Original Article

Contemporary perspectives in neuromarketing: a systematic literature review

Perspectivas contemporâneas em neuromarketing: revisão sistemática da literatura

José Sarto Freire Castelo[I] ⓘD , **Geizyanne Quirino dos Santos**[I] ⓘD ,
José Iran Batista de Melo Filho[I] ⓘD , **Tamiris Costa Diógenes Lima**[I] ⓘD,
Milena Reis Auip Barbosa[I] ⓘD

[I] Universidade de Fortaleza, Fortaleza, CE, Brazil

ABSTRACT

Purpose: This study is intended to address gaps in the neuromarketing literature by presenting a comprehensive systematic literature review (SLR) that covers related theories, techniques, and methodologies. The goal is to overcome existing limitations related to sector specificity, limited article count, and narrow database selection to provide a broad and deep understanding of neuromarketing's theoretical frameworks and applications.

Design/Methodology/Approach: Using an SLR approach, we examine 877 articles sourced from Scopus and Web of Science that were selected based on their relevance to neuromarketing theory. Through bibliometric analysis facilitated by the biblioshiny and Research Rabbit tools, we ascertained significant authors, documents, journals, collaboration networks, and thematic structures that culminate in a co-citation network and conceptual field mapping.

Findings: Our results indicate an increase in neuromarketing research, especially over the past 5 years. Key themes include consumer behavior, neuroscience integration, and ethical considerations. We identify three distinct research clusters that focus on neuromarketing's intersection with neuroscience, sensory marketing, and consumer psychology. Key authors and publications are mapped to highlight trends and emerging areas for future study.

Originality/Value: Our research provides a comprehensive overview of neuromarketing literature, establishing foundational insights into theoretical and practical advancements. Additionally, we propose a conceptual guide for future neuromarketing research avenues, which is a critical resource for researchers and practitioners who seek a structured understanding of this interdisciplinary field.

Keywords: Neuromarketing; Systematic literature review; Neuromarketing theory; Consumer behavior; Bibliometric

RESUMO

Objetivo: Este estudo visa abordar lacunas na literatura de neuromarketing, realizando uma revisão sistemática abrangente da literatura (SLR) cobrindo as teorias, técnicas e metodologias do campo. O objetivo é superar as limitações existentes relacionadas à especificidade do setor, contagem limitada de artigos e seleção restrita de banco de dados, fornecendo uma compreensão ampla e profunda das estruturas teóricas e aplicações do neuromarketing.

Design/metodologia/abordagem: Usando uma abordagem SLR, este estudo examina 877 artigos exclusivos provenientes da Scopus e da Web of Science, selecionados com base na relevância para a teoria do neuromarketing. Por meio da análise bibliométrica facilitada pelas ferramentas biblioshiny e Research Rabbit, o estudo identifica autores, documentos, periódicos, redes de colaboração e estruturas temáticas significativas, culminando em uma rede de cocitação e mapeamento conceitual do campo.

Resultados: Os resultados indicam um aumento da pesquisa de neuromarketing, especialmente nos últimos cinco anos. Os principais temas incluem comportamento do consumidor, integração da neurociência e considerações éticas. O estudo identifica três grupos de pesquisa distintos com foco na interseção do neuromarketing com a neurociência, o marketing sensorial e a psicologia do consumidor. Os principais autores e publicações são mapeados, destacando tendências e áreas emergentes para estudos futuros.

Originalidade/valor: Esta pesquisa fornece uma visão abrangente da literatura de neuromarketing, estabelecendo insights fundamentais sobre avanços teóricos e práticos. Ele também propõe um guia conceitual para futuras vias de pesquisa em neuromarketing, servindo como um recurso crítico para pesquisadores e profissionais que buscam uma compreensão estruturada desse campo interdisciplinar.

Palavras-chave: Neuromarketing; Revisão sistemática da literatura; Teoria do neuromarketing; Comportamento do consumidor; Bibliometria

1 INTRODUCTION

Neuromarketing literature explores theories that explain consumer buying behavior. Despite growing interest in the field, significant limitations persist, primarily due to the high cost of research equipment and methodologies. Additionally, as an emerging field, neuromarketing requires ongoing updates to its methods and regulations (Lindstrom, 2016; Bridger, 2019; Cardoso et al., 2022; Russian et al., 2022; Cenizo, 2022).

Many researchers have aimed to enhance the understanding of neuromarketing through bibliometric analyses, but their studies often have important limitations. Some have focused on a single sector, such as food (Stasi et al., 2018), while others have included only a small number of articles, such as Alsharif et al. (2021) with 24 publications. Many scholars have limited their search to a single database, such as Scopus or the Web of Science (Alsharif et al., 2022; Cardoso et al., 2022; Siddique et al., 2023). Furthermore,

some researchers have emphasized technical aspects and have neglected essential neuromarketing theories and concepts (Casado-Aranda & Sanchez-Fernandez, 2022).

To address these gaps, we offer a systematic literature review (SLR) that comprises the theories, techniques, and methodologies in neuromarketing without specific database or technical limitations. Our aim is to provide a comprehensive overview and to highlight promising theoretical developments for stakeholders. Therefore, this study contributes to the existing literature by answering the following questions:

(I) What are the most influential documents on the subject?

(II) Who are the most relevant authors in this field?

(III) Which journals have published the most articles on the subject?

(IV) What are the aspects of collaboration and authorship between authors and institutions?

(V) How has neuromarketing theory research evolved?

(VI) What are the most relevant discoveries in this field?

(VII) What are the main perspectives on future research according to related published studies?

(VIII) What is the understanding regarding the dialogue on the authors' co-citation network?

This work is crucial for researchers who need to understand previous studies' theoretical and epistemological frameworks. Its importance lies in the social impact it fosters by integrating diverse fields, particularly management, and addressing often-overlooked findings that contribute to academic and social progress.

This research advances the field by answering key questions through an SLR in which we employed the biblioshiny tool to analyze existing knowledge in neuromarketing, neuroscience, and marketing. We also examined the co-citation network in the selected articles using the Research Rabbit platform (Chandra, Slater, & Ma, 2023).

Following this introduction, the article includes a theoretical framework, a description of the methodology, and the main findings of the analysis. It discusses

scientific mapping, presents the co-citation network, suggests future research directions, and concludes with reflections on the principal findings.

2 THEORIES THAT UNDERPIN NEUROMARKETING

Among the key theories in this field, Kahneman's dual processing theory (2011) is significant for its proposition that human thought operates through two systems: System 1, which is quick and automatic, and System 2, which is slow and deliberate. Neuromarketers use this theory to explore how consumers are influenced by subconscious stimuli to make rapid, often irrational decisions (Bettiga et al., 2017; Alsharif et al., 2022; Calvert et al., 2020).

Cognitive dissonance, introduced by Festinger (1957), suggests that individuals strive to reduce the differences between their beliefs and behaviors. The reward circuit theory, based on Schultz's research (1998), highlights how specific stimuli activate the brain's reward areas.

Lazarus' (1991) theory of cognitive evaluation asserts that emotions arise from an individual's assessment of events, while the James-Lange theory (1884) posits that emotions result from physiological reactions to events. Neuromarketers employ these theories to analyze bodily responses, such as heart rate and galvanic skin response, during marketing exposure (Lee, Broderick, & Chamberlain, 2007; Plassmann et al., 2012).

Drawing from cognitive, social, and evolutionary psychology, this multidisciplinary approach enhances the understanding of the brain's role in purchasing behaviors to enable marketers to develop more effective strategies. Predictive coding theories suggest that the brain constantly develops and adjusts predictions about the world (Karmarkar & Plassmann, 2019), which explains how consumers form expectations (Clark, 2013).

Social comparison theory (Festinger, 1954) details how individuals evaluate choices based on others' opinions. Evolutionary psychology, as noted by Tooby and Cosmides (1992), indicates that modern behaviors may be adaptations of inherited traits that influence preferences (Griskevicius & Kenrick, 2013).

In summary, neuromarketers integrate insights from various psychological frameworks to provide a comprehensive understanding of consumer behavior and to inform effective, ethical marketing strategies.

3 METHODOLOGY

We employed an SLR as our primary method because of its effectiveness in identifying, evaluating, and consolidating existing documents in a specific knowledge area (Lobo et al., 2024).

The SLR process typically includes defining the research question, selecting search terms, choosing bibliographic databases, applying screening criteria, evaluating retrieved articles, and consolidating results (Tranfield et al., 2013; Fink, 2014; Thomé et al., 2016; Michelini et al., 2018; Lobo et al., 2024).

We developed search terms from prior analyses of articles related to neuromarketing, neuroscience, and marketing, and we selected the Scopus and Web of Science databases for their extensive peer-reviewed collections in organizational administration and applied social sciences (Colicchia & Strozzi, 2012; Michelini et al., 2018; Lobo et al., 2024). Table 1 illustrates how these terms were applied in each database.

To delimit the bibliographic research, we used the following criteria:

1. Search terms were enclosed in double quotation marks.
2. Only articles written in English were considered.
3. Regarding the country of origin, the selection was open without restrictions.
4. The beginning publication date was left blank, and the ending publication date was December 2023, as we attempted to cover seminal publications on the topic, including recent research.

Table 1 – Data Used in the Survey

Database	Expression Used in the Search	Authors
Web of Science	TS = ([neuromarketing] OR [neuroscience AND marketing])	Sokolova et al., 2021 Schneider & Wooglar, 2015 Morin, 2011
Scopus	TITLE-ABS-KEY ("neuromarketing" OR "neuroscience AND marketing")	Gil-Torres et al., 2023 Plassmann et al., 2015 Lee, Broderick, & Chamberlain, 2007

Source: Prepared by the authors

The document extraction process produced 1,210 articles: 500 were from the Scopus database, and 710 were from the Web of Science. We organized these articles into a single database using R4.20 software; this resulted in the deletion of 334 duplicate documents, which left 877 unique articles. It is important to note that the extensive search in two large databases justifies the high number of duplicate papers. These procedures ensured the relevance and accuracy of the results obtained in this study. Additionally, we conducted a documentary analysis (Bowen, 2009) of the abstracts of the 877 articles to identify those that were truly relevant to our research, removing all but 72 articles. We analyzed these articles via the bibliometrix library, which includes the biblioshiny package. This package has recently been used in other neuromarketing research (Aria & Cuccurullo, 2017; Abafe et al., 2022; Michailidis, 2022; Lobo et al., 2024), and we explored it in this study. We considered the articles to be relevant if they specifically and explicitly addressed a contribution to neuromarketing theory.

