

Neuromarketing at the Crossroads: Current Trends and Future Perspectives- Systematic Review

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ABSTRACT

In today's competitive business world, it has become increasingly difficult to capture consumers' attention and outshine competitors. Today's business is continuously tracking what consumers buy, and it has always been difficult to understand why they buy and how their thought process works in making such decisions. Using only traditional methods would not provide an edge over competitors; to sustain and survive in the competitive market, researchers began to work with a combination of traditional and modern marketing strategies, i.e., neuromarketing. Neuromarketing is the study of consumers' emotional and cognitive responses to media and marketing Stimuli. The new techniques of neuromarketing Insights into consumer decisions and actions that are unconscious and not taken into account by mere traditional marketing research methodologies, the study aims to explore the concept deeper and highlight the critiques of the field along with its ethical considerations Another important aspect of neuromarketing, that is growing at a faster pace is the sensory marketing (visual, auditory and kinesthetics) used in modern day marketing. This study highlights the importance of sensory neuromarketing in uncovering consumer psychology and detecting brain activity during consumer engagement with different products. The study employs a conceptual approach with insights drawn from existing literature and industry examples to critically examine the risks and opportunities inherent in sensory marketing for the coming generations. The findings suggest that although neuromarketing can improve the methods of identifying consumer decision making not free from limitations, and there exists a need for ethical considerations and regulatory attention to mitigate its potential adverse effects. The paper advances insights into how sensory marketing shapes the behavioural outcomes of consumers.

Keywords: Neuromarketing, Neuroimaging Techniques, Sensory Marketing, Consumer Psychology.

INTRODUCTION

In the last few decades, marketing has increasingly turned to better understand the consumer buying mechanisms, taking into consideration neuroscience and psychology along with the traditional models of consumer behaviour, which often focus on rational decision-making. Most human choices are derived from subconscious processes and emotional responses, which gave rise to the concept called Neuromarketing. (Gupta et al., 2025) describes Neuromarketing or consumer neuroscience as an interdisciplinary field that combines neuroscience, psychology, and economics to explore and influence consumer behaviour. (Harell, 2019) states that neuromarketing has developed into a vital tool for understanding and shaping consumer decision-making and providing a valuable insight into customers' motives

Preferences and choices. (Deb 2025) mentions that the application of neuroscience, when combined with traditional marketing strategies, has proved to produce better results in the field of consumer behaviour or brand management in the last few years.

The integration of neuroscience into marketing has opened new ways of exploring consumers' perception of different brands. And evaluate products in response to different advertising stimuli. Researchers have been

largely dependent on traditional marketing methods, even though such methods are not very reliable and valid. They only provide general information about consumers' unconscious behaviour. Traditional marketing strategy which are based on consumer preferences and cost are not being analysed with a microscope but with a magnifying glass in the form of FMRI and EEG, which has opened a new world of observation (**Schüll, 2008**) Traditional marketing has its own limitations in influencing purchasing decisions) (**Erenkol & Merve, 2015**).

According to **Zaltman**, approximately 90% of consumer behaviour, such as thought process and emotion decision-making, takes place unconsciously or subconsciously.

Theurmer, in its study, mentions that there is a significant split between conscious processes which drive the advertising practices and market research, and the unconscious processes which drive most decision-making processes. As per studies done by most of the authors, subconscious behaviour has been more significant in marketing practices. Most of the researchers and practitioners are more interested in exploring how the consumer brain reacts unconsciously in response to different marketing practices. In such a scenario, sensory marketing emerged as a promising field that aims to stimulate the senses and bring out cognitive and emotional responses, which play a significant role in influencing consumer perception and choices. (**De Garcillán López-Rúa, 2015**)

