

NEUROMARKETING: THE IMPACT ON CUSTOMER ENGAGEMENT AND PURCHASE DECISION

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Abstract

Neuromarketing, a developing discipline combining neuroscience and marketing, provides valuable insights into how unconscious consumer reactions impact engagement and buying decisions. This study investigates the impact of neuromarketing techniques on two key variables - customer engagement and purchase decisions—examining how neurobiological data can refine marketing strategies for greater effectiveness. Using a descriptive research design with convenience sampling, the study focuses on consumers in Kerala, India, analysing data through proportionate percentage analysis, chi-square tests, one-way ANOVA and multivariate techniques like exploratory factor analysis. Findings reveal how neuromarketing-driven stimuli enhance emotional engagement and shape buying choices compared to traditional marketing approaches. The research also discusses ethical considerations and strategic implications for businesses seeking to leverage cognitive science for competitive advantage. This study provides actionable recommendations for optimizing customer engagement and driving informed purchase decisions through neuromarketing.

Keywords: Neuromarketing, ANOVA, Exploratory Factor Analysis, Consumer Behaviour, Marketing

JEL classification: M31

Introduction

In the digital age, where consumer behaviour is rapidly shifting and competition is at an all-time high, businesses are constantly searching for innovative ways to understand and influence consumer decisions. Conventional marketing techniques, such as surveys, focus groups, and sales data analysis, often fail to identify the subconscious influences that shape consumer decisions. This limitation has paved the way for neuromarketing, a field that combines neuroscience, psychology, and marketing to understand how consumers' brains react to different marketing stimuli. According to some studies, this approach has been regarded as a revolutionary shift in the marketing landscape (Misra, 2023).

Neuromarketing is an interdisciplinary field that investigates the neural, emotional, and cognitive processes driving consumer behaviour. Utilizing advanced technologies such as “functional Magnetic Resonance Imaging (fMRI), Electroencephalography (EEG), eye-tracking devices, and facial expression analysis,” it enables researchers and marketers to gain deeper insights beyond self-reported data. It uncovers unconscious reactions to advertisements, brands, packaging, pricing, and product design, which are often more influential than conscious decisions. It employs various techniques to understand subconscious factors influencing purchasing decisions (Singh, 2020; Berson, 2025). Certain fMRI studies also shown that both age and divided attention have minimal impact on neural and behavioural measures of familiarity in memory tasks, suggesting that familiarity-based memory processes are largely preserved across the adult lifespan (de Chastelaine et al., 2023).

The core idea behind neuromarketing is that consumers are not always aware of the full range of factors influencing their purchasing decisions. In fact, research suggests that much of what drives our decisions occurs on a subconscious level. Emotional responses, often triggered by visual stimuli, sounds, and other sensory inputs, play a significant role in how we form attitudes toward brands and products. Neuromarketing seeks to harness this understanding to create more effective and personalized marketing strategies.

One of the fundamental goals of neuromarketing is to measure how consumers emotionally engage with brands or advertisements. Emotional engagement is crucial because emotional responses tend to drive stronger purchasing behaviours compared to rational decision-making. By measuring brain activity, marketers can pinpoint what resonates with consumers emotionally and uses these insights to tailor their marketing efforts, leading to enhanced customer engagement.

As neuromarketing techniques evolve, companies can fine-tune their marketing strategies to address the subconscious needs and desires of their target audiences. This approach moves beyond broad demographic targeting and focuses on creating deeply personalized experiences that can foster stronger brand loyalty, increase customer retention, and ultimately, drive purchasing decisions.

Neuromarketing has gained substantial attention from industries such as retail, entertainment, automotive, and technology, with companies leveraging brain science to improve product design, optimize advertising campaigns, and enhance customer experience. The findings from neuromarketing research assist organizations in identifying which aspects of their marketing materials capture attention, trigger emotional reactions, and drive purchasing decisions. Consequently, neuromarketing provides businesses with a strategic advantage, allowing them to create campaigns that are both captivating and psychologically compelling.

This study explores the practical applications of neuromarketing, focusing on its impact on customer engagement and purchasing decisions. It seeks to connect neuroscience with marketing, providing valuable insights on how businesses can leverage this innovative field to effectively influence consumer behaviour.

Review of Literature

Stefko et al. (2021) investigated gender-based differences in consumer behaviour and found statistically significant variations, suggesting that men and women may neurologically respond differently to marketing messages. This aligns with the idea that marketing strategies should consider these gender differences to enhance their effectiveness. In a similar vein, Alsharif et al. (2021) reviewed the development of neuromarketing techniques, such as fMRI and EEG. They highlighted both the growing applications of these tools and the ethical dilemmas surrounding privacy and consumer autonomy, raising concerns that need to be addressed as the field continues to expand.

