A Bibliometric Study of Cognitive Translation (2012-2021)

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Abstract

Cognitive translation emerged as an important part of translation studies development in the 1980s and 1990s, and reached a new level in 2010. This study, employing CiteSpace and VOSviewer to analyze articles retrieved from the WoS core database from 2012 to 2021, presents the growing trends in cognitive translation studies. The results are as follows: (1) Sweden and the University of Ottawa unfold the most cooperation with the rest of the world as country and institution, respectively. (2) Szarkowska is the author who has published the most articles in the past ten years, and those who are most frequently cited are Wild and Beaton. (3) Proceedings of the National Academy of Sciences (PNAS) is the journal that remains the highest level and quantity of academic output thanks to its highest H-index, and JMAM Journal of the American Medical Association is the most influential one in the field in 2021 due to its highest IF (Impact Factor). (4) The area of the brain where researchers highly focus on exploring cognitive activity is the hippocampus; the cognitive load has been the emerging trend in the past ten years and will continue to be trending for years to come; functional magnetic resonance imaging (fMRI), a dominant tool in cognitive neuroscience, is wildly adopted in studies of translators′ mental activity, and researchers also focus on methods like eye tracking to investigate the mental activity. Nevertheless, in the pursuit of reliability and validity, multivariate inter certification should be adopted in researches in mental translation studies.

Keywords: Bibliometric analysis, Citespace, VOSviewer, cognitive translation

1. Introduction

Starting in the 1960s, cognitive translation has emerged as a brand-new research branch in the translation area which thanks to in-depth exploration in the 1980s and 1990s and the rapid development in the latest three decades (Xiao & Martín, 2020). It takes cognitive science theories, such as cognitive psychology, cognitive linguistics, and neurosciences, to investigate translators′ mental activity (Wen et al., 2021). A host of universities worldwide launch centers or labs of mental translation study. Meanwhile, the survey of the specific academic field has seen dramatically dynamic updates over methodologies in the past thirty years. A slew of research achievements of cognitive translation based on the empirical data has been generated with the help of analytical methods, such as thinking aloud method-centered oral report, keystroke record-centered translator behavior data recording, eye tracking, neuroimaging recording, and collection of physiological data of translators by heart rate detection and galvanic skin test which highlight the practical and interdisciplinary nature of translation studies (Wen et al., 2021). What most complicated and worthy of exploring is the inner activity in a translator′s brain, namely, the black box, and the brain basis should become the leading research topic in the translation studies field, as Tymoczko (2012) puts it. As such, this study attempts to solve the following questions:

Q1) What is the growth trajectory of publications in the field of cognitive translation?

Q2) What implications and insights for cognitive translation can be obtained from the bibliometric analysis (most productive authors, institutions and countries)?

Q3) What main research trends have gained the greatest attention from the keyword-occurrence and keywords clusters analysis?

2. Research Design

2.1 Data Source

A number of documents on cognitive translation studies have been investigated since the very day it emerged; therefore, the authors employ advanced research from the Web of Science (WoS) core database in a bid to obtain an accurate data relevant to the academic area. A total of 1,676 documents composed of article titles, abstracts, authors, keywords, and references from 2012 to 2021 are selected and manually checked. In this paper, CiteSpace is employed to produce a visual graph of countries, institutions, authors, journals, cited-authors, keywords, and clusters of keywords, and VOSviewer is used to generate a graph of co-references.

2.2 Methodology

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CiteSpace, designed by Dr. Chao-Mei Chen, is an information visualization software based on Java, mainly aiming to analyze and visualize co-citation networks, and explore potential new trends in an academic area (Liu, 2017). VOSviewer (Visualization of Similarities Viewer), introduced in 2009 by Dr. Ludo Waltman and Ness Jan van Eck, is a free network software tool to construct and visualize bibliometrics (Win, 2020). Both of them support bibliographical and citation data from Web of Science, Scopus, and Dimensions, among others. Though convenient, some manual or semi-manual calculation remain a must to get clearer and more accurate results. Figure 1 shows steps of the present research.
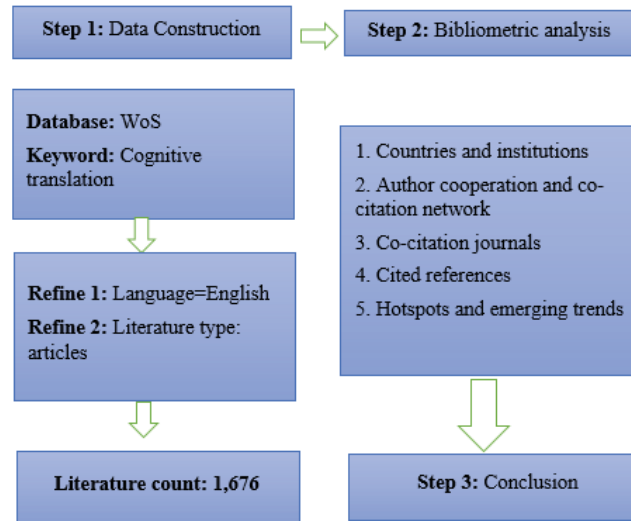