Parallel to this, sensory marketing is a complementary approach that focuses on the five senses-sight, sound, smell, taste, and touch- in shaping consumer experiences. Sensory factors have a great influence on consumer perception and evoke emotions, memories, and associations to certain brands, creating lifetime loyalty and memorable experiences. **Example: McDonald's** iconic "Ba-da-ba-ba-ba, I'm Lovin' It" jingle was tested through **neuromarketing** to ensure it evoked **positive emotions and brand recall** (**Neuroscience Marketing, 2023**). A pleasant scent and music create a positive retail environment. As highlighted by (**Gupta et al., 2025**) Visual, Auditory and kinesthetic cues play a distinct role across different stages of the consumer buying process. **Yactayo-Moreno and Vargas-Merino (2021)** mention that sensory neuromarketing is considered to be an innovative marketing strategy that uses stimuli which consumers perceive through their senses to influence their perception, judgment, and behaviour. Studies carried out in this area mentioned that certain colours, sounds, and even aromas enhance the perception of a product and increase its attractiveness(**Sagha et al., 2022**). Several global brands mention the use of sensory cues in their marketing strategies. For example, Coca-Cola advertising focuses on emotional branding and sensory marketing to drive subconscious engagement and brand recall. The "share a Coke" campaign created a sense of emotional connection and encouraged consumer interaction. When used together, these factors create an emotional experience for the consumer, associating them for a lifetime.

The primary aim of this study is to synthesise and critically evaluate existing research on neuromarketing and sensory marketing, focusing on the limitations and ethical considerations of neuromarketing and highlighting the importance, applications, and prospects of sensory marketing, the use of multisensory factors in advertising, and improving their effectiveness in consumer decision making.

Objectives

In today's marketing environment with increasing availability and critical consumers, sensory neuromarketing is an innovative and emerging strategy that would enhance attractiveness and direct consumer purchasing choice. For the study to move forward, it is highly important to analyse different sensory cues and identify which senses are most effective in shaping consumer behaviour according to different contexts and industries. The study aims to address the questions through a systematic review of existing literature, which focuses on the influences of decision/choice when they come across different senses. Based on these, the following research objectives are defined.

General objective

- To analyse through a systematic review of existing literature the use of different senses in increasing market effectiveness in influencing consumer behaviour.

Specific Objectives

- To identify the theoretical foundation and methodological tools of the nascent field of neuromarketing.
- To highlight the importance and limitations of neuromarketing tools used in marketing.

- To examine and analyse the importance of sensory marketing factors and their prospects

Emergence of neuromarketing

The focus of marketers in today's business world is merely on traditional marketing concepts, but by relying on these concepts, it becomes impossible to crack the minds of consumers.

Hugo Minsterberg 1913

The father of organisational psychology, he was the first person on record to take a keen interest in this interdisciplinary field around 1913. In this phase, we noticed some biomedical imaging technologies that progressed to a point where we could gain real insights into the human brain.

Many researchers have mentioned the term neuromarketing, and the field cannot be simply attributed to a single person. As widely agreed by most people, the term was coined by Ale Smith in 2002. The term was used to describe the neuroscientific techniques used in the marketing field, which can be adopted to ease the process of consumer buying Mechanism.

The field of neuromarketing uses techniques such as (fMRI) functional magnetic resonance imaging (fMRI), electroencephalography (EEG), and eye-tracking to study the brain responses to marketing stimuli. By using such techniques, it has become easier for marketers to get a better view of consumers, their thought process, their decision-making, and the factors that influence their choices. The primary aim of neuromarketing was to develop a better understanding of how consumers process information and make decisions about products and brands. Such information can be further used to develop a better understanding of marketing campaigns and analyse consumers on a deeper and emotional level. **(Nyoni & Bonga, 2017)** mentioned in its work that neuroscience can be used to get a better insight into consumer behaviour, and keeping this in mind, marketers hope to create campaigns that are more memorable and effective.

Lee, N., Broderick, A. J., & Chamberlain, L. (2007) mentioned that In the last few years neuroscientist have developed the ability to study the brain activity which includes subject area related to frequency time and space psychologist define that the new technology can be used to better understand human brain, emotions and insights of individual the marketing experts realised search technologies has great potential and associated with neuroscientist which created the term neuromarketing this can be defined as a marketing branch which uses different scientific methods and techniques for understanding human brain regarding important marketing issues.

(Solomon, 2018) focuses on the application, challenges, and prospects of neuromarketing. He mentioned that the application of neuromarketing has a great impact on emerging economies, especially as the consumer purchasing potential is increasing rapidly.

(Ariely & Berns, 2010) Mentioned in his study that neuroimaging methods, when applied to product marketing, could gain considerable popularity. He also proposed that the trend has been popular because of two main reasons: first, the possibility that the techniques would become cheaper and faster than other marketing methods, and second, that neuroimaging will provide marketers with the information that is not available through the conventional marketing methods.