Looking to the future of neuromarketing, Glova and Mudryk (2020) argued that advances in neuro-technology could make neuromarketing more accessible and valuable for predicting consumer behaviour. These developments could offer deeper insights into how consumers think and make decisions. In a study using EEG, Golnar-Nik et al. (2019) monitored brain activity during consumer choices and found that increased alpha wave power correlated with positive preferences. However, they noted the limitations of their study due to a small sample size, which may affect the generalizability of their findings.

Harrell (2019) defined neuromarketing as the measurement of brain and physiological responses to marketing, highlighting its use in areas like product design, pricing, and advertising. By aligning strategies with consumer reactions, neuromarketing can help brands optimize their marketing efforts. Devaru (2018) emphasized that neuromarketing bridges the gap between neuroscience and marketing. However, he cautioned that the field faces challenges such as ethical issues, methodological inconsistencies, and the lack of standardized frameworks, which hinder its full potential. Previous literature has cited that integrating neuroscience with consumer psychology offers promising insights into branding, but future research must address methodological standards and ethical concerns to fully realize its potential (Plassmann et al., 2012).

Jordão et al. (2017) conducted an integrated literature review and found that neuromarketing significantly contributes to understanding consumer behaviour by revealing how the brain processes marketing stimuli, influencing buying decisions. In their systematic review, Cruz et al. (2016) categorized neuromarketing literature into three main themes: conceptual background, brain mapping, and information processing. They also called for more ethical considerations in neuromarketing research, recognizing the importance of consumer protection.

Fortunato, Giraldi, and De Oliveira (2014) demonstrated that using attractive figures or celebrities in advertisements activates trust-related areas in the brain, providing a neurological explanation for the effectiveness of such marketing tactics. Similarly, Morin (2011) emphasized the emotional power of advertising, noting that neuromarketing tools can measure subconscious reactions, allowing marketers to create more emotionally resonant and persuasive campaigns. Renvoise and Morin (2007) introduced a brain-based marketing model that categorizes the brain into the old brain, middle brain, and new brain. They argued that the old brain plays a dominant role in consumer decision-making, which has important implications for marketers aiming to target the most instinctive aspects of consumer behaviour.

Finally, Kumar and Tyagi (2004) explored the complexity of consumer decisions, suggesting that purchasing behaviour is often a structured process involving sub-goals, motivations, and varying levels of cognitive involvement. This emphasizes the importance for marketers to grasp the complex nature of consumer decision-making in order to develop more effective strategies.

Objectives of the Study

1. To study demographics of the population and survey on the general awareness on Neuromarketing among the target population.
2. To assess the impact of gender on impulse purchasing behaviour influenced by product marketing.
3. To evaluate the influence of age on consumer familiarity with neuromarketing techniques.
4. To access the factors that influence purchase decision among the target group.

Hypothesis

H₁: “There is a significant association between gender and making an impulse purchase due to product marketing.”

H₂: “There is a significant difference in the mean familiarity with neuromarketing techniques between at least two age groups.”

Limitations

The study was limited to the geographic region of Kerala which will not give an overall picture of impact of Neuromarketing on the entire population of India.

The time limitation on the data collection restricted the accumulation of more from the target population through the survey.

Scope of the Study

This study aims to explore the impact of neuromarketing on two critical aspects of consumer behaviour: customer engagement and purchase decisions. It aims to offer a thorough understanding of how neuromarketing techniques, including brain imaging, eye tracking, and facial coding, impact consumers' emotional and cognitive reactions to marketing stimuli. By investigating these factors, the research will highlight how businesses can leverage neuromarketing to create more engaging and persuasive marketing strategies that drive consumer behaviour. The results will offer valuable insights for marketers, advertisers, and brand strategists interested in incorporating neuromarketing techniques to improve consumer engagement and optimize purchasing decisions.

Methodology

The study employed a descriptive research design using a structured survey to investigate the awareness of neuromarketing and its impact on purchase decision among the target group. Convenience sampling was employed, with primary data obtained through an online survey and secondary data sourced from journals and reports. The sample size included 120 respondents from Kerala, India, from students across the region. Kerala is one of consumer markets in the country where the population is exposed to influence of different national and international brands. Data was collected via Google Forms, with sections focused on demographics and related questions neuromarketing awareness. The second part focused on the factors influencing purchase decision and also the relation between age as well as gender on neuromarketing techniques. Descriptive statistics, inferential statistics like Chi-square tests and multivariate analysis including exploratory factor analysis using IBM SPSS.