4 RESULTS

We used the bibliometrix package and the biblioshiny tool to evaluate 72 documents from 61 sources. These documents represent an average annual increase

of 11.12% in studies on the topic and an average article age of 5.64 years; 45 articles were published between 2019 and 2023 compared to just two from 2009 to 2018. This indicates a significant increase in studies over the past 5 years.

Grimes (2006) first associated neuroscience with marketing, suggesting that companies that understand visual and phonological stimuli can better address consumer behavior. He references key figures including Lehmann (1977) and Medina (2004).

The 72 documents average 31.96 citations each and collectively contain 3,472 references. They also feature 302 keyword-plus terms and 266 author-assigned keywords. A total of 249 authors contributed to the articles, with only 12 articles being solely authored. On average, each paper has approximately three authors, as presented in Table 2.

Table 2 – General Information About the Database

Description	Results
Timespan	2006 - 2023
Sources (Journals, Books, etc)	61
Documents	72
Annual Growth Rate %	11,12
Document Average Age	5,64
Average citations per doc	31,96
References	3472
Keywords Plus	302
Author´s Keywords	266
Authors	249
Authors of single-authores docs	12
Co-Authors per Doc	3,86

Source: Prepared by the authors

The logic of Bradford's law in the tool allows researchers to identify the most relevant journals in any field and perform a more objective analysis (Abafe et al., 2022). Table 3 displays the top 10 neuromarketing journals.

Table 3 – Most Relevant Sources

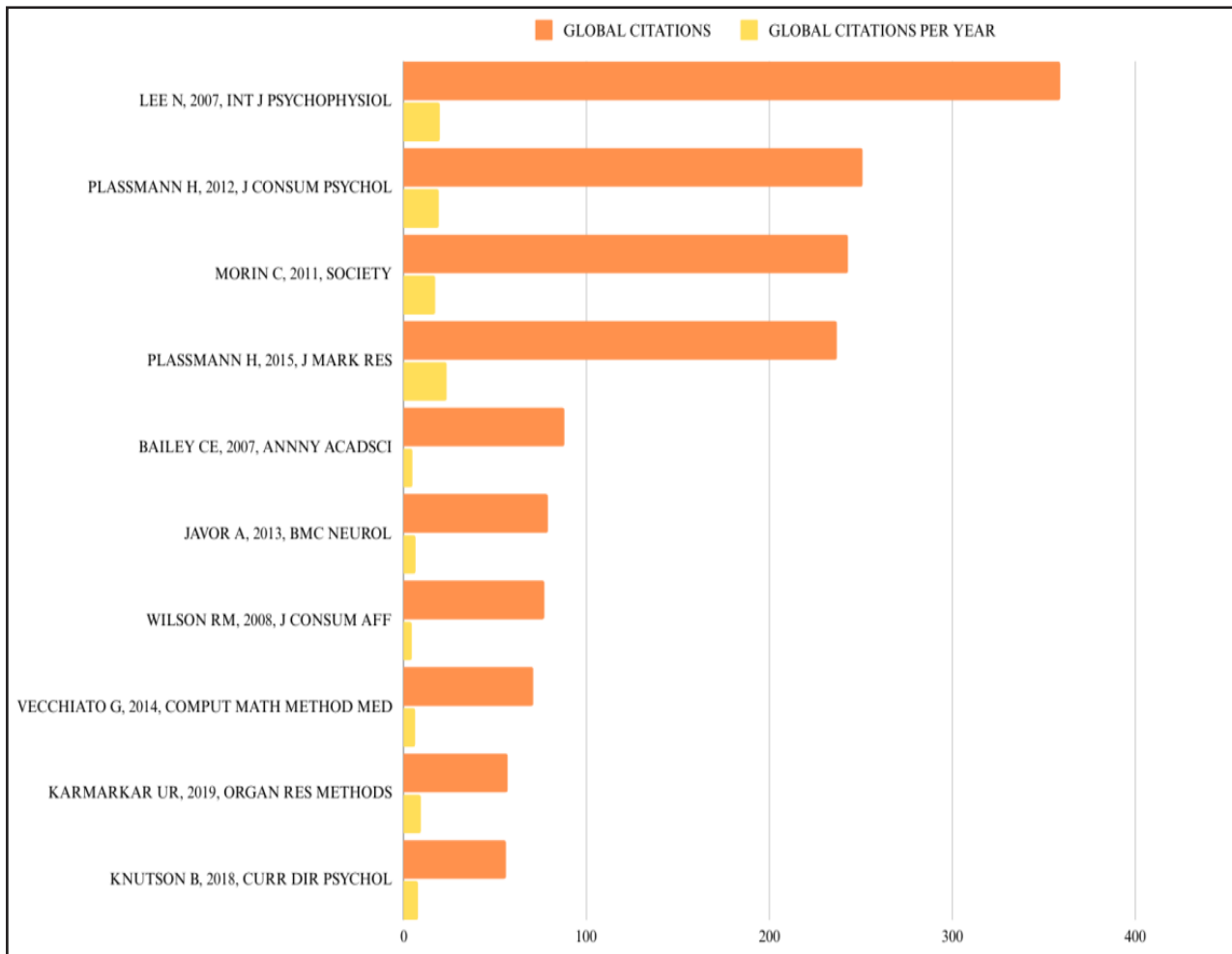| Sources	Articles
European journal of marketing	3
Frontiers in psychology	3
Behavioral sciences	2
Estudios de economia aplicada	2
Foods	2
Index comunication	2
Journal of advertising research	2
Journal of marketing research	2
Scientific annal of economics and business	2
Annals of tourism research	1

Source: Prepared by the authors

The main neuromarketing literature sources are the European Journal of Marketing and Frontiers in Psychology, each of which published three articles. The European Journal of Marketing experienced an increase in publications from zero in 2017 to three in 2018 and has since maintained this level. Frontiers in Psychology increased its publications from two in 2020 to three in 2021 and has sustained that number.

The most cited article is "What is 'neuromarketing'? A discussion and agenda for future research" by Lee, Broderick, and Chamberlain (2007), which has 359 citations and an average of 19.94 citations per year (Figure 1). In this seminal work, the authors argue that using neuroimaging in marketing research enhances understanding of the effects of marketing techniques and illuminates key business relationship issues.

The article "Branding the Brain: A Critical Review and Outlook" by Plassmann et al. (2012) has received 251 citations, which is an average of 19.31 citations per year. The authors explore the connection between neuroscience, marketing, and consumer psychology, highlighting researchers' excitement about applying neuroscience to brand consumption and their visions of future developments.

Figure 1 – Most Cited Articles in Total and by Year Globally

Source: Prepared by the authors

In fourth place among the most cited articles globally, "Consumer Neuroscience: Applications, Challenges, and Possible Solutions" by Plassmann et al. (2015) has 237 citations and the highest annual citation rate: 23.70. This article identifies three key challenges in neuromarketing: complexities beyond basic brain–behavior correlations, the need for a statistical foundation for behavioral inferences, and concerns over result reliability and generalizability. The authors discuss how consumer neuroscience can effectively address significant marketing questions and enhance theory and practice. Table 4 presents neuromarketing's 10 most relevant authors. It should be noted that Alsharif and Salleh (2022) collaborated in their four empirical studies.

Table 4 – Most Relevant Authors

| Authors	N. of articles
Alsharif	4
Chamberlain	4
Lee	4
Salleh	4
Plassmann	3
Ramsoy	3
Babiloni	2
Binkyte-veteline	2
Brandes	2
Cenizo	2

Source: Prepared by the authors

Chamberlain and Lee et al. (2007, 2017, and 2018) collaborated in four studies, three of which were theoretical and one that was empirical. Additionally, Brandes (see Table 4) participated with them in one theoretical and one empirical study. Plassmann et al. (2012 and 2015) appear on Table 4 with three articles, one of which had Ramsoy's (2019) participation. Among the authors mentioned, only Cenizo (2022 and 2023) published single-author studies.

Figure 2 reinforces the information presented in Table 4 and conveys the collaboration network among the authors. Coincidentally, the most relevant authors also have significant collaboration in their studies, which indicates that researchers who are interested in neuromarketing produce knowledge through partnerships.

Figure 3 illustrates the productivity timeline of the authors mentioned in Table 4. Articles included in this study began to be published in 2007 and peaked in 2022 and 2023.