Figure 1. Steps of bibliometric analysis of cognitive translation

3. Research results and analysis

3.1 Analysis of number of publications

As shown in Figure 2, publications of cognitive translation studies indicate a growing trend, from 115 papers in 2012 to 237 in 2021. From 2017 to 2018, there is a sharp rise, which potentially owes in large measure to mounting attention direct toward the multidisciplinary field. It is observable that the trend can be divided into two phases. Phase 1 is from 2012 to 2017, showing a slow growth in the publications, and phase 2 from 2017 to 2021, enjoying a rocketing upsurge. A slight decline in the number of publications is observed in 2021 from a year before.
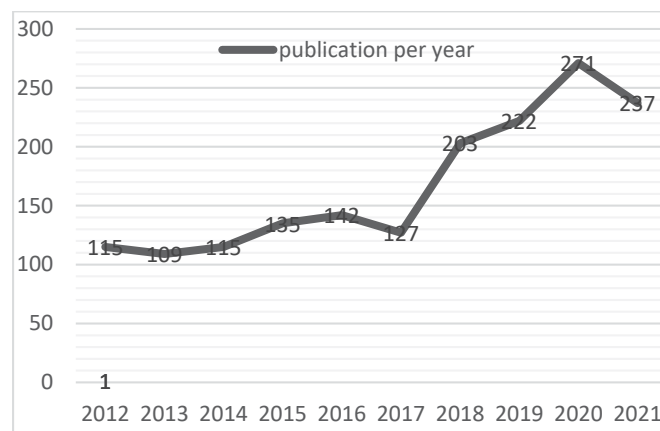

Figure 2. Network analysis of publications in terms of cognitive translation (2012-2021)

3.2 Analysis of countries and institutions

In recent years, the world has witnessed a flourishing development trend in cognitive translation studies. A clearer image of the distribution of articles in geography and space will be presented by conducting a survey in the distribution of a diversity of countries.

(a)

(b)

Figure 3. Network analysis of countries and institutions in terms of cognitive translation (2012-2021) (a). Map of countries. (b). Map of institutions

The network from CiteSpace of the collaboration for cognitive translation studies is displayed in Figure 3(a), in which the magnitude of nodes represents the number of published articles in every country. The larger the node, the more publications are recorded in one country. As evidenced by Table 1, topping the list is USA, housing 521 published articles. The nodes also represent the degree of centrality. Sweden, enjoying the highest centrality (0.29), boasts the most frequent rates in cooperation with the others, including Wales, Serbia, North Ireland, etc. Spain (0.25) is only behind the Nordic country, coming in the second place. Canada (0.00) remains the last, conducting a relatively low level of coordination with the rest of the world than the other nine nations.

Table 1. Top 10 countries in terms of cognitive translation (2012-2021)

Rank	Publications	Centrality	Countries
1	521	0.06	USA
2	204	0.12	England
3	176	0.00	Canada
4	148	0.09	Australia
5	122	0.10	Peoples R China
6	121	0.03	Germany
7	119	0.25	Spain
8	113	0.03	Netherlands
9	62	0.05	Italy
10	60	0.29	Sweden

Figure 3(b) shows the number of published articles from different institutions and collaboration between them. The magnitude of nodes represents the number of published papers from the top ten institutions. Multiple universities from diverse countries contribute a lot to the field, such as The University of Toronto, London's Global University, and McMaster University, boasting 42, 30, 28 articles respectively. University of Ottawa, enjoying the highest centrality of 0.29, is arguably the one that unfolds cooperation with its rivals in a relatively high level, including London's Global University, meanwhile, Monash University remains the last, with 17 published articles and the centrality of 0.02, suggesting it comes with a relatively low rate

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in coordination with other institutions in the rest of the world. To put it shortly, following a deeper level in collaboration among institutions and countries, a more brilliant future for cognitive translation will come.

