartes, who postulated a dualism between the mind-body relationship. For the french philosopher, the human being was composed by two principles: the mind and the body, which is where he made one of the most important and notable contributions to human knowledge, embodied in the famous phrase "I think therefore I am". Descartes true merit lies in the exploration not only theoretically but also anatomically and physiologically of how the human body possessed an immaterial mind, and how it affected and modified the human body, and how that also affected and modified human behavior and its functions (Gómez, 2017).

After Descartes, during the eighteenth and nineteenth centuries scientific advances increased greatly thanks to the discoveries made by various scientists such as Galvani, Gilsson, Borelli, Wesley, Stuart, Whytt, Willis, von Helmholtz, and Hensing, the latter being the precursor of "neurochemistry". Advances in the study of nervous electrical activity and the development of neuroscience continued to progress and gradually the term "nervous system", formulated by Sherrington at the end of the 19th century, was established for the first time. This created the basis for the understanding of nerve impulses and brain function in the cortex, where scientists such as Broca, Wernicke, Fritsch, Jackson, and Ferrier, among others, stood out. Also outstanding psychologists laid the foundations for the study of the mind. It was in the 19th century when remarkable progress was made in the knowledge and study of psychological diseases and disorders, as well as important advances in the study of the brain (C. Blanco, 2014).

In the 20th century, neuroscience was divided into two types of approaches: holistic and reductionist. The holistic approach proposed the study of neuroscience as a whole, while the reductionist approach was based on its components. One of the main holistic postulates is the Gestalt Theory, which was created in Germany at the beginning of the 20th century by the researchers Wertheimer, Koffka and Köhler. Gestalt proposes perception as the fundamental process of mental activity, and of other psychological activities such as learning, memory and thinking, among others. Gestalt assumes that mental activity does not come from the total of perceptions surrounding the individual, but that these perceptions are selected and extracted depending on the susceptibility of people, generating in them a mental representation, this means that perception tends to a mental order, and this determines what information is selected to the subsequently making of judgments, ideas or concepts. In 1912 Wertheimer considered that unlike what was believed in the last century, the individual is susceptible to various stimulus, caused by all the factors that surround him, the factors that surround him (light, sound, aroma), which generate in the individual a series of neurophysiological processes (Oviedo, 2004).

Also in this century Sigmund Freud postulated a holistic theory; The Theory of Psychoanalysis. This theory segmented the "psychic apparatus" into three instances (the Id, the Ego and the Superego), which form the totality of the human mind. On the other hand, reductionist theories put forward more forceful postulates that explained the molecular mechanisms that generated nervous impulses. Thus, the Neuron Theory was established, which defined the neuron as the structural and functional unit of the brain, consolidating the biological bases of neuroscience and neurology; this theory is attributed to the scientist Santiago Ramón y Cajal. During this century theories about synaptic transmission, synapse, and short and long term memory were also formulated. (C. Blanco, 2014).

The set of holistic and reductionist theories gave rise to an interdisciplinary science that works together with others such as neuropsychology, neuroanatomy, neurophysiology, social sciences and computational sciences, which in recent years have been of great importance for a complex study of the brain and nervous system in general.

C. Blanco places the birth of modern neuroscience in 1962, at the Massachusetts Institute of Technology, when the "Neuroscience Research Program" (NRP) was created by the scientist Francis O. Schmitt, who brought together an interdisciplinary group of scientists to carry out a complex and deep research on neuroscience and related disciplines. This program of great disciplinary diversity shows how difficult it was and has been to study the mind, proof of which is that holistic and reductionist processes were unified for such research.

After the NRP, the research and formulation of concepts within neuroscience expanded, generating the term cognitive neuroscience, a discipline that has become a scientific field merged from neuroscience and cognitive psychology (which is responsible for the study of higher mental functions). Cognitive neuroscience has greatly influenced the perspective and orientation implemented in neuroscience. In recent years, technological advances have made it possible to have different techniques such as neuroimaging and noninvasive brain stimulation techniques, among others, which have deepened the understanding of mental functions and their link with the underlying neurological systems. (Redolar, 2014).

