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Neuromarketing: Descriptive Analysis 2013–2022

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Abstract

Neuromarketing is a marketing method by finding its use in the field of neurology, which is neuroscience, and adapting this method into marketing has become a topic of growing interest for both businesses and researchers. The aim of the paper within this framework İS to analyze articles published on neuromarketing on the Web of Science (WOS) site. This study aims to examine the trends in literature related to the field of neuromarketing. The results are restricted by English language, 2013 and 2022 time period and type of the documents are article. The study uses filters to conduct a descriptive analysis of 165 papers on neuromarketing, looking at the year of publication, the author's name, the journal with the most published research, nation analysis of publications, keywords, related fields, and citation frequency. The results show that Europe is at the forefront of the field. The country which heavily involved in neuromarketing research is Switzerland. Regarding the analysed articles the most used keywords are, other than neuromarketing, brain, attention and responses. Likewise, the most popular journal for neuromarketing article is Frontiers in Psychology.

Keywords: Neuromarketing, Marketing, Marketing Research.
JEL Classification: M30

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1. Introduction

People have been trying to understand how we make decisions for hundreds of years. This question enables keeping alive some disciplines, like philosophy and psychology and this situation contributes neuroscience studies (Cherubino et al., 2019). Neuroscience has emerged as a new technique that has been created to method the impact of marketing efforts on the consumer and neuromarketing is a developing interdisciplinary field that utilizes neuroscience methods to comprehend consumer thinking and decision-making behavior (Hubert & Kenning, 2008). Psychology and marketing are significant components of this discipline to gain a deeper understanding of people's behaviour, preferences, and decision making strategies (Stanton et al., 2017).

Neuromarketing, which is a branch of neuroscience, has experienced significant growth in the field of consumer research over the years (Plasmann et al. 2012). The field of neuromarketing is dedicated to studying human brain responses to marketing stimuli using neuroscience methods (Genco et al., 2013). When marketing methods are used for understanding consumer behaviour in terms of markets and commercial trade, all these methods are called neuromarketing (Broderick & Chamberlain, 2006).

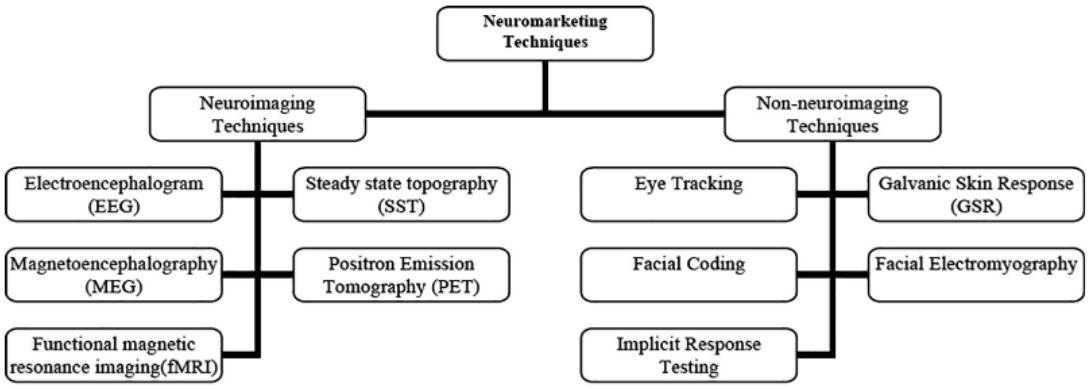
In 1990, therapists at Harvard University developed the concept of neuromarketing, which has since contributed significant insights and techniques into the study of consumer behavior. According to the non-profit organization "Business Alert" in the U.S, the human central nervous system is designed to be exploited for the purpose of achieving profitable business growth. Traditional marketing methods, which rely on highlighting a product's features and attributes, are shifting towards branding products through influencing consumers' subconscious minds prior to purchase. For advertisers, it is really important point to get the product fix into customers' memory. The emerging field of neuromarketing, which incorporates research on the human central nervous system into marketing strategies, has gained popularity in recent years as a growing area of research. (Alsharif, 2020). Neuromarketing provides more detailed and valuable feedback than the traditional marketing techniques (Eduardo et al., 2016). For obtaining the more pointed results, neuroscience tools are used to understand the human brain where emotion plays a fundamental role in how to respond to stimulus and this is the biggest different from the standard marketing techniques. Tools which enable marketers to pre-established emotional influence are neuroimaging and non-neuroimaging tools (Bechara et al., 2000).