Figure 2 – Collaboration Network Between Authors
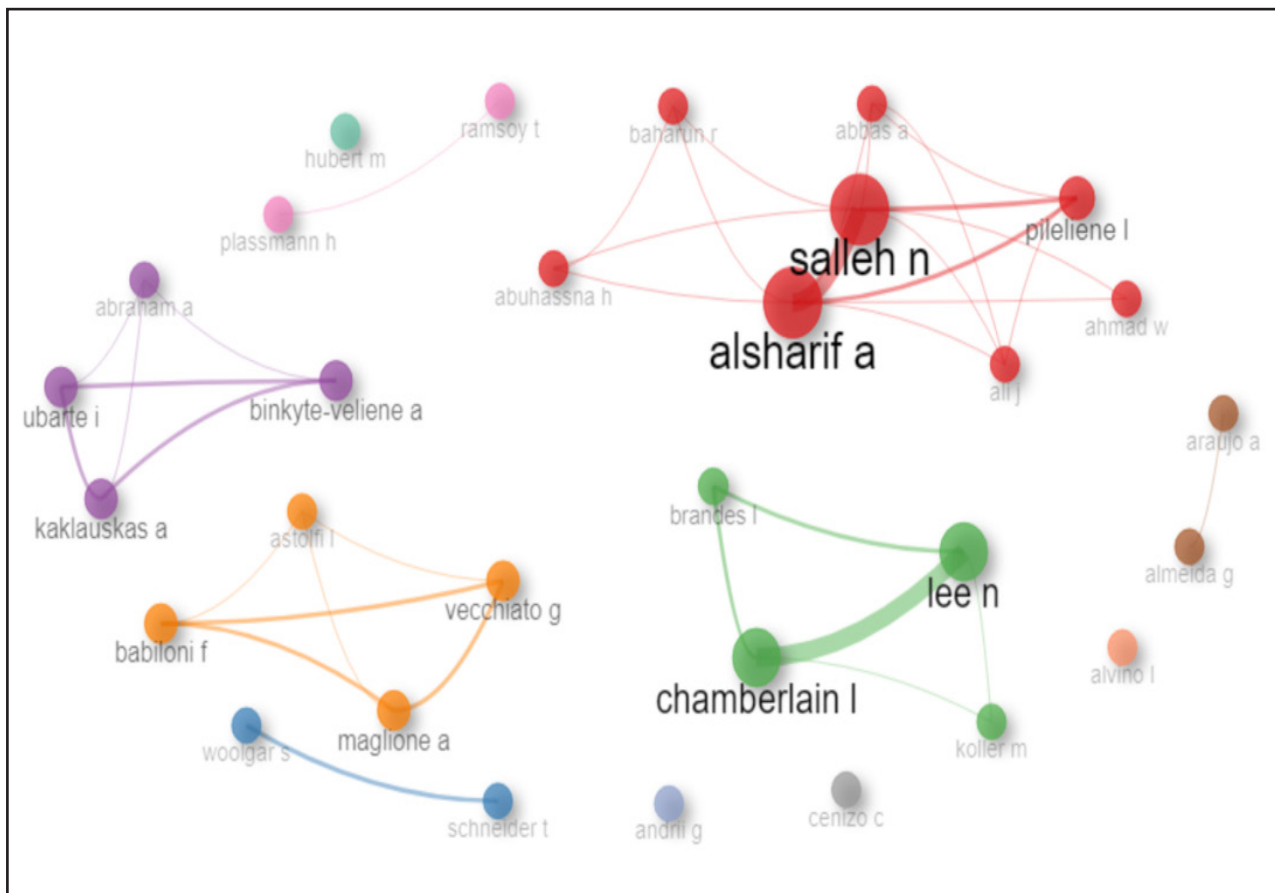
Source: Prepared by the authors

Lee, Chamberlain, and Brandes (2018) have been publishing specifically on neuromarketing since 2007 and have the most cited article globally. In a recent article, "Welcome to the jungle! The neuromarketing literature through the eyes of a newcomer," they detail their bibliometric study of 131 related articles and analyze the articles descriptively, including the number of publications over the years, content, and journal quality, thereby verifying that neuromarketing interest is growing, as evidenced by a greater variety of topics and methods year after year. This resulted in the lens of semiotics being used as a related neophyte perspective because the initial process of familiarization with the area is bibliographic research on the subject.

Figure 3 – Authors' Production over Time
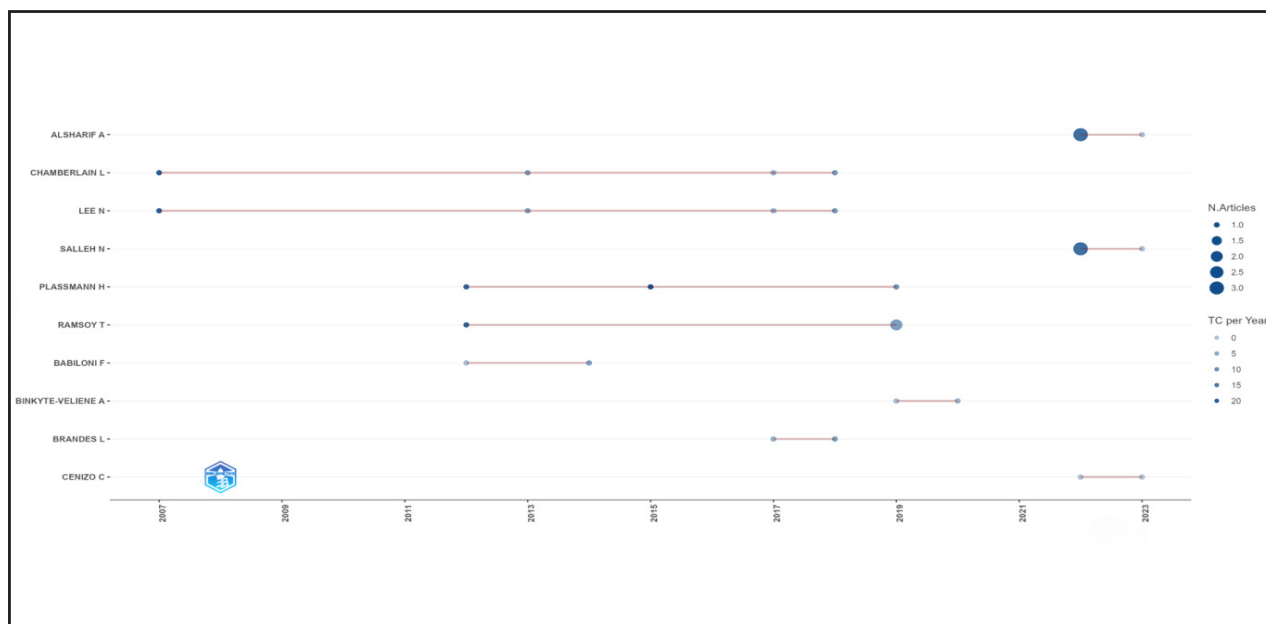
Source: Prepared by the authors

Another recent notable work is from Alsharif et al. (2022), who compile neuromarketing's most-used tools to study consumer behavior; they conclude that the EEG is the most frequently used tool to measure behavior related to advertisements, products, and brands. The authors also discuss the implicit association test (IAT), which provides information about valence and emotional arousal. These tools bring information from the conscious, subconscious, and unconscious to marketing stimuli. The authors emphasize that neuromarketing is a revolutionary field for understanding consumer behavior and effectively solving marketing issues.

Additionally, the biblioshiny tool presents the most relevant affiliations based on the collected database, as it considers the number of articles published and the institutions to which the authors are connected (Aria & Cuccurullo, 2017). Table 5 indicates that Teknol Malaysia University is in first place with eight published articles.

Table 5 – Most Relevant Affiliations

Affiliation	Articles
University Teknol Malaysia	8
University Cadiz	6
University Republica	6
University Roma La Sapienza	6
University Malaga	5
University Oxford	5
University Warwick	5
Aston University	4
Lesya Ukrainka Volyn Natl University	4
Ningbo University	4

Source: Prepared by the authors

Examining the literature from a geographic origin perspective (see Table 6) reveals the most productive countries based on author location; two indicators are used: single country publications (SCP) and publications with international contributions (MCP).

Table 6 – Corresponding Countries of the Authors

| Position	Country	Articles	SCP	MCP	MCP_%
1	Spain	12	10	2	16,70%
2	USA	7	5	2	28,60%
3	China	6	4	2	33,30%
4	Italy	5	3	2	40%
5	United Kingdom	5	5	0	0%
6	Malaysia	4	0	4	100%
7	Australia	3	3	0	0%
8	Switzerland	3	0	3	100%
9	Ukraine	3	3	0	0%
10	Austria	2	1	1	50%

Source: Prepared by the authors

Table 6 ranks the 10 most productive countries. It should be noted that most of the publications come from authors in Spain (12 articles), which is followed by the United States with seven publications and China with six publications. Brazil does not appear among the 10. When we analyzed the rate of international contributions (MCP%) by country, we observed that Malaysia and Switzerland have the highest level of international contribution in 100% of their investigations. Austria follows with 50%, and Italy places fourth with 40%. Table 6 illustrates the dynamics discussed. It is important to note the limited participation of authors from the South American and African continents; North America, represented by the US; Asia, represented by Malaysia and China; and Europe, England, Italy, and Spain took the lead.

Additionally, the co-occurrence of words can be analyzed through the keyword-plus entries and author-assigned keywords. From a bibliometric perspective, keywords have better explanatory power in the scientific area, while an author's keywords better represent the document's content (Abafe et al., 2022).

Our research dataset had 302 keywords plus 266 author-assigned keywords. Figure 4 illustrates the seven most cited words according to the authors' keywords, of which we mention the following: neuromarketing (41), consumer neuroscience (14), and neuroscience (13).

