Neuro-Marketing as the new science for marketing: understanding perspectives and defining future research agendas

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Abstract: *Neuromarketing, also known as consumer neuroscience, is a field of study that focuses on the analysis of the brain to forecast and, potentially, even manipulate the behaviour and decision-making of consumers. Over the course of the past five years, a number of ground-breaking studies have shown that it has the opportunity to generate value for marketers. The assessment of physiological and neural signals to delve into the choices, judgements, and possible motives of customers order to delve into the choices, judgements, and possible motives of customers is what is generally meant when the term "neuromarketing" is used. Standard techniques include brain scanning to determine neural activity and physiological tracking to determine other forms of exercise like eye movement. This paper looks at some of the studies that have been conducted on those methods and discusses the advantages and disadvantages of using them. Experts caution that the domain is riddled with operators who grossly overstate what neuromarketing can deliver, so prospective users of neuromarketing must exercise caution when working in conjunction with specialist consultants. Are there any of the consultancy`s data, methods, or tools been published in journals that have been subjected to peer review? Do the consultants also have expertise in marketing in addition to their knowledge of the sciences?*

Keywords: *Neuroscience, physiological, neuromarketing*

Introduction

"Marketing is a subject that is easy to pretend to understand but difficult to practise," observes Philip Kotler.(Kotler &Keller, 2015).All forms of advertising aim to encourage consumers to make a purchase. It's no secret that advertising is a huge part of any successful marketing strategy, with annual spending in the billions. Whether or not this type of marketing is successful is still up for debate. However, gauging an advertisement's true impact is notoriously tricky. As a result of their advertisements, advertisers want consumers to make a purchase. But consumers might view commercials more simply as fun things to watch. Before an advertisement is even conceived, market research firms engage in pertinent activities, and only after considering the results do they move forward with the concept. All the planning undertaken, and money spent on marketing communication design and release may not guarantee success. Not only that, but they fail to account for the fact that we already have information about how consumers think and how information is processed in our brains. The brain is the most intricate organ in the body, and it is responsible for regulating every aspect of our lives. Given that the brain's mechanism remains a mystery in many of its functional aspects that have not yet been decoded, a complete understanding of the brain is impossible at this time. Neuromarketing's increasing popularity is a direct result of the field's immense potential to illuminate a way forward for the advertising and branding industries.

Literature Review

In order to get a better grasp on customers' subconscious motivations and responses, neuro marketers can analyse various aspects of marketing and advertising, such as campaigns, campaigns' effectiveness, content, and packaging. Also, without actually testing any ads or other marketing materials, they can use what we know from neuroscience and cognitive science to improve the results.For their 2007 study on consumer decision-making, researchers from Carnegie Mellon, Stanford, and the MIT Sloan School of Management used functional magnetic resonance imaging (fMRI). Researchers found that they could predict a consumer's purchase decision using brain imaging by tracking which neural circuits were active and which were dormant during the buying process. Studies in neuromarketing often yield unexpected findings.(Knutson et al, 2007).

According to the principles of neuromarketing, both emotional and rational thoughts coexist and are mutually dependent. On a similar note, the field of neuroeconomics disproves the idea that irrational feelings can influence business judgement. Emotions capture people's interest and direct their thinking toward the issue at hand. This can result in either happiness or sadness, and both states are transitory. Multiple surveys have shown that customers, both satisfied and dissatisfied, eventually leave a company.(Kumar, 2015). Such occurrences are commonplace. The negative connotations that were formerly associated with the word "neuromarketing" have gradually faded away over time.(Morin, 2011) .The discipline was formally removed from the domain of pseudoscience by significant research conducted at Temple University, which also made the subject appropriate for serious academic investigation. For instance, Thomas Ramsoy, a professor at the Copenhagen Business School, used the word in the name of his textbook on the subject, which is titled Introduction to Neuromarketing and Consumer Neuroscience. (Ramsoy,2014).

The term "neuromarketing" is often used interchangeably with the term "consumer neuroscience." (Vela&Varga, 2022).As early as 2012, several people in the business proposed renaming neuromarketing as "consumer neuroscience" in order to increase the emphasis on tactics that are based on neuroscience and avoid the dubious image that has been established by excessively confident suppliers. Both "consumer neuroscience" and "neuromarketing" are used synonymously in today's society, despite the fact that many people and businesses have a strong preference for either one of these terms.