(Murphy et al., 2008) Conducted studies on neuromarketing and specifically focused on neuro-ethics in neuromarketing the main objective of the study was to analyse the ethical issues concerning neuromarketing and based on the existing literature review and opinions the author categorized such issues into two heads that is the protection of various parties that might be harmed or exploited via neuromarketing research or deployment of neuromarketing tools and second the protection of consumer autonomy if neuromarketing reaches a critical level of effectiveness. The author also mentions certain ethical guidelines that need to be considered while using neuromarketing tools.

LITERATURE REVIEW

The principal objective of neuromarketing is to understand the logic behind consumer decision-making; to understand the emotions of people using different techniques and the way people think about different brands and products, as it allows us to change the marketing strategies according to consumers' reactions.

(Ariely & Berns, 2010) Mentioned the usefulness of neuromarketing during the product designing stage, it provides insights into consumer responses to food, entertainment, architecture, and political candidates. The use of neuroimaging in food commercials is highly appealing and feasible. Neuromarketing methods can be used in the product development stage, as it becomes easier to get better insights into what consumers expect and hence can deliver better services accordingly. Neuromarketing has the potential to identify the real unfulfillment of consumers' needs in a way that could develop more useful and pleasant products, advertisements, and satisfy the consumer needs and desires **(Alsharif, Salleh, & Baharun, 2021)**. The primary emphasis of the study is to identify the effectiveness of sensory marketing in the examination of human decision-making. Scholars have highlighted the evolution of neuromarketing and its application in assessing sensory responses to diverse marketing stimuli. The study includes a discussion on numerous articles related to neuromarketing, its usage, and ethical considerations arising from the utilisation of such methodologies, and analysing consumer behaviour.

(Kenning & Plassmann, 2005) Mentions the criticism from the traditional economies that discusses topics like economic growth, employment rate, market shares, etc. Such aspects are not measurable or observable through traditional methods; to address this limitation, researchers have employed neuroscientific tools capable of monitoring brain activity and uncovering underlying behavioural patterns.” **(Alsharif, Salleh, Abdullah, Khraiwish, & Ashaari, 2023)** conducted a bibliometric analysis of neuromarketing research covering almost 86 articles, which were published between 2002 and 2022. The articles suggest that neuromarketing is a rapidly evolving and growing field with immense potential to reshape the marketing landscape

(Schüll, 2008) Conducted a study to explore the correlation between price and satisfaction with the use of fMRI technology. The subjects were presented with different samples of red wine, which they were asked to rate with respect to each other. Five wine samples were used, which were priced, and only three different wines were used as cheaper and more expensive at different times during the experiment. Naturally, a higher price is ranked higher than the cheaper options, which was observed in the fMRI. Feedback was that the high-priced wines were not treated highly because of their price, but the subjects felt enjoyment in things like odour and taste, more than the wines that were less expensive. These results defined the marketing philosophy of the last few years, which said that the pleasure derived from the product is only because of the quality; ironically, the experience of buying a product has a large effect on the overall enjoyment of the product, and it is in no way related to the quality of the thing in question.

(Cordeiro et al., 2024) Discuss the role of emotions and senses in purchasing decisions. The author conducted a study where he selected sixteen different studies that shed light on the impact of the five primary emotions, such as happiness, sadness, anger, disgust, and fear, on consumer behaviour. The work further investigates the impact of visual, olfactory, tactile, and auditory cues on consumer purchasing behaviour. A Systematic strategy was used to identify the relevant studies published between 1994 and 2023. The Web of Science database was selected as the primary source of information, which covered divorce discipline, including marketing and neuromarketing. The initial screening process involved articles based on titles, abstracts, and keywords to ensure rigorous selection of relevant studies, and a more in-depth reading of the articles was conducted to thoroughly evaluate their methodologies, results, and contributions to the literature. The study's findings indicate that emotions play a pivotal role in shaping consumer behaviour, and neuromarketing tools can effectively decode these emotional responses and provide valuable insights to shape marketing strategies. The sensory stimuli, such as visual, auditory, olfactory, and gustatory cues, also influence purchasing decisions, and neuromarketing can be effectively used to optimise the sensory experience and enhance customer engagement.