Figure 4 – Most Frequent Words as Attributed by the Authors
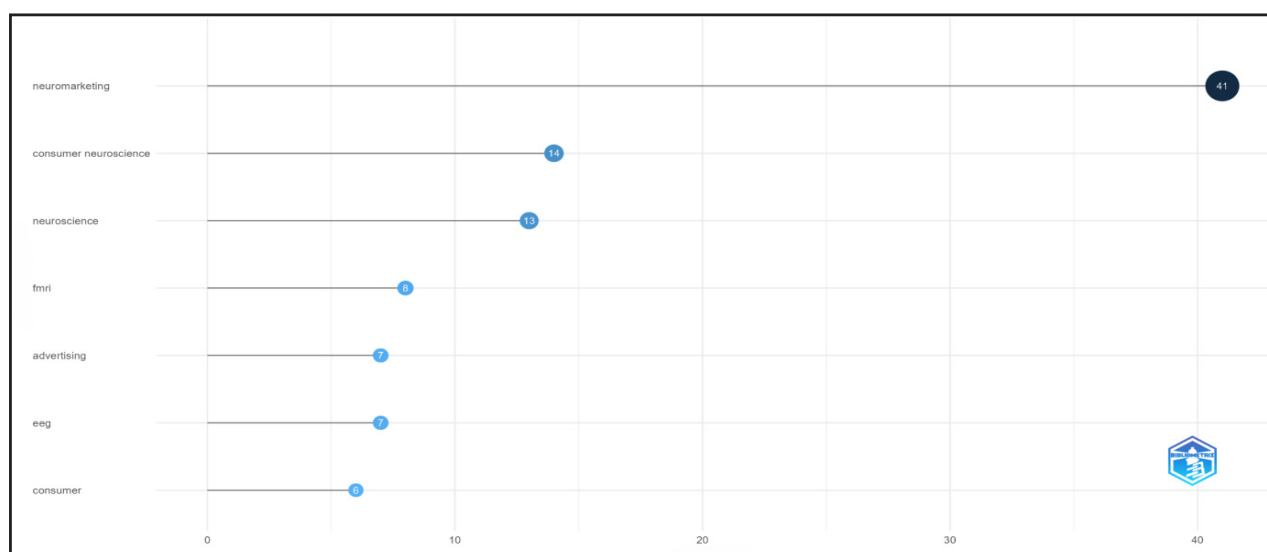
Source: Prepared by the authors

Two of these words correspond to the search terms that were initially defined for the search. *Neuromarketing* was used almost three times as often as *consumer neuroscience.*

Through multiple correspondence analysis (MCA), we analyzed patterns between categorical variables, using graphs and numerical frequencies to find new factors or variables to obtain a low-dimensional Euclidean representation of the original data (Aria & Cuccurullo, 2017; Abafe et al., 2022).

Figure 5 presents the map of the conceptual structure obtained through the MCA method; the keywords that are near each shape indicate that most of the articles present those words together; when the words are far from the shape, that means that few articles approach the topic from this perspective.

Figure 5 – Map of the Conceptual Structure: Factor Analysis
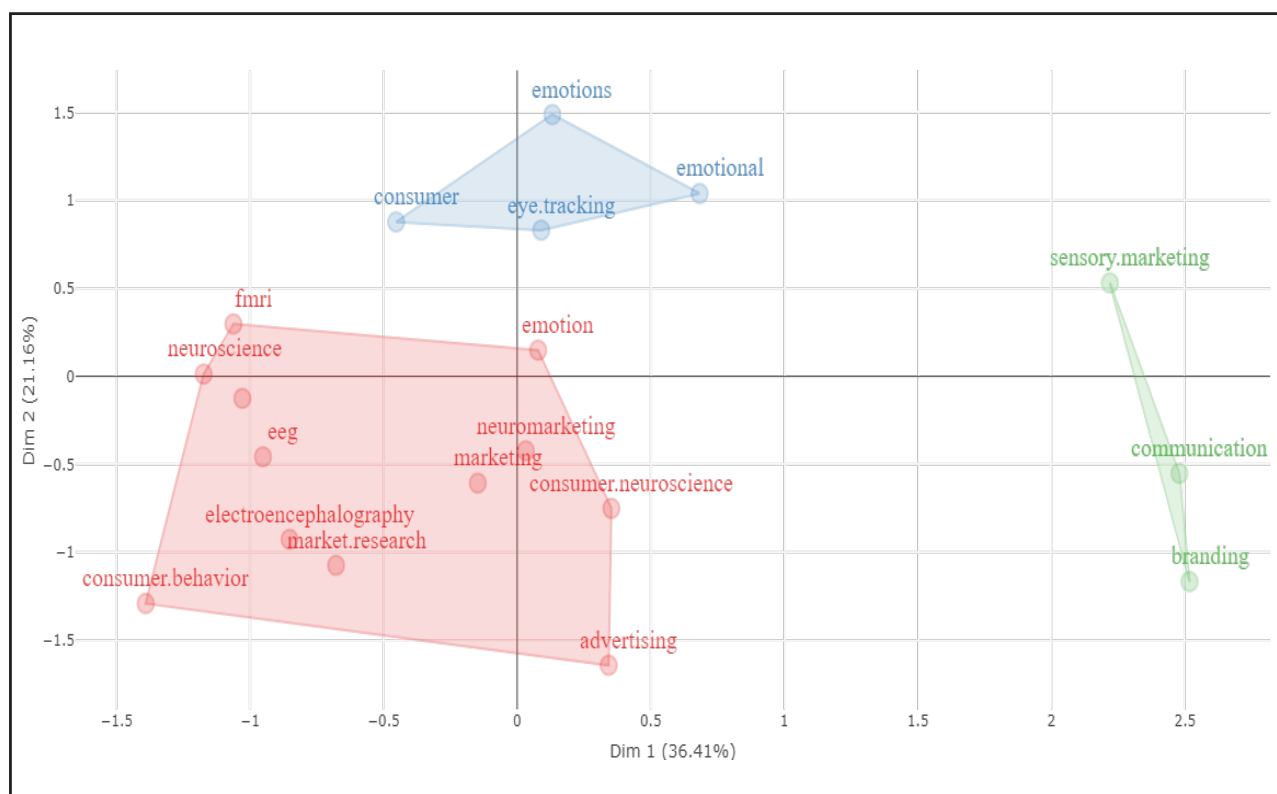
Source: Prepared by the authors

Analyzing Figure 5 allowed us to identify specific clusters of terms related to neuromarketing and its adjacent fields. The terms *neuromarketing, neuroscience,* and

marketing are closely grouped, thus indicating a significant volume of related research. This aligns with findings from Bailey (2007) and Karmarkar and Plassmann (2019) and thereby highlights the intersection between neuroscience and marketing practices.

A distinct cluster focuses on eye tracking, consumer behavior, and emotions; this cluster contains research by Chen et al. (2015) and Bordino (2022). The proximity to the main cluster suggests a strong connection between these concepts and neuromarketing strategies while still indicating different methodological approaches.

The third cluster is separate from the others because it encompasses studies on communication, sensory marketing, and branding, including works by Javor et al. (2013) and Fondevila-Gascon et al. (2023). Although important, this group represents a specialized focus on sensory experiences and brand development.

The thematic map in Figure 6 comprises four quadrants: niche themes, motor themes, basic themes, and emerging or declining themes. Clusters are organized based on centrality, which reflects the relevance and density of each theme (Lobo et al., 2011; Michailidis, 2022). The analytical parameters we established were intended to optimize search results and reduce irrelevant findings (Lobo et al., 2024).

As illustrated in Figure 6, themes characterized by both high centrality and high density, known as *motors,* represent the most extensively studied areas in neuromarketing and highlight significant priorities as well as impacts. The occurrence of terms related to neuroscience and consumer behavior, such as *neuroscience, fMRI, neuroethics,* and *purchasing behavior,* indicates their primary focus in current research. Additionally, the emphasis on emotion as a key theme highlights marketers' need to understand consumers' emotional responses. However, the low density in this area suggests substantial opportunities for further exploration.

Figure 6 – General Thematic Map
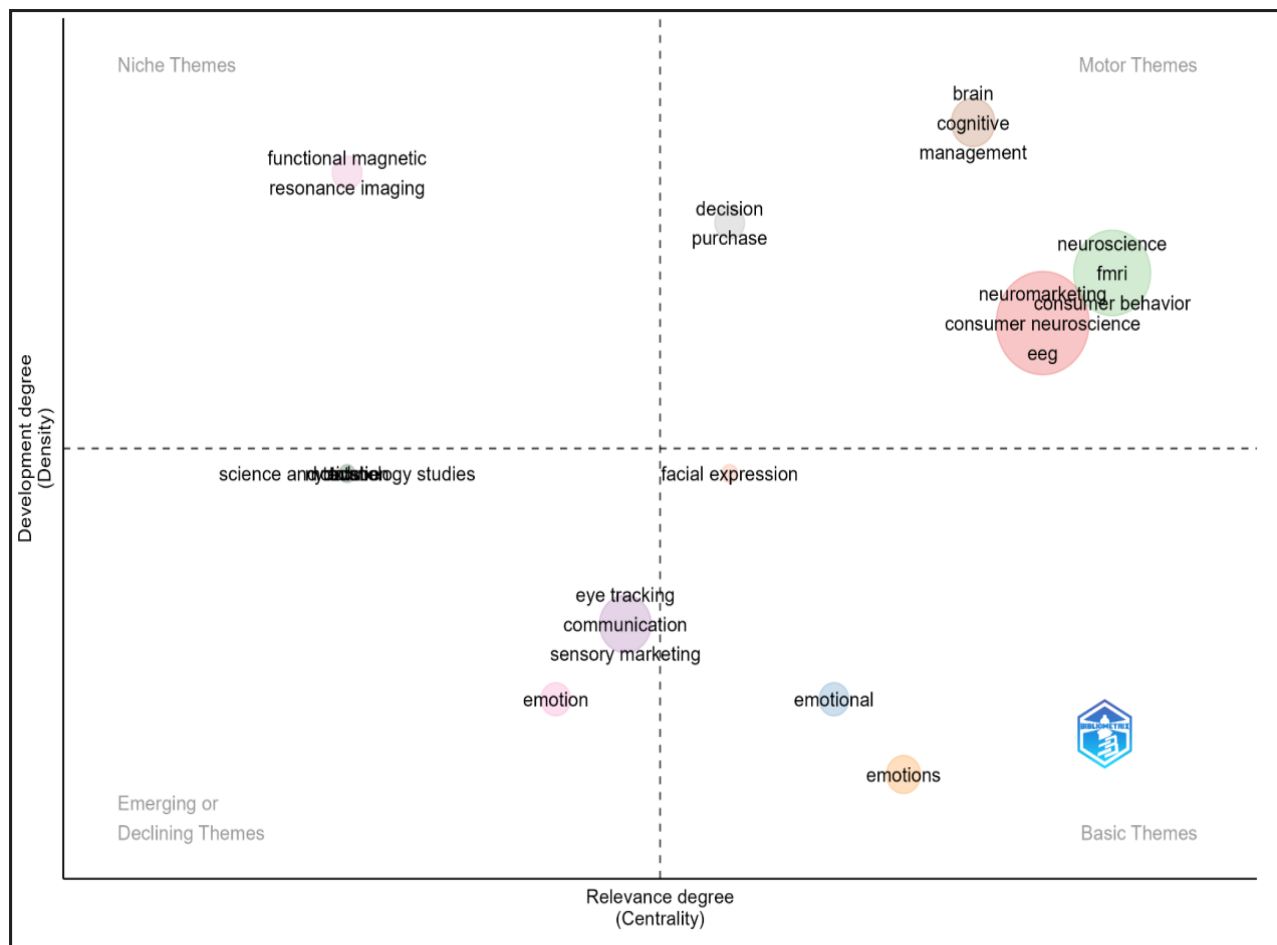
Source: Prepared by the authors

In the niche themes quadrant, *functional magnetic resonance imaging* (fMRI) appears to be well-developed but may be more applicable in specific contexts rather than being integrated into broader neuromarketing research. The quadrant that represents emerging or declining themes indicates an increase in topics such as eye tracking and sensory marketing, which are promising areas for future investigation but are currently underrepresented in the literature.