Table 2. Top 10 institutions in terms of cognitive translation (2012-2021)

Ranks	Publications	Centrality	Institutions
1	42	0.12	University of Toronto
2	30	0.06	London's Global University
3	28	0.22	McMaster University
4	20	0.04	McGill University
5	20	0.06	The University of Sydney
6	20	0.09	King's College London
7	19	0.02	University of Washington
8	18	0.06	Karolinska Institute
9	18	0.29	University of Ottawa
10	17	0.02	Monash University

3.3 Analysis of author cooperation and co-citation networks

Authorship is also an essential factor in the study of the trends and evolution in an academic field. Top 10 authors created from CiteSpace in the area of cognitive translation are shown in the Figure 4(a), suggesting many authors are inclined to cooperate with others in the field.

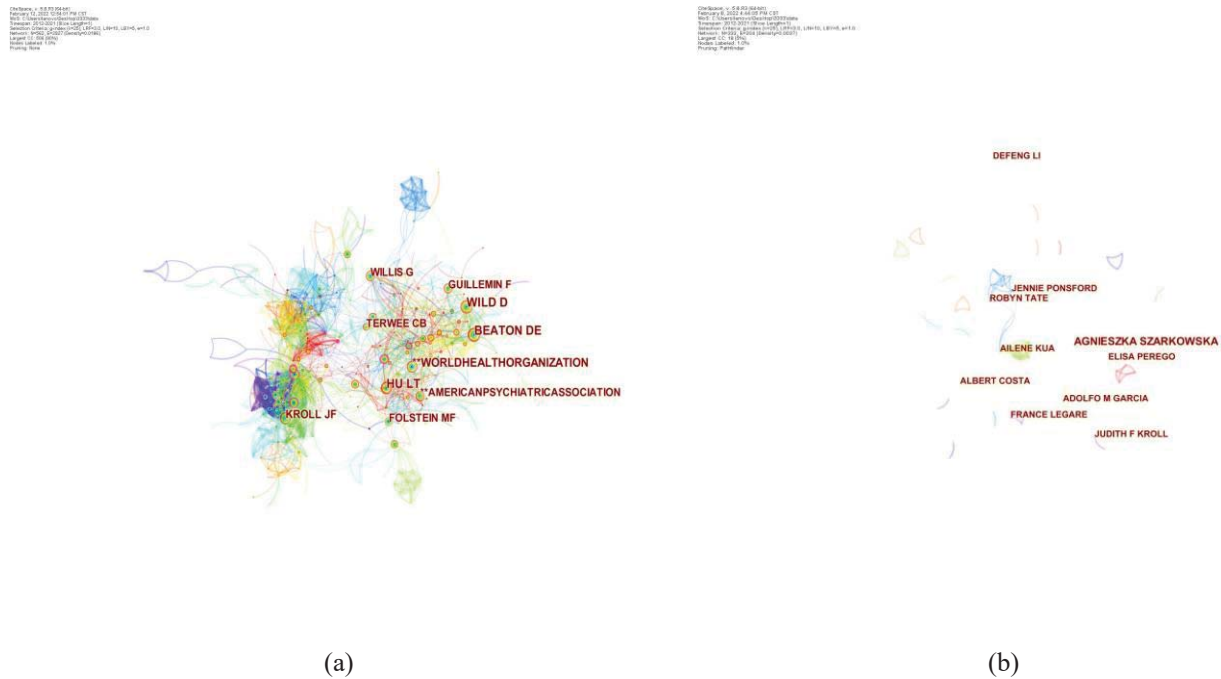(a)   (b)

Figure 4. Network analysis of authors in terms of cognitive translation (2012-2021). (a). Top 10 most productive authors. (b). Top 10 most frequently cited authors.

Agnieszka Szarkowska claim the top spot, outperforming other authors including France Legare, Defeng Li, Adolfo M Garcia, etc., all of who adeptly delve into cognitive translation and make great contributions to its advances and evolution. Co-authorship analysis also matters in the research on the field. As shown in Figure 4(b), each node represents an author, in which Dorcas E Beaton is the most frequently cited author with the biggest node.

