



Neuromanagement Research: Bibliometric Mapping by Integrating Scopus and Web of Science Data

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Received/ Başvuru: 14.10.2025

Accepted/ Kabul: 20.01.2026

Published/ Yayın: 26.02.2026

Abstract

This study conducts a comprehensive bibliometric analysis of neuromanagement, an emerging interdisciplinary field at the confluence of neuroscience and organizational science. In contrast to prior research that utilized a singular database, this study integrates 282 publications from both the Web of Science and Scopus, employing the R-based Bibliometrix package. The findings reveal a marked increase in scholarly output post-2015, with a focus on themes such as decision-making, leadership, emotion, event-related potentials (ERP), the brain and cognition. Although Chinese institutions dominate publication output, international collaboration remains limited. The largest co-citation network was associated with Qing-guo Ma, while Schupp and Semlitsch led another significant cluster. The influential study by Botvinik-Nezer et al. (2020) on variability in neuroimaging analysis is the most cited paper in this domain and continues to inform empirical research. This study identifies the following major research gaps: a paucity of empirical studies, insufficient engagement with ethical concerns in brain-based interventions, and underrepresentation of regions outside China, the United States, and Europe. This study provides a structural thematic mapping of neuromanagement and advocates for interdisciplinary, experimental, and ethically grounded research in the future. It also recommends the use of repeated comparative bibliometric analyses combined with qualitative meta-analyses to monitor the annual growth of the field.

Keywords: neuromanagement, neuroleadership, bibliometric analysis, bibliometrix

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Nöro-yönetim Araştırmaları: Scopus ve Web of Science Verilerinin Entegrasyonu ile Bibliyometrik Haritalama

Öz

Bu çalışma, sinirbilim ve örgüt biliminin kesiştiği noktada ortaya çıkan disiplinlerarası bir alan olan nöro-yönetimin kapsamlı bir bibliyometrik analizini sunmaktadır. Tek bir veri tabanına dayanan önceki çalışmaların aksine, bu araştırma R tabanlı Bibliometrix paketini kullanarak hem Web of Science hem de Scopus'tan 282 yayını birleştirmektedir. Bulgular, 2015 yılından sonra özellikle karar verme, liderlik, duygu, ERP, beyin ve biliş gibi temalara odaklanan bilimsel çıktılarda keskin bir artış olduğunu göstermektedir. Çinli kurumlar yayın çıktılarında hakimdir, ancak uluslararası iş birliği sınırlı kalmaktadır. En büyük ortak atıf ağı Qing-guo Ma'ya atfedilirken, bir diğer önemli küme Schupp ve Semlitsch tarafından yönetilmektedir. Alanda en çok atıf alan makale, Botvink-Nezer ve arkadaşlarının (2020) nörogörüntüleme analizindeki değişkenlik üzerine ampirik araştırmalara rehberlik etmeye devam eden etkili çalışmasıdır. Tartışma, önemli araştırma boşluklarını vurgulamaktadır: ampirik çalışmaların azlığı, beyin temelli müdahalelerde etik kaygılarla yeterince ilgilenilmemesi ve Çin, ABD ve Avrupa dışındaki bölgelerin yeterince temsil edilmemesi. Bu çalışma, nöro-yönetimin yapısal bir tematik haritasını sunmakta ve gelecekte disiplinler arası, deneysel ve etik temelli araştırmalar yapılması çağrısında bulunmaktadır. Ayrıca, alanın yıllık bazda büyümesini gözlemek için nitel meta-analiz ile birlikte tekrarlanan karşılaştırmalı bibliyometrik analizin kullanılmasını önermektedir.

Anahtar Kelimeler: nöro-yönetim, nöroliderlik, bibliyometrik analiz, bibliometrix



1. INTRODUCTION

Neuromanagement is an emerging interdisciplinary domain that draws on cognitive and affective neuroscience to illuminate managerial judgement, leadership, and organisational behaviour. Rather than treating decision-making and social influence as purely “black-box” processes, neuromanagement foregrounds underlying neurocognitive mechanisms (e.g., attention, emotion regulation, and reward learning) and asks how these mechanisms are mobilised in organisational settings.

In this study, we use neuromanagement to denote neuroscience-informed management and leadership research in organisational settings, while drawing on the broader organisational neuroscience literature for methodological and ethical debates.

Methodologically, we follow established multi-source bibliometric protocols for integrating records across Web of Science and Scopus ([Echchakoui, 2020](#)).

As the field grows, so do long-standing debates in organisational neuroscience about reductionism, methodological validity (including reverse inference), and the ethical governance of brain-related data. These debates matter because they shape what counts as credible evidence, which topics become central, and how quickly neuroscientific claims travel into managerial practice.

Despite the rapid expansion of publications, there is still limited clarity on how neuromanagement’s knowledge base is structured across disciplines, who and which institutions lead its development, and whether the field’s thematic evolution reflects a balanced integration of neuroscience and organisation studies or a narrower dependence on neurophysiological measurement traditions.

To address this gap, we conduct an integrated bibliometric mapping of neuromanagement research indexed in Web of Science and Scopus (2007-2025; $n=282$). Using Bibliometrix/Biblioshiny, we examine publication growth and sources, influential authors and documents, collaboration patterns and country-level concentration, and the intellectual and conceptual structure of the field through co-citation, co-occurrence, and thematic mapping.

The study contributes in three ways. First, it provides a transparent, multi-source dataset construction protocol and an audit-oriented reporting of key steps. Second, it moves beyond a purely cartographic map by interpreting bibliometric structures through two lenses—epistemic tensions (between neural measurement and organisational theorising) and ethical visibility—thereby clarifying what the field currently privileges and overlooks. Third, it develops an agenda for theory-driven, methodologically coherent, and ethically robust neuromanagement research.



2. LITERATURE REVIEW AND THE CONCEPTUAL FRAMEWORK OF NEUROMANAGEMENT

2.1. Need for a Bibliometric Perspective

The development of neuromanagement has established it as a promising interdisciplinary nexus between neuroscience and organizational science. Neuromanagement has garnered increasing scholarly interest because of its potential to improve decision-making, leadership, and organizational performance. Nevertheless, much of the bibliometric literature remains fragmented, often relying exclusively on databases such as Scopus or Web of Science (WoS), which may constrain the comprehensiveness of the thematic insights (Asunakutlu and Aydoğan, 2022; Tekin and Dener, 2025).

Recent studies, such as those by Küçün and Alptekin (2023), have made significant advancements in integrating bibliometric reviews with systematic review methodologies. However, there remains a need for more methodologically rigorous analyses that incorporate multiple data sources and adhere to clear inclusion criteria to avoid bias. Previous research has demonstrated variability in methodological rigor, with some studies employing systematic reviews (Aithal and Satpathy, 2024; Khaneja and Arora, 2024; Kouravand, 2024; Uğuz Arsu, 2024), while others have utilized conceptual or exploratory approaches across extensive databases (Kuncoro and Anshori, 2023; Valencia-Martínez and Suárez-Rojas, 2023). This underscores the importance of employing integrated and reproducible methodologies in bibliometric mapping.

2.2. Definition and Scope

Neuromanagement is broadly defined as the application of neuroscientific insights derived from techniques such as functional magnetic resonance imaging (fMRI), electroencephalography (EEG), neurofeedback, and cognitive neuroscience to enhance managerial processes such as leadership, decision-making, organizational change, and employee development (Aithal and Satpathy, 2024, p.41; Asunakutlu and Aydoğan, 2022, p.435; Sandhya and Satpathy, 2024). The field positions itself as a scientific framework capable of decoding behavioral phenomena through biological evidence, particularly in contexts involving stress, motivation, and interpersonal dynamics. The significance of neuromanagement lies in its potential to improve the understanding of how the human brain functions in the work environment, thereby optimizing decision-making, motivation, and leadership, and contributing to the success and efficiency of organizations (Valencia-Martínez and Suárez-Rojas, 2023, p.2). This emerging field emphasizes the application of neuroscientific methods, including neuroimaging, neurofeedback, and biofeedback, to facilitate a more nuanced understanding of and influence on human behavior within organizational contexts (Sandhya and Satpathy, 2024; Valencia-Martínez and Suárez-Rojas, 2023).



Identifying the core neuroscientific principles that inform managerial practices is essential to consolidating the conceptual foundations of neuromanagement. Table 1 summarizes the fundamental principles underpinning the integration of neuroscience into organizational behavior, leadership, and decision-making. These principles reflect the convergence of neurocognitive insights and management sciences across disciplines.

Table 1. Core neuroscientific principles underlying neuromanagement

Neuroscientific Principle	Definition and Organisational Implication	Representative Sources
Neuroplasticity	Refers to the ability of the brain to reorganise itself through new connections, enabling adaptive learning and leadership development	Klos, 2018; Rovelli, 2022; Sabır Taştan, 2020
Emotion Regulation	Neuroscience reveals how emotions are processed and modulated, contributing to managerial resilience and effective communication.	Gimpel et al., 2013
Cognitive Processes	This includes attention, memory, and executive functioning—critical for planning, strategic thinking, and problem solving.	Arce et al., 2020
Neuroleadership	Apply neuroscientific knowledge to develop leadership strategies that enhance trust, collaboration, and engagement.	Lavanderos et al., 2025; Parincu et al., 2020

Furthermore, understanding the specific brain structures implicated in these processes facilitates a more precise application of neuroscience in organizational contexts. Table 2 delineates the principal neuroanatomical regions associated with planning, emotional regulation and memory.

Table 2. Key brain regions associated with neuromanagement functions

Brain Region	Primary Function in Organisational Context	Representative Sources
Prefrontal Cortex	Complex decision-making, planning, and behavioural regulation	Sun et al., 2023
Amygdala	Central to emotional processing and threat detection, with implications for team stress management	Rolls, 2023; Sun et al., 2023
Hippocampus	Involved in learning and memory, contributing to professional development and knowledge transfer	Desmedt et al., 2015

The principles and associated brain regions not only offer a theoretical foundation for neuromanagement but also function as operational targets for neurofeedback, leadership training, and cognitive development. By anchoring managerial constructs in neurocognitive science, organizations can cultivate evidence-based leadership models and enhance their decision-making environments. The subsequent section expands this framework to explore how these principles are manifested in empirical studies and bibliometric trends in neuromanagement research.



This section examines the manifestation of neuroscientific foundations within core organizational domains, following an outline of the key brain structures pertinent to neuromanagement. The emphasis has now shifted from theoretical foundations to practical applications across cognitive, emotional, and managerial processes.

