

Recent Trends in Neuro marketing - A Review

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Abstract

Neuro-marketing is examined as a revolutionary economic strategy based on human brain research and conventional marketing principles. This research strongly depends on a working knowledge of neuromarketing and its influence on customer decision-making. This article discusses several neuromarketing strategies, as well as the advantages of various market input devices. Neuromarketing's numerous approaches and procedures, according to existing literature and research findings, have a direct impact on marketing success. Neuromarketing has garnered significant traction in recent years. Its work across a broad spectrum of marketing disciplines has benefited everything from marketing tactics to brand selection and advertising to ethical and decision-making difficulties. According to a recent study, neuromarketing concepts and ideas can help marketers better understand their clients' behaviour and build new marketing approaches that use neuroscience. This research examines customers' perspectives and conscious or subconscious purchasing decisions. The purpose of this study is to explore the advantages, disadvantages, ethical issues, and future possibilities of neuromarketing. A neuromarketing research will assist a business in competing for market dominance, expanding its consumer base, and retaining long-term customers. This research approach will assist in determining what the client desires, the preferred services, and how to capture the customer's attention. Neuromarketing has the potential to significantly increase a marketer's income.

1. Introduction:

By tapping into their emotions and subconscious beliefs about their products and services, organisations may improve their connection with customers through the use of neuromarketing methods. It is referred to as an interdisciplinary discipline approach due to the fact that it incorporates a wide variety of various subjects of study. Numerous marketing methods are evaluated in terms of emotional and cognitive responses. Neuro-culture is a vast topic in neuroscience. As a result of this development, two new schools of study emerged: neuroethology and neuro-philosophy [1].

Market research firms coined the term "neuromarketing" in 2002. In the United States, pioneers such as Bright House and Sales Brain pioneered the use of cognitive data for market research. The use of neuroscience to consumer behaviour research has made a significant contribution. Montague performed a 2004 study at Baylor College of Medicine utilising fMRI equipment to determine how carbonated beverages such as Pepsi or Coca-Cola affected brain scans. When you are aware of the beverage brand you are drinking, your brain activity changes considerably. When an individual takes their favoured beverage,

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the frontal cortex of the brain is aroused [2]. Two of the skills that may be practised here are short-term memory and decision-making. Neuromarketing was established as a valid marketing tactic for the first time in this experiment, and the emotional connection between the brain and brand popularity was established.

2. Related Works:

Neuromarketing has grown in importance in today's competitive business world. For long-term success, businesses must understand their customers' psyche. Researchers examined this notion and its potential benefits to businesses. This section contains a list of scholarly contributions to the field of neuromarketing. The conventional view of marketing would have you believe that it is limited to the selling of goods. Marketers in the past had to establish an emotional connection with customers in order to influence them when attempting to sell a product.

1. Neuroscience professionals may make a substantial contribution to the topic of the ethics of intrusive neuromarketing. The behavioural responses of participants may aid marketers in developing effective advertising tactics, and data indicating a particular sensitivity in customers may be used to target specific demographics.

2. In the future, neuroscientific concepts will increasingly be employed to influence commercial endeavours. Neuromarketing is a new technique to consumer research that makes use of imaging and measurement technology to forecast how people will react to products, packaging, and advertising. This conclusion is contradictory in two ways in this study: first, the consumer comments on why they prefer certain things over others, and second, the veiled or disguised reality that results from the technology's use.

3. Modern brain scanning technology allows neuromarketing to gain a deeper understanding of the psychological processes that underlie consumer purchasing decisions. Neuromarketing is composed of three fundamental components: interest and engagement, awareness and comprehension, and ethics.

4. Neuroscientific tools and insights are used to study consumer behaviour and marketing. Due to the inaccessibility of the human body, behavioural economics and marketing have long regarded it as a "black box." Study of neuroscience related to consumption marks a significant leap forward in research and theory development. Marketers will benefit from this study since it will help them gain a better understanding of their customers.