The birth of cognitive neuroscience dates back to 1982 and is attributed to David Marr, who formulated the basis for its continued development. This work would later be developed by Michael S. Gazzaniga and George A. Miller (Domínguez, 2011).

Neuroscience today is in charge of investigating the process of information capture and synthesis that occurs in the brain in addition to the contiguous study of sensation, perception, memory and learning. Knowledge of the brain and intelligence has increased exponentially, not only is more known about neuroanatomy and the way in which the brain synthesizes and processes information, but also about the mental interaction that individuals have with the outside world in their daily lives and in the way they interact with the outside world, in its physical, social and cultural spheres. Likewise, it is now known that neurons operate in specialized groups, each group in charge of diverse and specific functions within the brain (Cumpa, 2004).

In recent years, neuroscience has been interrelated in an important way with various sciences and disciplines, as has happened with marketing, with the aim of supporting the need to study the brain and the neurological processes that lead to consumer purchasing decisions and the determination of successful and fruitful business strategies (Osores, 2015).

Economists were the first to merge neuroscience with social science, proposing neuroeconomics, the purpose was to better understand the decision processes carried out by different economic agents, using approaches from cognitive psychology and neuroscience. (Zineb, Larbi, Mohamed, Yahya, Hadj, & Ali, 2011).

In order to address the process of fusion between neuroscience and marketing that led to the creation of neuromarketing, it is to deepen our understanding of marketing and its processes.

Marketing

According to the American Marketing Association, AMA (2013), marketing is defined as; "the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, partners, and society at large."

Kotler and Armstrong (2012) define marketing as; "a social and managerial process, through which individuals and groups obtain what they need and want by creating, offering and exchanging products or other items with value to others".

Kotler and Keller (2012) define marketing as; "the process of identifying and satisfying human and social needs profitably".

Marketing has been modified over the years since its initial conception, and its definition and application have undergone successive reinterpretations since its inception. The first definitions of marketing were oriented towards production and sales. Currently there is a different approach, based on the figure of the consumer, his needs and desires, with the aim of improving and consolidating the links between the brand, the customer and the rest of the agents in the environment. (Monferrer, 2013).

In its desire to embrace the customer, marketing has been busy dabbling in neuroscience. One of the foregoings to a complex study of neuromarketing was the so-called "triune brain", developed by neuroscientist Paul MacLean, who established that in the human brain there were three superimposed levels that function in an interconnected manner, each with its own

specific characteristics. According to Braidot (2009) these levels are known as; reptilian system, limbic system and cortex or thinking brain: "The reptilian brain is the oldest area and is located in the lower and rear part of the skull. At the center of this system is the hypothalamus, which regulates instinctive behaviors and primary emotions, such as hunger, sexual desires and body temperature". The limbic system is known as the emotion system. Among the main structures that integrate it are the hippocampus that the amygdala, "which triggers fear in response to certain stimuli and plays an active role in our emotional life", is also located here. Finally, there is the cortex or thinking brain, which is divided into the two cerebral hemispheres and is the seat of thought and higher cognitive functions, such as abstract reasoning and language (Braidot, 2009).

Based on the above, Rendon (2009) states that, from the perspective of the triune brain, the human brain is the conjunction of the complex interaction of these three systems. This means that in the human brain the evolution of the brain structures that have taken place since the origins of the human species is materialized and corroborated. This process is evidenced and synthesized in the nine months of human gestation. In addition, the complex interaction between the "three brains encompassed" contributes to the generation of the different states of consciousness, responsible for the activation of the higher neurocognitive functions. The states of consciousness determine the perception and personal knowledge and knowledge of the world around the individual (Rendón, 2009).

With the constant search for new techniques that would allow companies to better understand and engage with customers, a discipline emerged that precisely applied neuroscience techniques to marketing processes, thus giving rise to the term neuromarketing.

Neuromarketing

According to Kotler & Keller (2012) neuromarketing is defined as; "brain research on the effect of marketing stimuli, as an alternative to traditional consumer research."

Lee, Broderick & Chamberlain (2007) define it as; "the application of neuroscience methods in the analysis of people to understand their consumer behavior in relation to markets and marketing exchanges".