Table 3. Cognitive, emotional, and organisational dimensions of neuromanagement in organisational contexts

Dimension	Neurocognitive Focus	Organisational Application	Representative Sources
Decision Making and Bias	Prefrontal cortex, basal ganglia, and insula	Understanding and mitigating cognitive biases in leadership and strategy	Gimpel et al. (2013) ; Butler et al. (2016) ; Waldman et al. (2017) ; Aithal and Satpathy, (2024) ; Haketa and Qutieshat, (2023)
Emotional Intelligence	Amygdala, ventromedial prefrontal cortex	Enhancing trust, social cohesion, and conflict resolution	Ali et al. (2024) ; Raghvendra (2024)
Employee Development	Prefrontal cortex and autonomic feedback mechanisms	Neurofeedback for self-regulation, neuroprofile-based training, and mindfulness interventions	Sandhya and Satpathy (2024) ; Zito et al. (2021) ; Lemeshchuk (2024) ; Rovelli (2022)
Neuroleadership and Change	Amygdala, prefrontal cortex, and mirror neurons	Improving adaptability, innovation, and team coordination under stress conditions	Badenhorst (2016) ; Parincu et al. (2020)
Human Resource Management (HRM)	EEG and emotional recognition systems	Data-driven recruitment and well-being-centred work environments	Cheese and Hills (2016) ; Sehrawat and Pillai (2019)

2.3. Methodological and Ethical Debates in Organisational Neuroscience

Hannah and Waldman (2015) contend that the domain of behavioral ethics research within management is experiencing substantial growth and development. Comprehending ethical principles is essential for the efficient functioning of an organization. Scientific exploration of the nervous system provides a systematic approach to understanding these phenomena. Moreover, moral awareness invariably prompts subsequent actions. Hannah and Waldman (2015) argue that the scientific examination of the nervous system has identified a specific cerebral region responsible for error monitoring, thereby facilitating ethical decision-making. This discovery can aid leaders in recognizing the importance of moral resilience.

Furthermore, the application of neuroscience in management raises ethical challenges. While it enhances the understanding of behavior, it also presents risks such as reductionism and privacy



violations (Esmeray Yoğun, 2016; Lindebaum and Raftopoulou, 2017). For instance, the integration of neuroscientific evidence in leader selection and development processes may inadvertently favor certain characteristics over others, thus embedding biases within hiring and promotional decisions (Lindebaum and Raftopoulou, 2017). The collection of neural data also raises privacy concerns (Esmeray Yoğun, 2016). Organizations must carefully weigh the benefits and drawbacks of utilizing neuroscience (Lindebaum and Raftopoulou, 2017) and establish transparent protocols for using brain data.

Taken together, these debates also shape how an emerging field's bibliometric structures should be interpreted, not only mapped.

2.4. Analytical Framing: Epistemic Tensions and Ethical Visibility

Accordingly, we interpret the bibliometric structures through two complementary lenses. First, epistemic tensions: whether the thematic core reflects a genuine integration of organisational theory with neuroscientific measurement, or remains anchored in laboratory-oriented neurophysiology. Second, ethical visibility: whether governance-related concerns (e.g., consent, privacy, data security, neuro-rights) emerge as central themes or remain peripheral in the field's keyword ecology. Together, these lenses move the analysis beyond mapping by clarifying how neuromanagement's intellectual development is shaped by scientific opportunities as well as contested methodological and ethical foundations, and they are applied explicitly in the synthesis of findings (Section 4.9) and in structuring the Discussion (Section 5).

3. RESEARCH METHOD

This section offers a thorough examination of the study's objectives, the methodological framework employed for data collection, the procedures utilized for data analysis and interpretation, and the study limitations.

3.1. The Study Objective

The primary objective of this study was to conduct a quantitative and systematic analysis of the scientific literature within the field of neuromanagement, with the aim of elucidating the discipline's evolutionary trajectory, thematic orientations, and patterns of collaboration. While analyses based on a single database (e.g., Scopus or WOS) are frequently undertaken in the literature, this study integrates publications from both databases to conduct a comprehensive bibliometric analysis. In this regard, this study seeks to contribute methodologically to the existing literature (Echchakoui, 2020; Caputo and Kargina, 2022).

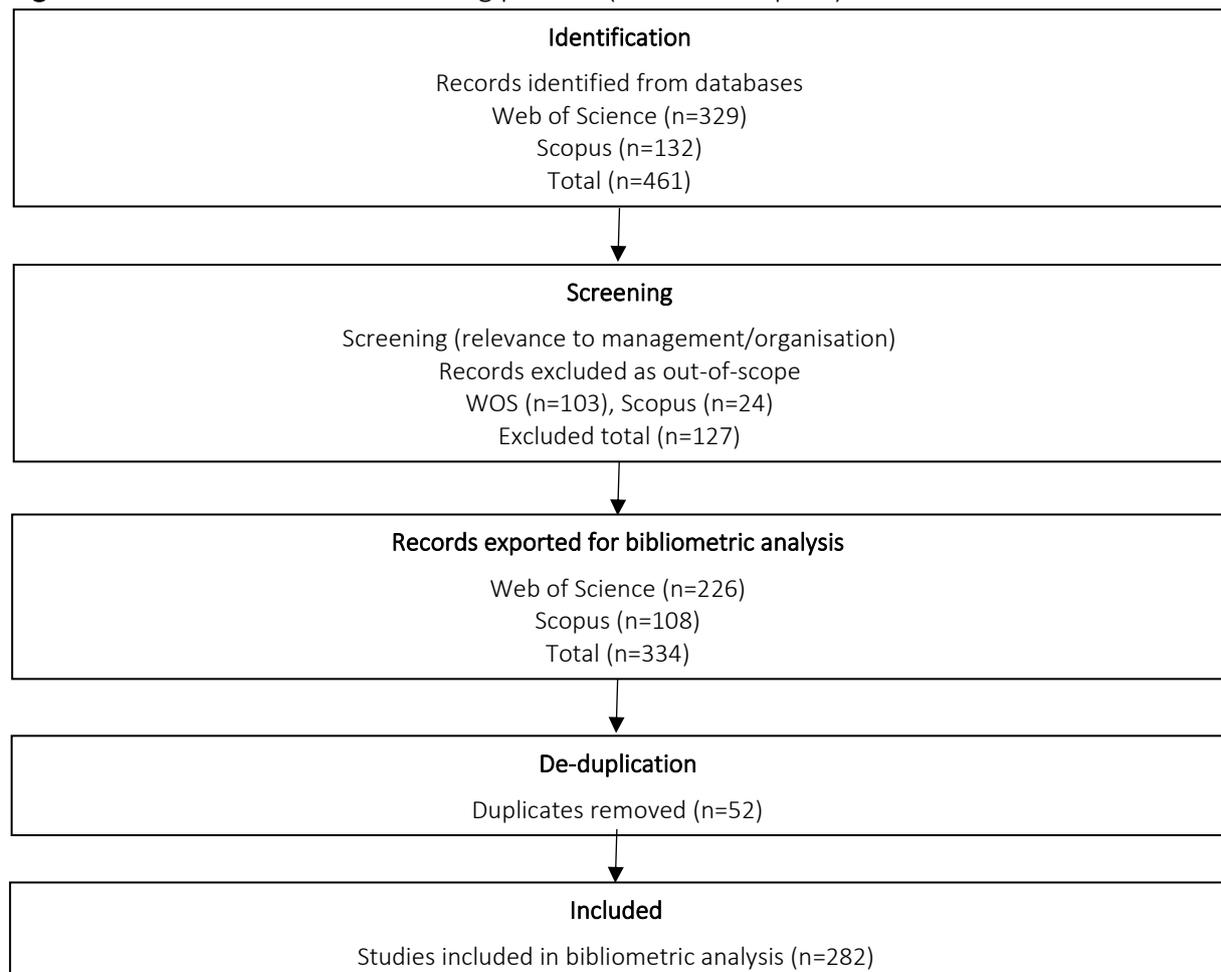
3.2. Data

Search and eligibility were designed to capture neuromanagement as used in management and organisation scholarship, while recognising that closely related work may appear in adjacent



outlets. Searches were conducted on 6 February 2025 in Web of Science Core Collection and Scopus using English and Turkish term variants for neuromanagement and neuroleadership (e.g., “neuromanagement”, “neuro management”, “neuroleadership/neuro-leadership”, “nöroyönetim”, “nöroliderlik”), applied to database-appropriate search fields (WoS: All Fields; Scopus: Title/Abstract/Keywords) (Scopus, 2024a; Web of Science, 2024a). The initial retrieval yielded 329 records in Web of Science and 132 records in Scopus (total n=461) (Scopus, 2024b; Web of Science, 2024b). Based on relevance to management/organisation scholarship, 103 Web of Science records and 24 Scopus records were excluded as out-of-scope (i.e., not relevant to management/organisation scholarship) (excluded total n=127). Data from the remaining 226 Web of Science and 108 Scopus records (total n=334) were exported and merged in R using Bibliometrix; duplicate items were removed during the merge step, eliminating 52 overlaps and yielding a final dataset of 282 unique publications (2007–2025) for analysis. Figure 1 summarises the data identification, screening, and de-duplication process (PRISMA-adapted).

Figure 1. Data retrieval and screening process (PRISMA-adapted)





Eligibility criteria (summary): (i) peer-reviewed journal articles, reviews, conference papers, or book chapters indexed in Web of Science Core Collection or Scopus; (ii) topical relevance to neuromanagement/neuroleadership or organisational neuroscience applications in managerial contexts; (iii) sufficient bibliographic metadata for bibliometric analysis (authors, title, source, year, keywords). As noted by Thompson (2018), database scope is a critical consideration in bibliometric research; therefore, Web of Science and Scopus were used as the two most widely adopted international indexing platforms in the field (Sabır Taştan et al., 2023, p.1319-1320).

3.3. Data Merging and Transformation

To integrate datasets from Web of Science and Scopus, we followed established multi-source bibliometric procedures that recommend combining both databases to obtain a more comprehensive and reliable representation of a field (Echchakoui, 2020; Caputo and Kargina, 2022). Database exports were converted into compatible bibliographic data frames and merged into a single corpus in R using Bibliometrix (Aria and Cuccurullo, 2017). To avoid statistical inflation, duplicate items were identified via bibliographic metadata matching (e.g., title, author(s), year, and source) and removed during the merge step. The resulting merged dataset (n=282) was then analysed in Biblioshiny (Bibliometrix). For auditability and replicability, Appendix A provides the reproducibility materials, including the conversion/merge workflow, de-duplication settings, and the computation formulas used in the study.

3.4. Data Analysis

The present study employed bibliometric analysis to develop a structured understanding of neuromanagement research and its intellectual and conceptual organisation. Bibliometric methods describe and map scholarly fields using indicators such as publication growth, source and authorship patterns, citation impact, and relational structures derived from references and keywords (Donthu et al., 2021; Aria and Cuccurullo, 2017). In addition to descriptive performance indicators, bibliometric mapping enables the examination of (i) citation and co-citation structures that signal intellectual foundations, and (ii) co-word structures that capture the field's conceptual themes and their evolution (Donthu et al., 2021; Aslancı, 2022, p.4).

Analyses were conducted in R using Bibliometrix and its graphical interface Biblioshiny (Aria and Cuccurullo, 2017), with spreadsheet checks used only for basic data inspection. Building on the merged dataset described in Section 3.3, we conducted analyses in eight domains: (1) publication output and growth, (2) document types, (3) publication languages, (4) source dynamics, (5) authorship and collaboration patterns, (6) citation analysis, (7) co-citation network analysis, and (8) word-based analyses (co-word networks and thematic/conceptual mapping).



