

Ethical Challenges in Neuromarketing : A Research Agenda

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Abstract

Neuromarketing is an emerging field which connects disciplines such as psychology, science, neurology, marketing, and neuroscience with economics. The main goal of neuromarketing is to explore how the brain is physiologically affected by various marketing strategies and advertising tools. The article discussed various neuromarketing techniques and their applications and aimed to examine the common ethical concerns of neuromarketing, emphasizing on the potential threats and risks to the consumers. A meta - analysis approach was used to capture the content of appropriate literatures and content analysis was done to support the views. As examined in the paper, neuromarketing studies the different emotions that are associated with human decision making and uses this information to improve the effectiveness of marketing. The benefits of this study can be taken to the marketing domain. This paper identified and addressed the qualitative impact of neuromarketing in different fields of advertisements and promotions. It also provided the metadata for future researchers to think about the universal code of ethics and objectives that can be implemented to promote the development of research in neuromarketing in a more positive light.

Keywords : ethical challenges, neuromarketing, consumer buying behaviour

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Consumer behavior is considered to be a very complicated field of study, particularly in the domain of marketing. It is because it is inclined toward understanding a complex creature called 'Human'. It is quite impossible to accurately predict how individual humans will behave in a given situation, as they get influenced by various cultural, sociological, economic, and psychological factors. For marketing decision makers, it has become imperative to understand the importance of the various determinants and recognize the factors that influence a consumer toward purchase decision making. This will help marketers identify different segments in the market and contribute toward developing effective marketing strategies. In studying consumers' buying patterns, the marketers believe that it was the consumers' perception and not essentially the reality which was considered as the driving force for consumers' choices. Thus, understanding and measurement of emotions are important in understanding consumers' buying behavior (Sastry & Rao, 2017).

Marketers use a variety of market research techniques and methodologies to understand what customers' needs

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are and will be in the future. But majority of them possess their own limitations in predicting the consumer insights toward a product or service offering in the market. These techniques are not very accurate in understanding the functioning of the human brain which indeed is responsible for provocation of the consumer toward any purchase. The emergence of neuroeconomics and neuroimaging in decision making science has provided a ray of hope to the marketers toward solving consumers' problems of accuracy, thereby analyzing the consumer behaviors. This field of study is coined as neuromarketing and is explained as a field which uses medical technologies to study brain's responses to market stimuli. Impulse buying of consumers is an unconscious behavior which can be tracked using neuromarketing tools, and these tools help to unravel the mystery behind consumers' irrational and disruptive behaviors (Jain, Gautam, & Pasricha, 2018).

Neuromarketing is an emerging field which applies neuroscience to study how the brain responds to areas such as advertising, products, and branding. The underlying aim of neuromarketing is to construct actionable plans related to decision processes and consumer preferences. It has thrown a light on important aspects of businesses as well as providing better insights into the minds of consumers by connecting the gaps that traditional marketing research could not address. In order to create customer delight, it is imperative to develop products and services from the customers' point of view. Customer delight happens when you astound customers by exceeding their anticipation and this can be done by tracking consumers' brain using newer technological tools available to marketers (Dubey, Bajpai, & Guha, 2016).

For many decades, researchers were under the impression that consumers are rational decision makers, who are capable of calculating the costs and benefits of an array of choices (Tor, 2008). Before neuromarketing, the rationalization of consumer behavior was established solely on inference. With the help of 'science to locate consumers' and 'buy buttons,' we have gotten closer to opening the 'black box' of the consumer's mind (Moore, 2005). The idea of the 'black box' began with Plato, a Greek philosopher who compared the human soul to a chariot pulled by the two horses of reason and emotion (Fugate, 2007). Although emotions play an important role in human behaviour, it is, in fact, the "horse of reason" that has prevailed throughout the past (Samson, 2015). Emotional factors have been overlooked since explaining and speculating on certain behaviours is much harder than trying to understand rational decision making. It is because of the fact that emotions play a vital role in the buying decision process that many large corporations and firms are interested to gain further valuable findings that can add to their growth. Even the study of demographic variables is an important factor in consumer buying. It has been found that age and income, which are demographic variables, have a direct relationship in impulse buying. Impulse buying is a strange, exciting phenomenon which is more of emotional rather than rational behavior. These purchases are basically convenience goods with low cost and frequently purchase. Thus, studying the emotions of consumers is the key to a marketer's success (Gupta, Chaudhry, & Kamal, 2015).