Additionally, the analyzed literature reveals connections between themes and authors, thereby enabling us to identify the most relevant niches in the field. By grouping articles according to the themes present in a database's theoretical framework, we identified many clusters: neuromarketing, neuroscience, decisions, emotion, brain, YouTube, trust, functional magnetic imaging, eye tracking, emotions, emotional responses,

facial expressions, motivation, and science and technology studies (Table 7). However, only the neuroscience cluster demonstrates a significant relationship with the neuromarketing cluster. Consequently, only those studies were included in the SLR analysis.

Table 7 – Documents' Adherence to the Theme

Title	Author and Year	Neuromarketing	Neuroscience	Agglomeration
Branding the brain: A critical review and outlook	Plassman, 2012	1	0	Neuromarketing
Consumer Neuroscience: Applications, Challenges, and Possible Solutions	Plassman, 2015	1	0	Neuromarketing
Welcome to the jungle! The neuromarketing literature through the eyes of a newcomer	Lee, 2018	1	0	Neuromarketing
Established liked versus disliked brands: Brain activity, implicit associations and explicit responses	Bosshard, 2016	1	0	Neuromarketing
What can neuroscience offer marketing research?	Sung, 2020	1	0	Neuromarketing
A global research trends of neuromarketing 2015–2020	Alsharif, 2022	1	0	Neuromarketing
Neuromarketing in the making: enactment and reflexive entanglement in an emerging field	Schneider, 2015	1	0	Neuromarketing
The added value of the electrical neuroimaging for the evaluation of marketing stimuli	Vecchiato, 2012	1	0	Neuromarketing

Continues

Table 7 – Documents' Adherence to the Theme

Title	Author and Year	Neuromarketing	Neuroscience	Agglomeration
A review of research on neuromarketing using content analysis: key approaches and new avenues	Robaina-Calderín, 2021	1	0	Neuromarketing
Accessing neuromarketing scientific performance: research gaps and emerging topics	Cardoso, 2022	1	0	Neuromarketing
Consumer Neuroscience: Attentional Preferences for Wine Labeling Reflected in the Posterior Contralateral Negativity	Alvino, 2021	1	0	Neuromarketing
A review of studies on internet of everything as an enabler of neuromarketing methods and techniques	Tirandazi, 2023	1	0	Neuromarketing
An implicit research methodology to evaluate advertising effectiveness in Esports streaming based on viewers' gaze, cognitive and emotional responses Implicit Research Methodology to Evaluate the Effectiveness of Advertising in Esports Streaming Based on Viewers' Cognitive and Emotional Responses	Giakoni, 2022	1	0	Neuromarketing

Table 7 – Documents' Adherence to the Theme

Title	Author and Year	Neuromarketing	Neuroscience	Agglomeration
Marketing in social innovations targeted at healthcare	Hanulakova, 2021	1	0	Neuromarketing
It's about the process, not the result: An fMRI approach to explore the encoding of explicit and implicit price information	Linzmajer, 2021	1	0	Neuromarketing
SEM model in neuromarketing as a planning tool in higher education	Bordino, 2022	1	0	Neuromarketing
Methodological providing of innovative marketing research technology	Sokolova, 2021	1	0	Neuromarketing
Neuromarketing: concept, historical evolution and challenges	Cenizo, 2022	0.892	0.108	Neuromarketing
A Comprehensive Bibliometric Analysis of fNIRS and fMRI Technology in Neuromarketing	Alsharif, 2023	0.874	0.126	Neuromarketing
Biomedical Technology in Studying Consumers' Subconscious Behavior	Alsharif, 2022	0.759	0.241	Neuromarketing
Current Trends in the Application of EEG in Neuromarketing: A Bibliometric Analysis	Alsharif, 2022	0.715	0.285	Neuromarketing
Measuring consumer neural activation to differentiate cognitive processing of advertising: Revisiting Krugman	Daugherty, 2018	0.696	0.304	Neuromarketing

Table 7 – Documents' Adherence to the Theme

| Title	Author and Year	Neuromarketing	Neuroscience	Agglomeration
An Overview of Research and Scientific Divulgation in Neuromarketing	Gil-Torres, 2023	0.682	0.318	Neuromarketing
An investigation of the neural correlates of purchase behavior through fNIRS	Çakir, 2018	0.512	0	Neuromarketing
Does Age Matter? Using Neuroscience Approaches to Understand Consumers' Behavior Towards Purchasing the Sustainable Product Online	Chiang, 2022	0.471	0	Neuromarketing
Neuromarketing: The New Science of Consumer Behavior	Morin, 2011	0.471	0.529	Neuroscience
This is your brain on neuromarketing: reflections on a decade of research	Lee, 2017	0.434	0.566	Neuroscience
Citation Classics in Consumer Neuroscience, Neuromarketing and Neuroaesthetics: Identification and Conceptual Analysis	Sánchez-Núñez, 2021	0.222	0.778	Neuroscience
The applicability of neuromarketing in luxury advertising: Current status and potential	Cenizo, 2023	0.128	0.872	Neuroscience
Consumer Neuroscience: Past, Present, and Future	Karmarkar, 2019	0.072	0.928	Neuroscience

Table 7 – Documents' Adherence to the Theme

Continuation

Title	Author and Year	Neuromarketing	Neuroscience	Agglomeration
Consumer Neuroscience: Past, Present, and Future	Lee, 2007	0.031	1.969	Neuroscience
Neuromarketing and the advances in the consumer behaviour studies: a systematic review of the literature	Cruz, 2016	0.008	0.605	Neuroscience

Source: Prepared by the authors

After the bibliometric and thematic text mining, we selected 33 articles, as displayed in Table 7, for the next step: the analysis of the co-citation network. Figure 7 illustrates the co-citation network.

Figure 7 – Co-Citation Network
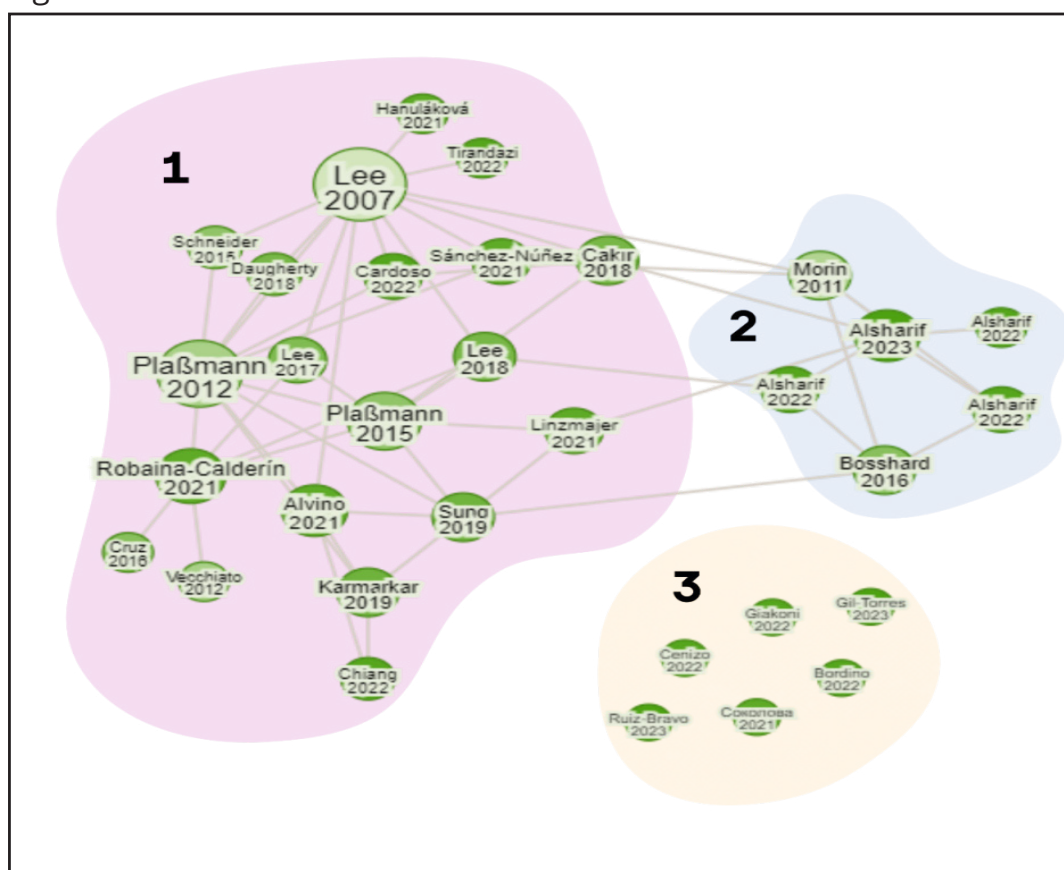
Source: Prepared by the authors

The co-citation network has three clusters: two demonstrate connections between authors, and one represents independence. Notable authors in Cluster 1 include Lee, Broderick, and Chamberlain (2007) and Plassmann et al. (2012), who have discussed the intersection of marketing and neuroscience, addressing the high costs of neuromarketing research and advocating for its integration with consumer psychology, particularly regarding brand perception.