(Morin, 2011) highlighted the worldwide acceptance and utilisation of the neuro marketing strategies in the field of advertising and marketing. The study discussed the potential of neuromarketing in advertising campaigns and getting better insights into consumers' emotional responses. The author supported the idea that scent Marketing

can be used to enhance brand recall and purchase intentions. The usage of order in branding has proved to improve date most spheres and allows an individual to associate with the brand by a particular odour (Imprint blue papers 2010).

(Mazhar, Daud, Mubin, & Bhutto, 2015) Conducted a study to understand the success behind big brands. The study analysed how different product packaging affects the decision-making in consumer buying behaviour based on research, and the data used were obtained from different sources of feedback. The packaging elements, such as the colour, material design of the wrapper, and the innovative ideas, were the factors of highest importance while making a choice, particularly in the FMCG sector, where a high rate of advertisements is required, and bulk production is made. Effective advertisement campaigns and packaging catch the attention of the individual. Colour can act as a significant mood determinant during purchasing decisions; for example, Coca-Cola's distinctive red packaging enhances visibility and evokes excitement, thereby influencing consumer choice.

(Kumar, 2017) mentions the importance of colour while recognising a brand, the colour mapping is the means of identifying potential logo colours for brand differentiation and new brands. According to his work, different individuals perceive certain colours with certain brands, for example, the yellow of Maggie conveys happiness, whereas the blue of lace conveys trust and safety, and similarly, the green of Starbucks conveys a sense of comfort and luxury feel.

(Bosch & Simon, 2013) focused on how big, bold, colourful letters can divert attention or how the sweet smell of a cookie makes us hungry, or the noise of sketch pens makes us keep writing. He emphasised that such outcomes stem from sensory marketing strategies designed by firms to engage consumers' conscious and subconscious attention.

Sensory marketing is a new, evolving, and growing mechanism used by many marketers to get an edge over competitors. Marketing needs to advertise the products in such a way that the consumers ask for more, and sensory marketing does the role at its best. It won't let the consumer realise that it happened. The sense-based marketing creates the stimulation and perception of the five senses. **(Thankachan & Yadalam, 2018)** In their article, they mentioned various examples about how these five senses can be used to stimulate buyers and how different brands are effectively using these techniques and how it had benefited them. Sensory marketing is the main topic of concern in the article, and how marketing can now be used to talk to consumers on a subconscious level.

Krishna A, (2012). The professor of the University of Michigan published a book name consumer science in her book, she mentions how people are realising the deep marketing strategies that affect the senses and how sensory marketing has become a new communication system. She further discusses how the five senses influence buying behaviour and quotes a few examples that made her take an interest in the field. For example, foil around Hershey's kiss chocolates excites the touch sense when the consumer opens the chocolate, similarly, the Dunkin' Doughnuts smells the aroma of coffee, and many other examples. the article also mentioned that certain companies have used this theory to their advantage Krishna mentioned that how every field should realise the importance of packaging appearance smell and the product surroundings for example banks which has wooden furniture or leather furniture have more assurance or the online clothing brands should back their clothes and bubble wrap the article also talks about the depth of communication the company should have with customers.

(B Devaru, 2018) Discussed that apart from using the neuromarketing tools and techniques, there are more practical forms of neuromarketing that may give consumers a little push and the right direction. He further mentions that sensory marketing offers a compelling example of detail-oriented marketing. It demonstrates that something as subtle as a pleasant scent can influence consumer behaviour, guiding them toward purchasing a product. By engaging the sense of smell, brands can create memorable experiences that elevate the perceived value of their offerings. A carefully chosen fragrance not only enhances the customer's emotional connection but also makes products feel more exclusive and high-end, reinforcing the brand's premium positioning. The author further mentions that there are a few mind tricks or psychological methods that may create a little more push towards making a sale. He mentions that merely removing the money sign can make people spend significantly more cash on products and food, people are more likely to choose the healthy menu options than

the unhealthy items, or the open spaces in luxury stores are usually associated with high social status. All these methods discussed in the study are useful and valuable tools providing better insights to neuro marketers. All the methods may not be effective in all contexts, but the key is knowing the applicability of such a technique.