3.5. Limitations

The primary limitation of this study is its exclusive reliance on Scopus and the Web of Science (WOS) databases. The exclusion of other data sources, such as PubMed, Google Scholar, and Embase, may have resulted in the omission of certain publications. Furthermore, the analysis is solely based on bibliometric indicators; thus, qualitative assessments, including content analysis or conceptual proximity, are not included in this study.

Second, bibliometric mapping captures the lexical and citation structure of a field, but it cannot directly adjudicate the epistemic validity of neuroscientific claims; organisational neuroscience scholars caution that leadership constructs may be reduced to neural correlates and that the quality of inferences—and their translation into practice—should be scrutinised (Lindebaum and Zundel, 2013, p.858-860).

Relatedly, empirical neuroimaging work has faced concerns about statistical power and interpretive limits; future neuromanagement studies should therefore pair neural indicators with multi-level theorising and robust designs to avoid overclaiming (Lindebaum and Jordan, 2014, p.899-903).

4. FINDINGS

This section delineates the bibliometric findings obtained from a consolidated dataset comprising 282 publications indexed in Scopus and the Web of Science from 2007 to 2025. The analysis was executed using the Biblioshiny application within the R-based Bibliometrix package, and the results were organized across eight dimensions.

4.1. General Overview of the Scientific Output

Table 4 presents the corpus metadata. A total of 282 publications were identified and distributed across 123 sources. The average citation rate per publication was 11.7, with an annual growth rate of 3.93. On average, the publications were 5.43 years old, and the authors used 814 distinct keywords.

Table 4. Overview of the scientific output

General Information About the Data	
Time interval	2007:2025
Number of published articles	282
Sources (Journals, Books, etc.)	123
Annual publication increase rate (%)	3.93
Average Age of Publication	5,43
Average number of citations per publication	11.7
Key Words	814

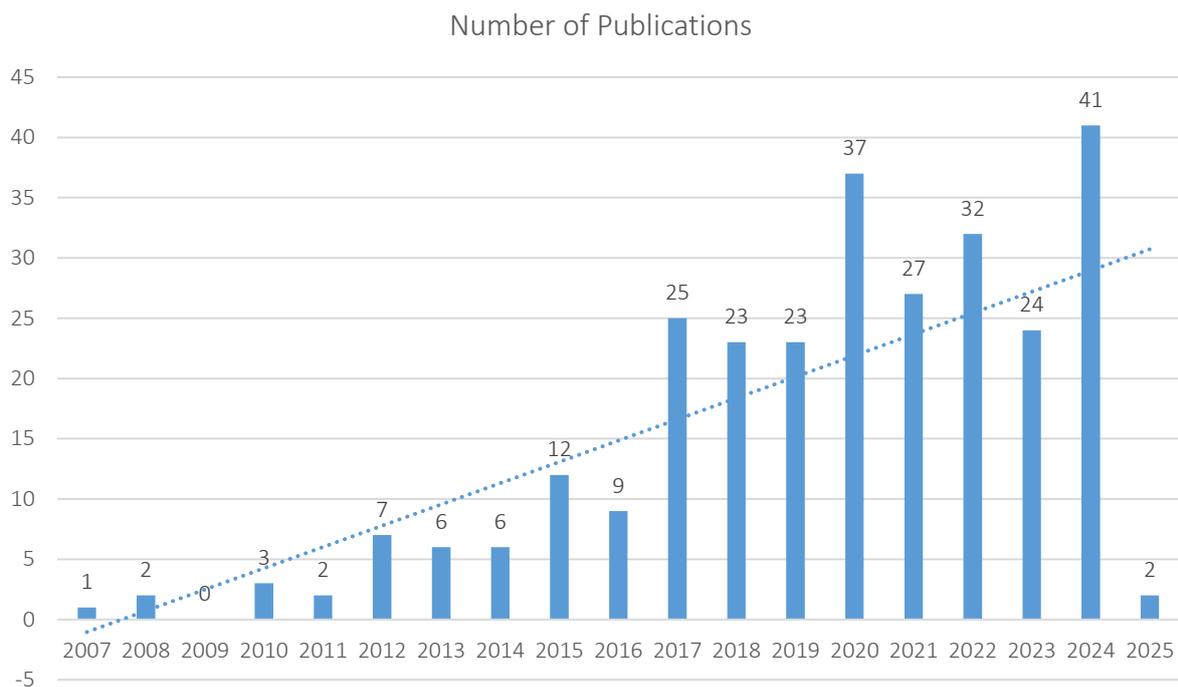
Source: This study was created by the author with data obtained from the Biblioshiny application of the Bibliometrix program by combining the Web of Science and Scopus data.



4.2. Trends in Annual Publication

Figure 2 demonstrates a significant increase in publication volume following 2015, reaching its peak in 2024. This trend indicates heightened interest in neuromanagement and its intersection with neuroleadership, emotion science, and decision theory.

Figure 2. Annual growth of publications in the literature on neuromanagement



Source: This study was created by the author with data obtained from the Biblioshiny application of the Bibliometrix program by combining the Web of Science and Scopus data.

The seminal work in the neuromanagement domain, published in 2007, is titled "Event-related potential N270 correlates of brand extension" by Ma et al. (2007). Although this publication is primarily a marketing study, it falls within the scope of neuromanagement in the databases examined.

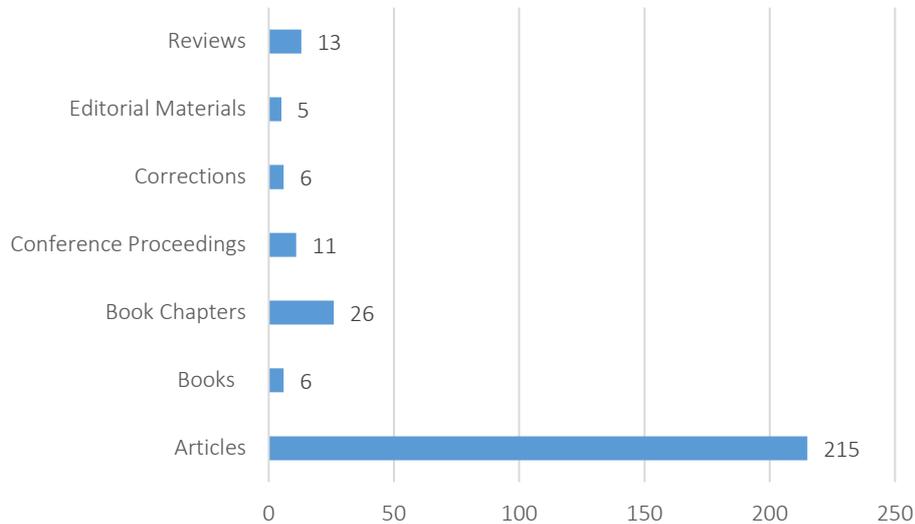
An analysis of the volume of scientific publications in the field of neuromanagement from 2007 to 2024, as depicted in Figure 2, indicates a significant increase in publications beginning in 2012. Since 2017, the annual number of publications has consistently exceeded 20. The trend line in Figure 2 demonstrates a steady acceleration in the growth of publication numbers, with the highest number of publications recorded in 2024 (n=41).

4.3. Type and Language of Publication

Figure 3 illustrates that the distribution of scientific publications in the neuromanagement field is dependent on the type of publication.



Figure 3. Types of publications in neuromanagement

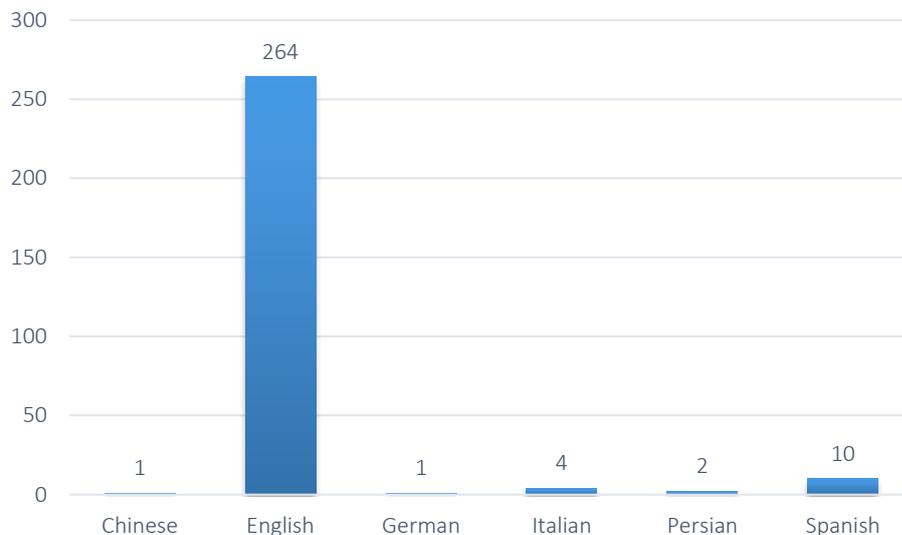


Source: Data were obtained from the Biblioshiny application of the Bibliometrix program by combining Web of Science and Scopus data.

Figure 3 illustrates that within the neuromanagement domain, scientific publications predominantly manifest as "articles" (n=215), which account for 76% of the total publications in the field. The remaining publications comprise book chapters, reviews, conference proceedings, and books.

Figure 4 depicts the distribution of scientific publications in the neuromanagement field based on publication language.

Figure 4. Languages of neuromanagement publications



Source: This study was created by the author with data obtained from the Biblioshiny application of the Bibliometrix program by combining the Web of Science and Scopus data.

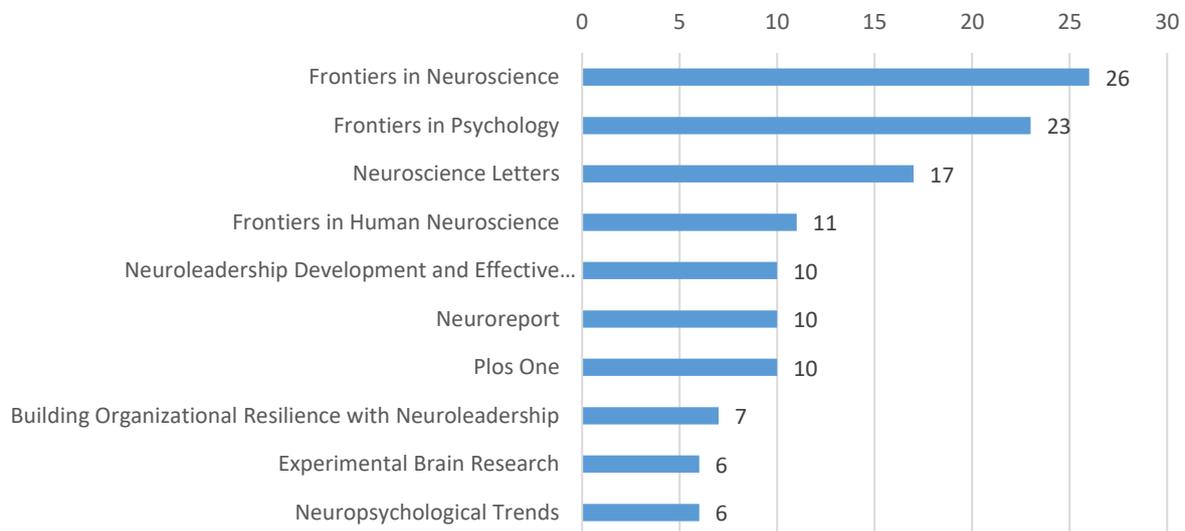


As illustrated in Figure 4, English is the predominant language employed in scientific publications in the neuromanagement field, accounting for 94% (n=264) of the total. Notably, none of the publications analyzed were in Turkish.