Braidot (2009) defines it as "the discipline in charge of the study and research of the neurological processes that explain the behavior and decision-making of individuals within the field of marketing".

The term neuromarketing cannot be attributed to a particular author, as it began to appear around 2002. At that time, some American companies such as Brighthouse and SalesBrain became the first to offer neuromarketing research and consulting services, thereby promoting the use of technology and knowledge from the field of neuroscience. The first academic research on neuromarketing was conducted by Read Montague, professor of neuroscience at Baylor College of Medicine in 2003 and published in the journal Neuron in 2004 (Morin, 2011).

The application and evolution of neuroscience within marketing has led to the development of various research methodologies, some of which are still under study and experimentation.

Neuromarketing studies generally measure product preference in terms of brand familiarity or consumer preference. In traditional marketing studies, measures such as product preference are sometimes difficult to measure, as the consumer may have a cognitive bias. However, brand familiarity and product preference have been correlated with the neural activity of individuals (Madan, 2010).

This is how within neuromarketing, the term neuro-selling was formulated. Previously, selling was considered a technique, nowadays it is considered a science, it is known that persuasive communication is not only verbal but also neurolinguistic, thanks to the contribution of neurosciences. Neuromarketing is responsible for studying the stimuli and preferences of the consumer's brain, when it is possible to sell to the "mind" sales increase, and companies manage to link in a more complex way with their customers (Klaric, 2014).

Neuromarketing answers with a greater degree of certainty to many of the questions asked in marketing:

Which stimuli should a commercial contain to achieve a greater degree of impact on the individual? What sensory stimuli should a product contain to achieve customer satisfaction? What should be the level of repetition in each medium for a campaign to be effective? What is the best pricing strategy?

How do you influence customers to stay longer at a point of sale? And how to increase sales volume? This makes it easier to understand the real needs of customers and to overcome and eliminate business barriers. Today's marketers have to know the brain in depth, since it is through the brain that individuals interact and interrelate with the social and physical world around them (Braidot, 2009).

Therefore, it is of great importance to have a deep understanding of consumer behavior, Schiffman and Kanuk (2010) define it as "the behavior that consumers exhibit when seeking, buying, using, evaluating and discarding products and services that they expect to satisfy their needs". Consumer's behavior focuses on how consumers and families make decisions to spend their available resources (time, money, effort) on consumption-related items. That includes what they buy, why they buy it, when, where, and how often they buy it (Schiffman and Kanuk, 2010).

In order to connect with people, companies need to develop an authentic DNA, which is the core of their true differentiation. This reflects the brand identity in customers' lives. For companies and/or businesses to achieve differentiation is a difficult task but to achieve authentic differentiation is even more complicated (Kotler & Kartajaya, 2018)

Marketers today realize that in order to outperform their competitors, they have to achieve the full profit potential in each of their customers. This is why it is so important to generate successful relationships between the company and its customers, fostering high levels of satisfaction, a strong sense of trust, and a structure that ensures customer retention (Schiffman & Kanuk 2010).

R. Blanco (2018) highlights the importance of Neuromarketing and the application of techniques belonging to neurosciences to the field of sales, experiencing the effects that took place on the human brain with the aim of identifying and conditioning consumer behavior,

which is why the need is created to understand consumers behavior beyond what an interview can reveal. The author mentions that consumer preferences are not rational, these are derived from unconscious emotional forces that determine their choices, preferences, and tastes, this is identified with techniques that allow analyzing both observable behaviors and those that have their origin in non-conscious actions, discovered through the analysis of brain processes, as well as the identification of sensory reactions, emotions and sensations that products cause in the consumer. (R. Blanco, 2018)

Braidot (2009) defined that the brain is attacked by signals, which in turn are translated into nerve impulses that travel through neural circuits. Thus, each human being constructs reality based on what his or her brain perceives and internalizes.

According to Braidot (2009), brain functions can be grouped into three fundamental types in the study of neuromarketing; the first of these functions is sensory, in which the brain receives stimuli from all sensory organs, processes them and integrates them to form perceptions.