(Birendra et al., 2023) Conducted a study to explore the effectiveness of mental simulation and mental imaginary revoked by visuals that enhances promotional effectiveness. For example, the sense of touch can significantly influence consumer perceptions, as both real and perceived tactile experiences often lead to improved product ratings. Similarly, music used in advertising can capture attention and enhance promotional effectiveness, guiding consumers toward deeper engagement with the brand. Together, these sensory cues contribute to product assessment by shaping emotional responses and reinforcing marketing objectives. The author used sources like the Internet, published materials, and other sources about the topic. Primary data was collected using the organised questionnaire taking around 108 respondents. Analysing the results of the questionnaire, the study proved that sensory marketing in retail stores has been proven highly effective. When retailers use multiple sensors, it enhances the overall shopping experience. Some sensory marketing strategies include playing pleasant background music using scent and aromas, effective lighting to create a good mood, and appealing visuals. The author further mentioned that appealing to customer senses can be useful in developing brand loyalty, and customers are more likely to return when they have a good sensory experience. The study concludes that sensory marketing is highly effective in providing an enjoyable experience to customers.

(Krajnovic & Jasic, n.d.) The study states the new branch of marketing and the direction the market is heading. Psychological factors represent the interest of marketing experts and affect consumer decisions in real-life situations. The neuro design in Europe branding focuses on emotions which provoke the desired emotion of customers by marketing tools such as the colour, scent, design, music, and others. The paper presents an overview of the ethical problems associated with the use of neuromarketing and the limitations the concept carries along.

Advantages and disadvantages of neuromarketing

As has already been stated, marketing has come a long way in the last few decades. It's quite a topic of discussion in the market, which has both critics and advocates of its branch and its methods.

(Touhami et al., 2017) Mentions several limitations that neuromarketing carries along. Firstly, it bypasses the ethical limits, which is a big barrier to its development. Apart from the ethical side, the uses of neuromarketing are critically low due to its methodological limits. The process or the protocols in neuromarketing are quite long and difficult to operate. Another reason for avoiding neuromarketing is that certain techniques may cause discomfort, making participants feel anxious or even phobic. In addition, the financial burden is considerable, as brain imaging technologies such as fMRI or EEG involve high operational costs. These limitations highlight both ethical and practical challenges that can restrict the widespread application of neuromarketing in consumer research. Moreover **(Ariely & Berns, 2010)** Questions whether neuroimaging provides better access to hidden data than the other marketing methods. He assumes that using expensive neuroimaging techniques might prove to be more efficient than using the cheaper methods, as the cost of a research setting in a university is approximately \$500 per hour, which is much higher and hence not affordable. The author further states that neural signals detected during or after the experiment are a good indicator of satisfaction.

(Schüll, 2008) states that many studies and scientists oppose the idea of increasing the use of neuromarketing, and they have a huge backlash against increasing the effectiveness of advertising. He says that critics are speaking about the concept, mentioning that the factors that do not directly relate to the merits should not be used to influence a potential buyer, and consumers should be interested in buying a product purely based on its quality.

(Wilson, Gaines, & Hill, 2008) States that the MRI machines used today are quite bulky, noisy, and expensive, but he also convinces the marketers by saying that so was the case with computers 40 years back; maybe the machines could turn portable just like computers did in today's age.

Apart from the above-mentioned disadvantages, ethics is one of the most common concerns amongst marketers related to neuro marketing and its techniques as mentioned by **(Lee, N., Broderick, A. J., & Chamberlain, L. 2007)** The information obtained through the use of neuromarketing techniques can be used for analytical purposes and can proved to be an invasion of privacy which is completely unacceptable.

Apart from the negative opinions about neuromarketing and its methods and techniques, there are several authors who mention that this comprehensive approach can be used to create better connections in the economy. through the use of neuromarketing we have come a long way and now it is easier to identify the information of the subconscious mind which could not be possible merely by the use of traditional marketing methods **(Wilson, Gaines, & Hill, 2008)** Further states that the use of neuromarketing could help buyers and exports to understand each other better and help them create products the consumers expect which may create a win-win situation for both the parties. (situation where nobody loses).