4.4. Sources of Publications

The subsequent section offers a detailed overview of the sources of scientific publications in the neuromanagement field (Figure 5). Given the considerable number of sources (n=123), the top 10 journals were highlighted based on the volume of publications.

Figure 5. Publication sources



Source: This study was created by the author with data obtained from the Biblioshiny application of the Bibliometrix program by combining the Web of Science and Scopus data.

Frontiers in Neuroscience (n=26) and Frontiers in Psychology (n=23) had the highest number of publications. The journals with the most publications after these were Neuroscience Letters (n=17), Frontiers in Human Neuroscience (n=11), and Neuroleadership Development and Effective Communication in Modern Business, Neuroreport, and PLOS ONE, each with 10 publications.

4.5. Information on Authors and Collaborations

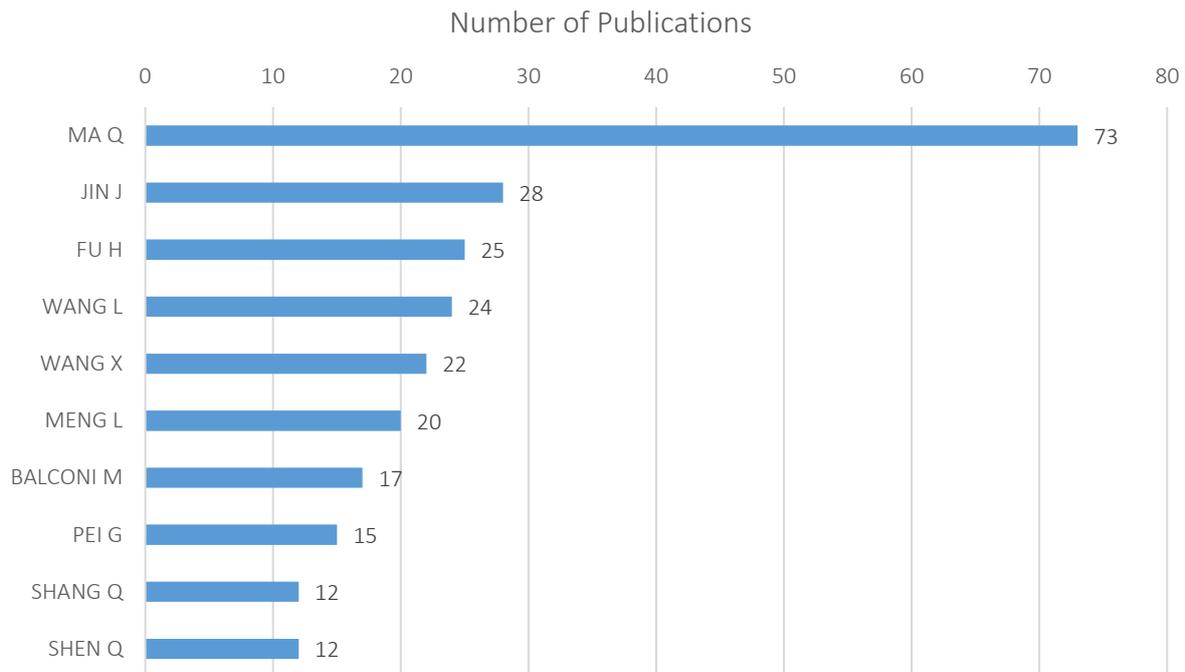
A total of 737 authors contributed to 282 articles. Only 9.9% (n=28) of these articles were authored by a single individual, whereas the majority (90.1%, n=254) were collaborative efforts. Among these collaborative works, 17.73% involved international co-authorship, reflecting a developing but limited trend of global collaboration.



4.5.1. Most Relevant Authors

Figure 6 presents the ranking of researchers in the neuromanagement domain based on their publication count.

Figure 6. Number of publications of relevant authors working in the field of neuromanagement



Source: This study was created by the author with data obtained from the Biblioshiny application of the Bibliometrix program by combining the Web of Science and Scopus data.

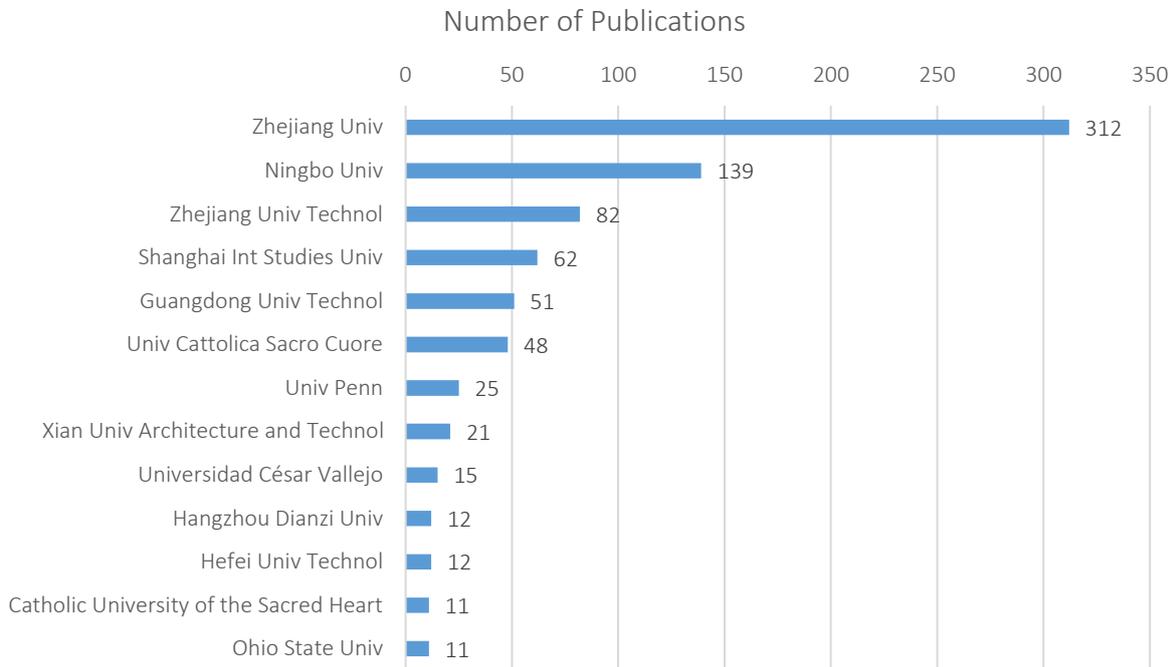
Qing-guo Ma has authored 73 publications, thereby establishing himself as the most prolific researcher in the field. He is followed by J. Jin (n=28), H. Fu (n=25), L. Wang (n=24), X. Wang (n=22), Meng (n=20), Balconi (n=17), Pei (n=15), Q. Shang (n=12), and Q. Shen (n=12). These individuals are the principal contributors to neuromanagement.

4.5.2. Authors' Affiliations

Figure 7 presents the institutional affiliations of the researchers engaged in neuromanagement.



Figure 7. Institutions of the Authors



Note: The authorship of all co-authors is included separately for each article.

Source: This study was created by the author with data obtained from the Biblioshiny application of the Bibliometrix program by combining the Web of Science and Scopus data.

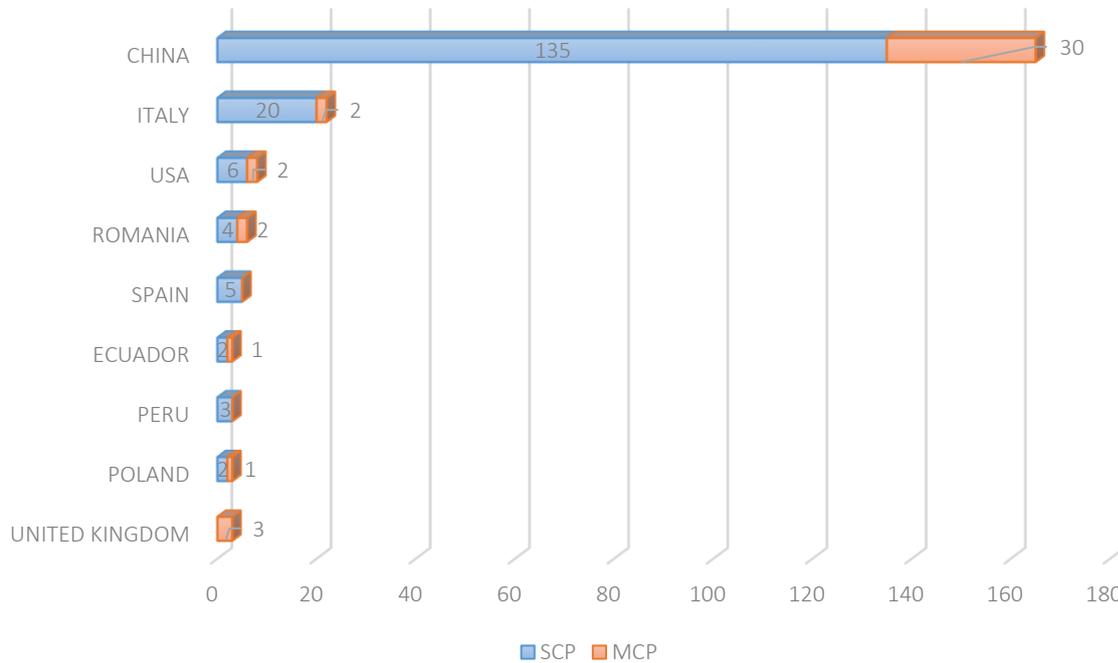
Recent rankings indicate that the top five institutions in the field of neuromanagement are Chinese: Zhejiang University, Ningbo University, Zhejiang University of Technology, Shanghai International Studies University, and Guangdong University of Technology. Additionally, the Ohio State University, a prominent public institution in the United States, is recognized as one of the leading universities in this field.

4.5.3. Country of Corresponding Authors

Figure 8 illustrates the countries of origin of the corresponding authors engaged in neuromanagement research.



Figure 8. Country of corresponding authors



SCP: single country publications; MCP: multiple country publications

Source: This study was created by the author with data obtained from the Biblioshiny application of the Bibliometrix program by combining the Web of Science and Scopus data.