5. Consumer behaviour and neurology are becoming more entwined in the developing field of neuromarketing. Advertising and marketing professionals are fast legitimising and popularising the neighbourhood, which was first frowned upon when it opened in 2002. Each year, an estimated \$400 billion is spent on marketing. Due to customers' incapacity to articulate how they feel when exposed to advertising, traditional ways to measuring the worth of such investments have been mostly ineffective. Neuromarketing use cutting-edge technology to explore people's minds directly, without requiring them to engage in complicated cognitive or awareness tasks.

6. Neuromarketing employs approaches and understandings from neuroscience research to address difficulties in marketing. Along with product, price, communication, and distribution strategies, the findings from this study may be used for brand research.

7. Neuroimaging techniques such as functional magnetic resonance imaging (fMRI) and electroencephalography can be used to monitor and measure the brain activity that occurs while someone views advertisements (EEG). The majority of neuromarketing research compares product preferences based on participants' knowledge or affection for a particular brand. Due to the effect of customer bias, traditional marketing research cannot reliably quantify product preferences. Brain activity has been linked to brand identification and product choice. Certain consumer organisations and academics are sceptical about neuromarketing due to the potential ethical ramifications of intentionally eliciting certain neurological reactions in commercials.

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3. Research Gap:

Marketers must utilise a range of strategies in order to gain and retain clients. A marketer's most critical resource in marketing is also their insight and knowledge of the factors that influence how people make decisions. Recently, neuromarketing have emerged as feasible solutions for the next generation of intelligent consumers. Neuromarketing is the most cutting-edge technology for analysing client behaviour available in today's marketing toolset [2]. Neuromarketing makes use of cutting-edge brain scanning technologies to gain a deeper understanding of the complexities inherent in customer decision-making [3]. Brainwave monitoring can be used to track clients' unconscious reactions to marketing stimuli [4-8]. Neuromarketing can be used to determine the effectiveness of ads [8, 9-11]. This enables the visual and aural components of a good commercial to be selected and timed effectively [9]. Neuromarketing may be used to investigate and diagnose hedonic shopping concerns, resulting in more successful advertising [9, 10, 12-15]. An impact on a company's income at the macro level requires an understanding and implementation of the unique neuromarketing strategy capable of acquiring data at levels above human awareness. This is because one's unconscious thinking has an effect on one's purchasing behaviour.

FUNCTION OF THE HUMAN BRAIN

All body functions are controlled by the brain. Every aspect of our lives is governed by it, including our creativity, intellect, memory, and emotions. The five senses give the input: sight, smell, taste, and auditory/tactile feedback. Before knowledge can be kept in our memory, it must be absorbed and analysed. The largest and most noticeable part of the brain, the cerebrum, is situated in the middle of the skull. The brain is divided into two parts, the left and right hemispheres, respectively. The frontal, parietal, temporal, and occipital lobes are located in each hemisphere. Our capacity to plan, conduct, assess, feel, and solve issues is strongly influenced by the frontal lobe. The parietal lobe processes all sensory, motor, and memory information. Both language comprehension and long-term memory are controlled by the temporal lobe of the brain.

Memory and Neuronal Coding:

There are three main roles of memory: encode, store and decode. Depending on the sort of memory a person retains, the brain gets triggered in various ways. Short-term and long-term memories are both stored in the brain. Short-term memories, which last about 60 seconds, are stored in the prefrontal cortex. Long-term memories are kept in the hippocampus, a structure located in the temporal lobe.

The typical brain is composed of glial and neuron cells. The neuron's principal way of action is through chemical and electrical impulses. Synapses are the microscopic gaps between neurons that allow them to interact. The neuron's numerous arms are called dendrites. As with a radio receiver, they operate as antennas, gathering up information from other nerve cells and delivering it back to the brain. When data is received, a code is formed and subsequently stored in the brain's memory. The brain's long-term memory may be accessed via a process called decoding. Binary code, similar to that found in a computer's memory, may exist in the neural code of the brain. By influencing the neural code in a client's brain, neuromarketing seeks to hypnotise them into making a purchase.

