

Neuromarketing: a historical review

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Supplementary Table S1: Summary of Reviews

Author(s)	Objective(s)	Methodology	Findings
(Constantinescu et al., 2019)	Attitude evaluation on the use of neuromarketing approaches in social medial, matching corporate purpose, and the benefits of customers for sustainable business growth.	Quantitative research	Findings from the research indicate that it is not easy to integrate neuromarketing in social media as a result of two significant reasons. These reasons are substantial investments required for integration and reluctance of users to gathering data about their characteristics and behavior.
(Solomon, 2018)	The primary aim of this study was to analyze the importance of neuromarketing as well as the benefits that it brings to the marketing field based on previous researches.	Literature review and personal commentaries	The paper revealed that neuromarketing offers exciting opportunities as well as provides new avenues for exploring the marketing field. Additionally, it can enhance marketer's understanding of the consumers as well as how they implement marketing-related decisions.
(Arthmann & Li, 2017)	Not defined	Literature review and personal commentaries	neuromarketing has the potential to influence brand association and consumer loyalty proactively as it measured the behavior of customers in real-time, and also come with the capability of testing the verbal and non-verbal responses of customers to new products, pricing, and advertisement promotions.
(Hensel et al., 2017)	The study was aimed at checking the validity of additionally developed ethical aspects that are supplementary to Neuromarketing Science and Business Association (NMSBA) code of ethics, as contained in the Ethical Guidelines in Neuromarketing (EGNM) guideline used to determine the extent of consensus with the answers that were provided by the neuromarketing practitioners. Additionally, the study aimed	Exploratory, qualitative study	It was discovered that there is a lack of research in the field of neuromarketing on ethical guidelines. All seven aspects of ethicality were found to be crucial in neuromarketing research.

	to refine the ethical guidelines with extra aspects that are considered relevant for the practitioners.		
(Nemorin & Gandy Oscar H., 2017)	To evaluate the consequences of neuro marketers'reliance on direct and indirect forms of remote sensing.	Literature review and personal commentaries	Findings from the study indicate that there are ethical implications concerning neuromarketing, and they are closely related to remote sensing, invasion of privacy, and statistical discrimination.
(Glaenzer, 2016)	The study was designed to demonstrate how neuromarketing connects to the history of subliminal messaging and the present neuro-obsessed culture (neuroculture).	Literature review and personal commentaries	It was found in this study that neuromarketing can be effectively used in supporting claims made in traditional marketing and also assisting marketers to understand how products can be marketed more effectively.
(Kumar, 2015)	The work focused on investigating how the attention levels influence users from the neuromarketing perspective, and the research was conceptual	Literature review and personal commentaries	When neuromarketing is combined with culture, advertising can be made both practical and exciting.
(Roth, 2013)	The paper was designed to evaluate the influence of neuromarketing tools on traditional marketing inputs to complete the understanding of consumer behavior.	Literature review and personal commentaries	Neuromarketing brings about a strong influence on the behavior of consumers, pricing, branding, advertising, product distribution, and decision-making within the marketing dimension.
(Krajnovic et al., 2012)	The research focused on the possibility of applying neuroscience in marketing and branding, and it also looked at the limitations that come with understanding the human brain in the marketing context.	Literature review and personal commentaries	It was found that neuromarketing offers the possibility of detecting the data about purchase decisions of customers and well as their preferences that were not known till now.
(Morin, 2011)	The paper focused on discussing the burgeoning field of neuromarketing and also suggesting the potential it has to significantly enhance the effectiveness of both commercial and cause-related advertising messages being delivered across the world.	Literature review and personal commentaries	It was highlighted that the field of neuromarketing is gaining widespread credibility and is being significantly adopted by marketing and advertising professionals. Neuromarketing is also said to have the potential of addressing the limitations that comes with conventional approaches for testing and predicting the effectiveness of advertising investments.
(Murphy et al., 2008)	The main objective was to assess the ethical issues concerning neuromarketing.	Literature review and personal commentaries	There are two categories of ethical issues in neuromarketing: 1) protection of various parties that might be harmed or exploited via neuromarketing research or deployment of neuromarketing tools; and 2) protection of consumer autonomy if neuromarketing reaches a critical level of effectiveness. It was highlighted in this study that companies intending to utilize neuromarketing techniques should adopt a code of ethics to ensure that the technology is both beneficial and non-harmful to the two categories of ethical concerns stated above.

(Lee et al., 2007)	The paper was developed as an attempt to widen the scope of neuromarketing beyond commercial brands and applications in consumer behavior, paving room for the inclusion of wider conceptualized of marketing science.	Literature review and personal commentaries	It was found that neuromarketing is continuously evolving both in the area of technology and insight. Additionally, the future direction of researches was suggested to be in the area of understanding the issues related to neuromarketing and how companies can successfully integrate this technology into their business process.
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