China emerged as the leading nation in terms of publication output, with 165 publications attributed to authors from this country, of which 135 were single-country papers. Other significant contributors were Italy, the United States, Romania, and Spain. This distribution underscores the regional concentration of scholarly activity in East Asia and certain parts of Europe.

4.5.4. Co-authorship of the Authors

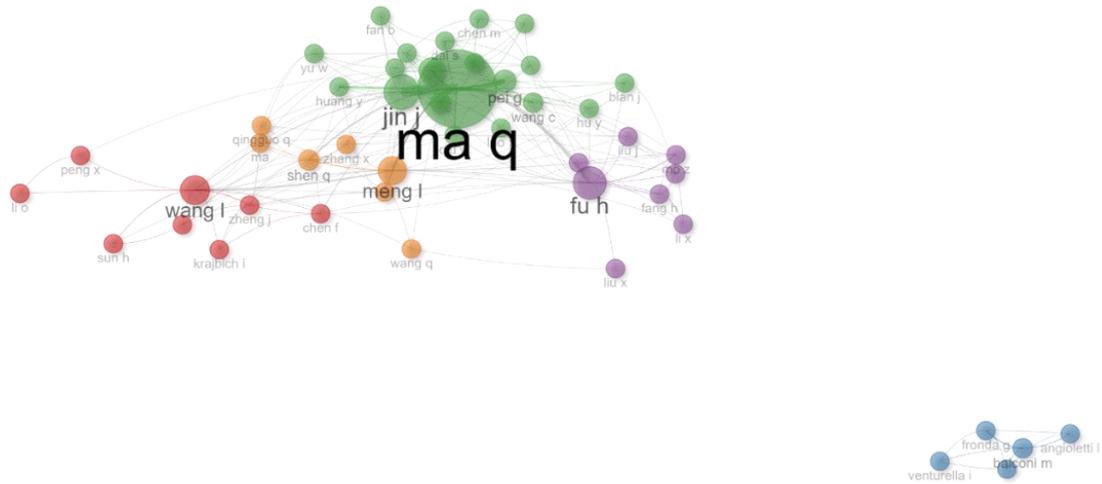
The co-authorship analysis highlights the collaborative nature of neuromanagement research, revealing a network of scholars from diverse backgrounds working together to advance this field. This collaborative effort is crucial for fostering innovation and integrating diverse perspectives, which is particularly important in multidisciplinary domains such as neuromanagement (González-Morales and López, 2023). The analysis further indicates that certain institutions have emerged as prominent centers for neuromanagement research, significantly contributing to the existing body of knowledge in the field.

Figure 9 presents the authorship status of the publications. The total number of authors of the 282 publications included in this study was 737. Of these publications, 28 are single-authored, with 25 authors listed. In contrast, 254 publications were co-authored, with 17.73% of the co-authorships involving international collaborators. According to the authors' co-authorship



analysis, a network map was created using the Walktrap Clustering Algorithm in the Biblioshiny program to identify the most connected and collaborating authors.

Figure 9. Co-author links indicating author cooperation



Source: This study was created by the author with data obtained from the Biblioshiny application of the Bibliometrix program by combining the Web of Science and Scopus data.

According to the Biblioshiny data, collaborating authors were categorized into five distinct groups. Qing-guo Ma, identified as the most prolific author, leads the largest cooperative group in terms of publications. The principal authors of the other cooperative groups include Wang, Fu, Meng, Balconi, and Jin.

Furthermore, the most collaborative institutions were classified into five categories based on Biblioshiny data (Figure 10).

Figure 10. Co-operating institution network



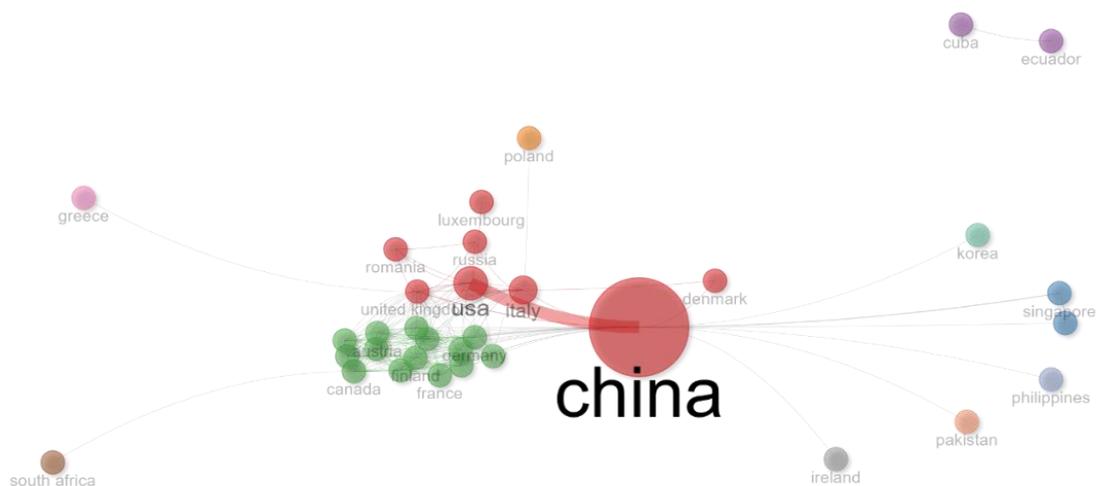
Source: This study was created by the author with data obtained from the Biblioshiny application of the Bibliometrix program by combining the Web of Science and Scopus data.



Zhejiang University, China, is a prominent cooperative institution. Cluster 1’s leading institution is Zhejiang University, which oversees 21 affiliated institutions. The second cluster, led by Stanford University, included 14 institutions, including Oxford University. Other significant clusters included Xian University of Architecture and Technology and City University of Hong Kong, Near East University and University of Kyrenia, and the Neuroleadership Institute.

The network analysis of organizational collaboration by country (Figure 11) identified a substantial cluster comprising China, the United States, Italy, the United Kingdom, Romania, Luxembourg, Denmark, and Russia.

Figure 11. Analysis of collaboration by countries



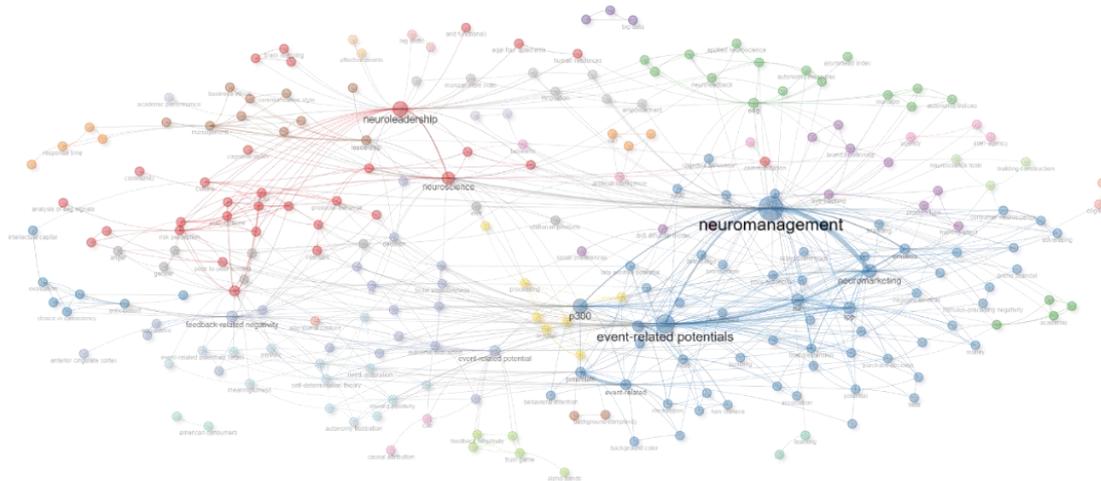
Source: This study was created by the author with data obtained from the Biblioshiny application of the Bibliometrix program by combining the Web of Science and Scopus data.

4.5.5. Authors' Keywords

Figure 12 presents a mapping derived from Biblioshiny data, utilizing authors' keywords.



Figure 12. Thematic mapping based on the authors' keywords



Source: This study was created by the author with data obtained from the Biblioshiny application of the Bibliometrix program by combining the Web of Science and Scopus data.

Figure 12 illustrates that "neuromanagement" emerges as the most frequently used keyword in the publications, with a frequency of 267, thereby establishing itself as a predominant theme. Other notable themes included "neuroleadership" (n=85), "event-related potential" (n=55), "self-determination theory" (n=29), "leadership" (n=26), "EEG" (n=24), "eye tracking" (n=20), "gender" (n=19), "AI" (n=15), and "attention" (n=11).

4.6. Citation Analysis

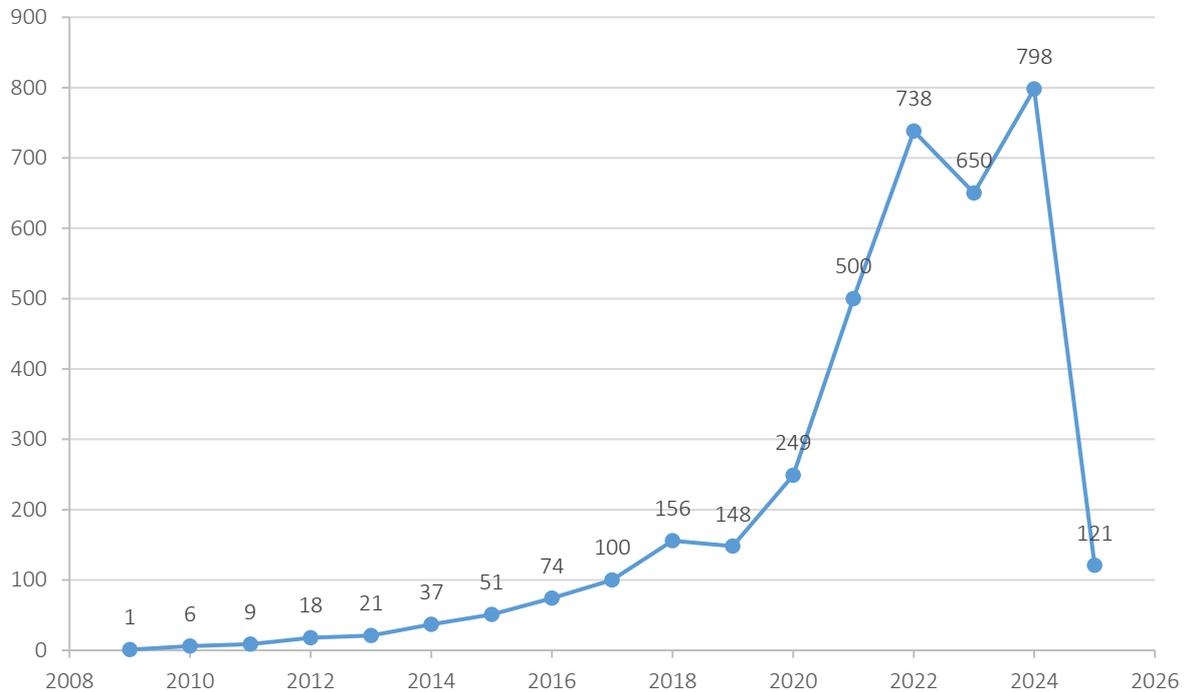
Citation analysis is a crucial metric for evaluating the impact of research in neuromanagement. This analysis revealed that certain publications received substantial attention, indicating their influence on subsequent research and contributing to the ongoing development of the neuromanagement discipline.