This study fills the gap in the chronological presentation of research in the field of neuromarketing, and the study is presented with the descriptive analysis technique. Neuroimaging techniques, non-neuroimaging techniques, methods, and results are explained in the rest of the article.

2. Neuroimaging Techniques

Neuromarketing techniques can be broadly categorized into two types: neuroimaging and non-neuroimaging techniques. The primary distinction between these two categories is that neuroimaging techniques involve the measurement of brain activity and electrical signals, while non-neuroimaging techniques do not require any neurological activity (Jesus Martínez et al., 2019). Classification of neuromarketing technique shown in Figure 1 (Gill & Singh, 2022).

Figure 1. Classification of neuromarketing technique



Source: Gill & Singh, 2022

• Functional magnetic resonance imaging (fMRI) — fMRI is a technique that measures changes in blood flow associated with brain activity, allowing for precise imaging of neural processes. Cerebral blood flow and neuronal activation are closely linked, fundamental components of the fMRI technique. When a particular region of the brain is active, blood flow to that region increases as well. This is because blood contains iron, this flow can be tracked by a massive magnet that surrounds the head of the person being studied (Genco et al., 2013).

• Electroencephalography (EEG) — EEG is a method to record the strength at the scalp of small electrical areas produced by human brain activities. It is the most popular and well-established neuromarketing technology because of its relatively low cost and deliverable equipment requirements and besides that recent studies have underscored the significance of the human eye as a valuable source of biomarkers (Ueda & Wolf, 2021). However, there is one important point that must be careful. EEG results can unreliably measure changes in electrical activity deep in the human brain (Genco et al.,2013).

• Magnetoencephalography (MEG) — MEG is a technique that measures the tiny changes in the magnetic field generated by the brain. However, it has a high cost, so because of this, usage of MEG is really low (Genco et al., 2013).

• Steady State Topography (SST) — SST is able to be used to specify the instant changes in the consumers' responses to marketing stimuli. SST records and measures electrical signals at the scalp to build a second by second view of brain activity. Based on an improvement of EEG measurements, MEG has been widely used in hospitals worldwide and has been approved for research and clinical applications for over fifteen years (Alsharif, 2020).

• Positron emission tomography (PET) — PET is a nuclear imaging technique that enables the quantitative measurement of physiological functions in the body. It works by detecting the metabolic activity of small areas in the body (Ziegler, 2018).

• Magnetoencephalography (MEG) — MEG is a technique that detects changes in magnetic fields resulting from the electrical activity of the brain. While MEG has a good temporal resolution for detecting small changes in brain activity, its installation costs are higher than those of EEG, and it is not portable. (Bercea, 2013).

3. Non -Neuroimaging Techniques

• Facial coding — Facial coding is a technique that identifies even the subtlest changes in facial muscles in response to marketing stimuli. Human face is the richest and the most powerful source of clues among nonverbal emotion expression so this technique is important (Kumar, 2016).

• Eye tracking — Eye tracking method is a technique used to gather information on where people look and track their eye movements. After tracking, it gives heat maps where individuals' gaze is fixed (Gill & Singh, 2022). Eye tracking is a versatile technique that can be used to test a wide range of stimuli, including websites, apps, social media, in-store displays, packaging designs, advertisements, video materials, print and image design, product placement, and aesthetic stimuli. It provides valuable insights into how consumers perceive and process information by tracking their gaze patterns and fixations (Cherubino et al., 2019).

• Galvanic Skin Response (GSR) — Scientists' research studies always try to measure and record the emotion. GSR is used to decide the excitement level of the customer after exposure to external stimuli like ad, movie or new products. The galvanic skin response (GSR) measures the electrical conductance of the skin, which changes as a result of sweating due to emotional or physiological arousal. This measurement is then quantified in terms of the skin conductance level (Critchley, 2002).

• FEMG — Facial electromyography (FEMG) records the electrical activity of facial muscles to detect emotions associated with specific external stimuli. In essence, it uses facial sensors to track changes and movements in facial muscles (Gill & Singh, 2022).