NEUROMARKETING TECHNIQUES

The following are some neuromarketing techniques:

Environmental Reaction

Outward response methods such as face coding, eye contact, and empathetic design are all examples. The data collection process is brain-friendly. As they view it, the human brain is the wellspring of their creativity. One may check for outward reactions like as goosebumps and sweat with a lie detector.

Body language

It is critical in the exchange of ideas. Emotions may be seen in the brain using techniques such as fMRI scanning and other forms of body language. Through the contraction and relaxation of muscles in body language, nonverbal signals and emotions are sent. It is not just what you say that matters, but how you say it.

Empathic Design

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No technology is required to examine humans in this manner. Customers' daily routines are monitored without their knowledge. The testing procedure entails a comprehensive investigation of how a product is utilised in the actual world by a genuine user. The direct-marketing concept [16] refers to the practise of getting information and then using it for marketing purposes, rather than soliciting information from an individual.

Facial Coding

According to a technique called facial expression analysis, emotions may be determined from a person's facial expressions. There are twenty-four different muscle activity combinations for each of the seven most typical human emotions. Marketing use face expression patterns and specific triggers to identify and target consumers. The following table summarises the types of face coding used in neuromarketing, their dimensions, their ages, their advantages, and their limitations.

Eye Tracking

With eye tracking, it is possible to see how the subconscious brain responds to stimuli. This is a great strategy. Data from eye tracking is used to produce more effective advertising and websites. Market analysts might use this method to monitor a customer's interests and preferences.

Models for Input-/Output

The brain is researched by seeing how an individual reacts to a certain stimuli. In the Input/Output Model, the brain is portrayed as a black box. Marketers that follow this technique expect that every move they do will result in some form of quantifiable outcome.

Inside Reflexes:

By utilising the inner reflex approach, it is possible to get insight into the functioning of the human brain. This is accomplished using a variety of means, including brain scans. Reflexes are not subject to the input-output standard. Packaging has a great influence in advertising. Advertising affects potential customers psychologically by affecting their emotional attachment to a product.

Electroencephalography (EEG) is a widely used technique for recording brain activity (EEG). The location of the brain can be detected using this method by changes in the electrical field [4-8].

Electroencephalography

Although there are a variety of techniques for recording electrical activity in the brain, electrodes are the most often utilised. It is feasible to wear headgear equipped with electrodes. A forty-minute tape is not ruled out. Neurons are the response cells of the brain. The brain has billions of synapses that are involved in cognition [8]. The products and services are displayed to the individual being presented via an electrode-enhanced helmet or headgear. Brain activity may be utilised to determine the attractiveness of a product to a potential consumer [8]. Due to the millisecond temporal resolution of the EEG, it is capable of detecting brief bursts of brain activity. There is lightweight and portable EEG measuring equipment available [17]. A critical issue with EEG is the presence of unwanted electrical activity in the brain, which is by far the most important disadvantage of the technique. Additionally, there are flaws in the spatial resolution (approximately one centimetre) [4, 8, 18]. Increase the amount of electrodes on the skull to reduce this issue. Neuromarketing provides an overview of electroencephalography (EEG) measures, their applications, and associated benefits and drawbacks.

Functional Magnetic Resonance Imaging (fMRI)

This technique is used to study the anatomical structure of the brain and the regulation of blood flow. An MRI scan may be used to determine the oxygen saturation level of the blood. As a result, neuronal activity in that region increases [19, 20]. Researchers can monitor changes in brain activity across multiple areas using functional magnetic resonance imaging (fMRI), a neuromarketing technique. Blood that is either oxygenated or deoxygenated generates electromagnetic waves. This mismatch can be identified via signals [18]. As a baseline, a resting-state fMRI brain scan was used [21]. Advertising stimulates the circulation of oxygenated blood to certain areas of the brain [8, 20]. A comparison to the control group is done to determine the extent to which the advertisement had

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an effect. The use of functional magnetic resonance imaging in neuromarketing may be beneficial or detrimental (fMRI).