(Lee, N., Broderick, A. J., & Chamberlain, L., 2007) Was the first person to propose the concept of neuroeconomics. The author observes that the field is bifurcated into two distinct perspectives: one that treats it as a pure science and another that regards it as a business activity, capable of being effectively harnessed for practical advantage.

(Stanton, Sinnott-Armstrong, & Huettel, 2007) The author states that neuromarketing is employed to enhance branding, facilitate cross-cultural market entry, strengthen sensory marketing, and improve advertising effectiveness. It also supports sales professionals by enhancing persuasion skills and boosting productivity.

(Bhardwaj et al., 2024) States that neuromarketing offers powerful tools to decode consumer buying, it facilitates the understanding of consumer behaviour allows to decode the emotional triggers that help us enhance the brand positioning, but the author suggests balancing the growth with sufficient ethical safeguards to protect consumer autonomy.

Some studies e.g.**(Knutson et al., 2007); (Falk et al., 2012)** Highlighted strong predictive validity of neural markers for consumer behaviour, on the other hand, some argue that laboratory-based measures lack ecological validity and fail to generalise to the real-world context.

(Knutson et al., 2007) emphasised on reward anticipation and then the pain of paying, he stated that the desirable product is more influential to a consumer than the actual experience. **(Ariely, Loewenstein, & Prelec, 2003)** further states that factors like reward anticipation, such as discounts, coupons, and bundled goods, make the purchases more likely to take place in the subconscious state, which the consumer may have never desired to even purchase.

The eye tracking and EEG studies have confirmed that the visual salience, such as the colour and contrast, captures attention more quickly and activates long-term brand recall **(Vecchiato et al., 2014)**

(Stallen, 2018) Consumers highly connect and respond to brands that align with their values and lifestyle, also explaining the effectiveness of brand storytelling and cultural alignment. Social influence plays a critical role, suggesting that consumers are neurologically influenced by factors such as views, likes, and celebrity endorsements. Social proof not only shapes consumer psychology but also creates connections and brand engagement.

Multi-sensory stimuli are usually found to enhance brand recall and consumer engagement **(Krishna, A., 2012)**. Many contradictory results exist. which talks about overstimulation. Some studies have even suggested that excessive sensory input can sometimes overwhelm the consumer, which may reduce clarity and their purchase intent.

After going through all the criticisms and advantages of neuromarketing, it is convenient to say that neuromarketing has been quite successful in changing the perception of marketing and attitude towards the consumer. Neuromarketing has taken a great step in the field of marketing, but there still exists plenty of space in the field to make progress towards growth and reliability. The new technology would certainly help

neuroscientists and marketing experts to understand the role of consumers and their decision-making. and could enable them to make meta-strategies and methods to reinforce the trust and loyalty of consumers towards the brand, while taking care of the ethical limits of the process.

Technique and Methods in Neuromarketing

Neuromarketing employees' range of neuroscientific behavioural tools to detect hidden information, as mentioned by **Lewis (2004)**, the most important techniques for analysing the human brain are FMRI and EEG.

FMRI (Functional Magnetic Resonance Imaging) is used to detect brain activity. Powerful magnetic and radio waves are used to create high-quality images, repeating regions that are linked to reward preferences and decision-making (**Ariely & Berns, 2010**).

Electroencephalography (EEG) is a technique used to measure attention, engagement, and emotional reactions in real time. This is the second most frequently used method and can be used to detect a very short neuronal spike (**Ariely & Berns, 2010**).

(**Gupta et al., 2025**) Eye-tracking can be used to capture the movement patterns to identify the elements of advertisements, packaging, and websites to capture consumer attention. For example, many times images of kids are used in baby products to make the advertisements effective and capture the gaze of the consumer.

The methods are quite a topic of discussion in the market as they are used to identify the purchasing key in the brain of the consumer and help to enhance and create effective methods of advertising and branding.

Application of sensory marketing

Retail store atmosphere

Retailers design their store environment in a way to create immersive sensory experiences for the consumers. They make use of visual elements such as lightning, colours, and layout, which enhance the product's attractiveness. On the other hand, they make use of olfactory cues such as pleasant scents, which increases the time spent in stores and purchase likelihood. Similarly, the auditory cues such as music and tempo affect the shopping pace and mood of customers.