4.6.1. Number of Citations and Most Cited Publications

Figure 13 illustrates the annual citation count of scientific publications in the neuromanagement domain.



Figure 13. Number of citations per year



Source: This study was created by the author with data obtained from the Biblioshiny application of the Bibliometrix program by combining the Web of Science and Scopus data.

Figure 13 demonstrates a significant increase in citations of scientific publications within the neuromanagement domain since 2012, aligning with the field's development. A parallel trend is evident in the number of citations, which has increased alongside the expansion of neuromanagement literature since 2020. This observation suggests a concurrent rise in citations of scientific publications in the neuromanagement domain, particularly since 2020.

Table 5 lists the top ten most frequently cited scientific publications in the neuromanagement domain.

Table 5. Most cited scientific publications in neuromanagement

Publication Title	Author(s)	Year of publication	Source Title (Journal/Book)	Total Citations
Variability in the analysis of a single neuroimaging dataset	Botvinik-Nezer et al.	2020	NATURE	539
Neuromanagement decision-making and cognitive algorithmic processes in the adoption of mobile commerce apps	Andronie et al.	2021	Oeconomia	83
P300 and categorisation in brand extension	Ma et al.	2008	Neuroscience Letters	83
Event-related potential P2 correlates of implicit aesthetic experience	Wang et al.	2012	Neuroreport	74



Effect of facial attractiveness on brain responses to fairness in the Ultimatum Game: an ERP study	Ma et al.	2015	Frontiers in Neuroscience	74
Biased Sequential Sampling Underlies the Effects of Time Pressure and Delay in Social Decision Making	Chen and Krajbich	2018	Nature Communications	59
Event-Related Potential N270 Correlations of Brand Extension	Ma et al.	2007	Neuroreport	54
I endeavour to make it: Effort increases the valuation of the subsequent monetary reward	Ma et al.	2014	Behavioural Brain Research	53
The Influence of negative emotion on brand extension as reflected by N2 change: A preliminary study	Ma et al.	2010	Neuroscience Letters	46
The neural process of hazard perception and evaluation of warning signal words: Evidence from event-related potentials	Ma et al.	2010	Neuroscience Letters	45

Source: This study was created by the author with data obtained from the Biblioshiny application of the Bibliometrix program by combining the Web of Science and Scopus data.

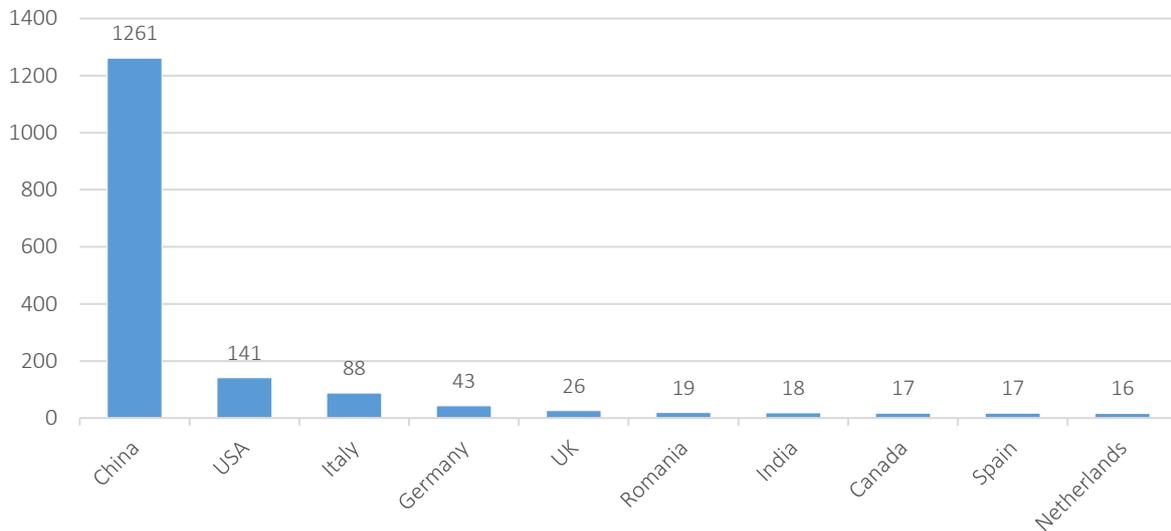
Botvinik-Nezer et al. (2020) is the most frequently cited publication in the neuromanagement domain, with a total of 539 citations. Other highly cited publications include Andronie et al. (2021), Ma et al. (2008), Wang et al. (2012), Ma et al. (2015), Chen and Krajbich (2018), Ma et al. (2007), Ma et al. (2014), Ma, Wang, et al. (2010), and Ma, Jin, et al. (2010). Notably, Qing-guo Ma is the most prominent author on this list, appearing across six distinct publications.

4.6.2. Citation Analysis of the Countries

An analysis was conducted to construct a network map of citations received by publications, which were categorized by their country of origin. This analysis examined the interrelationships between countries. China was the most frequently cited country, with 1,261 citations. The United States follows in second place with 141 citations; however, the number of citations it received was relatively low (see Figure 14). Turkey is also included in this list with two citations.



Figure 14. Citation numbers of the countries



Source: This study was created by the author with data obtained from the Biblioshiny application of the Bibliometrix program by combining the Web of Science and Scopus data.

4.7. Co-citation Network Analysis

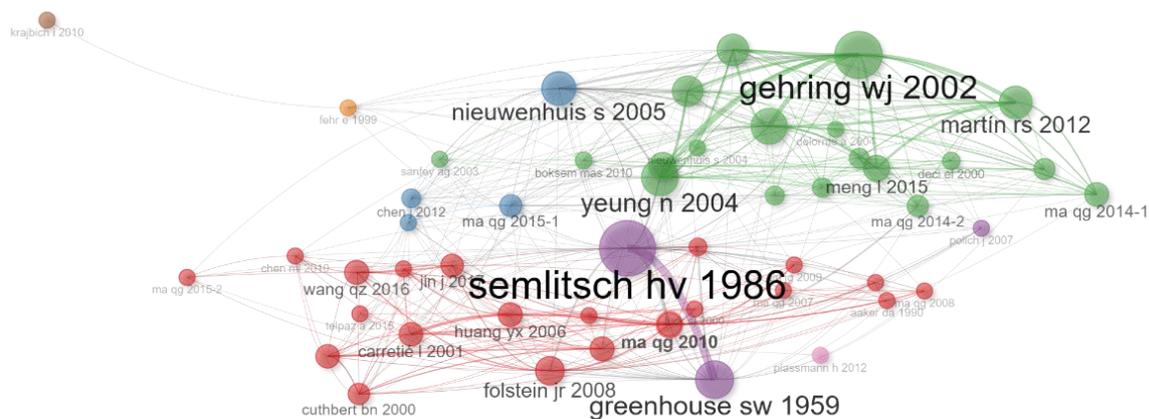
As indicated by Dirik et al. (2023, p.180), the term "co-citation" is employed to denote the occurrence of multiple sources being cited within a single publication.

4.7.1. Co-Citation Analysis of Publications

A network map was developed using the Walktrap Clustering Algorithm within Biblioshiny to conduct a co-citation network analysis of publications.



Figure 15. Co-citation network of publications



Source: This study was created by the author with data obtained from the Biblioshiny application of the Bibliometrix program by combining the Web of Science and Scopus data.

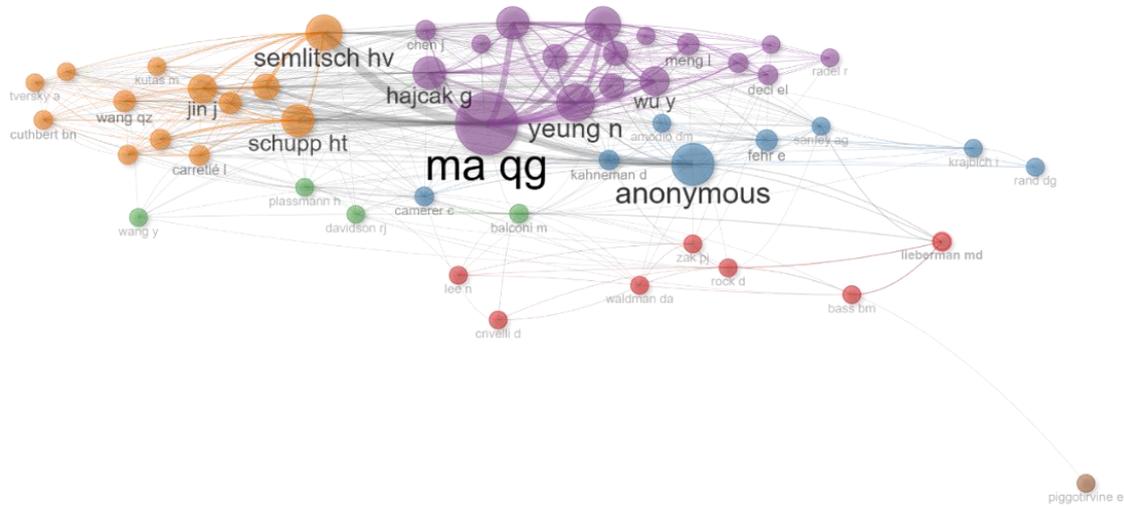
Biblioshiny data indicate that publications with a co-citation network can be categorized into five distinct groups (Figure 15). Prominent publications frequently cited within these groups include: "On methods in the analysis of profile data" (Greenhouse and Geisser, 1959), "A Solution for Reliable and Valid Reduction of Ocular Artefacts, Applied to the P300 ERP" (Semlitsch et al., 1986), "The Medial Frontal Cortex and the Rapid Processing of Monetary Gains and Losses" (Gehring and Willoughby, 2002), "Decision making, the P3, and the locus coeruleus-norepinephrine system" (Nieuwenhuis et al., 2005), and "Influence of cognitive control and mismatch on the N2 component of the ERP: A review" (Folstein and Van Petten, 2008).

4.7.2. Co-Citation Analysis of the Authors

A network map was developed using the Walktrap Clustering Algorithm within Biblioshiny to perform a co-citation network analysis of authors (Figure 16). Notably, when two publications are both cited within a third publication, they are considered co-cited. The co-citation network evolves as this process progresses. This phenomenon is similar to bibliographic coupling.