3.4 Co-citation journals analysis

The quantity of literature and citations must be involved in a bid to become acquainted with the core journals in one specific field. Top ten journals created from CiteSpace in the academic area of cognitive translation and their collaborations are displayed in Figure 5.
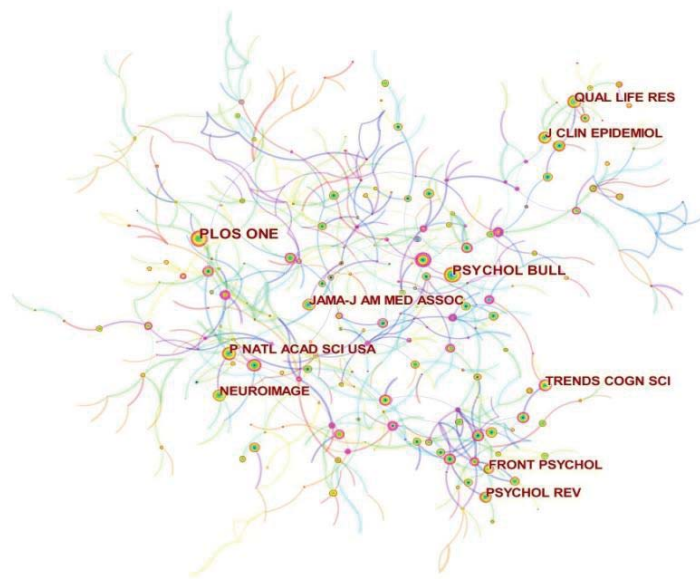

Figure 5. Top 10 journals in the terms of cognitive translation (2012-2021)

PLOS ONE is home to 344 published articles, claiming the top spot, while *JMAM Journal of the American Medical Association* has 178 published papers, remaining the last one. *Proceedings of the National Academy of Sciences (PNAS)* boasts the highest H-idex of 699, suggesting that it enjoys the highest level and quantity of academic output. *JMAM Journal of the American Medical Association* boasts the highest IF, in a testament to that it is the most influential journal in the area of cognitive translation in 2021.

3.5 Cited references

As shown in Figure 6, co-references in cognitive translation are created by VOSviewer. Some overlaps between authors of the items can be easily observed in Figure 4(b) and 6, in which the highest-impact authors are often the most-cited ones in terms of production and quotation instances.

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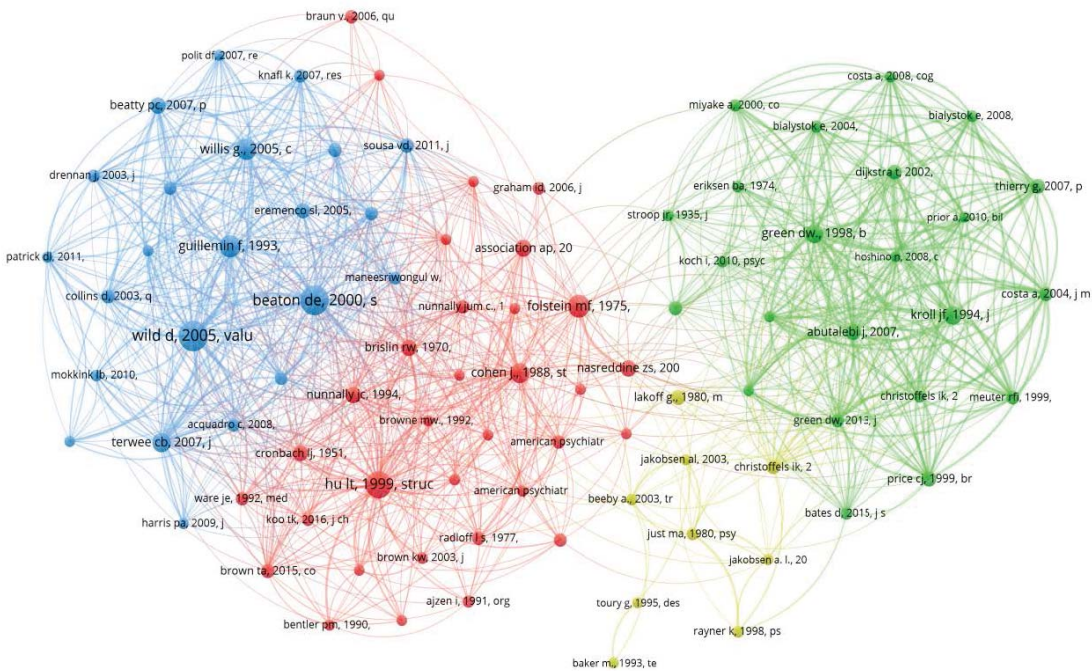ISSN (online): 2766-791X; ISSN (print): 2770-6354
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Figure 6. Co-citation in terms of cognitive translation (2012-2021)