Findings and Discussion

“Demographics and general survey questions related to Neuromarketing”

Table 1: Demographic characteristics

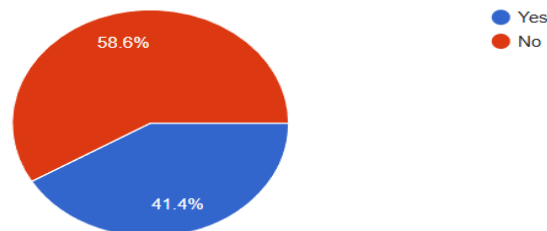
Demographic Characteristics	Number	Percentage
Age:		
18 - 24	79	65.8
25 – 34	21	17.5
35 - 44	8	6
45 - 54	8	6
55 +	4	3
Gender:		
Male	62	51.6
Female	58	48.8

Qualification:		
High school	7	5.8
Bachelor's degree	68	56.6
Master's degree	49	40.8
Ph.D.	2	1.6
Other	4	3.3
Employment status:		
Student	73	60.8
Employed	29	24.1
Self-employed	9	7.5
Unemployed	9	7.5

Source: Author's field survey (2025). Sample Size = 120.

The demographic data show that the majority of respondents (65.8%) are between the ages of 18 - 24, with a lower proportion from older age groups. (51.6 %) of respondents belong to Male category and remaining (48.8 %) of respondents are female category. (56.6%) have a Bachelor's degree, 40.8% of respondents have a Master's degree, (5.5%) possess a High school, (1.6%) of respondents hold a Ph.D. and remaining (3.3%) have another qualification.

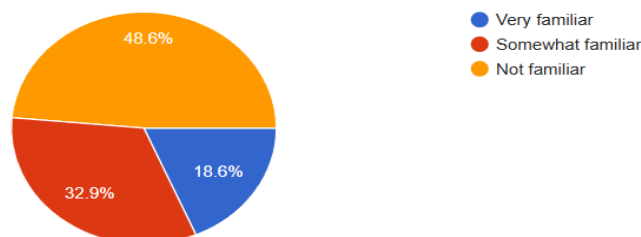
Figure 1: Awareness of the term "Neuromarketing"



Source: Author's field survey (2025)

A considerable majority (58.6 %) of respondents said they heard of the term neuromarketing before. Remaining (41.1%) of respondents have not heard the term neuromarketing.

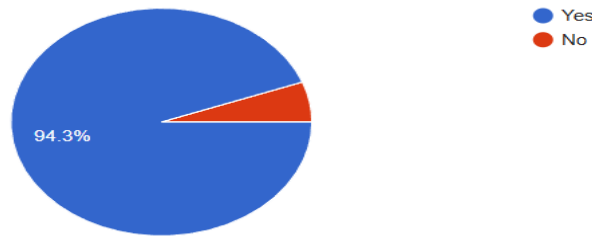
Figure 2: Familiarity with Neuromarketing Techniques



Source: Author's field survey (2025)

The familiarity with neuromarketing techniques, (48.6%) of respondents are not familiar with neuromarketing techniques, (32.9%) of respondents are somewhat familiar and remaining (18.6%) of respondents are not familiar with neuromarketing techniques.

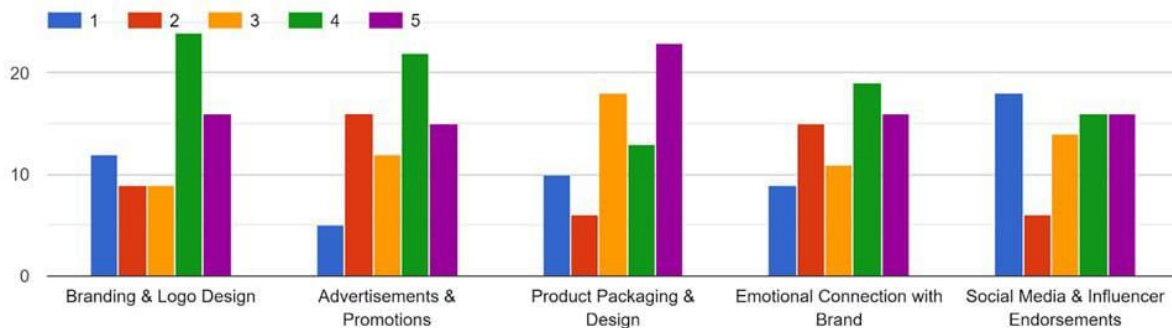
Figure 3: Customer Belief on the Use of Psychological Techniques in Marketing



Source: Author's field survey (2025)

A majority of respondents (94.3%) believe that brands use psychological techniques - such as (colours, sounds, scents, and emotions) to influence buying decisions. Only a small portion (6.7%) do not share this belief. Previous studies have hinted that distinct neural circuits play predictive roles in consumer purchasing decisions, suggesting that brain activity linked to anticipated gain and loss can forecast buying behaviour (Knutson et al., 2007).