For example, an airport generally uses a very soothing scent to give a luxury and premium feel to its passengers.

(**Motoki & Iseki, 2022**) States that multisensory store atmospheres are highly influential in perception and consumer behaviour.

Branding and product packaging

The packaging design mainly uses sight and touch in shaping first impressions.

The colour and design communicate emotions and brand identity of the product, whereas tactile materials are highly used to influence the perceived product quality, and the shape of the product is used to enhance brand recognition.

For example, Coca-Cola used its smooth and ladylike glass bottle packaging to reinforce the brand identity.

(**Zha et al., 2025**) states Sensory attributes in branding have a great contribution in building strong emotional attachment and loyalty.

Food and Beverage Industry

The food industry highly relies on the taste, smell, and visual presentation of the food; about 90% decisions are made based on smell and the visual presentation of the food. The aroma of the food stimulates appetite and

influences the consumer's taste perception, whereas the visual presentation or the plating of the food enhances the pursued flavour, and the same goes for the ambient factors such as music and lighting. which enhances the dining experience of consumers. For example, when we talk about Starbucks coffee, after entering the place, we come across a pleasant smell of coffee and a cosy ambience that is sufficient to attract and retain customers. **(Lee et al., 2025)** In his work on technologies in food sensory and consumer science mentioned that advances in artificial intelligence and sensory science are improving how food experiences are turning into better designs and evaluations.

Advertising and digital marketing

We come across a hundred advertisements every day, and each advertisement uses some of the sensory cues to enhance its engagement and memory. Talking about audio branding jingles and logos improves brand recall; on the other hand, visual storytelling helps strengthen the emotional connection of consumers. For example, Nescafé coffee ad uses the Jingle “pa Para Pa Papa” which is satisfying and memorable enough to convince the customer to take a break and have a cup of coffee. It reinforces recognition and creates brand loyalty. **(Rodríguez-Ulcuango et al., 2025)** States that sensory marketing, when used digitally with the help of virtual reality and augmented reality proof to be an emerging trend which is useful in influencing online consumer behaviour patterns.

Apart from the above-mentioned applications of neuromarketing, they are highly useful in the hospitality and tourism industry, as well as the automotive industry. E-commerce and digital experience are turning better with the alignment of multisensory cues. Healthcare Wellness and other areas have proved to be effective in enhancing better consumer services and brand recall by using the sensory trigger points. Modern research and authors have highlighted the growing importance of sensory marketing, especially with the integration of digital technologies such as AI (Artificial Intelligence), AR (Augmented Reality), and VR (Virtual Reality), and data personalisation. Competition is increasing day by day, and so is the usage of multisensory experiences, which enables gaining a significant advantage in influencing consumer behaviour.

Ethical considerations in neuromarketing

There exists no doubt in concluding that neuromarketing has come a long way in the field of marketing. Neuromarketing is an emerging field that studies the consumer brain and acquires the hidden information that is not available through traditional methods. This new discipline has recently been the topic of discussion between industry experts and critics. Though neuromarketing has been an essential part in identifying the subconscious activities in the consumer's brain, it still carries ethical considerations that need to be taken care of.

(Murphy et al., 2008) The author highlights that the technologies employed in neuromarketing raise a range of ethical concerns, which can be categorised into two major areas. The first involves safeguarding parties who may be exploited through research, marketing practices, and the deployment of neuromarketing. The second focuses on protecting consumers and their autonomy, particularly in cases where neuromarketing may diminish critical thinking or compromise decision-making effectiveness.”

(Krajnovic & Jasic, n.d.) In his work regarding neuromarketing, he states that the most important issue of public concern is creating products and campaigns that are not possible to resist, as the public is more concerned about finding the ‘purchase Key’, which is the brain area that oversees the purchase.

Consumers' safety is of utmost Priority as most of the authors agree that no present technology gives access to the human brain. with an intention of manipulation.

(Ariely & Berns, 2010) Is concerned about the privacy of information about the preferences of consumers. He mentions that the information about preferences and activities is being sold to different companies, where a lot of private information, such as email, search history, and purchase history, is being sold and shared with companies. Such activities raise important questions as to who owns the images, who has the right to access them, and what benefit they achieve through their usage.

