Top 100-Most Cited Articles About Cognitive and Computational Neuroscience

think neuro

Affiliations

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Introduction

Cognitive Computational Neuroscience is an interdisciplinary field that combines cognitive science, neuroscience, and computer science to produce simulations that help us understand how the brain works. It uses advanced technology such as MEG and EEG to study brain activities and processes. These computational models simulate brain processes, showing how neurons work together to process information. Computer Scientists use these breakthroughs to create biologically influenced technology and AI systems.

Objectives

- The objective of this research were to examine different fields of science, including neuroscience, psychology, computer science, and mathematics, to study how the brain processes information and develops sophisticated cognitive skills.

- We aimed to analyze the trends in brain function and cognitive processes within the 100-most cited articles using computer science and mathematics to process the data.

Methods

- Extracted top 200 literatures from Web of Science
- Sorted literatures into categories such as authors, affiliations, keywords and WOS topics
- Java and Python used to gather data for each of these topics
- Formed graphs with Excel and Google Sheets
- Bibliometrix (R programming) used for complex mapping analysis graphs
- Python used to create more statistical graphs
- Used Biblioshiny to create graphs based on top 100 literatures
- Timeline was adjusted to include data from 2000-2022

Data Analysis and Results

- The bar graph demonstrated how, of the 83 different authors, 12 authors had two or more publications that were among the top 100 most cited WOS articles. We determined that Karl J. Friston published 6 articles, the most among all of the 12 authors and that Decety J. published 3 articles, which was the second most among all of the 12 authors.
- The pie chart displays the most often used WOS topics among the top 100 most cited articles. Along with Neuroscience, we discovered that Psychology was the most frequently addressed topic in the literatures.