• Implicit Response Testing — Another type of technique used in neuromarketing research is the Implicit Response Test (IRT), which is designed to measure non-conscious responses to marketing stimuli. These tests are used to capture inherent consumer behavior or attitudes when presented with, for example, two different brands or characters for comparison (Gill & Singh, 2022).

4. Methodology

Neuromarketing aims to eliminate the deficiencies in the classification of neuroimaging techniques in terms of marketing and create a systematic structure. For this reason, the themes in the descriptive analysis technique are being studied to eliminate this deficiency in the field of neuromarketing.

The articles which were used for the descriptive analysis were extracted from the Web of Science on the 25 of April 2022. In this paper, the keyword "neuromarketing" was the only search term, yielding 631 results. The results were limited by the English language, the 2013-2022 time period, open access documents, and the type of study: article, thus we reduced the sample to 165 articles and examined them for this study.

We used Vosviewer to analyze and visualize the most commonly used keywords, and Excel to analyze and visualize the year of publication, the author's name, the journal with the most published research, the country of origin of articles, related topics, and citation frequency.

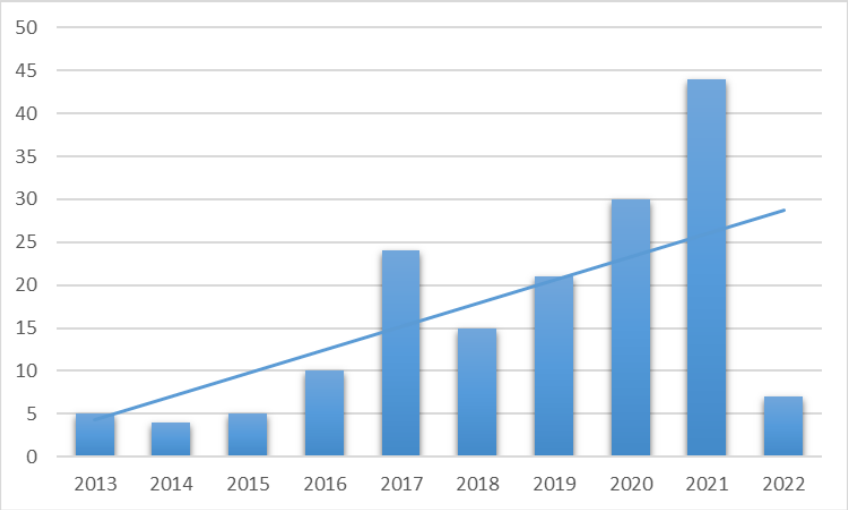
5. Results

The study aims to gain a comprehensive understanding of advancements in neuromarketing research and thus, encompasses all documents, languages, and countries available. The research period spans over 10 years from 2013 to 2022.

5.1. Number of publications per year

The data was obtained from the Web of Science database in the field of "neuromarketing". The chart illustrates the trend of descriptive papers published from 2013 to 2022, during which a total of 165 articles were published. According to Figure 2 the highest number of articles were published in 2021 (44), while the lowest number was published in 2014 (4).

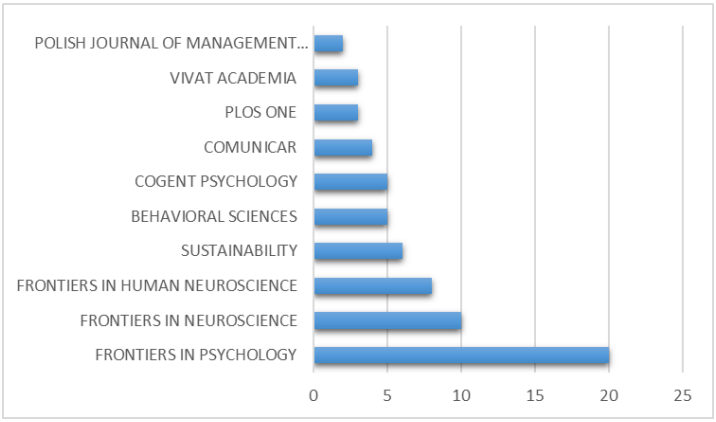
Figure 2. Year Wise Publication of Descriptive Papers From 2013 Through 2022.