Figure 16. Collaborative citation network of authors



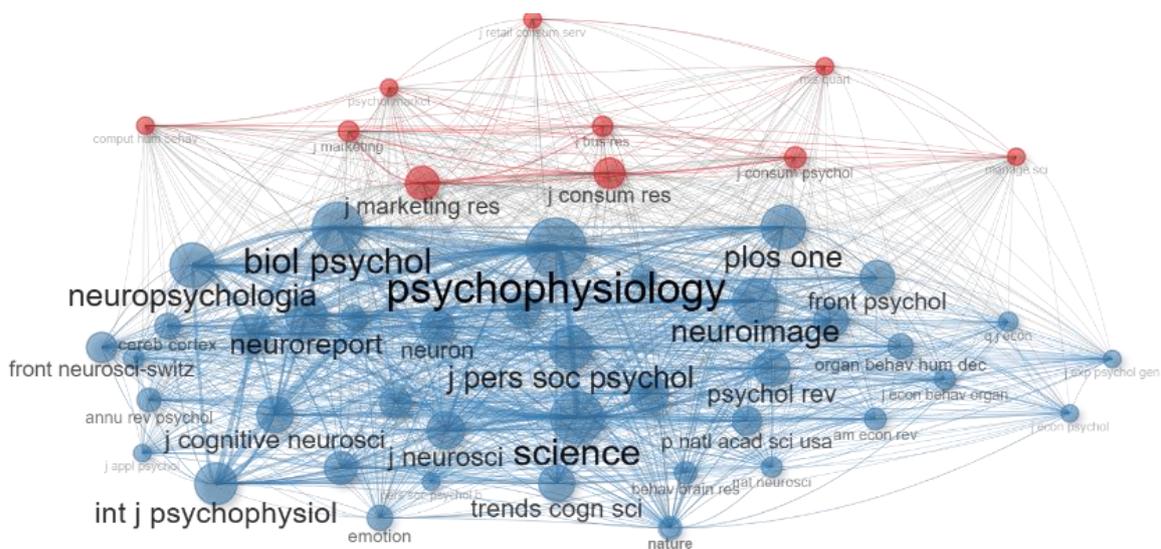
Source: This study was created by the author with data obtained from the Biblioshiny application of the Bibliometrix program by combining the Web of Science and Scopus data.

In the analysis conducted using Biblioshiny, the co-citation network of Ma, who has the highest number of publications in neuromanagement, represents the largest network and is linked to nearly all clusters. Another significant co-citation network was that led by Schupp and Semlitsch (Figure 16).

4.7.3. Co-Citation Network of Sources

A network map was developed using the Walktrap Clustering Algorithm within Biblioshiny to conduct a co-citation network analysis of the sources.

Figure 17. Common citation network of the sources



Source: This study was created by the author with data obtained from the Biblioshiny application of the Bibliometrix program by combining the Web of Science and Scopus data.



The sources were categorized into two distinct groups based on the outcomes of the co-citation analysis (Figure 17). The primary cluster comprises the following academic journals: Psychophysiology, Journal of Personality and Social Psychology, Neuroimage, Science, Biological Psychology, International Journal of Psychophysiology, Neuropsychologia, Neuroscience Letters, PLOS One, Neuroreport, Psychological Review, Frontiers in Psychology, Journal of Neuroscience, Psychological Science, Proceedings of the National Academy of Sciences USA, Frontiers in Human Neuroscience, Trends in Cognitive Sciences, Social Cognitive and Affective Neuroscience, Neuron, Journal of Cognitive Neuroscience, Frontiers in Neuroscience-Switzerland, Psychological Bulletin, American Economic Review, Brain Research, Journal of Economic Behaviour and Organisation, Organisational Behaviour and Human Decision Processes, Annual Review of Psychology, Emotion, Cerebral Cortex, Journal of Experimental Social Psychology, Journal of Experimental Psychology: General, Clinical Neurophysiology, Journal of Applied Psychology, Nature, Cognition, Affect, and Behaviour, Nature Neuroscience, Personality and Social Psychology Bulletin, Journal of Economic Psychology, Behavioural Brain Research, and Quarterly Journal of Economics.

The secondary cluster comprises journals such as the Journal of Consumer Research, Journal of Marketing Research, Journal of Marketing, Journal of Business Research, Journal of Consumer Psychology, Computers in Human Behavior, Journal of Retailing and Consumer Services, Management Science, and Psychology and Marketing.

The co-citation network analysis identified two primary clusters: one predominantly consisting of neuroscience-focused journals (e.g., Neuroimage and Biological Psychology) and the other primarily encompassing business and marketing journals (e.g., Journal of Marketing and Management Science).

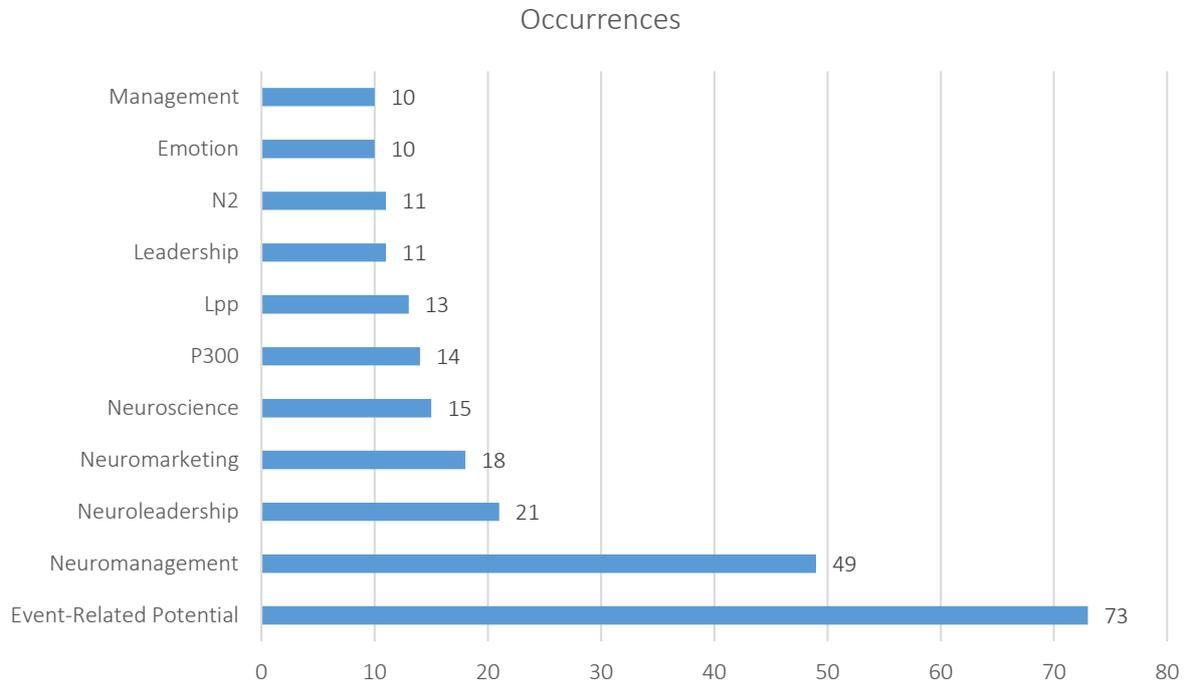
4.8. Analyses of Words

4.8.1. Word Frequencies and Word Cloud

The most frequently identified keywords were event-related potentials (ERP) (n=73), neuromanagement (n=49), neuroleadership (n=21), neuromarketing (n=18), neuroscience (n=15), leadership (n=21), and emotion (n=10). These results suggest a conceptual convergence between brain-based decision-making and leadership (Figure 18).



Figure 18. Most frequently used word formations



Source: This study was created by the author with data obtained from the Biblioshiny application of the Bibliometrix program by combining the Web of Science and Scopus data.

Furthermore, a subsequent analysis of the frequency of keywords (Keywords Plus) associated with the article, as indexed by the SCOPUS and Thomson Reuters' ISI Web of Knowledge databases, revealed the following occurrences: "event-related potentials (ERP)" appeared 39 times, "brain" 28 times, "emotion" 24 times, "attention" 21 times, "behaviour" 21 times, "information" 20 times, "responses" 20 times, "decision-making" 19 times, "brain potentials" 15 times, and "choice" 15 times. Figure 19 illustrates the word cloud generated using Biblioshiny software based on these terms.

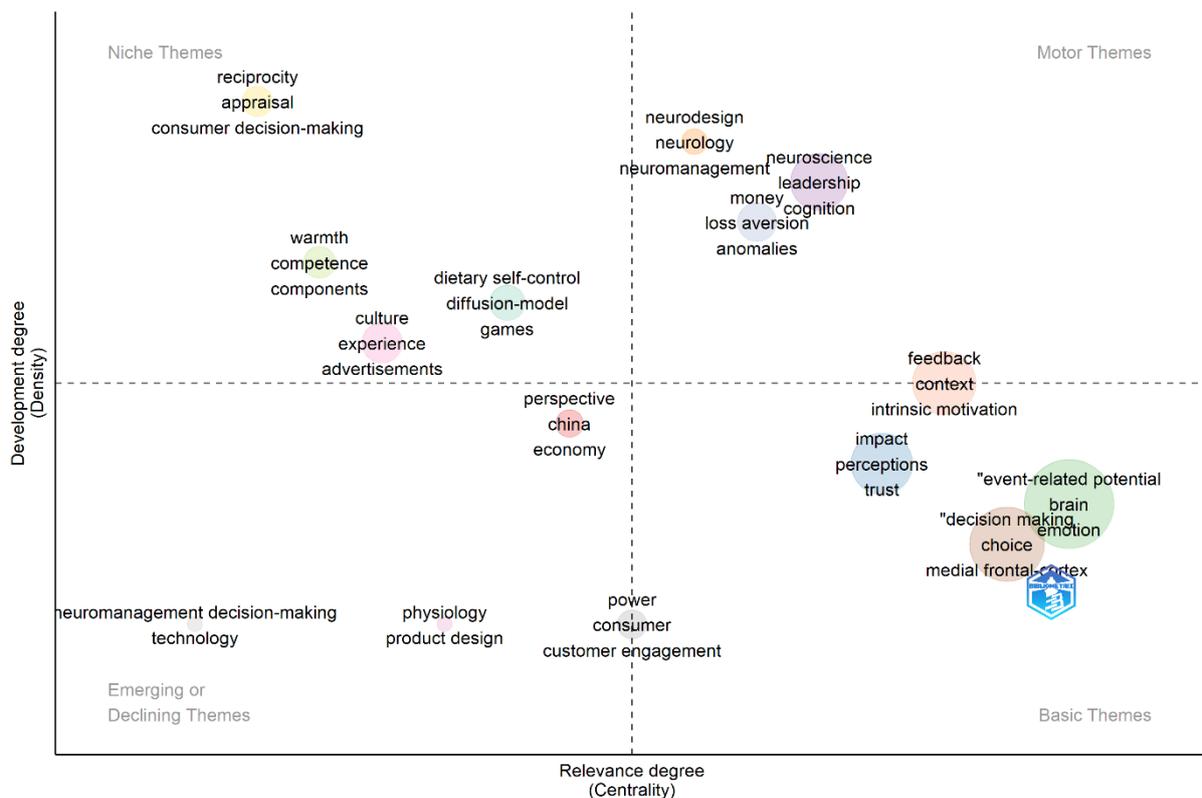


As illustrated in Figure 20, the terms "Event-Related Potentials," "Brain," "Decision-Making," "Choice," "Impact," "Eeg," "Leadership," "Cognition," "Motivation," and "Sex-Differences" were identified as the most significant within the common word networks.