The use of neuromarketing strategies has been met with a degree of criticism. On the one hand, those who are opposed to the idea believe that the implementation of such strategies would have the effect of reducing customers' freedom to decide whether or not to buy products that are being marketed to them. As a result, these individuals would be unable to resist such efforts, which would make them simple targets for the company's campaigns.(Wilson et al, 2008).On the other side, advocates of neuromarketing activities,emphasise the advantages resulting from the approach to both consumers and organisations.(Fortunato et al, 2014).These defenders of neuromarketing activities argue that the technique is beneficial. As per them, consumers would stand to gain from the development of products and campaigns that were directed to them, and their judgements would be aided instead of distorted. Additionally, companies would save huge parts of their expenditures that are presently used on advertisements that are inefficient and ineffective, which would ensure greater competitiveness and advantages to customers. There is a further subset of researchers who are of the opinion that neuromarketing is more closely related to science fiction than it is to reality. These researchers believe this to be the case due to the fact that it is physically impossible to find two people in the world who have the same thoughts, as thought is malleable and varies according to the individual's experiences, beliefs, and personality. (Hubert,2010).

Neuromarketing techniques include a wide range of things, such as sweating, the electrical conductivity of the skin, changes in hormones and neurotransmitters, the movement and dilation of the pupil, and the movement of muscles (both in the body and face). Neuromarketing techniques can also be used to understand complex cognitive things, such as the functional activity of different brain areasof the brain, by assessing various indicators, such as the electrical conductivity of the skin. This link between numerous distinct lines of neuroscience and marketing enables each of these strategies to have expanded or decreased applicability to answer to a variety of challenges that standard promotional strategies either cannot deal with at all or only adhere to in part.(Swathi, 2018). The procedures that employed brain imaging were the ones that attracted the most attention out of all of the other methods, both new and old, and the findings from this research had a significant influence on academics as well as business. One of the first studies that provided evidence of this possibility was carried out at Harvard in the latter half of the 1990s utilising a piece of somewhat intrusive technology known as a PET-SCAN. (Zaltman, 1997). A further significant milestone effort made use of a different method that also receives a great deal of attention; this method is called functional magnetic resonance, and it employs expensive but non-invasive technology.(McClure et al, 2004).

If, after being exposed to an advertising stimulus, there were no changes in any part of the brain, then it may be concluded that this stimulus was not effective. If, on the other hand, the inspiration was shown to have generated organic changes in a particular location, then it is possible to deduce that there is a connection between marketing and aroused emotion.(Fugate,2007).To suggest that a particular region of the brain that lights up during the research did so because a picture prompted certain emotions and patterns of consumption is a frivolous statement, however, since various emotions rely on various parameter of activations of neural substrates.(Marcus, 2022).

Research Method

In most cases, the processes of fMRI, EEG, galvanic skin reaction, and eye tracking are investigated during neuromarketing research. They were chosen because of the prospective outcomes as well as the expense of using them. The study of the brain is by far the most interesting of all the many fields of inquiry. The human brain is the most complicated part of our body to structurally describe. The synapses alter throughout time as a result of both experience and learning, which results in a varied image being presented to marketing specialists when they research participants of varying ages or levels of education.After years of research employing these methods, neuromarketers discovered that although we have three brains that contribute to our decisions, there is only one brain that ultimately makes the call.For research pertaining to neuromarketing, the following methods are currently being utilised:

Functional magnetic resonance imaging, sometimes known as fMRI, is a method used in neurological research that enables us to monitor the activity of the whole brain in exquisite detail. In order to forecast consumer behaviour, functional magnetic resonance imaging (fMRI) records both conscious and unconscious feelings and reactions occurring deep inside the brain. The functional magnetic resonance imaging (fMRI) technique analyses activity deep inside the brain and records the human subject's emotions and responses, both conscious and unconscious.

The MRI scan employs a powerful magnetic field to provide a three-dimensional picture of the patient's brain. A functional magnetic resonance imaging (fMRI) scan may detect brain activity by measuring the blood oxygen levels in neurons. Neurons that are active use far more oxygen than neuronal populations that are dormant. The scan would reflect activated neurons in the event that they were present. The functional magnetic resonance imaging (fMRI) technology is the only one that can record the activity of the whole brain in such minute detail. The use of fMRI has

various benefits when it comes to forecasting consumer behaviour, including the following:

The functional magnetic resonance imaging (fMRI) method is the most effective neuromarketing tool for predicting customer behaviour such as purchasing behaviour and sales (hard KPIs). Feelings and mental processes, many of which occur below a person's level of conscious awareness, are the primary drivers of consumer behaviour. The functional magnetic resonance imaging (fMRI) method is the only one that can measure everything, including conscious and unconscious emotions, ideas, and rational cognition.