Magneto Encephalography (MEG)

Doctors may examine brain activity with MEG without putting the patient at danger. However, voltage fluctuations are a component of an EEG. The spatial and temporal intensities of brain activity in various brain regions can be measured with MEG [22]. While MEG is superior in terms of spatial resolution, its expensive cost outweighs this advantage.

Positron Emission Tomography (PET)

It is comparable to functional magnetic resonance imaging in terms of efficiency and spatial resolution (fMRI). Radiation exposure is required in this process to produce the desired results. PET is a neuromarketing method that should be avoided owing to the health concerns associated with it [23].

Eye Tracking

A user's visual attention, reaction to visual stimuli, gaze patterns, attention span, and pupil changes can all be determined through eye tracking. The primary advantage of this technology is its portability. The primary disadvantage is the absence of emotional connections between different brain regions. By utilising eye-tracking equipment, you may learn a great deal about your attention span, concentration, and pupil dilation tendencies. The eye-tracking device records both continuous and occasional eye movements.

Facial Recognition or Electromyography

Utilize this tool to determine a person's facial expressions, which provide valuable insight into their emotional state. Electrodes attached to the lips to monitor the tiniest changes of the face muscles that are absolutely imperceptible to the naked eye. Electrodes are placed on the zygomaticus major and minor muscles, as well as the orbicularis and occipitofrontal muscles, on either side of the mouth. This method has been demonstrated to uncover a broad variety of emotions, including happiness and sadness. This method has two disadvantages: it increases the possibility of misunderstanding of

certain emotions owing to the simultaneous suppression of facial expressions. Electromyography (EMG) is a critical technique in neuromarketing since it may be utilised for a number of reasons.

Cardiovascular Parameters

Observing changes in a customer's heart rate and blood pressure level may provide insight into how they feel about a product or marketing campaign. The rhythm of a customer's heartbeat and the time between pulse transitions can be utilised to assess the customer's attention span [24].

Galvanic Skin Response

Numerous human emotions, including fear, joy, fury, anxiety, and curiosity, may be quantified by analysing the feels on the hand. Neurological reactions of consumers to a variety of stimuli may be determined and utilised in marketing initiatives.

The Transcranial Magnetic Stimulation

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THE CONSUMERS BRAIN:

Traditional techniques have a long history of failure. Historically, market researchers depended on surveys and interviews to get information on the efficacy of a product campaign from focus groups. Due to the advancement of neuroimaging methods, there are new and fascinating methodological areas to examine. This way, they will be able to accurately forecast whether advertising will be a success or a failure.

APPLICATIONS OF NEUROMARKETING:

Neuromarketing is a widely used technique for determining a customer's wants and preferences. Marketing is all about communicating to the customer the product's characteristics and advantages, two critical components of the process [25]. In marketing, the look of a product and its emotional connection contribute to establish trust, value, and recognition. Client preferences and

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purchasing habits will alter as a result. The reward and identification centres of the customer's brain are activated by advertisements that evoke pleasant and relaxing images [13]. Advertisers may use neuromarketing to determine which pictures, sound effects, and text are most successful in their commercials in order to develop more effective advertisements. Advertisers can use neuromarketing to gain a better understanding of their target audience's preferences and decisions prior to developing an advertisement [10].

4. Benefits of Neuromarketing:

A deeper knowledge of the consumer's brain and their decision-making process through neuromarketing has greatly helped marketers [4, 9, 13, 26]. This idea is used by the majority of consumer organisations and their allies. Consumers' socio-demographic characteristics such as their age, ethnic origin, gender, residence location, and socioeconomic status can all be utilised to segment the cohorts. This will result in more precise consumer behaviour forecasts and more focused marketing [27].

NEUROMARKETING ADVANTAGES

In marketing, the word "neuromarketing" refers to the use of behavioural neuroscience. Neuromarketing approaches can assist us in gaining a better understanding of our clients' behaviours [27]. Neuromarketing, according to [28], is an excellent technique for product development, marketing, and brand building. Along with the immediate physiological response to a purchase, these approaches may help merchants gain a greater understanding of their customers' whole shopping experience, from the minute they enter the store to the moment they exit. A virtual shop integrating 2D and 3D retail items is an intriguing notion for this type of programme. Actual marketing circumstances are utilised to analyse the purchase behaviour of test clients.