4.8.3. Thematic Mapping

The thematic analysis of the neuromanagement literature identifies several principal areas of focus. These categories encompass motor, core, and niche themes, as well as themes that are either emerging or in decline. The “Keywords Plus” method was used to conduct this thematic analysis.

Figure 21. Keywords and thematic mapping



Source: This study was created by the author with data obtained from the Biblioshiny application of the Bibliometrix program by combining the Web of Science and Scopus data.

The thematic map depicted in Figure 21 categorizes the concepts into four distinct quadrants. The upper-left quadrant contains "niche" concepts, which are infrequently encountered within the field. The lower-left quadrant encompasses developing concepts. The upper right quadrant includes "motor" concepts, which are pivotal in determining the field's progress. Finally, the lower right quadrant comprises foundational concepts of the field (Çavdar, 2021, p.372).

Four distinct thematic clusters were identified as niche themes. The first cluster comprises "reciprocity, appraisal, and consumer decision-making." The second cluster includes "warmth,



competence, components." The third cluster consists of "culture, experience, advertisements," while the fourth cluster encompasses "dietary self-control, diffusion-model, games."

Thematic clusters within emerging or declining themes include "neuromanagement decision-making and technology," "physiology and product design," and "perspective, China, economy."

Three separate thematic clusters were identified as motor themes. As illustrated in Figure 21, the first cluster includes "neurodesign, neurology, neuromanagement," the second cluster comprises "neuroscience, leadership, cognition," and the third cluster consists of "money, loss aversion, anomalies." The thematic cluster of "feedback, context, intrinsic motivation" integrates both motor and basic themes.

Three thematic clusters were designated as basic themes. The first basic theme cluster includes "erp, brain, emotion," the second comprises "decision-making, choice, medial frontal-cortex," and the third consists of "impact, perceptions, trust." The thematic cluster "power, consumer, customer engagement" represents a combination of basic, emerging, and regressive themes.

4.9. Interpretive Synthesis: Epistemic Tensions, Institutional Concentration, and Ethical Visibility

Building on the analytical framing introduced in Section 2.4, we synthesise the results through two complementary lenses: epistemic tensions and ethical visibility. Across the intellectual and conceptual maps (Sections 4.7-4.8), the field's centre of gravity appears strongly shaped by measurement-led neuroscientific toolkits (e.g., ERP/EEG, emotion and decision paradigms) that travel into managerial questions. Managerial constructs (e.g., leadership and organisational outcomes) are clearly present, yet the overall structure suggests that theoretical integration with management and organisation scholarship develops more slowly than the diffusion of laboratory-oriented methods into applied settings. In this sense, the mapping points to an ongoing tension between neurophysiological anchoring and organisational-theoretical explanation: the field advances rapidly in technique and application, while the explanatory bridge back to organisational theory remains uneven. This interpretation is consistent with the field's growth trajectory: publications increase markedly after 2012 and, since 2017, annual output remains above 20, peaking in 2024 (n=41) (Figure 2).

A second, field-shaping observation concerns institutional concentration (Section 4.5). The productivity and collaboration patterns indicate a pronounced clustering around a relatively narrow set of highly productive scholars and institutions, with China occupying a central position in the publication network and international co-authorship remaining limited. Such concentration can accelerate cumulative output and method diffusion, but it may also narrow the range of organisational contexts and theoretical traditions represented in the corpus. Read together with the network structures, this pattern is consistent with a field that is expanding, yet still developing in terms of pluralism in settings, research traditions, and cross-regional collaboration.



Finally, the results highlight an ethical visibility gap. While ethical issues are discussed in the conceptual background (Section 2.3), governance-related concerns (e.g., consent, privacy, data security, and responsible interpretation standards) do not emerge as central organising themes in the keyword ecology and thematic structures (Sections 4.8.2-4.8.3). This matters because neuromanagement research frequently touches on sensitive bio-behavioural data and high-stakes organisational decisions. The synthesis therefore suggests a clear developmental task for the field: methodological innovation and empirical growth need to proceed alongside explicit ethical governance themes that become visible not only in narrative discussion but also in the field's conceptual core—an implication we develop directly in the Discussion (Section 5).

5. DISCUSSION

The field of neuromanagement has not only grown in volume; it is also consolidating around a particular form of interdisciplinarity. The bibliometric structures show that the thematic core clusters strongly around electrophysiological approaches—especially ERP/EEG-related terms—linking measurement-forward neuroscience toolkits to leadership, cognition, and decision themes. Read through the lens of epistemic tensions (Section 2.4), this configuration indicates a field advancing faster in measurement capacity than in organisational-theoretical integration: laboratory-oriented metrics and experimental paradigms travel readily into managerial questions, while the explanatory bridge back to organisational mechanisms remains uneven. Overall, the study's contribution is to conceptualise neuromanagement's field formation through the dual lenses of epistemic tensions and ethical visibility, thereby linking bibliometric structures to substantive debates in organisational neuroscience rather than treating mapping as an end in itself.

This measurement-forward trajectory helps explain why critiques of reductionism and interpretive overreach remain salient in organisational neuroscience. When organisational phenomena are inferred from neural correlates, the risks of reverse inference and neuro-essentialism increase, and the explanatory distance between the brain and the organisation can be underestimated (Lindebaum and Jordan, 2014, p.899-903; Lindebaum and Zundel, 2013, p.858-860). The prominence of measurement-centred themes therefore supports calls for multi-level theorising and research designs that connect neural indicators to behavioural, relational, and institutional mechanisms, rather than treating neuro-signals as stand-alone explanations. In this context, the corpus's most-cited paper (Botvinik-Nezer et al., 2020; 539 citations) is a useful signal of the evidentiary standards increasingly expected of neuro-methods—namely, transparency about analytic flexibility, robustness checks, and replicability. As neuromanagement draws on these methods to inform managerial inference and organisational decision-making, such standards become part of the field's legitimacy conditions rather than a technical footnote.

The publication trajectory further indicates that neuromanagement is moving beyond an exploratory stage. Output rises notably after 2012 and, since 2017, annual production



consistently exceeds 20 publications, reaching its highest level in 2024 (n=41). This growth, however, unfolds alongside an institutional concentration dynamic: a relatively narrow set of prolific scholars and institutions shapes a substantial share of output, with China occupying a central position in the network and international co-authorship remaining comparatively limited. Concentration can accelerate field formation and methodological standardisation, yet it may also narrow contextual diversity and the range of organisational settings in which claims are examined. A promising direction is therefore to expand cross-national collaborations and to test neuromanagement propositions across organisational cultures, sectors, and governance regimes, strengthening both robustness and generalisability.

Finally, the mapping foregrounds an ethical visibility gap. Although ethics is discussed conceptually, governance-related concerns remain peripheral in the keyword ecology and thematic structures. In a domain that increasingly involves sensitive neuro- and biometric data, the lag of governance-focused scholarship relative to technical experimentation poses a legitimacy challenge. Future work should treat governance as a first-order research concern—covering informed consent, privacy and data security, proportionality of measurement, and clear communication of what neuro-indicators can and cannot claim (Lindebaum and Raftopoulou, 2017). Put differently, responsible neuromanagement requires making governance auditable at the study-design level, rather than treating ethics as a post-hoc narrative add-on.

Taken together, the results suggest that neuromanagement is moving toward a more consolidated interdisciplinary agenda. The next developmental step is to shift from method-led novelty to theory-led explanation: articulating mechanisms that connect neural processes to organisational outcomes through well-specified pathways, tested with designs that are methodologically coherent and ethically robust.

6. CONCLUSION

This study provides an integrated bibliometric mapping of neuromanagement by combining records from Scopus and the Web of Science and analysing the merged corpus using Bibliometrix/Biblioshiny. By adopting a transparent multi-source workflow, the study enhances methodological clarity and offers a replicable template for future bibliometric investigations in interdisciplinary domains.

Three contributions follow from the findings. Methodologically, the study demonstrates a reproducible protocol for integrating multi-source bibliographic data and mitigating inflation due to duplicate records. Empirically, it maps the field's growth and structures its intellectual and conceptual landscape across 2007–2025, showing a marked expansion after 2012 and sustained annual output above 20 publications since 2017, with a peak in 2024 (n=41). Analytically, the synthesis suggests (i) a measurement-forward trajectory in which neurophysiological toolkits (e.g., ERP/EEG) occupy a central thematic position, (ii) an institutional concentration dynamic in knowledge production with comparatively limited



international co-authorship (China $n=165$; $MCP \approx 17.73\%$), and (iii) the relative underdevelopment of explicit ethical governance themes within the field's conceptual core.

Several directions for future research emerge. First, neuromanagement would benefit from more organisationally embedded empirical studies that connect neuro-indicators to behavioural, relational, and institutional mechanisms, thereby strengthening theory-led explanation rather than method-led novelty. Second, governance should be treated as a first-order research concern, with auditable frameworks for consent, privacy and data security, proportionality of measurement, and clear communication about the limits of inference. Third, broader cross-regional collaboration and stronger representation of under-studied contexts would improve the generalisability of claims and reduce the risk of context-bound conclusions. Finally, periodic bibliometric updates complemented by qualitative evidence syntheses would help monitor how the field's conceptual agenda evolves as it matures.

In summary, neuromanagement appears as a promising yet still consolidating interdisciplinary area. Its long-term impact will depend on balancing methodological innovation with organisational-theoretical integration and ethical governance, so that neuroscientific insights translate into robust, context-sensitive contributions to management scholarship and practice.

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Declaration of Contribution Rate: The entire study has been prepared only by the responsible author.

Declaration of Support and Appreciation: The research did not receive any support from any institution or organisation.

Declaration of Conflict: The author declares that there is no conflict of interest.

Declaration of AI Assistance: The author used SciSpace, an artificial intelligence language model, to support the literature review process. DeepL and Trinko were employed for language proofreading and stylistic refinement. SciSpace contributed to identifying relevant sources, extracting key points, and summarizing publications by providing answers and suggestions to specific research-related inquiries. All information, analyses, and outputs generated by the AI tools were critically reviewed and approved by the author.

In this study, the rules stated in the “Higher Education Institutions Scientific Research and Publication Ethics Directive” were followed.

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Appendices

Appendix 1. Reproducibility: Core R/Bibliometrix Commands

To improve auditability and replicability, we provide the essential commands used to convert, merge, de-duplicate, and export records. File paths and object names should be adapted to local directories.

```
library(bibliometrix)
```

```
A <- convert2df("Wos.bib", dbsource = "wos", format = "bibtex")
```

```
B <- convert2df("Scopus.csv", dbsource = "scopus", format = "csv")
```

```
NoroMan <- mergeDbSources(A, B, remove.duplicated = TRUE)
```

```
library(openxlsx)
```

```
write.xlsx(NoroMan, file = "NoroManbib.xlsx")
```