Although neuromarketing has received a huge amount of attention, it is not free of criticism. The various techniques have been termed "abusive" and "invasive" because consumers may be reluctant on sharing private unconscious thoughts, and in addition, researchers have the advantage to manipulate certain important aspects. This is the main reason that neuromarketing raises ethical concerns and tries to understand if there is a breach into a consumer's privacy, solely for a commercial gain (Kumar et al., 2013). The present study aims to discuss the existing literature on neuromarketing research in application and its ethical concerns.

Neuromarketing : An Overview

The word 'neuromarketing' was first introduced by Ale Smidts in 2002, and the term was first published by BrightHouse (Lee, Broderick, & Chamberlain, 2007). However, in the late 1990s, there was already research conducted in the field by Gemma Calvert and Gerald Zaltman. Gerald Zaltman was a marketing professor who patented ZMET - Zaltman Metaphor Elicitation Technique. The ZMET examined how different sets of images elicited positive or negative emotional responses. In the year 2006, it was Dr. Carl Marci, who established

Innerscope Research, a research firm that was the first to focus on neuromarketing research. This was later procured by Nielsen Corporation in May 2015. Today, it is known as the Nielsen Consumer Neuroscience.

Neuromarketing : Tools and Techniques

The elementary existing techniques used in neuromarketing research for generating neurological images are: electroencephalography (EEG), magnetoencephalography (MEG), positron emission tomography (PET), functional magnetic resonance imaging (fMRI), transcranial magnetic stimulation (TMS), eye tracking (ET),

Table 1. Summary on Neuromarketing Techniques

Neuromarketing Technologies /Techniques	Application	Benefits to Marketers
Functional MRI (fMRI)	To map and measure the activity of the brain.	Exact mental processes and thinking can be interpreted from the high-resolution images provided by fMRI. It helps in understanding what a consumer is thinking at any particular point of time.
Electroencephalography (EEG)	Measures the changes in the electrical field of the brain.	Helps in tracking and recording the different patterns of the brain wave to assess any unusual or unexpected changes. Changes incurred in the left and right frontal region help interpret the marketers about the probable decision processes of the consumers. More activity in the left frontal region is associated with positive emotional states or motivational approach for an object and vice versa.
Magnetoencephalography (MEG)	Measures the changes in the magnetic fields of the brain induced by neuronal activity.	The spatial distribution that is generated by the magnetic fields is examined to locate which part of the brain is activated. MEG measures the magnetic fields with the help of superconducting quantum interference devices, which can pick up extremely tiny magnetic fields. This allows researchers to track in "real-time" a consumer's processing speed to communicate information.
Transcranial Magnetic Stimulation (TMS)	TMS is a non-invasive procedure in which a changing magnetic field is used to cause an electric current to flow in a small targeted region of the brain via electromagnetic induction.	As a research tool, TMS has been used to study the causal role of specific brain regions, in particular, tasks by temporarily taking them 'offline'.
Positron Emission Tomography (PET)	It is an imaging test that uses special dye containing radioactive tracers to inject into the veins/ swallowed. The PET Scanner then measures the metabolic changes occurring in an organ or tissue.	This technique helps the researchers to understand what motivates the consumers and how chemicals contribute in decision making.
Eye Tracking (ET)	This is a tool for the analysis of visual attention and its	Eye-tracking in market research can provide insights into participants' habits even when these participants

	association with the cognitive and emotional responses.	are not aware that they are being observed. This information is mainly related to what should attract visual attention or visual behavior in different situations. The use of eye tracking and neuromarketing in marketing analysis is becoming increasingly popular and shows great potential for aiding market research, innovation, product development, advertising, sales, customer service, loyalty programs, and various other marketing topics.
Galvanic Skin Response (GSR) / Electrodermal Activity (EDA)	This technique involves measurement of the electrical conductivity of a form of fine sweating, called eccrine sweating, that is automatically generated during emotive responses.	GSR can be measured to track emotional arousal towards products with high consumer interest, however, only subtle differences can be detected in terms of performance and quality.

galvanic skin response (GSR) and these are used for neuromarketing research today (Moore, 2005). A summary about these techniques is discussed in the Table 1.

Review of Literature

Various attempts have been made in the recent past to understand the concept of neuromarketing and its feasibility and applicability in business oriented processes, particularly in marketing. It has been argued that there exists a new discipline as neuromarketing, which is the result of a combination of neuroscience and marketing process. While neuroscience is the scientific study of the human nervous system, marketing is a process of getting products or services sold to the consumers. The new discipline emerged as neuromarketing, which is a method to get inside the brain of the consumers and understand their patterns of decision making. This concept in itself created so much of hype, projecting the neuromarketing process as a boon/curse. Debate among researchers, subject experts, professionals, agencies, marketers, social settings, etc. is going on and is still in the process of concluding anything substantial. Few argued that it is going to help a lot in understanding the consumers’ needs and wants and hence providing them with the right offerings. On a different scale, few raised their eyebrows on the ethical concerns of human rights and consumer rights in choosing offerings as per their needs and wants. Others even claimed that neuromarketing techniques not only get the data relevant in projecting and selling the products/services, but also