Figure 4: Influence of branding and advertising on purchase decisions



Source: Author's field survey (2025)

Branding and logo design emerged as a significant factor in influencing purchase decisions. A majority of respondents rated this aspect as highly important, particularly choosing the top two points on the scale. This suggests that Branding & Logo Design greatly affects consumer perception and can be a decisive factor during purchasing.

Advertisements and Promotions, this factor was also rated favourably by most participants. The most of respondents are selected high importance ratings, while some indicated moderate importance. Very few respondents viewed advertisements and promotions as unimportant. These findings suggest that marketing campaigns, Advertisements & promotions are vital role in attracting and persuading consumers.

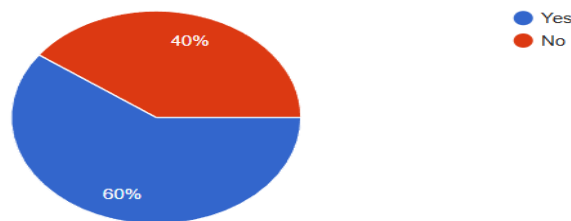
Product packaging and design stood out as one of the most influential factors. The highest number of participants rated it at the top level of importance. This reflects the strong impact

that product appearance, packaging quality, and design aesthetics have on consumers. Not only does packaging influence first impressions, but it also contributes to perceptions of product quality, trust, and brand identity.

Emotional connection with Brand, A substantial portion of respondents rated this factor as important, though slightly lower than branding or packaging. This suggests that emotional resonance - such as shared values, storytelling, and personal & social relevance can influence purchasing decisions. It highlights the role of brand loyalty and consumer-brand relationships in the decision-making process.

Social media and Influencer Endorsements, this factor received the most mixed responses. While a portion of the participants rated it as highly important, a significant number also rated it as the least important. This variation suggests that the effectiveness of social media and influencer marketing is audience-dependent such as demographics.

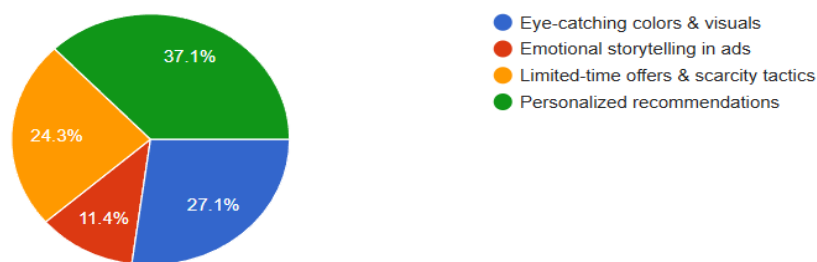
Figure 5: Impact of marketing on impulse purchase



Source: Author's field survey (2025)

A considerable majority (60%) of respondents reported that they have made an impulse purchase due to how a product was marketed. The remaining (40%) indicated that they have not made such a purchase. Interestingly, some research suggests that female consumers are more influenced by perceived hedonic value during livestream e-commerce, leading to greater impulsive buying behaviour compared to males (Huang et al., 2024).

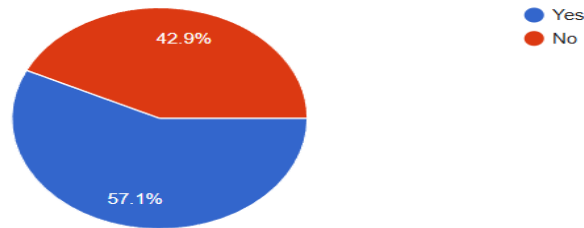
Figure 6: Most influential marketing technique



Source: Author's field survey (2025)

Analysing most influential marketing technique on purchase decision of a customer. A majority of respondents (37.1%) says that personalized recommendations are most influencing factor. (27.1%) of respondents said that eye – catching colours & visuals. (24.3%) have to limited time offers & security tactics and remaining (11.4%) of respondents agreed that emotional story telling ads are least influencing factor.