Wild and Beaton are the top two in both cited authors and cited references, and their strong expertise is what makes them stand out in the area of cognitive translation studies. Wild (2005) says that a consensus can be reached on principles of good practice (PGP) for translation and cultural adaptation only by looking at fields of agreement from a broader perspective and allowing diverse ways to achieve the same goal for each step in the translation process. Beaton (2000) argues that linguistically translated and culturally adapted items are a must if a diversity of cultures are to see the use of the health status measures, which will ensure the content validity of instrument at a conceptual level across a multitude of cultures to be maintained.

3.6 Hotspots and emerging trends

The emerging trends and hotspots in one academic field can be reflected from the keywords in published articles. Keywords in cognitive translation are shown in Figure 7.

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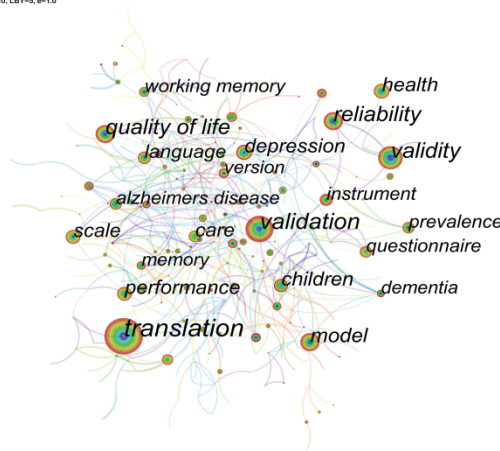www.jhkpress.com

Figure 7. Visualization map of co-occurrence keywords in terms of cognitive translation (2012-2021)

A more accurate analysis of the emerging trend in the academic field can be revealed from a cluster analysis of keywords, as shown in Figure 8, in which, eight different colors represent eight clusters, including hippocampus, bilingualism, HIV, time, women, cognitive insight, reliability, health, cognitive control, and fMRI.
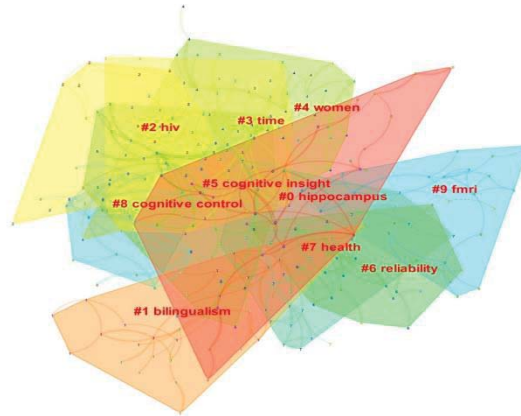

Figure 8. Keywords clusters visualization of the keywords in cognitive translation (2012-2021)

The themes of Cluster #0, # 1, #5, #6, #7, #8 and #9 are associated with hippocampus, bilingualism, cognitive insight, cognitive control, reliability, health and fMRI. Cognitive load refers to the total cognitive resources that an individual costs when conducting information process. To complete a task, the limited cognition in working memory, psychological resources, must be used, thus cognitive load will be generated (Wen et al., 2021). Pavlovic and Jensen (2009) conduct an experiment using eye tracking to explore translators' cognitive load in forward and backward translation, suggesting that the total load in backward translation is higher than that in its forward counterpart; the load that a translator deals with target text is higher than the one with source text regardless of forward or backward translation; the load of student translators is higher than that of their professional counterparts. Delavari et al. (2020) perform an experiment to evaluate the developmental trajectory of hippocampal functional connectivity across human population, finding that a critical period of prefrontal cortex-hippocampal-striatal circuit dysmaturation, especially in the late adolescence, could be a target for short-term interventions to potentially achieve long-lasting rescue of circuit dysfunctions associated with psychosis. As Ekstrom (2019) puts it, functional magnetic resonance imaging (fMRI), a dominant tool in cognitive neuroscience, sees a little relation to underlying neural activity,