Several authors, including Schneider and Wooglar (2015), Daugherty et al. (2018), Alvino et al. (2021), Sánchez-Núñez et al. (2021), and Cardoso et al. (2022), have cited both key works. Of these five studies, four are empirical and one is theoretical, focusing on consumer behavior with EEG neural screening or identifying trends and gaps in the field. Schneider and Wooglar (2015) note a disconnect between researchers and subjects, emphasizing that although neuromarketing is emerging, marketing has not yet fully leveraged its potential.

Overall, many authors agree that neuromarketing provides a nonintrusive alternative to traditional marketing research, and it can capture consumer reactions to stimuli and offer neurologically based predictions of purchasing behavior.

Regarding Cluster 1, we made several key observations: a) no studies were published in 2020, and approximately 25% were published in 2021; b) only Morin (2011) cited Lee, Broderick, and Chamberlain (2007) outside this cluster; c) studies by Cruz et al. (2016) and Vecchiato et al. (2012) were each referenced only in the article by Robaina-Calderín and Martín-Santana (2021). This indicates a convergence among authors on topics such as the ethical implications of neuromarketing, the need for standardized approaches, and the importance of replication research to validate findings.

The cluster predominantly focuses on consumer behavior studies. Important works include Hanulakova et al.'s (2021) article that examines neuromarketing techniques to enhance health marketing and introduces nano marketing through devices such as bracelets and chips for data accuracy. Karmarkar and Plassmann

(2019) discuss consumer neuroscience—specifically, eye-tracking technology to predict preferences in consumer behavior. Finally, Chiang et al. (2022) explore online consumer behavior toward sustainable products, concluding that aging and declining visual processing skills affect purchasing decisions.

Cluster 2 includes Morin (2011), Bosshard et al. (2016), Alsharif et al. (2022), and Alsharif et al. (2023), all of whom are positioned in the upper-right corner of the image. Notable in this cluster is Alsharif et al.'s (2022) article, which explores global trends in neuromarketing. Alsharif et al. (2023) indirectly engage with Cluster 1 through Çakir et al. (2018) and Linzmajer et al. (2021), who have examined functional near-infrared spectroscopy (fNIRS) and fMRI.

Morin (2011) uniquely cites Lee, Broderick, and Chamberlain (2007), arguing that while neuroscience is in its early stages, neuromarketing is still developing. He highlights the need for further exploration in advertising's effects on self-destructive behaviors.

Bosshard et al. (2016) argue that social constructs significantly shape emotional perceptions of established brands versus new entrants, using the IAT to illustrate their influence on consumer preferences.

Cluster 3 includes six independent studies: Sokolova et al. (2021), Bordino (2022), Cenizo (2022), Giakoni et al. (2022), Cenizo (2023), and Gil-Torres et al. (2023). Key points about this cluster include the following:

a) Two studies are empirical, while four are theoretical.

b) Approximately 34% of the articles are published in *Index Comunicación,* Spain's sixth most relevant scientific journal.

c) All studies were published in the past 5 years; half were published in 2022.

d) While not connected in the citation network, 50% of the articles reference Lee, Broderick, and Chamberlain (2007) or Plassmann et al. (2012).

Notably, Bordino (2022) emphasizes that neuromarketing should guide marketing in education, with decision-making being influenced by empathy. Giakoni

et al. (2022) explore sponsorship effectiveness in electronic sports broadcasts through EEG and eye tracking. Cenizo (2023) examines luxury consumer behavior and concludes that neuromarketing can be beneficial in this saturated market, as it influences emotions and improves consumer awareness.

4.1 Directions for Neuromarketing Research

The intersection of neuroscience and consumer psychology, particularly in brand perception, product characteristics, and social constructs, was explored through content analysis of the co-citation network. This area highlights several potential topics for future research:

a) Ethical Challenges: Upholding ethical standards is crucial for preserving the rights and dignity of research subjects. Concerns arise when research is conducted solely for market objectives and uses provocation to influence decision-making, as this may conflict with democratic principles (Lee, Broderick, & Chamberlain, 2007; Nemorin, 2017; Cenizo, 2022).

b) Research Standards: As a developing field with various techniques and tools, neuromarketing necessitates a standardized research roadmap, which would provide a foundation for future studies (Sokolova et al., 2021; Cenizo, 2022).

c) Sampling Issues: Small sample sizes undermine the credibility, validity, and robustness of neuromarketing techniques (Cenizo, 2022; Gil-Torres et al., 2023).

d) Theoretical Opportunities: Consumer psychology, particularly brand psychology, has been studied extensively. Social constructs significantly influence individuals' emotional perceptions of brands, which highlights the need to consider consumers' social and cultural contexts.

e) Emerging Technologies: Tools such as eye tracking and fMRI provide deeper insights into how the brain processes marketing stimuli. For instance, Giakoni et al. (2022) demonstrate the impact of visual stimuli on viewers' attention, memory, and emotions during electronic sports broadcasts.

f) Various Sector Applications: Neuromarketing is particularly beneficial in the luxury and education sectors, but its applicability extends beyond these areas. For example, Cenizo (2023) finds that luxury sector neuromarketing contributes to identifying the emotions that influence consumer decisions, while Bordino (2022) highlights neuromarketing's importance in education, as it can reveal students' decision-making processes.

g) Interdisciplinary Integration: Merging insights from psychology, neuroscience, and marketing, as proposed in the theoretical framework of this research, can enhance neuromarketing studies. Theories such as Schultz's reward circuit (1998) and Festinger's cognitive dissonance (1957) offer valuable frameworks for analyzing consumer behavior.

Additionally, this research proposes the conceptual map in Figure 8 as a guide for new avenues of neuromarketing study.

Figure 8 – Guide for New Avenues of Study in Neuromarketing
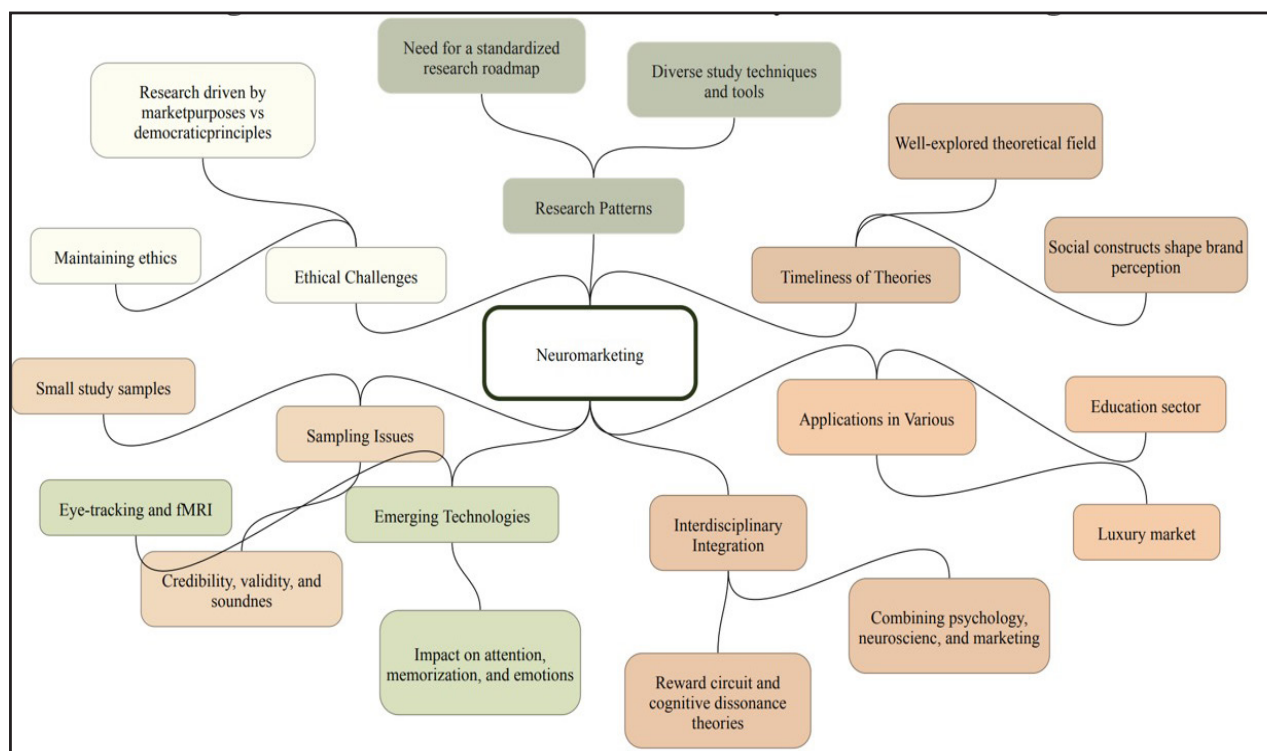
Source: Prepared by the authors

This conceptual map provides a strategic direction for researchers to navigate this complex and evolving landscape. The following section presents a reflection on the main findings of this research.

5 CONCLUSION

This research process began with 877 retrieved articles, which were narrowed to 73 through various mining stages and ultimately to 33 for citation network analysis. Over the past 5 years, neuromarketing publications have increased significantly, averaging an annual growth rate of 11.12%. The number of publications has recently surpassed that of the previous decade, indicating a considerable rise in interest since 2006.

The most cited work in this field is "What is 'neuromarketing'? A discussion and agenda for future research" by Lee, Broderick, and Chamberlain (2007) with 359 citations and an average of 19.94 citations per year. Key journals in the area include the *European Journal of Marketing* and *Frontiers in Psychology*, each of which publishes three neuromarketing-related articles annually.

Among productive authors, notable collaborators include Alsharif and Salleh et al. (2022) and Lee and Chamberlain et al. (2007); each group contributed four articles. The biblioshiny tool facilitated various analyses, including MCA and a thematic map, which revealed significant connections between neuromarketing and neuroscience.