LIMITATIONS OF NEUROMARKETING

A concern with neuromarketing data is its lack of reliability and dependability [1, 3, 8]. The neuroscience concept has acquired recent popularity as a result of several studies and applications in a variety of sectors. Regrettably, there are few

publications published to date concerning neuromarketing corporations and academics. Additionally, the financial performance of businesses has been made public [1, 29]. It is plausible that when consumers encounter marketing messages at different times and locations, their brains process them differently [10, 30]. The relationship between emotional valence and various brain regions has been widely studied [9]. Neuromarketing research is highly complex and time consuming, not to mention prohibitively costly.

NEUROMARKETING IMPACT

Neuro-marketing is a collection of neuro-techniques, strategies, and technology that enables businesses and their customers to interact unconsciously. This strategy has resulted in a boost in consumer base. Additionally, neuromarketing results in the following:

Consumer Buying Behaviour

Customers' purchasing patterns are becoming increasingly significant as the market expands. When you want to purchase anything, your brain gathers information about the item you desire. A marketer must understand how consumers make money-saving decisions [4, 20]. Neuromarketing contributes to the development of new products that have an effect on client purchasing behaviours.

Advertising

Advertisements are known to activate specific areas of the brain. Two parts of the brain are involved in ad recall: the ventral striatum and the ventromedial prefrontal cortex [6]. The research indicated that advertising with pleasant facial expressions had a beneficial effect [6]. Neuromarketing technology enables the tracking of a commercial's impact down to the individual. The medial prefrontal cortex of the brain, which is responsible for decision-making, may be manipulated to improve sales [31].

Pricing

It is critical to consider each element that may influence a consumer's buying decision [30]. The right pricing for a service or product manufacturing is critical when making purchasing decisions [32, 33, 34, 35, 36]. The most challenging aspect of marketing is determining the pricing of a product and its relevance to a customer's buying decision.

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Marketers can use neuromarketing to ascertain the price that consumers are willing to pay for a product or service. As a consequence, marketers will adjust the product's pricing accordingly. Brain scanning techniques may also be used to determine which parts of the brain are activated by good or negative emotions.

New Product Development

Neuromarketing techniques are thought to be more suitable for assessing the product experience [4]. It is possible to manufacture a new product using other ways if the necessary materials are unavailable. Earlier study indicates that the inherent information included in fMRI scan data may be used for pre-testing and product development. As a result, neuromarketing may be used to evaluate new goods and create wholly new ones from scratch. In addition to neuromarketing, a SWOC study may be used to aid in the creation of a new product.

Communication

The impact of neuromarketing on customers' verbal communication may be studied using traditional market research approaches. A neuromarketing method is used to study facial expressions and body language. EEG and fMRI are powerful tools for examining the brain's internal reactions. Thus, neuromarketing findings will be of little utility in the field of public relations and marketing.

Distribution of Products

Neuromarketing techniques can be used to enhance a product's appearance on supermarket shelves and racks. It may be used to determine which product layout style attracts buyers the most effectively [37]. The scenario is an excellent demonstration of how to make an educated choice. Customers provide higher ratings to merchandise located near the entrance to the store [38]. Customers are more likely to buy items on the top shelf. Consumer behaviour may be studied using eye tracking and EEG caps attached to customers' heads while they shop [39, 40]. Additionally, this method may be utilized to browse online retailers [41].

Decision-Making

Neuromarketing makes decisions in five stages. To begin, one first recognise the issue and then weigh all available choices and their associated advantages and downsides. FMRI neuromarketing research studies how people make decisions while taking their emotions into account. Using EEG and fMRI, neuroscientists discovered that the ventromedial

prefrontal cortex and the striatum are engaged in decision-making [42].

Branding

It's normal for customers to want to continue doing business with firms they've developed a relationship with. Customers' purchase decisions may be influenced by a strong emotional connection and affinity with a brand. Marketers must take every opportunity to communicate with their target audience. For instance, in fMRI experiments, preferred brands had more brain activity than common brands. Consumers develop an intrinsic and veiled fear when they interact with brands, which impacts their decision-making process [13].