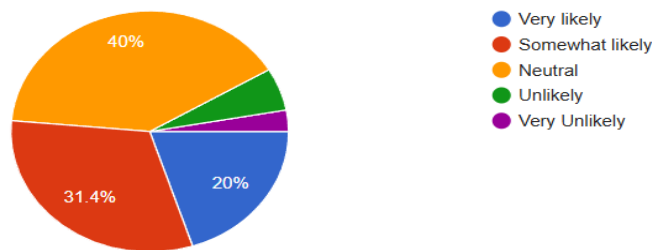
Figure 7: Trust in emotional or psychological advertising



Source: Author's field survey (2025)

An analysis of consumer trust in brands that use emotional or psychological triggers in advertising, the majority of respondents (57.1%) expressed trust, while the remaining 42.9% expressed a lack of trust.

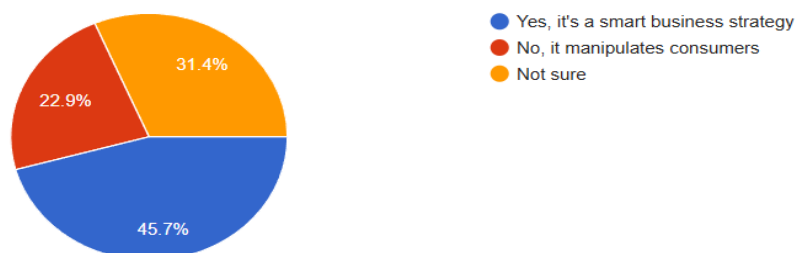
Figure 8: Willingness to recommend brands using neuromarketing



Source: Author's field survey (2025)

While analysing how likely respondents are to recommend a brand that employs engaging neuromarketing strategies, responses varied significantly. Almost half portion of respondents (40%) maintained a neutral stance, indicating neither a strong inclination nor resistance toward recommending such brands. Meanwhile, (31.4%) of respondents reported being somewhat likely to recommend them, reflecting a moderate level of influence. Additionally, (20%) expressed a strong positive response, stating they are very likely to recommend brands using these strategies and remaining (9.6%) indicated they are very unlikely to recommend such brands that means, indicating discomfort with the psychological nature of these strategies.

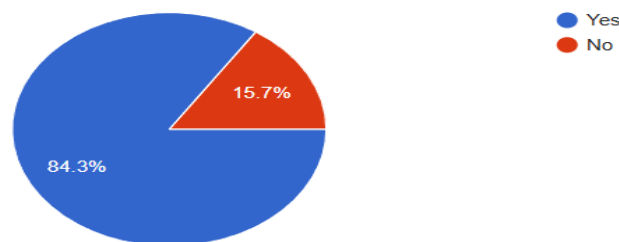
Figure 9: Perceptions of the ethics in neuromarketing



Source: Author's field survey (2025)

In analysing customer perceptions regarding the ethicality of neuromarketing, the majority of respondents (45.7%) viewed it as a smart business strategy - implying that they consider neuromarketing and its techniques to be ethical. Additionally, (31.4%) of respondents were unsure, a smaller group (22.9%) expressed a neutral opinion, with some believing that neuromarketing could be manipulative and potentially influence consumers in ways that raise ethical concerns.

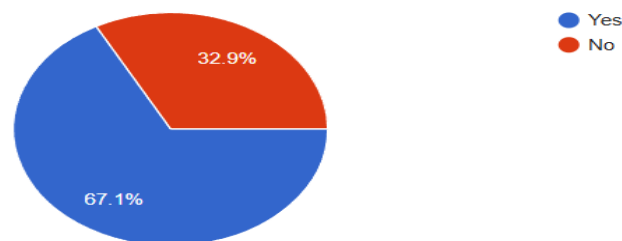
Figure 10: Preference for transparency in psychological marketing



Source: Author's field survey (2025)

A strong majority of respondents (84.3%) indicated a clear preference for brands to be transparent about their use of psychological marketing techniques, reflecting a growing consumer expectation for honesty and ethical communication. In contrast, only 15.7% did not share this preference, suggesting a minority remains indifferent or less concerned about such disclosure.

Figure 11: Impact on neuromarketing on shopping experiences



Source: Author's field survey (2025)

The analysis of customer perspectives on neuromarketing revealed that a majority (67.1%) believe it enhances the overall shopping experience by making interactions more personalized and engaging. However, 32.9% of respondents did not believe that neuromarketing contributes positively to their shopping journey.

Chi-Square Test: Gender *Have you ever made an impulse purchase because of how a product was marketed?

Hypotheses

- Null Hypothesis (H₀): "There is no significant association between gender and making an impulse purchase due to product marketing."