Table 2. Summary of Previous Studies on Neuromarketing and Its Ethical Concerns

Domain of Study	Author (Year)	Key Arguments
Neuromarketing and its agenda for future research.	Lee et al. (2007)	It was strongly argued that although neuromarketing is a recent development and possesses significant threats, unethical issues, and flaws, it should be considered as an important area of future research. This will help in understanding the complex human behaviors.
Potential applications of neuromarketing in the marketing domain.	Fugate (2007)	It was advised to construct a behavioral model that would predict what types of consumption related problems brain structures under study need to solve. This model suggested made an attempt to find a sort of universal stimulus classification system that can be generalized to a broad population.

Neuromarketing as an emerging consumer behavior science.	Morin (2011)	The study stated that neuromarketing is at its embryonic stage & there exist extreme possibilities for understanding the brain's circuit functioning in the process of buying a product. The study strongly argued in support of continuing the future research on neuromarketing based on the fact that the brain is responsible for all the behaviors of a consumer. The study also put forward that neuromarketing will evolve to a great extent. The ethical concerns will surface, but will be dealt with the structured conduct of research with respect and transparency.
Emergence of neuromarketing's importance in business.	Fisher, Chin, & Klitzman (2010)	The study strongly put forth the advantages of using neuroimaging in marketing domains following its cheap and fast attributes, making it attractive against current marketing tools. The study was positive in predicting that neuromarketing will be contributing much in the interface between people and business, which will in return foster a more human - compatible design of the products in the market.
Neuromarketing as a mixture of brain science and marketing.	Touhami, Benlafkih, Jiddane, Cherrah, Malki, & Benomar (2011)	The study presented a brief outline of neuromarketing as a new discipline that combines neuroscience and marketing. The study attempted to study the link between consumers' neuroscience and the reward system and promoted research towards the use of neuromarketing for less commercial purposes.
The research - practice gap of neuromarketing.	Butler (2008)	The study highlighted the importance of the research - practice gap in organization studies and tried to propose a novel neuromarketing research model to open the debate for future researchers.
Neuromarketing as an emerging interdisciplinary field.	Madan (2010)	The study recognized the previous studies on neuromarketing and also acknowledged that it is an emerging interdisciplinary field connecting psychology and neuroscience with economics. Further, the study discussed that there existed future implications of neuromarketing, which shows great success potential on marketing success. However, the study raised concerns on its adequacy in determining if an advertisement is effective or not. The study argued that the activation in regions such as the medial prefrontal cortex does not necessarily indicate that an advertisement is effective or not as the region has been the centre of previous studies on other human behaviors as well such as fear conditioning, eating disorders, etc. The study also highlighted on enforcement of ethical practices in neuromarketing for better results.
Neuromarketing practices & challenges.	Fisher, Chin, & Klitzman (2010)	The study suggested for more research in this field in order to get better understanding of neuromarketing processes, neuromarketing companies, and their practices and claims onto the society at large. It was argued that the issues raised by neuromarketing highlighted important professional, ethical, and scientific concerns, which need to be addressed by both public and private agencies, including academics.
Neuromarketing and the future of marketing research.	Miljković & Alčaković (2010)	The article gave a viewpoint of the service settings marketers need to go in for a better understanding of how the brain reacts to marketing stimuli and process those stimuli further. This can benefit them in improving their efficiency and effectiveness if they try to understand how the brain functions or which functions are activated during the various stages of the consumer's decision-making process.