The results of functional magnetic resonance imaging (fMRI) provide the most comprehensive picture yet of the consequences of marketing messages. The parts of the brain responsible for thinking, feeling, and being aroused are all involved in the activity. If all of these diverse processes are recorded, only then will it be possible to build a complete image of the customer. The functional magnetic resonance imaging (fMRI) creates a three-dimensional view of the activity in the full brain, making this conceivable. The quick and instinctive reactions to marketing messages may be measured using fMRI; these responses are analogous to how individuals behave in real life.

Participants in conventional market research are presented with a question or scenario and then asked to generate an opinion on the matter. This approach of polling people's ideas results in post-rationalization, in which respondents express justifications for their beliefs that may or may not have any connection to the respondents' actual feelings or cognitive processes. Numerous studies have demonstrated again and again that individuals are unable to correctly express what they believe, what they desire, or what they appreciate. In contrast, functional magnetic resonance imaging (fMRI) may directly capture emotional states as well as cognitive activities by monitoring brain activity.Neurensics has made it possible to do fMRI studies on a larger and more inexpensive scale. You should expect to acquire more insightful answers in only five business days for the same amount of money that you would spend on conventional research.

Analysis & Findings

The fMRI analyses the subconscious feelings and responses that are triggered by your advertisements. The metrics are compared to a standard that has already been set for successful advertising. This enables the user to improve the effectiveness of the advertisements and, if at all feasible, lower the ad budget by reducing the amount of time wasted on useless advertising.

The useris able to maximise the return on investment (ROI) by optimising the advertisement before it goes live by using fMRI to assess which unconscious emotions and behaviours are activated by the advertising idea. The users able to establish a Neuro Brand Signature using fMRI. This is the pattern of neural connections that are unique to the brand that is found in the brain of the customer. It is possible to utilise this to examine the direct effect that the marketing materials have on the connections that are created in the brains of the customers.

The fMRI analyses how much of an impact your product's packaging has on consumers' decisions to make a purchase. Each method of study has its own set of advantages and disadvantages. The following is a list of the limitations of fMRI:The measurement of fMRI takes place in a clinical setting, which might have a detrimental impact on the people being tested. Because an MRI scanner may cost millions of dollars, many people believe that functional MRI is prohibitively costly. The temporal resolution of fMRI is lower due to the fact that it does a full scan once every two seconds. As a result, there is no way for us to identify the exact instant when a particular area of the brain reacts to a marketing message.

The transcranial magnetic stimulation approach is a neurophysiologic method that enables noninvasive stimulation of the human brain. The transcranial magnetic stimulation (TMS) modifies the activity of particular regions of the brain by using magnetic induction. When it is put

on the head and monitors brain activity, it generates a magnetic field that is powerful enough to produce electrical currents in the neurons under the surface by using an iron core that is often shaped like a toroid and is wrapped in electrical wire. TMS is being used more often in the measurement of behavioural changes, including attention cognition, recognition, attention, and engagement/boredom. Researchers have employed transcranial magnetic stimulation (TMS) to explore the causal function of certain brain areas by briefly bringing them "offline." Additionally, it is helpful in the creation of advertising, the testing of the viability of new campaigns, product moment connection and correlation.

Electroencephalography, sometimes known as EEG, is a method used in neuroscientific research that analyses the activity of the brain. In the field of neuromarketing research, this method for measuring cognitive functions like computations is one of the most common methods used to make predictions about customer behaviour.

Electrodes are positioned superficially on the scalp to get electroencephalogram (EEG) readings. It is able to record the coordinated activity of neuronal networks. In particular, it is able to detect significant activity voltage coming from regions of the brain that are near to the skull. The headgear used for EEG measurements has the appearance of a swim cap. It comprises of electrodes (sensors) that are snugly connected to the head and transfer the brain activity that is being recorded from the subject's head. The EEG can only detect big and consistent patterns of brain activity.

EEG measures brain reactions. Users won't get conscious and justified verbal replies, but rather objective reactions when someone does it instead. It is important to understand this since the majority of what drives consumer behaviour is not conscious reactions but rather unconscious ones.The accuracy of EEG readings may be measured in milliseconds. This enables the users to assess the immediate brain reactions as well as the first impressions evoked by marketing communications. The electroencephalogram is a useful tool for evaluating cognitive activities like calculating, which occur in the brain.