- Alternative Hypothesis (H₁): “There is a significant association between gender and making an impulse purchase due to product marketing.”

Table 2: Gender Vs Have you ever made an impulse purchase because of how a product was marketed?

		<i>Have you ever made an impulse purchase because of how a product was marketed?</i>		Total
		No	Yes	
Gender	Female	30	21	51
	Male	11	58	69
Total		46	74	120

Source: Author’s field survey (2025)

Table 3: Chi-Square Test Summary

Test	p	df	Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	0.08	1	0.777		
Continuity Correction	0.001	1	0.972		
Likelihood Ratio	0.081	1	0.777		
Fisher's Exact Test				0.809	0.487
Linear-by-Linear Association	0.079	1	0.778		

Source: Author’s field survey (2025)

A chi-square test of independence was conducted to examine the relationship between gender and impulse purchasing behaviour in response to product marketing. The sample consisted of 70 participants, of whom 30 were female and 40 were male. Among females, 63.3% (n = 19) reported having made an impulse purchase due to marketing, while 47.5% (n = 19) of males reported the same. Conversely, 36.7% of females and 52.5% of males indicated they had not made such a purchase.

The results of the chi-square test revealed no statistically significant association between gender and impulse purchasing behaviour, $\chi^2 (1, N = 120) = 0.08, p = .777$. This finding was consistent with the continuity correction, $\chi^2 (1, N = 120) = 0.001, p = .972$, and the likelihood ratio test, $\chi^2 (1, N = 120) = 0.081, p = .777$. Additionally, Fisher’s Exact Test did not indicate significance (2-sided $p = .809$).

The results indicate that there is no substantial difference in impulse purchasing behavior between genders in this sample. Previous research indicates that women are generally more susceptible to impulse buying due to perceived hedonic value, especially in contexts like livestream e-commerce and Instagram marketing (Huang et al., 2024). Men, on the other hand, are less influenced by emotional marketing stimuli and tend to prefer products that project independence and activity (Kovacheva et al., 2022).

Onaway-ANOVA Test: Assessing the Impact of Age on Consumer Familiarity with Neuromarketing Techniques

Hypotheses

- Null Hypothesis (H₀): “There is no significant difference in the mean familiarity with neuromarketing techniques across different age groups.”
- Alternative Hypothesis (H₂): “There is a significant difference in the mean familiarity with neuromarketing techniques between at least two age groups.”

Table 4: Descriptives - How familiar are you with Neuromarketing techniques?

Age	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
18 - 24	79	1.5	0.629	0.095	1.31	1.69	1	3
25 - 34	21	2.3	0.823	0.26	1.71	2.89	1	3
35 - 44	8	2	0.894	0.365	1.06	2.94	1	3
45 - 55	8	2.29	0.756	0.286	1.59	2.98	1	3
55 +	4	2.33	1.155	0.667	-0.54	5.2	1	3
Total	120	1.77	0.783	0.094	1.58	1.96	1	3

Source: Author’s field survey (2025)

Table 5: ANOVA Summary

<i>How familiar are you with Neuromarketing techniques?</i>					
	Sum of Squares	df	Mean Square	F	p
<i>Between Groups</i>	9.148	4	2.287	4.478	0.003
<i>Within Groups</i>	33.195	65	0.511		
Total	42.343	69			

Source: Author’s field survey (2025). $p < .05$

A one-way analysis of variance (ANOVA) was performed to assess whether age group affects self-reported familiarity with neuromarketing techniques. Participants were categorized into five age groups: 18–24, 25–34, 35–44, 45–54, and 55+.

Descriptive statistics showed that participants aged 18–24 reported the lowest familiarity (M = 1.50, SD = 0.63), while those in the 25–34 age group had the highest mean familiarity (M = 2.30, SD = 0.82). The overall mean familiarity across all age groups was M = 1.77 (SD = 0.78).

The ANOVA revealed a statistically significant difference in familiarity with neuromarketing techniques across age groups, $F(4, 65) = 4.48, p = .003$. This indicates that age has a significant effect on how familiar individuals are with neuromarketing strategies. Interestingly, some

studies have mentioned no significant difference among age groups related to neuromarketing techniques (de Chastelaine et al., 2023).