While this investigation has limitations, such as the timeframe that extended only to the end of 2023, it is a starting point for organizing the literature in this evolving field. This article highlights the need for further research, particularly regarding ethical concerns, standardization, and a deeper theoretical understanding of how the brain processes advertising, as neuromarketing currently lacks adequate integration with marketing principles, thereby emphasizing the need for additional replication studies.

REFERENCES

Abafe, E. A., Bahta, Y. T., and Jordaan, H. (2022). "Exploring Biblioshiny for historical assessment of global research on sustainable use of water in agriculture". *Sustainability*, 14(17), 10651. doi: 10.3390/su141710651

Alsharif, A. H., Salleh, N. Z. M., Baharun, R., Abuhassna, H., and Hashem E, A. R. (2021). "A global research trends of neuromarketing: 2015-2020". *Revista de Comunicación*, 21(1), 15–32. doi: 10.26441/rc21.1-2022-a1

Alsharif. A. H., Salleh, N. Z. M., Wan Amira binti Wan Ahmad, and Khraiwish, A. (2022). "Biomedical technology in studying consumers' subconscious behavior". *International Journal of Online and Biomedical Engineering* (iJOE), 18(08), 98–114. doi: 10.3991/ijoe. v18i08.31959

Alsharif, A., Md. Salleh, N. Z., and Pilelienė, L. (2023). "A Comprehensive Bibliometric Analysis of fNIRS and fMRI Technology in Neuromarketing". *Scientific Annals of Economics and Business*, 70(3), 459–472. doi: 10.47743/saeb-2023-0031

Alsharif, A., Md Salleh, N. Z., Pilelienė, L., Abbas, A. F., and Ali, J. (2022). "Current trends in the application of EEG in neuromarketing: A bibliometric analysis". *Scientific Annals of Economics and Business*, 69(3), 393–415. doi: 10.47743/saeb-2022-0020

Alvino, L., Constantinides, E., and van der Lubbe, R. H. J. (2021). "Consumer neuroscience: Attentional preferences for wine labeling reflected in the posterior contralateral negativity". *Frontiers in psychology*, 12. doi: 10.3389/fpsyg.2021.688713

Aria, M., and Cuccurullo, C. (2017). "bibliometrix: An R-tool for comprehensive science mapping analysis". *Journal of Informetrics*, 11(4), 959–975. doi:10.1016/j.joi.2017.08.007

Bailey, C. E. (2007). "Cognitive accuracy and intelligent executive function in the brain and in business". *Annals of the New York Academy of Sciences*, 1118(1), 122–141. doi: 10.1196/ annals.1412.011

Bettiga, D., Lamberti, L., and Noci, G. (2017). "Do mind and body agree? Unconscious versus conscious arousal in product attitude formation". *Journal of Business Research*, 75, 108–117. doi: 10.1016/j.jbusres.2017.02.008

Bordino Mónico , A. E. (2022). "SEM model in neuromarketing as a planning tool in higher education". *Texto Livre Linguagem e Tecnologia*, 15, e40501. doi: 10.35699/1983-3652.2022.40501

Bosshard, S. S., Bourke, J. D., Kunaharan, S., Koller, M., and Walla, (2016). "Established liked versus disliked brands: Brain activity, implicit associations and explicit responses". *Cogent Psychology*, 3(1), 1176691. doi: 10.1080/23311908.2016.1176691

Bowen, G. A. (2009). "Document analysis as a qualitative research method". *Qualitative Research Journal*, 9(2), 27–40. doi:10.3316/qrj0902027

Bridger, D., 2019. "Neuro Design: Neuromarketing insights to boost engagement and profitability". *Translated by A.C. da Cunha Serra*. São Paulo: Autentica Business.

Çakir, M. , Çakar, T., Girisken, Y., and Yurdakul, D. (2018). "An investigation of the neural correlates of purchase behavior through Fnirs". *European Journal of Marketing*, 52(1/2), 224–243. doi: 10.1108/ejm-12-2016-0864

Calvert, G. A., Trufil, G., Pathak, A., and Fulcher, E. (2020). "IMPULSE moment-by-moment test: An implicit measure of affective responses to audiovisual televised or digital advertisements". *Behavioral Sciences*, 10(4), 73. doi: 10.3390/bs10040073

Carboni, A., Maiche, A., and Valle-Lisboa, J. C. (2021). "Teaching the science in Neuroscience to protect from neuromyths: From courses to fieldwork". *Frontiers in human neuroscience*, 15. doi: 10.3389/fnhum.2021.718399

Cardoso, L., Chen, M.-M., Araújo, A., de Almeida, G. G. F., Dias, F., and Moutinho, L. (2022). "Accessing neuromarketing scientific performance: Research gaps and emerging topics". *Behavioral Sciences*, 12(2), 55. doi: 10.3390/bs12020055

Casado-Aranda, L.-A., Dimoka, A., and Sánchez-Fernández, J. (2019)." Consumer processing of online trust signals: A neuroimaging study". *Journal of Interactive Marketing*, 47, 159–180. doi: 10.1016/j.intmar.2019.02.006

Cenizo, C. (2022). Neuromarketing: concepto, evolución histórica y retos. *Revista ICONO14*, 20(1). doi: 10.7195/ri14.v20i1.1784

Cenizo, C. (2023). "La aplicabilidad del neuromarketing en la publicidad del sector lujo. Situación actual, potencial de crecimiento y limitaciones". *Index comunicación*, 13(2), 97–117. doi: 10.33732/ixc/13/02laapli

Chandra, K., Slater, B., and Ma, M. (2023). Research Rabbit [Plataforma web]. Retrieved from https://www.researchrabbit.ai/

Chen, Y.- , Nelson, L. D., and Hsu, M. (2015). "From "where" to "what": Distributed representations of brand associations in the human brain". *JMR, Journal of Marketing Research*, 52(4), 453–466. doi: 10.1509/jmr.14.0606

Chiang, M.-C., Yen, C., and Chen, H.-L. (2022). "Does age matter? Using neuroscience approaches to understand consumers behavior towards purchasing the sustainable product online". *Sustainability*, 14(18), 11352. doi: 10.3390/su141811352

Clark, A. (2013). "Whatever next? Predictive brains, situated agents, and the future of cognitive science". *The Behavioral and Brain Sciences*, 36(3), 181–204. doi: 10.1017/s0140525x12000477

Colicchia, C., and Strozzi, F. (2012). "Supply chain risk management: a new methodology for a systematic literature review". *Supply Chain Management: An International Journal*, 17(4), 403–418. doi:10.1108/13598541211246558

Cruz, C. M. L., Medeiros, J. F. D., Hermes, L. C. R., Marcon, A., and 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. doi: 10.1504/ijbg.2016.078842

Daugherty, T., Hoffman, E., Kennedy, K., and Nolan, M. (2018)." Measuring consumer neural activation to differentiate cognitive processing of advertising: Revisiting Krugman". *European Journal of Marketing*, 52(1/2), 182–198. doi: 10.1108/ejm-10-2017-0657

Festinger, L. (1957). "A Theory of Cognitive Dissonance". Palo Alto, CA, USA: *Stanford University Press.*

Fink, A. (2014). "Conducting Research Literature Reviews: From the Internet to Paper". 4th edn. *Sage Publications*, Thousands Oaks.

Fondevila-Gascón, J.-F., Gutiérrez-Aragón, Ó., Vidal-Portés, E., and Pujol-Cordero, O. (2023). "Influencia del neuromarketing en la percepción de carteles publicitarios: Factores determinantes en la atención". *grafica*, 11(22), 133–143. doi: 10.5565/rev/grafica.256

Giakoni, F., López, M., Segado, F., Manzanares, A., and Mínguez, J. (2022). "An implicit research methodology to evaluate advertising effectiveness in Esports streaming based on viewers' gaze, cognitive and emotional responses". *SPORT TK-Revista EuroAmericana de Ciencias del Deporte*, 11, 21. doi: 10.6018/sportk.485921

Gil-Torres, A., López-López, A., Sánchez-Sandoval, R., and Mall, B. A. (2023). "Panorama de la investigación y divulgación científicas en neuromarketing". *Index comunicación*, 13(2), 13–24. doi: 10.33732/ixc/13/02panora

Grimes, A. (2006). "Are we listening and learning? Understanding the nature of hemispherical lateralisation and its application to marketing". *International Journal of Market Research*, 48(4), 439–458. doi: 10.1177/147078530604800406

Griskevicius, V., and Kenrick, D. T. (2013). "Fundamental motives: How evolutionary needs influence consumer behavior". *Journal of Consumer Psychology*, 23(3), 372–386. doi: 10.1016/j.jcps.2013.03.003

Hanulakova, E., Dano, F., Kukura, M., and Hula, R. (2021). "Marketing in social innovations targeted at healthcare". *Marketing and Management of Innovations*, 5(3), 90–107. doi: 10.21272/mmi.2021.3-08

James, W.; Lange, C. G. The emotions. Baltimore: Williams and Wilkins Company, 1884.

Javor, A., Koller, M., Lee, N., Chamberlain, L., and Ransmayr, G. (2013). "Neuromarketing and consumer neuroscience: contributions to neurology". *BMC Neurology*, 13(1). doi: 10.1186/1471-2377-13-13

Karmarkar, U. R., and Plassmann, H. (2019). "Consumer neuroscience: Past, present, and future". *Organizational Research Methods*, 22(1), 174–195. doi: 10.1177/1094428117730598

Khurana, V., Gahalawat, M., Kumar, , Roy, , Dogra, D. , Scheme, E., and Soleymani, M. (2021). "A survey on neuromarketing using EEG signals". *IEEE transactions on cognitive and developmental systems*, 13(4), 732–749. doi: 10.1109/tcds.2021.3065200

Lazarus, R. S. (1991). *Emotion and Adaptation.* Nova Iorque, NY, USA: Oxford University Press.