Product Design

Developing an aesthetically pleasing product is crucial for both market research and marketing. Thus, design and presentation are critical components of a product's success. Neuroscience technology such as electroencephalography (EEG) and functional magnetic resonance imaging (fMRI) may be utilised to improve goods. Due to the fact that the entire operation is performed subconsciously in the brain. Decision-making has been associated with the nucleus acumens and the ventromedial prefrontal cortex of the brain [43].

5. Ethical Concerns of Neuromarketing:

When doing neuromarketing research, ethical concerns must be made. According to some detractors, this technique violates individuals' right to free choice. People are more likely to purchase anything if they have a variety of possibilities. Due to the fact that neuromarketing technology enables a deeper knowledge of a customer's behaviour, it may enable them to make more educated judgments. This method requires the marketer to put their own financial interests ahead of the consumer's demands. This method conflicts with customer-company ties that are governed by privacy policies [44]. To prevent infringing human rights and ethical principles, rules and standards for the use of brain probes to interfere with a person's decision-making process must be established [9]. Neuromarketing is primarily concerned with two ethical issues [39]: preserving customers' freedom of choice and defending their individual rights. Neuromarketing tactics were controlled to guarantee that they are not abused and that they are utilised to improve the consumer experience [4, 45]. Regardless of how

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useful neuromarketing is to organisations, ethical and customer-focused concerns must be addressed.

CHALLENGES OF NEUROMARKETING

Customer decision-making is notoriously tough to influence. Neuromarketing has its own set of difficulties when it comes to persuading clients to make purchases. While this method offers a number of advantages, it also limits clients' freedom of choice when doing market research utilising cutting-edge technologies. Human robots that have been programmed to respond to marketing stimuli will take on the function of the buyer's logical thought process. Humans, like robots, may one day be trained to purchase specific commodities and products. [7, 20, 30]. Numerous businesses are looking to neuromarketing for assistance [7, 46].

IMMINENT OF NEUROMARKETING IN INDIA

Neuromarketing has shown steady growth in India over the last many years. By 2025, India's wealthy and affluent will increase from 8% to 16%, while the poor will decline from 31% to 16%. By then, between 27% and 40% of the population will be among the top strata of society. According to the United Nations, Indian consumers are likely to exceed Chinese consumers in the near future. India's CPI has averaged 114.67 index points since 2011, peaking at 137.60 in November 2017. GDP is expected to rise from its current level of 2.8 trillion dollars in 2018 to 4.6 trillion dollars in 2025, according to current growth projections.

6. Conclusion:

Because neuromarketing opens up new avenues for study and analysis in the realm of marketing, marketers should examine it. Although the concept has a promising future, it is currently in its infancy. Additional study is necessary to solve the numerous obstacles this notion confronts, but researchers in this field believe it also has considerable economic potential. Neuromarketing can aid marketers in achieving substantial success in today's highly competitive industry. Neuromarketing has a bright future ahead of it as a result of scientific and technological advancements.