Ethical concerns over neuromarketing.	Flores, Baruca, & Saldivar (2014)	The study explored the perceived ethicalness of the use of neuromarketing by the organizations and their implications. The study compared the perceptions of using neuromarketing by for profit organizations and non - profit organizations. The study argued that the use of neuromarketing by for-profit organizations was perceived to be unethical and use by non - profit organizations was considered ethical. The debate still continues.
Neurophysiological insights on the influence of consumer impulsiveness on trustworthiness evaluations in online settings.	Hubert, Hubert, Linzmayer, Riedl, and Kenning (2018)	The study stated that neuromarketing research should be considered as being a triangulation of research as it implies defining a problem (qualitative approach), defining and test hypothesis (quantitative approach), and exploring the results in depth (qualitative approach).
Application of EEG in consumer neuroscience.	Lin, Cross, Jones, & Childers (2018)	The study discussed the issues of neuromarketing and proposed a code of ethics for neuromarketing to be followed by the organizations. The code of ethics proposed are : protection of research subjects ; protection of vulnerable niche populations from marketing exploitation ; full disclosure of goals, risks, and benefits ; accurate media and marketing representation ; and internal and external validity.
Ethical responsibility in neuromarketing.	Pop, Dabija, & Iorga (2014)	The study was claimed as the first one of such type on the Romanian market and was the first step towards ensuring an ethical neuromarketing investigation framework in Romania.
Ethical issues in neuromarketing.	Ulman, Cakar, & Yildiz (2014)	The study concluded that neuromarketing has emerged as an applied field which may transform traditional marketing research by means of various neuroimaging tools. Since many details about this evolved process are unclear, ethical concerns have been raised by several governmental and non-governmental bodies, experts, scholars, and by various groups in society. The study proposed that public policies based on human rights laws, and the bioethical value of human dignity and integrity should become a part of research in this newly emerging field. Many other related suggestions were put forth for scientific research in neuromarketing technologies.

get other subconscious reactions of the brain, which later can be manipulated to boost sales by compromising the quality of the products rather than improving the quality of the products.

A summary of few selected studies in the field of neuromarketing is summarized in Table 2 for understanding the sentiments of the academic researchers on applicability of neuromarketing as a business tool and its ethical concerns on the consumers.

Research Gap

There have been several studies concerning neuromarketing and its applications (Hubert et al., 2018). However, a comprehensive study based on a majority of publications seems to be lacking. There are many experiment based studies concentrating on applications of neuroscience/neuromarketing tools and techniques across the world. All the experiments tried to influence the human brain and affected its functioning in a different way. There exists a lack of studies having an elaborative discussion on the process and outcomes of the experiments and their ethical implications on consumers at large.

Also, the present study attempts to discuss the outcomes of the previous studies and their present and future implications from an ethical viewpoint. This ethical viewpoint on the available literature seems to be limited and also does not provide a comprehensive outlook on the uses, processes, and implementation of neuromarketing concepts, tools, and techniques on the consumer base.

The concluding discussion of the present study supports the connotations provided by various studies in the recent past (Hubert et al., 2018) and also highlights strong concerns on the ethical issues of neuromarketing, which majority of the recent studies seem to be missing.

Table 3. Select Neuromarketing Applications

Country (Year) & Authors	Neuromarketing Tool/Technique	Experiment/Study
USA (2013),Djamasbi, Hall-Phillips, & Yang (2013)	Eye Tracking (ET)	This study was done in the marketing field through ET technique by targeting a group of young adults in the age group of 18 - 29 years. They were known as the Generation Y. These adults who were selected had integrated the use of smart phones into their daily lives. By studying their search behaviour and browsing pattern on laptops and mobile phones, researchers could develop an efficient e-marketing strategy. Visual hierarchy theory is yet another theory which is important in this subject. It basically refers to the order in which a webpage or an interface communicates the information to its users. This study confirmed and concluded that the participants looked mostly at the items at the top of the page. By studying this, marketers could effectively create advertisements that created a long lasting impression in the consumers' mind and in turn resulted into sales. The fixation count, total fixation duration, and the first action (clicking or scrolling) duration were higher when the advertisements were present. Again, the theory of banner blindness was contradicted as the advertisements were not ignored by the viewers. It showed that banner blindness exhibited a negative effect on the examination manner.
USA (2011) Palmer, Owens, and Chaparro (2011)		Palmer, Owens, and Chaparro (2011) conducted another research on text advertising blindness and it had a dual purpose. The purposes were : (a) to confirm that the text advertisements were susceptible to user "blindness" and (b) to note the effects of search type (exact or semantic) and target location on the degree of blindness. The above experiment concluded by proving that the text advertising had the same type of "blindness" as banner advertising. The secondary conclusions that should be considered by website operators and advertisers are as follows : When an advertisement is placed at the top on the right side of the page, the user finds the tasks more difficult. Users usually ignore the advertisements or information located in these two areas on a webpage and this is done especially when these areas look like text advertisements. After a semantic search, the users had the same difficulty

**USA (2004),
McClure, Li, Tomlin,
Cypert, Montague, &
Montague (2004)**

Functional Magnetic
Resonance Imaging (fMRI)

finding the information embedded in an advertisement either at the top or the right side of the page. Users usually associate the right side of a web page to be full of advertisements and banners, and therefore, they neglect it.