(Murphy et al., 2008) It is suggested that a comprehensive code of ethics be established and adopted by industries and marketing professionals to ensure ethical research, responsible entrepreneurship, and sustainable business practices. This code should mandate the use of non-harmful neuroimaging technologies throughout all stages of development, deployment, and dissemination. Furthermore, it should be deliberated within the neuromarketing community, incorporating insights from independent academic researchers specialising in decision-making, social behaviour, and consumer preferences. Many authors have approached them for ethical issues that need to be dealt with in a different manner and addressed accordingly.

(Ariely & Berns, 2010) The information obtained through neuromarketing can be used to differentiate between individuals or to map specific traits that appear within certain groups of people. The author further notes that approximately 1% of the population may present abnormalities on MRI scans. However, individuals with clinical symptoms may not always yield significant MRI findings, resulting in both false positives and genuine abnormalities. Given the absence of standardised protocols to address such situations, the author recommends establishing a return policy for cases involving abnormal findings. Without such measures, both neuromarketing firms and their clients risk exposure to medical liability. Neuromarketing has proved to be quite useful and effective in studying the consumer brain and getting subconscious information. The technology may go a long way in the marketing field if it takes into consideration the ethics that are of utmost importance while reading the human brain, and takes into consideration the issues of privacy manipulation and user exploitation.

Research gaps and future Directions

Although research on sensory marketing has expanded, there exist critical gaps that persist and require further examination. First, much of the existing literature examines only single-sense effects in isolation, leaving the complex dynamics of multisensory integration and cross-modal interactions insufficiently explored **(Ankitha, A., & Rai, V. S. 2025)**. Future research should employ comprehensive methodologies to assess how combinations of sensory cues shape consumer perception and decision-making. Second, most studies focus on traditional retail and hospitality settings, with limited exploration of emerging digital environments, such as virtual and augmented reality and AI-driven personalisation **(Kumra & Arora, 2022)**.

Addressing this gap requires analysing how immersive technologies and machine learning can customise sensory experiences for individual consumers. Third, the literature remains predominantly Western-centric, often neglecting cultural and demographic differences in sensory responses **(Ankitha, A., & Rai, V. S., 2025)**. Comparative cross-cultural research is necessary to interpret variations in sensory preferences across diverse populations. Fourth, current research primarily addresses short-term outcomes, such as purchase intention and brand recall, while long-term impacts on loyalty, trust, and brand equity remain to be explored **(Ankitha, A., & Rai, V. S., 2025)**. Longitudinal studies are essential to capture enduring consumer behaviour. Finally, ethical considerations are seldom discussed, despite the often-subconscious influence of sensory marketing. Future scholarship should establish frameworks for ethical sensory marketing that ensure both persuasive effectiveness and consumer autonomy. Advancing these research directions will enhance theoretical understanding and offer practical guidance for practitioners in increasingly immersive consumer environments.

CONCLUSION

Marketing has come a long way in the past few decades, the activities which were not possible merely by the use of traditional methods are now possible with the integration of neuroscience along with marketing, there has been a mention of quite a lot drawbacks of neuromarketing by the experts, No field is free from limitations and so is neuromarketing, the field has ample amount of contribution in the industry and it still has a long journey to go, and there is still enough room for improvement, looking at the existing work it would be unfair to fully criticize the domain, there are of-course few factors that needs to be given attention for ex, Ethical code of conduct is the primary and mandatory factor that needs to be kept in mind, similarly consumers autonomy and privacy needs to be protected, looking at the sensory factors it won't be wrong to say that it has completely changed the idea of marketing, almost every brand, each product is somewhere dependent on at-least one of the cues to outshine its competitors, every industry is making a potential use of sensory cues and gaining worldwide attention, and with the integration of AI(Artificial Integration) the field has taken a drastic shift towards the

digital phase and growing rapidly at a speed. It is beyond doubt that neuromarketing has a great growth potential, and it is quite convenient and beneficial to use the sensory cues in marketing to get a better and clearer picture of consumers' subconscious information and thought process, which helps to create effective marketing strategies, engagement, and recall. The study highlights the importance of neuromarketing, the timeless contribution the field has made in the industry, potential growth factors and the critiques it carries along. The field carries a great scope of improvement in the future, to make effective the usage of such emerging technology.

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