Each method of study has its own set of advantages and disadvantages. In terms of EEG, they are the findings from an EEG study need to be taken with caution. This is due to the fact that EEG does not have the resolution necessary to see activations that are localised to particular parts of the brain; instead, it can only assess broad-scale and synchronous brain activity across huge brain regions. It is not possible to anticipate every customer behaviour using EEG. The EEG is not a reliable method for measuring feelings like fear, desire, worth, or trust in others. This is due to the fact that the deeper brain areas are responsible for processing these feelings and EEG measures the activity of the cerebral cortex and not deeper areas.

Electrodes are put on the muscles of the mouth (zygomaticus minor and major) and on the occipitofrontal and orbicularis muscles to verify the kind of emotion (happy, sorrow, apathy, pain, etc.) by subtle facial muscle movements that are not visible to the naked eye; this method is known as facial recognition or electromyography and is still not widely utilised in neuromarketing. (Wendy, 2022). It has a high spatial resolution, and its credibility is growing for use in the study of various emotional reaction to visual stimulation, responses to taste, smell and hearing, as well as human interaction and behaviours. Amongst benefits are the following: high spatial resolution; growing credibility for use in these analyses; human interactions and behaviours. Because the electrodes are anchored to the face, there is a possibility that certain facial motions may be restricted as a result. The fact that some expressions can be understood in more than one way is another significant drawback associated with the use of neuromarketing. This renders the standardisation of single expressions that are correlated with particular emotions meaningless, which in turn limits research into certain more specific emotional responses. (Ryan, 2009).

Measurement of an individual's behaviour and experience may be obtained via the use of implicit association techniques, which have been around for quite some time and infer latent processes and reactions.This method assesses the buyer's disposition in addition to measuring the buyer's reaction times and accuracy on tasks that are known to be systematically influenced by the buyer's responses to advertisements and brands. There is a connection between unconsciously held automatic attitudes and implicit associations. Various favourable connections with brands are assumed to have been implicitly activated (e.g., quality, value, youth, strength, speed, etc.). These kinds of unstated connections may have a significant role in the consumer's choice to purchase. Steady state topography, sometimes known as SST, is a technique that directly monitors the activity of the brain. It is widely used in the field of cognitive neuroscience as a fundamental research approach. It requires participants to observe visual stimuli or do certain activities while EEG electrodes are placed on their heads to capture their brain activity. A high level of temporal resolution may be reached by continuously monitoring these changes in brain activity over extended periods of time while maintaining a high level of tolerance for background noise. The gadgets are quite invasive and can only be used with visual stimulation. (Silberstein et al, 1995). This approach employs the deployment of a visual flicker in the participants' peripheral vision in order to elicit a brain response known as the Steady State Visually Evoked Potential (SSVEP). These are signals that indicate the normal reactions of the nervous system to stimuli.

Magnetoencephalography, abbreviated as MEG, is a method that involves expanding and mapping the magnetic field that is produced as a result of brain processes and the electrochemical signals that are exchanged between neurons. Magnetoencephalography, like electroencephalography, has good temporal resolution. On the other hand, magnetoencephalography's spatial resolution is superior to that of EEG, despite the fact that it is less than optimal for monitoring subcortical regions and deeper locations in the brain. When performing MEG research, as opposed to EEG, persons employ hypersensitive sensors to detect the electromagnetic field without making contact with the scalp. This is in contrast to the EEG method. It is quite expensive to acquire the required equipment and to conduct a session of magnetoencephalography, which is one factor that contributes to the higher popularity of electroencephalography (EEG) than magnetoencephalography (MEG). The Rapid Implicit Association Task, often known as RIAT, is a method used in neuromarketing research that evaluates automatic and frequently unconscious (brand) connections. This method employs the utilisation of time constraint as a means of reducing both conscious thought and excessive reasoning. RIAT is a tool that assesses the instinctive and unconscious connections generated by your brand; associations that contribute to the expansion of your brand.The RIAT may be completed on a desktop computer, a laptop, or even a smartphone by the participants. They are under time constraint and have to indicate left or right in order to identify relationships that are appropriate for the brand.

The RIAT is a true speed test; if the participants take too much time to reply, they have to begin the test from the very beginning. The amount of time given to respond is restricted. During the RIAT, the person conducting keeps track of how quickly the answer is given. When a reaction is given more quickly, the strength of the link increases. This measured speed is what decides whether or not a customer will choose your brand when making a purchase.