References

- [1] Javor A, Koller M, Lee N, Chamberlain L, Ransmayr G. Neuromarketing and consumer neuroscience: contributions to neurology. *BMC neurology*. 2013 Dec; 13(1):1-2.
- [2] Stasi A, Songa G, Mauri M, Ciceri A, Diotallevi F, Nardone G, Russo V. Neuromarketing empirical approaches and food choice: A systematic review. *Food Research International*. 2018 Jun 1; 108:650-64.
- [3] Niedziela MM, Ambroze K. The future of consumer neuroscience in food research. *Food Quality and Preference*. 2021 Sep 1; 92:104124.
- [4] Khurana V, Gahalawat M, Kumar P, Roy PP, Dogra DP, Scheme E, Soleymani M. A survey on neuromarketing using EEG signals. *IEEE Transactions on Cognitive and Developmental Systems*. 2021 Mar 12.
- [5] Ariely D, Berns GS. Neuromarketing: the hope and hype of neuroimaging in business. *Nature reviews neuroscience*. 2010 Apr; 11(4):284-92.
- [6] Kenning P, Linzmajer M. Consumer neuroscience: an overview of an emerging discipline with implications for consumer policy. *Journal für Verbraucherschutz und Lebensmittelsicherheit*. 2011 Mar; 6(1):111-25.
- [7] Morin C. Neuromarketing: the new science of consumer behavior. *Society*. 2011 Mar; 48(2):131-5.
- [8] Pradeep AK. The buying brain: Secrets for selling to the subconscious mind. *John Wiley & sons*; 2010 Jul 16.
- [9] Ford JB. What do we know about neuromarketing? *Journal of Advertising Research*. 2019 Sep 1; 59(3):257-8.
- [10] Fugate DL. Neuromarketing: a layman's look at neuroscience and its potential application to marketing practice. *Journal of consumer marketing*. 2007 Nov 6; 24(7), 385-394.

Journal of Coastal Life Medicine

- [11] Ohme R, Matukin M. A small frog that makes a big difference: Brain wave testing of TV advertisements. *IEEE pulse*. 2012 Jun 4; 3(3):28-33.
- [12] Bazzani A, Ravaoli S, Faraguna U, Turchetti G. Is EEG suitable for marketing research? A systematic review. *Frontiers in Neuroscience*. 2020 Dec 21; 14:1343.
- [13] Fisher CE, Chin L, Klitzman R. Defining neuromarketing: Practices and professional challenges. *Harvard review of psychiatry*. 2010 Jul 1; 18(4):230-7.
- [14] Fugate DL. Marketing services more effectively with neuromarketing research: a look into the future. *Journal of services marketing*. 2008 Apr 25; 22(2), 170-173.
- [15] Orzan G, Zara IA, Purcarea VL. Neuromarketing techniques in pharmaceutical drugs advertising. A discussion and agenda for future research. *Journal of medicine and life*. 2012 Dec 15; 5(4):428.
- [16] Leonard D, Rayport JF. Spark innovation through empathic design. *Harvard business review*. 1997 Nov 1; 75:102-15.
- [17] Sawangjai P, Hompoonsup S, Leelaarporn P, Kongwudhikunakorn S, Wilaiprasitporn T. Consumer grade EEG measuring sensors as research tools: A review. *IEEE Sensors Journal*. 2019 Dec 30; 20(8):3996-4024.
- [18] Camerer C, Loewenstein G, Prelec D. Neuroeconomics: How neuroscience can inform economics. *Journal of economic Literature*. 2005 Mar; 43(1):9-64.
- [19] Vecchiato G, Kong W, Giulio Maglione A, Wei D. Understanding the impact of TV commercials. *IEEE pulse*. 2012; 3(3):42.
- [20] Wilson RM, Gaines J, Hill RP. Neuromarketing and consumer free will. *Journal of consumer affairs*. 2008 Sep; 42(3):389-410.
- [21] Raichle ME, Mintun MA. Brain work and brain imaging. *Annu. Rev. Neurosci.* 2006 Jul 21; 29(1):449-76.
- [22] Miller M, Bentsen T, Clendenning D. D, Harris S, Speert D. Brain facts: A primer on the brain and nervous system, (6th edn). Society for Neuroscience, Washington. 2008; pp 76-80.
- [23] Lin CH, Tuan HP, Chiu YC. Medial frontal activity in brand-loyal consumers: A behavior and near-infrared ray study. *Journal of Neuroscience, Psychology, and Economics*. 2010 Nov; 3(2):59-73.
- [24] Lindstrom M. Buyology: Truth and lies about why we buy. Random House Digital. 2010; Pp 8-285.
- [25] Fisher CE, Chin L, Klitzman R. Defining neuromarketing: Practices and professional challenges. *Harvard review of psychiatry*. 2010 Jul 1; 18(4):230-7.
- [26] Tusche A, Bode S, Haynes JD. Neural responses to unattended products predict later consumer choices. *Journal of neuroscience*. 2010 Jun 9; 30(23):8024-31.
- [27] Venkatraman V, Clithero JA, Fitzsimons GJ, Huettel SA. New scanner data for brand marketers: How neuroscience can help better understand differences in brand preferences. *Journal of consumer psychology*. 2012 Jan; 22(1):143-53.
- [28] Belden SR. Science is Culture: Neuroeconomics and Neuromarketing. Practical Applications and Ethical Concerns. *Journal of Mind Theory*. 2008; 1(2):249-58.
- [29] Marci CD. Minding the gap: The evolving relationships between affective neuroscience and advertising research. *International Journal of Advertising*. 2008 Jan 1; 27(3):473-5.
- [30] Lee N, Broderick AJ, Chamberlain L. What is 'neuromarketing'? A discussion and agenda for future research. *International journal of psychophysiology*. 2007 Feb 1; 63(2):199-204.
- [31] Cranston RE. Neuromarketing: Unethical Advertising? The Center for Bioethics and Human Dignity. http://www.cbhd.org/resources/biotech/cranston_2004-02-13.html. 2004:02-13.