"Cola Brains" is one of the most popular research works conducted by McClure, Li, Tomlin, Cypert, Montague, and Montague at Baylor College of Medicine in Houston, Texas. The participants were exposed to two different scenarios. In the first scenario, individuals were asked to choose between Coke and Pepsi. On the other hand, during the blind test (second scenario), they were asked to choose a drink, without knowing which one was Pepsi or Coke. In the first scenario, the subjects preferred Coke to Pepsi. Nevertheless, in the second scenario, participants preferred the taste of Pepsi to Coke. During the experiments, the "subjects lay supine with their head in the scanner bore and viewed a back-projected computer-generated image via a 45° mirror. Subjects were instructed to watch the screen and swallow the colas when they were delivered" (p.379, McClure et al. 2004). However, the study did not provide a rational explanation on how and why our brain chooses certain brands over others.

**Italy (2014),Vecchiato
et al. (2014)**

Electroencephalography and
Galvanic Skin Response
(EEG and GSR)

Giovanni Vecchiato et al. in the year 2014 conducted an experiment. There were 28 participants involved in the study, where 12 of the participants were women. A consent form was signed by each party after a careful explanation of the study. Participants were asked to sit comfortably in front of the computer. They were then shown a documentary with six commercial ads in between the screening of the documentary (target stimuli). The six types of advertisements that were shown fell under the categories of perfumes, consumption, banks, sports, telephone, and clothing. While the videos were playing, electroencephalographic, electrocardiographic, and galvanic skin response were being recorded. The only instruction given to the participants was to watch the videos carefully, and they were not aware that an interview would be held at the end of the data recording. During the interviews, the subjects were asked to recollect commercial clips and were given a list of the sequence of advertisements. The interviewer also showed pictures of advertisements that were not part of the video to distract the participants. Finally, they were asked to score the advertisements on how well they perceived the same. Two perfume commercials by Cartier and Prada were analyzed in depth by comparing between the genders of the participants and the video clips. The average values of memorization between women and men did not present high differences, being both negative and close to -1. Men showed negative values for both emotion and interest ; whereas, the cerebral activity of women was characterized by positive

values for both emotion and interest. This study used the approach - withdrawal index to measure the different patterns that elicited emotion, interest, and memorization in men and women. Based on the advertisements, different sections attracted men and women at different points.

Neuromarketing in Action : Recent Applications

There are several applications which are using neuromarketing techniques to understand and influence the pattern of consumers' responses toward products or services. There exist several applications in the real world which we may or may not be aware of. To name a few are: baby eye gaze, Frito-lay's effective packaging, etc. Few experiments were also attempted to gain an insight into the applicability and effectiveness of neuromarketing techniques, so that they can be proposed for application into the real world. A summary of selected studies/experiments is discussed in the Table 3.

Neuromarketing : Ethical Concerns

The main aim of neuromarketing is to obtain valuable information about a consumer's emotional response and action while being exposed to different marketing stimuli. One of the main benefits in acquiring information with the help of neuromarketing tools and techniques is that there are no consumer biases and reluctances in revealing the true facts. However, ethical concerns arise because of sensitive information that a consumer might be unwilling to share, that can be obtained in the process. Ethical concerns can be divided into two main categories: (a) protection of various parties who may be harmed or exploited by neuromarketing, and (b) protection of consumer autonomy (Murphy, Illes, & Reiner, 2008). Ethical development of neuromarketing requires protection of the research subjects, responsible business - to - business advertising, and accurate representation of state of the art of technology to the public.

When research is conducted in medical institutions, there are certain laws that protect the privacy of individuals, along with clear instructions and requirement of consent. For instance, in the United States, they have what is known as a Department of Health and Human Services. This department protects the privacy of a subject participating in a study. However, when a research is conducted for marketing purposes, there are no stringent laws for privacy protection. An even bigger issue arises when new technologies are invented, which are not governed by regulatory authorities. It will give researchers the opportunity to exploit participants without their consent. In the case of fMRI, the advanced technology has the capability to invade a person's private thoughts. Researchers can then take the information gained from the study to further misuse it for their own personal benefit.

The second ethical concern that arises is the exploitation of niche populations. There is a fine line between target marketing and exploitation. Vulnerable segments of the society can be exploited. Vulnerable persons include people with neurological or psychological disorders, children, the elderly, and minority groups. The main ethical issue is manipulating sensitive individuals who are especially prone to "stealth neuromarketing" (Fisher, Chin, & Klitzman, 2010).

Responsible business-to-business advertising and public representation have been heavily criticized as neuromarketing oversells its accuracy, benefits, and potentialities. There have been publications on the potential risks involved in overinterpreting the results of neuromarketing studies (Murphy et al., 2008). Companies who advertise their services must be extremely careful to not create a "neurohype". The brain is a highly complex organ with billions of cells connecting with one another. Many companies overlook at the possibility of the inaccuracy of the results found and risk losing huge investments made in neuroscience research.