Exploratory Factor Analysis (EFA): *Factors influencing your purchase decisions*

Table 6: KMO and Bartlett's Test Summary

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.855
Bartlett's Test of Sphericity	Approx. Chi-Square	286.944
	df	10
	Sig	<.05

Source: Author's field survey (2025)

Table 7: Pattern Component Matrix, Eigen Values and Total Variance Percentage for Components obtained by Principal Component Analysis with Varimax Rotation Method

Variables	Component	
	1	2
Branding & amp; Logo Design	0.903	
Advertisements & amp; Promotions	0.806	
Product Packaging & amp; Design	0.784	
Social media & amp; Influencer Endorsements		0.875
Emotional Connection with Brand		0.86
Eigen values	3.2	1.02
Percentage of total variance	68.47	20.09
<i>Note: Factor loadings <.035 have been omitted from the table</i>		

Source: Author's field survey (2025)

A Principal Component Analysis (PCA) with Varimax rotation was conducted to identify underlying components influencing consumer purchase decisions based on five sensory marketing-related factors. The Kaiser-Meyer-Olkin (KMO) measure verified the sampling adequacy for the analysis, with a value of .855, which is considered "meritorious" (Kaiser, 1974). "Bartlett's Test of Sphericity was statistically significant, $\chi^2(10) = 286.94, p < .001$, indicating that the correlation matrix was not an identity matrix and thus suitable for factor analysis."

The analysis identified two components with eigenvalues greater than 1, which together accounted for a cumulative variance of 88.56%. The first component explained 47.63% of the variance, while the second accounted for 40.92%, based on the rotated sums of squared loadings. Community values for all items were above .85, suggesting that a significant portion of the variance for each item was captured by the extracted components. From the rotated component matrix, the first factor (Component 1) was heavily loaded by Branding & Logo Design (.903), Advertisements & Promotions (.806), and Product Packaging & Design (.784). This factor appears to reflect "Visual and Promotional Appeal". The second factor

(Component 2) was strongly associated with social media & Influencer Endorsements (.875) and Emotional Connection with Brand (.860), suggesting a theme of "Emotional and Social Engagement." These results indicate that consumer purchase decisions in this context are influenced by two distinct dimensions: one based on visual and promotional elements, and the other on emotional and social connections. The high communalities and strong factor loadings support the reliability and clarity of the factor structure. Previous Literature has sighted similar results that these factors affecting purchase decision (Dejene & Kant,2023). Also, Neuromarketing has found hint the companies regarding consumer behaviour according to previous research which justifies the findings of this paper (Ismajli et al., 2022).

Conclusion

Neuromarketing holds transformative potential in decoding consumer behaviour by bridging neuroscience and marketing. However, to harness its full value, the field must overcome ethical, methodological, and transparency challenges. The path forward lies in establishing standardized practices, encouraging cross-disciplinary collaboration, and prioritizing consumer welfare. Only then can neuromarketing evolve into a responsible and impactful force in the future of marketing.

Recommendations

Neuromarketing should progress through the development of strict ethical frameworks to safeguard consumer privacy and ensure transparent data practices. Establishing standardized research methods and analytical protocols will enhance reliability and comparability of findings across studies. Cross-disciplinary collaboration among neuroscientists, psychologists, and marketers is vital to deepen understanding and innovation in the field. Above all, neuromarketing must prioritize consumer welfare and transparency to build trust and ensure its responsible integration into modern marketing practices.

References

- Alsharif, A. H., Salleh, N. Z. M., & Baharun, R. (2021). Neuromarketing: The popularity of the brain-imaging and physiological tools. *Neuroscience Research Notes*, 3(5), 13-22.
- Berson, P. (2025, February 18). *Neuromarketing: The science behind Consumer Decision-Making*. AMA Boston. <https://amaboston.org/neuromarketing-the-science-behind-consumer-decision-making/#:~:text=Neuromarketing%20analyzes%20brain%20activity%20and,webpage%2C%20ad%2C%20or%20product>.
- Cruz, C. M. L., Medeiros, J. F. D., Hermes, L. C. R., Marcon, A., & Marcon, É. (2016). Neuromarketing and the advances in the consumer behaviour studies: a systematic review of the literature. *International Journal of Business and Globalisation*, 17(3), 330-351.
- de Chastelaine, M., Horne, E. D., Hou, M., & Rugg, M. D. (2023). Relationships between age, fMRI correlates of familiarity and familiarity-based memory performance under single and dual task conditions. *Neuropsychologia*, 189, 108670. <https://doi.org/10.1016/j.neuropsychologia.2023.108670>
- Dejene, F., Y., & Kant, S. (2023). Neuro-Marketing in Understanding Consumer Behaviour: Systematic Literature Review. *Journal of Social Sciences and Management Studies*. <https://doi.org/10.56556/jssms.v2i2.483>.
- Devaru, S. D. B. (2018). Significance of neuromarketing on consumer buying behaviour. *International Journal of Technical Research & Science*, 3(03), 114-121.