Journal of Coastal Life Medicine

- [32] Hermann S, Dolan RJ. Price customization. *Marketing Management*. 1998 Oct 1; 7(3): 11-17.
- [33] Vanhuele M, Drèze X. Measuring the price knowledge shoppers bring to the store. *Journal of marketing*. 2002 Oct; 66(4):72-85.
- [34] Evanschitzky H, Kenning P, Vogel V. Consumer price knowledge in the German retail market. *Journal of Product & Brand Management*. 2004 Oct 1; 13(6), 390-405.
- [35] Bialkova SE, van Trijp JC. Is Eye tracking an effective experimental tool for capturing consumers attention? In *Measuring Behavior* 2010; 20(4), 498-498.
- [36] Frederick DP, Bhat G. Review on Customer Perception Towards Online Food Delivery Services. *IJCRT*, 2021; 9(7), b301-b314.
- [37] Nagyová L, Horská E, Berčík J. Application of neuromarketing in retailing and merchandising. In *Neuromarketing in food retailing* 2017 May 31 (pp. 197-232). Wageningen Academic Publishers.
- [38] Chandon P, Hutchinson JW, Bradlow ET, Young SH. Does in-store marketing work? Effects of the number and position of shelf facings on brand attention and evaluation at the point of purchase. *Journal of marketing*. 2009 Nov; 73(6):1-7.
- [39] Gidlöf K, Anikin A, Lingonblad M, Wallin A. Looking is buying. How visual attention and choice are affected by consumer preferences and properties of the supermarket shelf. *Appetite*. 2017 Sep 1; 116:29-38.
- [40] Plassmann H, Ramsøy TZ, Milosavljevic M. Branding the brain: A critical review and outlook. *Journal of consumer psychology*. 2012 Jan; 22(1):18-36.
- [41] Drèze X, Hussherr FX. Internet advertising: Is anybody watching? *Journal of interactive marketing*. 2003 Jan 1; 17(4):8-23.
- [42] Peelen MV, Fei-Fei L, Kastner S. Neural mechanisms of rapid natural scene categorization in human visual cortex. *Nature*. 2009 Jul; 460(7251):94-7.
- [43] Reimann M, Zaichkowsky J, Neuhaus C, Bender T, Weber B. Aesthetic package design: A behavioral, neural, and psychological investigation. *Journal of consumer psychology*. 2010 Oct; 20(4):431-41.
- [44] Illes J, Racine E. Imaging or imagining? A neuroethics challenge informed by genetics. *The American Journal of Bioethics*. 2005 Mar 1; 5(2):5-18.
- [45] Kumlehn M. Consumer Neuroscience: Pricing research to gain and sustain a cutting edge competitive advantage by improving customer value and profitability. Available at SSRN 1872325. 2011 Jun 19.
- [46] Page G. Scientific Realism: What 'Neuromarketing' can and can't Tell us about Consumers. *International Journal of Market Research*. 2012 Mar; 54(2):287-90.