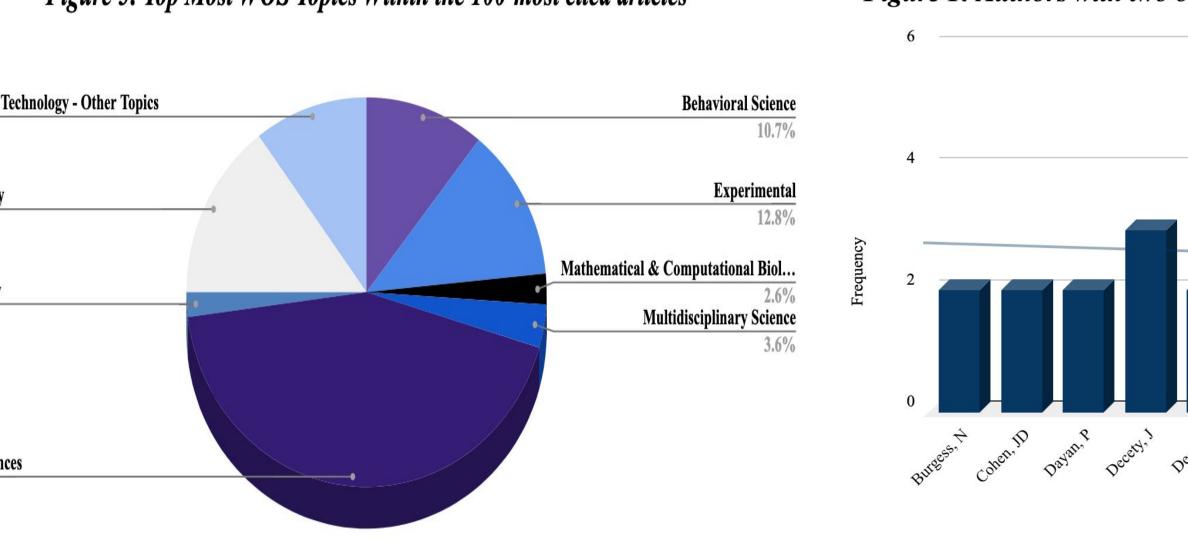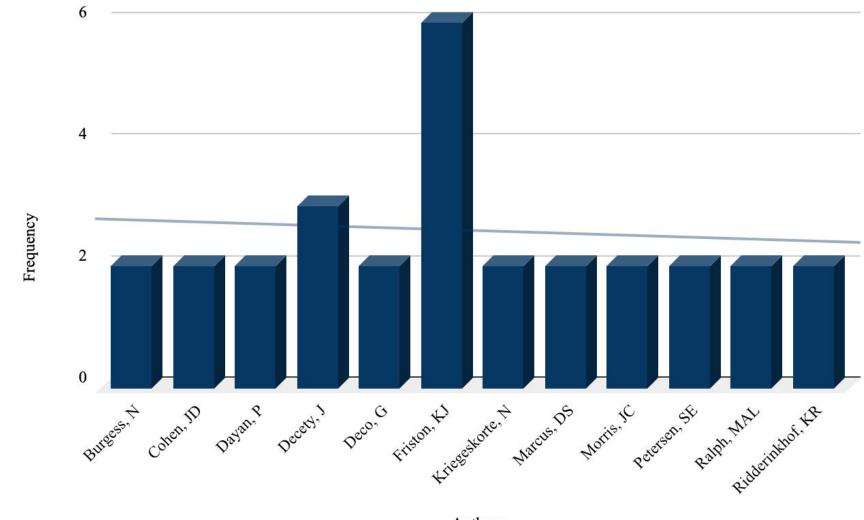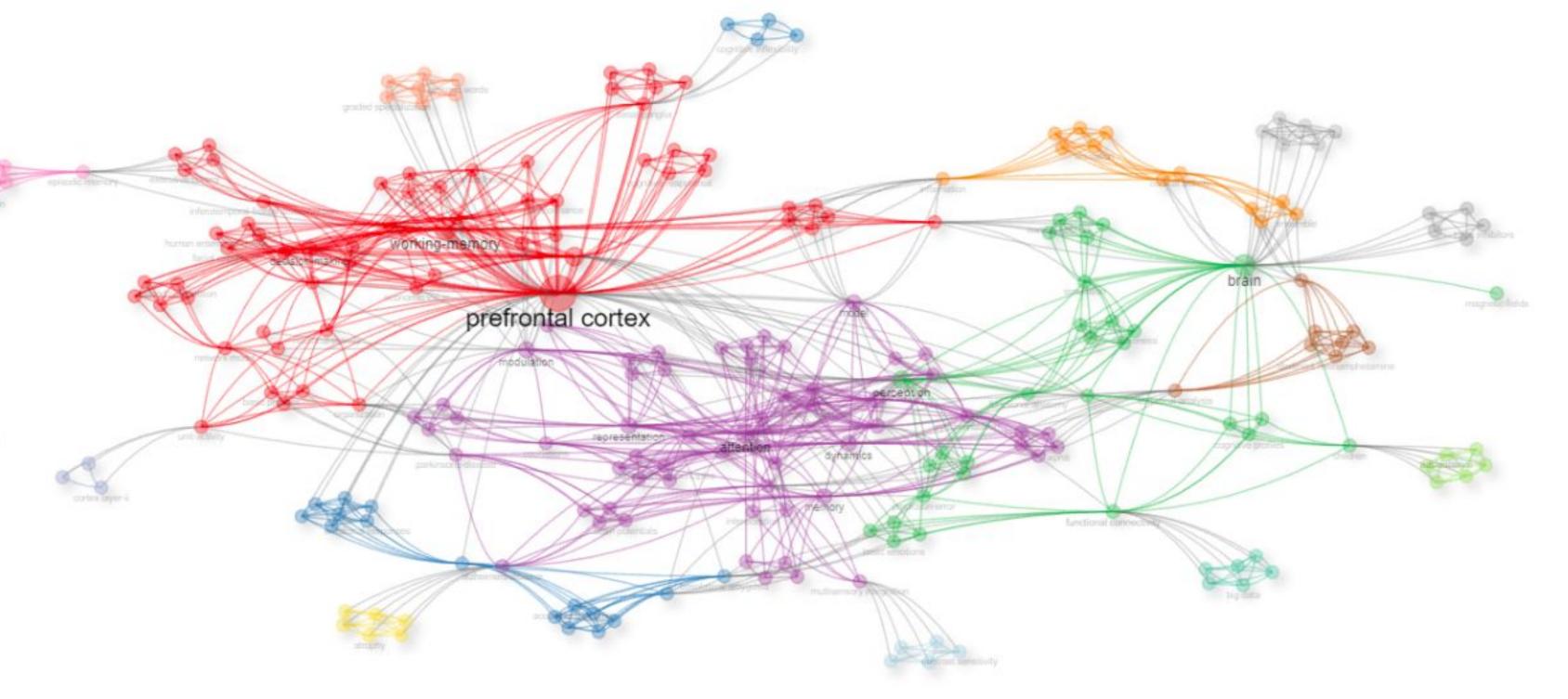Figure 5: Top Most WOS Topics Within the 100-most cited articles

Figure 1: Authors with two or more papers of the 100-most cited articles

- The keywords thematic map displays the common keywords used in each of the articles which depicts the similar themes among the articles. We found the the most common used keyword was memory, having prefrontal cortex as the keyword connecting most topics.

Conclusions

- Through the data extraction of memory within the top 100 most-cited articles, the following recommendations suggest:
  - Memory is a growing area of research in neuroscience
  - Continuing to analyze future research papers on such topics, promoting more educated predictions and claims surrounding the study of the brain
- Our purpose of conducting this research:
  - It provides future researchers with access to latest trends and current methodologies.
  - Opportunities are provided for researchers to identify existing gaps in current neuroscience research.
  - Changing approaches to such problems leads to new breakthroughs to further advancement in understanding brain behavior and anatomy.
- Similar studies: research conducted by Yeung in 2017, consisting of a citation network using VOSviewer to group together apparent themes & trends in neuroscience.
- To gain better insight on other studies, research conducted by Huang & Wei in 2021 emphasized the focus on "memory," relating to cognitive functioning.
- Sources of Error / Areas of Improvement:
  - Java: extract data from authors with two or more articles and obtain the 20 most frequently occurring keywords.
  - Sources of error: miscount for these two sections - the keywords came up multiple times, heavily influencing the standard deviation & frequency
  - Improvement: keep the procedure consistent with one singular platform

References

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Huang, Q.-S., & Wei, H. (2021, March 31). *A computational model of working memory based on spike-timing-dependent plasticity*. Frontiers. www.frontiersin.org/articles/10.3389/fncom.2021.630999/full