The RIAT is a test that examines how fast, automatic, and intuitive a reaction is. Participants won't have the opportunity to engage in post-rationalization since there won't be enough time. One will get objective insights on brand associations, which may be used to anticipate

customer behaviour (purchase intention). Since it is an internet tool, it can be accessed from any location on any mobile device that is compatible with it. One is not restricted to operating in a certain geographical area.

Each method of study has its own set of advantages and disadvantages. Similar limitations apply to RIAT:

The output determines the scope of the findings. Because the connections that participants perceive are predefined, users may not acquire any new associations that the brand may trigger as a result of this activity. The connections are only words, and words may have a variety of meanings depending on the person reading them.

Positron-emission tomography, often known as PET, is a method that involves the use of radiation and is intrusive in nature. PET examines the metabolic activity of the human body. It is capable of detecting and analysing the three-dimensional distribution of an ultra-short-lived radiopharmaceutical that has been administered intravenously in the body. Alterations in the chemical makeup of the brain's tiny and deep structures may be identified, as can alterations in the flow of fluid through those structures. Because PET is an intrusive technique that makes use of radioactive materials and subjects to radiation, the applicability of PET to healthy participants in non-clinical investigations (such neuromarketing studies) is limited. In addition to this, the temporal resolution it offers is relatively low, and the price is rather high.

The galvanometer is a piece of equipment that measures the galvanic reaction, often known as the amount of sweat on the skin (galvanic skin response, GSR). This technique monitors and records the minute shifts that occur in the conductance of the skin's reactions. In other words, GSR is also used in neuromarketing, and it measures the nuanced modifications in the skin's perspiration that participants experience. This occurs when the skin becomes a better electricity conductor because of an increase in the activity of endocrine glands (sweat), which can happen after an individual is exposed to a marketing stimulus that is physiologically intriguing.

Eye tracking, often known as ET, is a method that utilises infrared light to monitor and record the motions of the eye in order to determine the location of the pupil. To put it another way, it monitors the participants' eye movements and records their gaze patterns. Eye-trackers recognise and record patterns of gaze in order to explain a subject's visual path as a reaction to a given stimulus and, as a result, acquire information about the subject's visual attention. Eye-tracking is capable of providing data on temporal activities at a high resolution and at a rate that is affordable. It has a high approval rate among users, and it can be carried about easily. Thus, it should not come as a surprise that eye-trackers are among the approaches that are used the most in neuromarketing.

Both marketing and neuromarketing have certain common features while also displaying some distinctive variances. In a strict sense, all marketing may be categorised as neuromarketing. It is common practise for marketing efforts to aim to have a psychological impact on consumers, with the intention of persuading them to adopt a certain attitude toward a particular brand or product. As a means of differentiating the two, industry experts may define neuromarketing as any marketing strategy that incorporates neuroscience in its methodological approaches. According to this definition, not all marketing is synonymous with neuromarketing, as marketing teams might or might not opt to employ neurological approaches while doing consumer research. Therefore, this definition excludes certain types of marketing from the category of neuromarketing.

Although significant research has been conducted in this area over the last ten years, neuromarketing is still a relatively young field. Only a handful of the trials that have been carried out have shown evidence that it can fulfil the requirements set out by corporations as well as researchers. Since it is directly connected with viewing the

operations of the human brain and involves a significant invasion of privacy, ethics will be called into question on a regular basis as a result. There is a lack of evidence to demonstrate that standard techniques of assessing the efficacy of advertising are fundamentally useful or not, and this is because of the limited number of studies that have been conducted. It is quite costly to perform studies using neuromarketing, and this will serve as a barrier in the near future for individuals who are interested in exploring the topic but do not want to spend the money. It has also been noticed that involvement in this field is necessary in conjunction with different other streams of study such as psychology, neurology, and marketing in order to do research in this area. When trials like this are carried out without the supervision of medical professionals, there is an additional cause for worry about the potential adverse consequences that may be caused by the operation.

Conclusion

Because of the myriad of factors involved, it is not possible to say with certainty if neuromarketing will prove to be a saviour in the world of business in the coming years or whether it will simply be yet another promotional stunt. To effectively arrive at a conclusion on whether or not this method is just a scam, hype, or genuine promise for the future of consumerism, further in-depth study must be conducted under the direction and oversight of relevant authorities.

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