Neuromarketing has also been viewed to be unethical due to the lack of information available to the public.

Table 4. Summary of the Ethical Concerns in Neuromarketing

Neuromarketing Ethical Concerns	Description	References
Neuromarketing as a market research methodology.	It possesses a potential threat to the research methodology as it is believed to have a great potential for intruding into the subject's mind (i.e. consumers in the marketing context). This would allow marketers or companies involved in neuromarketing to trick the consumers' brain and manipulate them to make buying decisions in favour of a particular company or product or service.	Pop et al. (2014)
Consumers' decision making process and their freedom of choices.	Following the nature of any emerging field, neuromarketing too has both promoters and antagonists. The debate is concerned on the ability of neuromarketing to foster the development of products that are really desired by people, and on the other hand, critics warn that people's ability to make informed decisions about purchases and/or consumption will be compromised. Their freedom of choices may be altered by the marketers by using neuromarketing tools.	Teo & Yong (2003)
Confidentiality and property rights of data of consumers' brain activity.	The neuromarketing techniques allow to record the brain's activity, which is the information from its subconscious reactions. This is further analyzed and used to trigger specific portions of the brain of the consumers using personalized marketing strategies/advertisements. Additionally, many researchers projected that it will soon be possible to monitor consumers' brain activity throughout their visit at the market store and further can be used for specific offerings.	Wilson, Gaines, & Hill (2008)
Consumers' consent for continuous monitoring.	Yet another ethical issue raised by several researchers is about continuous monitoring of the consumers' brain activity while they visit market stores with the help of videos cameras installed at market places. This allows the marketers to collect information on consumers without asking for their prior permission or even informing them about it.	Pop et al. (2014)
Generalization of the brain responses, abnormal findings, and lack of regulations.	Since the neuromarketing tools and techniques derive their processes from clinical perspectives, there is an urgent need of regulations for their applicability to safeguard the rights of the consumers like in the traditional marketing research techniques. There are chances of getting abnormal MRI scans of few consumers in a given population and there is no existing standard to handle these errors, which may lead to wrong interpretations of the recorded brain data. This will also impact the generalizations of the sample observations on population as marketing strategies.	Ariely & Berns (2010)

When there is little or no information about research studies that were conducted, it creates a sense of mistrust and suspicion. When the element of adding a new technology is proposed, it draws even more skepticism and fear in the minds of the public.

One of the most serious issues of neuromarketing is the “realm of autonomy” (Murphy et al., 2008). Participants have the right to know the clear possibilities of the risks involved. Clear and transparent information on the reasons for the research being conducted should also be provided. The Table 4 provides a summary of ethical concerns in neuromarketing.

Conclusion and Implications

Over the past years, there has been a rapid rise in the development and application of technology in almost every domain, and in particular, the marketing domain. Marketing, by nature, involves understanding consumers’ needs and wants and accordingly serves them with the right set of offerings. As the market intensified, technology showed a different angle of consumer study. It involved not only reading and understanding the external behaviors of the consumers ; rather, it attempted to get inside the brain to get information about consumers. Brain being behind every action and reasoning of a human, if gets analyzed, can provide real - time and much appropriate results in marketing decision making. This paved a way for the birth of neuromarketing. With the collaboration of various disciplines, researchers now have the possibility of uncovering the mysterious ‘black box’ of consumers. As examined in the paper, neuromarketing is a technique that studies the different emotions that are associated with human decision making and uses this information to improve the effectiveness of marketing. Neuromarketing explores the consumers’ sensorimotor, cognitive, and affective responses to marketing stimuli. This field applies neuropsychology to marketing research. The main benefits for a marketer include more effective marketing campaigns and strategies, fewer product and campaign failures, and finally alignment of the real need and wants of the consumer with marketing strategies (Vecchiato, Tieri, Jelic, De Matteis, Maglione, & Babiloni, 2015).

However, there are many ethical issues with the concept because of the lack of information available. It has often been termed to be ‘intrusive’ and ‘manipulative’ instead. The public, even today, are still worried about losing their autonomy to powerful companies. Neuromarketing highlights a number of important issues in the ethical and scientific field. It raises serious concerns about how research methods should be conducted responsibly during experiments. The focus has also slowly shifted towards making the public understand the underlying meaning of neuromarketing. Research should be transparent for all parties that are involved. More research is needed in order to better understand neuromarketing, neuromarketing companies, and their practices and claims (Fisher et al., 2010).