particularly in human brain. By evaluating the proposal that blood oxygen level dependent-signal changes equate to the ones in gamma-band activity, which in turn may partially related to the spiking activity of neurons, Ekstrom (2019) finds that deeper brain structures like hippocampus suggest both regional and frequency-wise differences. Sharmin et al. (2008) conduct an experiment using eye tracking to analyze the impact of source text difficulty on translators' cognitive load. Three source texts that boast different difficulty in word frequency and syntax were chosen in the research, and cognitive load were measured by two indicators -- fixation counts and average fixation duration. The results shows that the more difficult the text, the higher the average number of fixations per minute is, and that no significant changes are observed in average fixation duration. Lu and Sun (2018) compare cognitive processing in human translation and post-edition, finding that the processing speed of the latter is faster, pupil diameter, fixation number and duration are smaller, and cognitive effort is lower, moreover, translators pay more attention to the target text area, while do the same to the source text area in the process of manual translation. Wu and Wang (2019), through eye tracking and keyboard logging, study the process data of a group of student interpreters translating economic text from English to Chinese. The experiment finds that cognitive effort in metaphor translation is higher than that in its non-metaphorical counterpart, and that differences of the effort can be seen from the dealing process of metaphor in different categories, the bigger the cultural differences between source and target text, the higher the cognitive difficulty is. In addition, different cognitive translation results in different cognitive efforts, from high to low, respectively, the replacement of source language image, retention of source language image, and interpretation. Wen et al. (2021) argue that limitations exist in the major tools used in cognitive research of written translation, keystroke recording and eye tracking, and multivariate intercertification should be adopted with a view to meet the improvement of reliability and validity of experimental research. China's relevant studies consider "thinking aloud" + "performance measurement" + "questionnaire/ interview" as the most common multiple combination. Wang et al. (2013) explore relations between translators' cognitive psychological factors and interpreting translation selection during consecutive interpreting, suggesting that among those factors, the distribution of attention and memory impacts on strategies for memory and concept formation, logical capability and comprehensive ability on express and coordinate strategies, and confidence, preciseness and perseverance on the interpreting process as a whole, three direct determinants on translators' interpreting strategies.

The theme of Cluster #2 relates to HIV. As Van Pelt (2021) puts it, Public Significance Statement HIV-affected children in Botswana suffer a known pattern of cognitive difficulties that can affect school performance and later life outcomes. Cluster #3 is associated with time. Celian et al. (2021) perform an experiment, in a bid to enhance understanding over rehabilitation therapists' real-time decision-making processes on the use of rehabilitation technology (RT) in clinical treatment. Cluster #4 is linked to women. Anandavadivelan et al. (2020) present a study to describe the cultural adaptation of the Reproductive Concerns After Cancer (RCAC) scale into Swedish and evaluate its psychometric properties among young women who undergo treatment for cancer.

Simply put, hippocampus is the main area of brain that researchers focus on to explore cognitive activity; cognitive load is the mainstay in cognitive translation area, and will maintain the status quo in years to come; methods like fMRI are wildly used, so are eye tracking, keyboard logging and keystroke recording, to investigate translators' cognitive activity. In the pursuit of reliability and validity, multivariate intercertification should be adopted in studies.

4. Conclusion and Implications

The state of the emerging trends in a certain academic area is a must for researchers, especially the beginning ones. The current bibliometric analysis study displays a lucid overview of cognitive translation studies from 2012 to 2021 and gives an insight into its trends and developments.

First, through the analysis of nations and institutions, Sweden and University of Ottawa respectively claim the top spot in cooperation with the rest of the world. Second, through the inquiry of authors and co-cited-authors, Szarkowska outperforms other authors in the number of published articles in the past decade; among those who are most frequently cited are Wild and Beaton. Third, through investigation into journals, it is found that *Proceedings of the National Academy of Sciences (PNAS)*, enjoying the highest H-index, remains the highest level and quantity of academic output; *JMAM Journal of the American Medical Association* boasts the highest IF, in a testament to that it is the most influential journal in the area in 2021. Fourth, through exploration into co-occurrence of keywords, hippocampus remains the area in the brain that researchers focus on most to explore cognitive activity; cognitive load is the emerging trend in the past ten years and will continue to be trending for years to come; methods like fMRI and eye tracking, among others, are wildly adopted in studies of translators' cognitive activity.

An even more brilliant future for cognitive translation studies will be seen in the foreseeable future, with more coordination unfolded among countries and institutions, and more academically achieved authors publishing professional and thought-provoking articles.

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