5.2. Most Productive Journals

According to the study, 93 journals were found to publish articles on neuromarketing. The top 10 most productive journals in terms of neuromarketing-related articles are shown in Figure 3. Notably, Frontiers in Psychology tops the list with 20 articles, followed by Frontiers in Neuroscience with 10 articles, and Frontiers in Human Neuroscience with 8 articles.

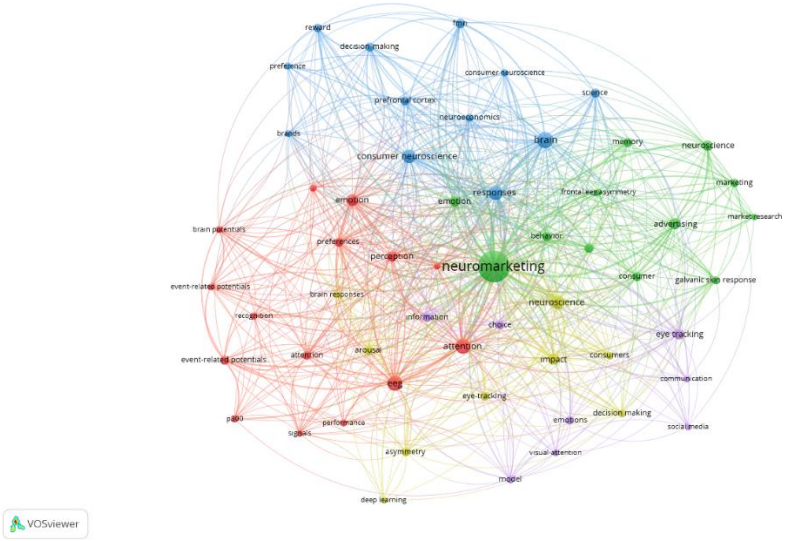
Figure 3. Ranking of the Top 10 Journals With The Most Articles on Neuromarketing by Number of Articles Published Between 2013 and 2022.



5.3. Most used keywords

An analysis of 165 articles retrieved from the Web of Science database between 2013 and 2022 was conducted, and a total of 1042 keywords were identified. The top five most frequently used keywords were "neuromarketing" (used 104 times), followed by "brain" (29 times), "attention" (25 times), "responses" (22 times), and "EEG" (21 times), as shown in the figure.

Figure 4. Distribution of Keywords of Neuromarketing-Related Articles.



5.4. Citation Frequency

Table 1 shows the top 10 most frequently cited articles between 2013 and 2022. The article with the highest number of citations during this time period is "Contribution of Eye-Tracking to Study Cognitive Impairments Among Clinical Populations" (195 citations), followed by "I Welcome to the jungle! The neuromarketing literature through the eyes of a newcomer" (185 citations) and "Neuroscience-Inspired Design: From Academic Neuromarketing to Commercially Relevant Research" (176 citations).

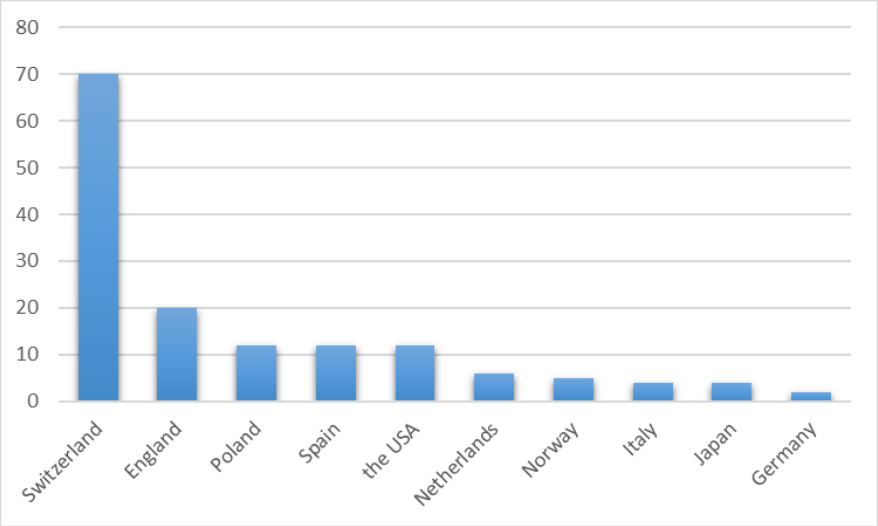
Table 1. Top 10 Citation Frequency of neuromarketing-related articles