A universal code of ethics and objectives needs to be implemented, which will promote the development of research in a more positive light. Clear regulations must be stated in order to raise credibility and to allow the development of the field. Also, scientists should find a balance between what they want to accomplish and the rules they should obey in order to conduct ethical studies (Olteanu, 2015). This way, encroachment on autonomy as well as freedom of will and privacy will be significantly reduced. Hence, policy makers and consumer scholars play a critical role in developing trust between the public and the researchers.

Limitations of Neuromarketing and the Way Forward

Neuroscience has a promising future in neuromarketing; however, there are limitations and challenges associated with it. The most distinct limitation for marketers and researchers in neuromarketing is the high cost involved in using the tools and techniques. Many companies are not able to afford it. For example, the positron emission tomography (PET) scanner costs about 13 million dollars and the fMRI can cost upto 1 million dollars, depending on the size of the machines.

Another limitation or challenge that neuromarketers face is setting up the “right environment”. Most experiments require large machines, which are often placed in a condition that lacks the richness of a real - world scenario. In numerous occasions, such factors can alter the outcomes of the results (Ruanguattamanun, 2014). The

third limitation is on the technology used by researchers. For instance, when conducting a study using fMRI, only simple designs like printed ads, logos, pictures, movie trailers, or some speeches can be well fitted into the method (Ruanguttamanun, 2014). Highly complicated designs may not yield sufficient results. There are also studies that have a long history in literature. New studies that rely on that literature may find unreliable results that could have major consequences. The ethical concern, no doubt, poses the biggest limitation. Public controversial issues limit how a research can be conducted. When there is an 'increased emphasis on ethical issues,' it involves heavy restrictions on the freedom of neuroscientists in conducting research, also limiting the results (Olteanu, 2015). Researchers must try and find a balance which does not limit the results or invade an individual's privacy and freedom of autonomy.

References

- Ariely, D., & Berns, G. S. (2010). Neuromarketing: The hope and hype of neuroimaging in business. *Nature Reviews Neuroscience*, 11, 284 - 292. doi:10.1038/nrn2795
- Butler, M. J. R. (2008). Neuromarketing and the perception of knowledge. *Journal of Consumer Behaviour*, 7 (4 - 5), 415 - 419. doi:10.1002/cb.260
- Djamasbi, S., Hall - Phillips, A., & Yang, R. (2013). An examination of ads and viewing behavior: an eye tracking study on desktop and mobile devices. *Proceedings of the Nineteenth Americas Conference on Information Systems* (p. 6), August 15 - 17, 2013. Chicago, Illinois: Americas Conference on Information Systems.
- Dubey, P., Bajpai, N., & Guha, S. (2016). Mapping customer delight by using a surprise model. *Indian Journal of Marketing*, 46(10), 22 - 39. DOI : 10.17010/iiom/2016/v46/i10/102852
- Fisher, C. E., Chin, L., & Klitzman, R. (2010). Defining neuromarketing: Practices and professional challenges. *Harvard Review of Psychiatry*, 18 (4), 230 - 237. DOI: 10.3109/10673229.2010.496623
- Flores, J., Baruca, A., & Saldivar, R. (2014). Is neuromarketing ethical? Consumers say yes. Consumers say no. *Journal of Legal, Ethical and Regulatory Issues*, 17 (2), 77 - 91.
- Fugate, D. (2007). Neuromarketing: A layman's look at neuroscience and its potential application to marketing practice. *Journal of Consumer Marketing*, 24 (7), 385 - 394.
- Gupta, S., Chaudhry, H., & Kamal, H. (2015). Exploring the relationship between demographic factors and consumers' buying behaviour towards cause - based marketing: An assessment study. *Indian Journal of Marketing*, 45(10), 49 - 61 doi : 10.17010/iiom/2015/v45/i10/79800
- Hubert, M., Hubert, M., Linzmajer, M., Riedl, R., & Kenning, P. (2018). Trust me if you can – neurophysiological insights on the influence of consumer impulsiveness on trustworthiness evaluations in online settings. *European Journal of Marketing*, 52 (1/2), 118 - 146. doi : <https://doi.org/10.1108/EJM-12-2016-0870>
- Jain, K., Gautam, S., & Pasricha, D. (2018). The pleasure and the guilt - impulse purchase and post purchase regret: A study of young Indian consumers. *Indian Journal of Marketing*, 48(3), 49 - 63. DOI : 10.17010/iiom/2018/v48/i3/121984
- Kumar, V., Chattaraman, V., Neghina, C., Skiera, B., Aksoy, L., Buoye, A., & Henseler, J. (2013). Data - driven services marketing in a connected world. *Journal of Service Management*, 34 (3), 330 - 352. DOI : <https://doi.org/10.1108/09564231311327021>