Lee, N., Brandes, L., Chamberlain, L., and Senior, C. (2017). "This is your brain on neuromarketing: reflections on a decade of research". *Journal of Marketing Management*, 33(11–12), 878–892. doi: 10.1080/0267257x.2017.1327249

Lee, N., Broderick, A. J., and Chamberlain, L. (2007). "What is 'neuromarketing'? A discussion and agenda for future research". International Journal of Psychophysiology: Official Journal of the *International Organization of Psychophysiology*, 63(2), 199–204. doi: 10.1016/j.ijpsycho.2006.03.007

Lee, N., Chamberlain, L., and Brandes, L. (2018). "Welcome to the jungle! The neuromarketing literature through the eyes of a newcomer". *European Journal of Marketing*, 52(1/2), 4–38. doi: 10.1108/ejm-02-2017-0122

Lehmann, D.R. (1977). "Responses to advertising a new car". *Journal of Advertising Research*, 17, 4, p 23–28.

Lindstrom, M. (2016). *A lógica do consumo: verdades e mentiras sobre por que compramos* (M. Lino, Trad.). Rio de Janeiro: HarperCollins Brasil.

Linzmajer, M., Hubert, M., and Hubert, M. (2021). "It's about the process, not the result: An fMRI approach to explore the encoding of explicit and implicit price information". *Journal Of Economic Psychology*, 86(102403), 102403. doi: 10.1016/j.joe 2021.102403

Lobo, E. A., de Melo Filho, J. I. B., Tahim, E. F., and Câmara, S. F. (2024). "The orchestration approach in innovation: A systematic literature review". *International Journal of Innovation and Technology Management*. doi: 10.1142/s0219877024300052

Medina, J. (2004). The neurobiology of the decision to buy. Psychiatric Times, October, p 31–34.

Michelini, L., Principato, L., and Iasevoli, G. (2018). "Understanding food sharing models to tackle sustainability challenges". *Ecological Economics*: *The Journal of the International Society for Ecological Economics*, 145, 205–217. doi:10.1016/j.ecolecon.2017.09.009

Morin, C. (2011). "Neuromarketing: The new science of consumer behavior". *Society*, 48(2), 131–135. doi: 10.1007/s12115-010-9408-1

Nemorin, S. (2017). "Neuromarketing and the "poor in world" consumer: how the animalization of thinking underpins contemporary market research discourses". *Consumption Markets and Culture*, 20(1), 59–80. doi: 10.1080/10253866.2016.1160897

Plassmann, H., Ramsøy, T. Z., and Milosavljevic, M. (2012). "Branding the brain: A critical review and outlook". *Journal of Consumer Psychology: The Official Journal of the Society for Consumer Psychology*, 22(1), 18–36. doi: 10.1016/j.jcps.2011.11.010

Plassmann, H., Venkatraman, V., Huettel, S., and Yoon, C. (2015). "Consumer neuroscience: Applications, challenges, and possible solutions". *JMR, Journal of Marketing Research*, 52(4), 427–435. doi: 10.1509/jmr.14.0048

Ramsøy, T. Z. (2019). "Building a foundation for neuromarketing and consumer neuroscience research: How researchers can apply academic rigor to the neuroscientific study of advertising effects". *Journal of Advertising Research*, 59(3), 281–294. doi: 10.2501/jar-2019-034

Robaina-Calderín, L., and Martín-Santana, J. D. (2021). "A review of research on neuromarketing using content analysis: key approaches and new avenues". *Cognitive Neurodynamics*, 15(6), 923–938. doi: 10.1007/s11571-021-09693-y

Russian, V., Bilucaglia, M., Circi, R., Bellati, M., Valesi, R., Laureanti, R., ... Zito, M. (2022). "The role of the emotional sequence in the communication of the territorial cheeses: A neuromarketing approach". *Foods* (Basel, Switzerland), 11(15), 2349. doi: 10.3390/foods11152349

Sánchez-Núñez, , Cobo, M. J., Vaccaro, G., Peláez, J. I., and Herrera-Viedma, E. (2021). "Citation Classics in consumer neuroscience, neuromarketing and neuroaesthetics: Identification and conceptual analysis". *Brain Sciences*, 11(5), 548. doi: 10.3390/brainsci11050548

Schmitz, S. (2012). "The neurotechnological cerebral subject: Persistence of implicit and explicit gender norms in a network of change". *Neuroethics*, 5(3), 261–274. doi: 10.1007/s12152-011-9129-1

Schneider, T., and Woolgar, S. (2012). "Technologies of ironic revelation: enacting consumers in neuromarkets". *Consumption Markets and Culture*, 15(2), 169–189. doi: 10.1080/10253866.2012.654959

Schneider, T., and Woolgar, S. (2015). "Neuromarketing in the making: Enactment and reflexive entanglement in an emerging field". *BioSocieties*, 10(4), 400–421. doi: 10.1057/biosoc.2015.37

Schultz, W. (1998). "Predictive reward signal of dopamine neurons". *Journal of Neurophysiology*, 80(1), 1–27. doi: 10.1152/jn.1998.80.1.1

Sokolova, L., Veriasova, G., Ivanova, V., Kurdenko, O., and Ponomarov, S. (2021). "Methodological providing of innovative marketing research technology". *Estudios de economía aplicada*, 38(4). doi: 10.25115/eea.v38i4.3990

Stipp, H. (2015). "The evolution of neuromarketing research: From novelty to mainstream: How neuro research tools improve our knowledge about advertising". *Journal of Advertising Research*, 55(2), 120–122. doi: 10.2501/jar-55-2-120-122

Sung, B., Wilson, N. J., Yun, J. H., and Lee, E. J. (2020). "What can neuroscience offer marketing research? "*Asia Pacific Journal of Marketing and Logistics*, 32(5), 1089–1111. doi: 10.1108/apjml-04-2019-0227

Thomé, A. M. T., Scavarda, L. F., and Scavarda, A. J. (2016). "Conducting systematic literature review in operations management". *Production Planning and Control*, 27(5), 408–420. doi:10.1080/09537287.2015.1129464

Tirandazi, , Bamakan, S. M. H., and Toghroljerdi, A. (2023). "A review of studies on internet of everything as an enabler of neuromarketing methods and techniques". *The Journal of Supercomputing*, 79(7), 7835–7876. doi: 10.1007/s11227-022-04988-1

Tranfield, D., Denyer, D., and Smart, (2013). "Towards a methodology for developing evidence‐ informed management knowledge by means of systematic review". *British Journal of Management*, 14(3), 207–222. doi:10.1111/1467-8551.00375

Tversky, A., and Kahneman, D. (1981). "The framing of decisions and the psychology of choice". *Science* (New York, N.Y.), 211(4481), 453–458. doi: 10.1126/science.7455683

Vecchiato, G., Toppi, J., Astolfi, L., Cincotti, F., De Vico Fallani, F., Maglione, A. G., … Babiloni, F. (2012). "The added value of the electrical neuroimaging for the evaluation of marketing stimuli". *Bulletin of the Polish Academy of Sciences Technical Sciences*, 60(3), 419–426. doi: 10.2478/v10175-012-0053-2

Vecchiato, Giovanni, Maglione, A. G., Cherubino, , Wasikowska, B., Wawrzyniak, A., Latuszynska, A., … Babiloni, F. (2014). "Neurophysiological tools to investigate consumer's gender differences during the observation of TV commercials". *Computational and Mathematical Methods in Medicine*, 2014, 1–12. doi: 10.1155/2014/912981

Authors

1 – Geizyanne Quirino dos Santos

Institution: Universidade de Fortaleza – Fortaleza, Ceará, Brazil

Graduação em moda pela Universidade de Fortaleza

Orcid: https://orcid.org/0009-0004-6711-3824

E-mail: qsgeizy@edu.unifor.br

2 – José Sarto Freire Castelo

Institution: Universidade de Fortaleza – Fortaleza, Ceará, Brazil

Doutoramento em Gestão com ênfase na área de Marketing pela Faculdade de Economia da Universidade de Coimbra

Orcid: https://orcid.org/0000-0003-3552-9986

E-mail: sarto@unifor.br

3 – José Iran Batista de Melo Filho

Institution: Universidade de Fortaleza – Fortaleza, Ceará, Brazil

Mestre em Administração de Empresas pela Universidade Estadual do Ceará

Orcid: https://orcid.org/0000-0002-8091-2311

E-mail: irandemelo@unifor.br

4 – Tamiris Costa Diógenes Lima

Institution: Universidade de Fortaleza – Fortaleza, Ceará, Brazil

Estudante de Graduação em Marketing na Universidade de Fortaleza

Orcid: https://orcid.org/0009-0002-9189-2712

E-mail: tamirisdiogenes@edu.unifor.br

5 – Milena Reis Auip Barbosa

Institution: Universidade de Fortaleza – Fortaleza, Ceará, Brazil

Doutorado em Administração de Empresas pela Universidade de Fortaleza (Unifor)

Orcid: https://orcid.org/0000-0001-5334-8252

E-mail: milenaauip@unifor.br

Contribution of authors

Contribution	[Author 1]	[Author 2]	[Author 3]	[Author 4]	[Author 5]
1. Definition of research problem		√	√		√
2. Development of hypotheses or research questions (empirical studies)	√	√	√	√	√
3. Development of theoretical propositions (theoretical work)		√	√		
4. Theoretical foundation / Literature review		√	√		√
5. Definition of methodological procedures		√	√		
6. Data collection	√			√	√
7. Statistical analysis	√			√	
8. Analysis and interpretation of data	√			√	
9. Critical revision of the manuscript		√	√		
10. Manuscript writing	√	√	√	√	√
11. Other (please specify)					

Conflict of Interest

The authors have stated that there is no conflict of interest.

Copyrights

Authors of articles published by ReA/UFSM retain the copyright of their works.

Plagiarism Check

The ReA/UFSM maintains the practice of submitting all documents approved for publication to the plagiarism check, using specific tools, e.g.: Turnitin.

Edited by

Jordana Marques Kneipp

Data availability statement

Data will be available upon request