Publication Year	Article Title	Cited Reference Count
2021	Contribution of Eye-Tracking to Study Cognitive Impairments Among Clinical Populations	195
2018	Welcome to the jungle! The neuromarketing literature through the eyes of a newcomer	185
2019	Neuroscience-Inspired Design: From Academic Neuromarketing to Commercially Relevant Research	176
2013	Neuromarketing and consumer neuroscience: contributions to neurology	175
2021	A Comparative Eye Tracking Study of Usability-Towards Sustainable Web Design	150
2021	The emergence of neuromarketing investigated through online public communications (2002-2008)	133
2020	What Can Neuromarketing Tell Us about Food Packaging?	112
2021	Applying Implicit Association Test Techniques and Facial Expression Analyses in the Comparative Evaluation of Website User Experience	112
2021	Consumer Neuroscience: Attentional Preferences for Wine Labeling Reflected in the Posterior Contralateral Negativity	111
2020	Autonomous Sensory Meridian Response (ASMR) for Responding to Climate Change	109

5.5. Countries with the greatest productivity

Figure 5 shows the countries where authors produce the most research on neuromarketing between 2013 and 2022.

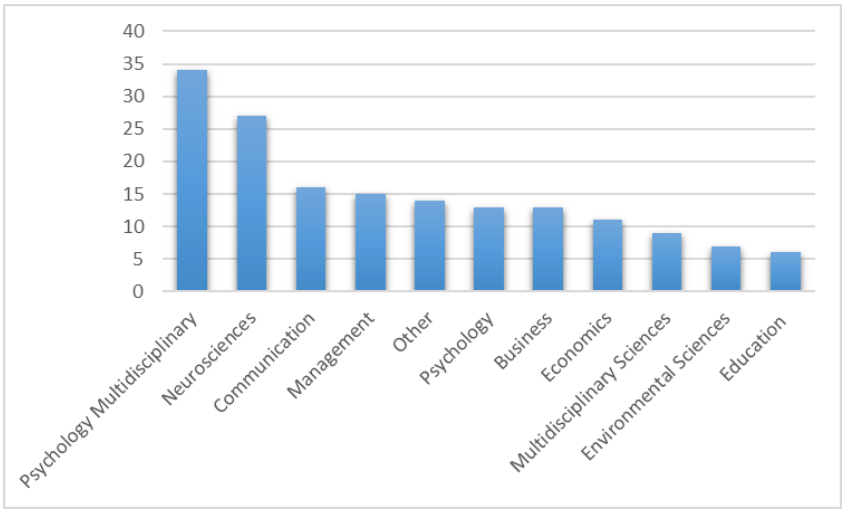
Figure 5. Distribution of Authors most Research on Neuromarketing-Related Articles



5.6. Related Areas

Figure 6 shows the related areas which authors produce the most research on neuromarketing. 165 articles which are analysed in this study published between 2013 and 2022 are generally related with psychology multidisciplinary and neurosciences. This is because neuromarketing as a term is associated with psychology.

Figure 6. Related Areas



6. Conclusion

This study aims to provide an overview of the scientific research on neuromarketing-related articles in English language between 2013 and 2022, based on publications available in the Web of Science database. The results show a steady increase in the number of articles published during the observation period, and provide insights into the existing information on neuromarketing research. The productivity of countries was also analyzed, with Switzerland having the largest number of publications.

The top three keywords for neuromarketing-related articles were "neuromarketing", "brain", and "attention". The three most prolific journals publishing articles on this topic were Frontiers in Psychology, Frontiers in Neuroscience, and Frontiers in Human Neuroscience.

In future studies, it is regarded useful to examine the subject using methodologies other than descriptive analysis.

7. Limitations

The indicators used to measure the amount, qualitative, and relationships between articles are the most challenging component of descriptive analysis. The study was limited to the 2013-2022 time period.

Competing Interest

The authors declare that they have no competing interests.

Fundings and Acknowledgments

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Ethical Statement

It is declared that scientific and ethical principles have been followed while carrying out and writing this study and that all the sources used have been properly cited.

Author's Contributions

The authors contributed to the study nearly equally.

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