- Fortunato, V. C. R., Giraldi, J. D. M. E., & de Oliveira, J. H. C. (2014). A review of studies on neuromarketing: Practical results, techniques, contributions and limitations. *Journal of Management Research*, 6(2), 201.
- Glova, B., & Mudryk, I. (2020, August). Application of deep learning in neuromarketing studies of the effects of unconscious reactions on consumer behaviour. In 2020 IEEE Third International Conference on Data Stream Mining & Processing (DSMP) (pp. 337-340). IEEE
- Golnar-Nik, P., Farashi, S., & Safari, M. S. (2019). The application of EEG power for the prediction and interpretation of consumer decision-making: A neuromarketing study. *Physiology & behaviour*, 207, 90–98. <https://doi.org/10.1016/j.physbeh.2019.04.025>
- Hammou, K. A., Galib, M. H., & Melloul, J. (2013). The impact of neuromarketing on marketing management. *Romanian Journal of Marketing*.
- Harrell, E. (2019, January 23). *Neuromarketing: What you need to know*. Harvard Business Review. <https://hbr.org/2019/01/neuromarketing-what-you-need-to-know>
- Huang, Q., Dastane, O., Cham, T., & Cheah, J. (2024). Is ‘she’ more impulsive (to pleasure) than ‘him’ during livestream e-commerce shopping? *Journal of Retailing and Consumer Services*. <https://doi.org/10.1016/j.jretconser.2024.103707>.
- Hubert, M., & Kenning, P. (2008). A current overview of consumer neuroscience. *Journal of Consumer Behaviour*, 7(4–5), 272–292. <https://doi.org/10.1002/cb.251>
- Ismajli, A., Ziberi, B., & Metushi, A. (2022). The impact of neuromarketing on consumer behaviour. *Corporate Governance and Organizational Behaviour Review*. <https://doi.org/10.22495/cgobrv6i2p9>.
- Jordão, I. L. D. S., Souza, M. T. D., Oliveira, J. H. C. D., & Giraldi, J. D. M. E. (2017). Neuromarketing applied to consumer behaviour: an integrative literature review between 2010 and 2015. *International Journal of Business Forecasting and Marketing Intelligence*, 3(3), 270-288.
- Karmarkar, U. R. (2011). Note on neuromarketing. *Harvard Business School Publishing*. <https://www.hbs.edu/faculty/Pages/item.aspx?num=41232>
- Knutson, B., Rick, S., Wimmer, G. E., Prelec, D., & Loewenstein, G. (2007). Neural predictors of purchases. *Neuron*, 53(1), 147–156. <https://doi.org/10.1016/j.neuron.2006.11.010>
- Kovacheva, A., Nikolova, H., & Lamberton, C. (2022). Will he buy a surprise? Gender differences in the purchase of surprise offerings. *Journal of Retailing*. <https://doi.org/10.1016/j.jretai.2022.04.002>.
- Misra, L. (2023). Neuromarketing insights into consumer behaviour. *IUJ Journal of Management*, 11(1), 143-163.
- Morin, C. (2011). Neuromarketing: The new science of consumer behaviour. *Society*, 48(2), 131–135. <https://doi.org/10.1007/s12115-010-9408-1>
- Plassmann, H., Ramsøy, T. Z., & Milosavljevic, M. (2012). Branding the brain: A critical review and outlook. *Journal of Consumer Psychology*, 22(1), 18–36. <https://doi.org/10.1016/j.jcps.2011.11.010>

Reimann, M., Schilke, O., & Weber, B. (2011). Neuromarketing: A framework for researching how customers make decisions. *Journal of Marketing Management*, 27(7–8), 848–850. <https://doi.org/10.1080/0267257X.2011.595398>

Renvoise, P., & Morin, C. (2007). *Neuromarketing: Understanding the buy buttons in your customer's brain*. HarperCollins Leadership.

Singh, S. (2020). Impact of neuromarketing applications on consumers. *Nihon Keiei Gakkaishi*, 26(2), 33–52. [https://doi.org/10.6347/jbm.202009_26\(2\).0002](https://doi.org/10.6347/jbm.202009_26(2).0002)

Stefko, R., Tomkova, A., Kovalova, J., & Ondrijova, I. (2021). Consumer Purchasing Behaviour and Neuromarketing in The Context of Gender Differences. *Journal of Marketing Research and Case Studies*, 1-11

Tyagi, C. L., & Kumar, A. (2004). *Consumer behaviour*. Atlantic Publishers & Dist.