- Lee, N., Broderick, A. J., & Chamberlain, L. (2007). What is "neuromarketing" ? A discussion and agenda for future research. *International Journal of Psychophysiology*, 63 (2), 199 - 204.
- Lin, M. - H., Cross, S. N. N., Jones, W. J., & Childers, T. L. (2018). Applying EEG in consumer neuroscience. *European Journal of Marketing*, 52 (1/2), 66 - 91. DOI : <https://doi.org/10.1108/EJM-12-2016-0805>
- Madan, C. (2010). Neuromarketing : The next step in market research ? *Eureka*, 1(1), 34 - 42. DOI : <https://doi.org/10.29173/eureka7786>
- McClure, S. M., Li, J., Tomlin, D., Cypert, K. S., Montague, L. M., & Montague, P. R. (2004). Neural correlates of behavioral preference for culturally familiar drinks. *Neuron*, 44 (2), 379 - 387. DOI: 10.1016/j.neuron.2004.09.019
- Miljković, M., & Alčaković, S. (2010). Neuromarketing: Marketing research future. *Menadzment Marketing*, 6 (12), 274 - 283.
- Moore, K. (2005). Maybe it is like brain surgery. *Marketing Magazine*, 110 (15), p.12.
- Morin, C. (2011). Neuromarketing: The new science of consumer behavior. *Society*, 48 (2), 131 - 135. doi:10.1007/s12115-010-9408-1
- Murphy, E. R., Illes, J., & Reiner, P. B. (2008). Neuroethics of neuromarketing. *Journal of Consumer Behaviour*, 7(4 - 5), 293 - 302. doi : <https://doi.org/10.1002/cb.252>
- Olteanu, M. D. B. (2015). Neuroethics and responsibility in conducting neuromarketing research. *Neuroethics*, 8 (2), 191 - 202.
- Palmer, E. M., Owens, J. W., & Chaparro, B. S. (2011). Text advertising blindness: The new banner blindness? *Journal of Usability Studies*, 6 (3), 172 - 197.
- Pop, N. A., Dabija, D. - C., & Iorga, A. M. (2014). *Ethical responsibility of neuromarketing companies in harnessing the market research – A global exploratory approach*. Retrieved from <https://ssrn.com/abstract=2579933>
- Ruanguttamanun, C. (2014). Neuromarketing: I put myself into a fMRI scanner and realized that I love Louis Vuitton ads. *Procedia - Social and Behavioral Sciences*, 148, 211 - 218.
- Samson, A. (ed.) (2015). *The behavioral economics guide 2015 (with an introduction by Dan Ariely)*. Retrieved from <http://www.behavioraleconomics.com>
- Sastry, D. V. R., & Rao, B. M. (2017). A study on consumers' perception about the importance of payment processing efficiency in online retaining environment. *Indian Journal of Marketing*, 47 (6), 22 - 34. doi : 10.17010/iim/2017/v47/i6/115367
- Teo, T. S. H., & Yeong, Y. D. (2003). Assessing the consumer decision process in the digital marketplace. *Omega*, 31(5), 349 - 363. doi:10.1016/s0305-0483(03)00055-0
- Tor, A. (2008). The methodology of the behavioral analysis of law, 4 *Haifa L. Rev.* 237. Retrieved from https://scholarship.law.nd.edu/law_faculty_scholarship/836
- Touhami, Z. O., Benlafkih, L., Jiddane, M., Cherrah, Y., Malki, O. E., & Benomar, A. (2011). Neuromarketing: Where marketing and neuroscience meet. *African Journal of Business Management*, 5 (5), 1528 - 1532.

- Ulman, Y. I., Cakar, T., & Yildiz, G. (2014). Ethical issues in neuromarketing : “I Consume, Therefore I am!” *Science and Engineering Ethics*, 21(5), 1271 - 1284. doi:10.1007/s11948-014-9581-5
- Vecchiato, G., Maglione, A. G., Babiloni, F. (2014). Neurophysiological tools to investigate consumer’s gender differences during the observation of TV commercials. *Computational and Mathematical Methods in Medicine, Volume 2014*, Article ID 912981, 1 - 12. doi:10.1155/2014/912981
- Vecchiato, G., Tieri, G., Jelic, A., De Matteis, F., Maglione, A. G., & Babiloni, F. (2015). Electroencephalographic correlates of sensorimotor integration and embodiment during the appreciation of virtual architectural environments. *Frontiers in Psychology*, 6, 1944. doi:10.3389/fpsyg.2015.01944
- Wilson, R. M., Gaines, J., & Hill, R. P. (2008). Neuromarketing and consumer free will. *Journal of Consumer Affairs*, 42 (3), 389 - 410.

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