The second function is motor, in which the brain emits impulses that control voluntary and involuntary muscle movements. Finally, there are the integrative functions, in which the brain generates complex mental activities such as memory, cognition, multiple emotions and language.

Another of the pillars of study of neuromarketing is the mind, Braidot (2009) defines it as "the emergent set of conscious and non-conscious processes of the brain that are produced by the interaction and communication between groups and circuits of neurons that originate thoughts and feelings".

In the last decades the technology that studies the brain has increased remarkably, this has allowed the study of brain reactions just at the moment in which they occur, allowing us to identify the brain area that is activated when we speak, observe an advertisement, or touch an object. These studies and the applications of neuroscience in everyday areas of life are allowing great advances in the study of human beings and their reactions to advertising stimuli. The main techniques for studying the brain come from medical sciences, but their studies can be extrapolated to Neuromarketing (R. Blanco, 2018).

For neuromarketing, understanding the perceptual process is fundamental, since what the customer understands becomes the true reality. Perceptions determine the vision we have of the world and from that vision will derive behaviors, many of which are extremely useful for organizations. Neuromarketing techniques provide accurate and relevant results and information for organizations seeking to generate a greater impact of their products and/or services on the consumer. These techniques roughly measure the attention, emotion and memory that is generated in the brain of consumers (Baptista, Leon, and Mora, 2010).

In recent years, the use of advanced techniques such as electroencephalogram (EEG) has been implemented, which, despite not being recent, is still considered an adequate way to measure changes in the electrical field in certain regions of the brain. Another technique is the functional magnetic resonance imaging (FMRI), the most widely used at present. This technique presents images of the brain, in which the level of activity in each of its areas can be appreciated, since it is capable of recognizing the levels of oxygen in the blood. Another method is Magnetoencephalography (MEG), which is a non-invasive procedure similar to the previous

one, focused on the measurement of neuronal activity. There are also other techniques such as eye tracking, this method captures information on internal brain activity, this was first implemented in the eighties using simple observation methods and techniques, currently the process is controlled by computers, this technique tracks what the individual sees and what things is where he pays more attention (Osores, 2015).

According to Brain Sings (2018) another of the most commonly employed techniques today is the galvanic skin response (GSR), which measures the electrical variations of the skin, such as conductance, caused by the variation of sweating of the human body. This technique is easy to record as only two electrodes are placed on the second and third fingers of one hand. GSR falls into the category of biometric measurements that are generally used by Neuromarketing consulting agencies. This technology is the same as the polygraph technology implemented since 1881 by Fere. Neuromarketing consulting agencies use metric activation to detect consumers' impulse or desire to buy, even monitoring heart rate, blood pressure, respiration and sweating (Mojica, 2017).

The use of these advanced techniques and procedures has led to increased productivity in the formulation and implementation of marketing strategies (Osores, 2015).

Neuromarketing in our days has penetrated within all the functions and variables of traditional marketing, so it happens with the so-called marketing mix, which is defined as the set of controllable tools, which the company combines to produce a desired response in the target market. The marketing mix includes the variables that influence consumers and the market, called the "four Ps": product, price, place and promotion (Osores, 2015).

The above has raised new methodologies and advanced techniques that have allowed to increase productivity in the formulation of marketing strategies. Thanks to neuromarketing, companies have a deeper and more accurate knowledge of consumers, their behavior, preferences, motivations and sensations.

However, neuromarketing faces difficulties. A current topic of discussion is the ethical issue of the study techniques used. From a scientific point of view, neuromarketing is nowhere near being able to allow researchers to design a marketing campaign so addictive and strong that it can override an individual's freedom of decision making and totally condition him or her to the desires of companies. Despite this, in the United States, a consumer protection group has filed complaints with the federal government and the Senate, protesting and questioning the ethics of the processes and techniques employed by marketers.

Despite the above, neuromarketing has gained unusual interest among many experts in marketing and related disciplines. And related disciplines, it is presented as a new frontier to be conquered. The use of tools that make tangible the emotional relationship established between companies and consumers allows a better understanding of how the image of brands is processed in the brain and the stimuli generated in the consumer (De Balanzo and Sabate, 2007).

The process of research and study continues, there is still much to develop and discover, in a way it is in a process of growth and expansion, where the constant technological advances take a decisive role in the future and the way in which neuromarketing will evolve.

References

American Marketing Association. (2013). Definition of Marketing. Recuperado de: https://www.ama.org/the-definition-of-marketing/

Baptista, V; León, M; Mora, Cesar. (2010). Neuromarketing: Conocer al cliente por sus percepciones. Tec Empresarial IV (3), 9-19.

Blanco, C. (2014). Historia de la Neurociencia. Madrid, España: Biblioteca Nueva. Blanco, R. (2018). Como vender al cerebro. Neuromarketing aplicado. Madrid, España:

Bubok Publishing S.L.

Braidot, N. (2009). Neuromarketing. Barcelona, España: Gestión 2000.

Brian Sings. (2018). Respuesta galvánica de la piel (GSR). Sapienza Universita di Roma. Recuperado de: https://www.brainsigns.com

Cumpa, J. G. (2004). Neurociencia Cognitiva y Educación. Lambayeque, Perú: Fachse.

De Balanzó, C. y Sabaté, J. (2007). Neurociencias y publicidad: la nueva frontera de la persuasión. Trípodos Extra II. 909-923.

Domínguez, A. (2011). La Neurociencia Computacional en Churchland y Sejnowski (1992). A Parte Rei 74.

Gómez, J. D. (29 de julio de 2017). El dualismo de Descartes: ¿dónde y cómo interactúan mente y cuerpo? El Semanario. Recuperado de: https://elsemanario.com

Kandel, E.; Schwartz, J.; y Jessel, T. (2000). Neurociencia y conducta. Madrid, España: Prentice Hall.

Klaric, J. (2014). Véndele a la mente, no a la gente. Lima, Perú: BIIA División Editorial. Kotler, P. y Armstrong, G. (2012). Principles of marketing. Boston, U.S.: Pearson

Prentice Hall

Kotler, P., y Kartajaya, H. (2018). Marketing 3.0. Barcelona, España: LID Editorial. Kotler, P., y Keller, K. (2012). Dirección de Marketing. Ciudad de México, México:

Pearson Educación. Lee, N; Broderick, A; y Chamberlain, L. (2007) What is 'neuromarketing'? A discussion and agenda for future research. International Journal of Psychophysiology, 63 (2), 199-204.

Madan, C. (2010). Neuromarketing: The net step in market research? Eureka, I (1), 34- 42.

Mojica, A. G. (2017). Actividad electrodérmica aplicada a la psicología: análisis bibliométrico.

Revista Mexicana de Neurociencia, 18 (4), 46-56.

Morin, C. (2011). Neuromarketing: The New Science of Consumer Behavior. Springer Science (48) 131-135. DOI: 10.1007/s12115-010-9408-1

Monferrer Tirado, D. (2013). Fundamentos del Marketing. Castellón, España: Publicacions de la Universitat Jaume I. DOI: http://dx.doi.org/10.6035/Sapientia74

Osores, M. (2015). Conceptualización del neuromarketing: su relación con el mix de marketing y el comportamiento del consumidor. Revista Academia & Negocios, I (2), 103-118.

Oviedo, G. (2004). La definición del concepto de percepción en psicología con base en la teoría Gestalt. Revista de Estudios Sociales, 89-96.

Redolar, D. (2014). Neurociencia Cognitiva. Madrid, España: Editorial Médica Panamericana.

Rendon, M. (2009). Creatividad y cerebro: bases neurológicas de la creatividad. Revista de Pedagogía de la Universidad de Salamanca, 15, 117-135.

Schiffman, L; Kanuk, L. (2010). Comportamiento del Consumidor. Ciudad de México, México: Pearson Educación.

Zineb, O; Larbi, B; Mohamed, J; Yahya, C; Hadj, O; y Ali B. (2011). Neuromarketing: Where marketing and neuroscience meet. African Journal of Business Management, V (5), 1528-1532.

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