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Artificial Intelligence and International Rules in Cyberspace: A Comparative Knowledge-Mapping Analysis

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Abstract

Considering the new technologies, trends, and geopolitical challenges brought about by the globalization of the Internet, research on international rules in cyberspace holds theoretical urgency, practical significance, and provides guidance for real-world applications. A comparative analysis of relevant papers on the international governance of cyberspace between 1999 and 2020 was conducted using the knowledge mapping tool CiteSpace in Chinese and English databases. The analysis revealed that Chinese research exhibits a stronger focus on national policies, with distinct characteristics at different stages of research. In contrast, English literature demonstrates a clear delineation of the theoretical foundation and maintains a continuous and in-depth exploration of foundational topics. While the field of communication in Chinese has a significantly higher quantity of research compared to English, there exists a structural gap between this field and its foundational theories. In the process of a paradigm shift, it is crucial to emphasize Chinese academic perspectives in this field, pay attention to both domestic and international foundational knowledge and emerging trends, and strengthen theoretical innovation and academic community-building.

Keywords: CiteSpace; comparative analysis; cyberspace; international rules; multi-sensor data fusion

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1. Introduction

The Internet plays a crucial role as a tool for globalization, enabling global communication processes and reshaping collective global consciousness [1]. The application of new technologies, including big data, cloud computing, the Internet of Things, and artificial intelligence, has not only facilitated various aspects of people's lives, work, and learning, but has also introduced a myriad of network security risks and crises. Since the late 1990s, scholarly attention has increasingly shifted towards the study of cyberspace and cyber norms, transitioning from debates centered around "Internet utopian autonomy" to addressing issues pertaining to public policy and the legal aspects of cyberspace governance [2]. Over the past five years, Chinese scholars have conducted a notable increase in research on cyberspace governance, owing to the influence of new technologies, emerging trends, and the profound geopolitical landscape. This trend underscores the pressing theoretical urgency, practical demands, and pragmatic guidance of studying international rules in cyberspace.

Considering the fact that few studies have systematically compared bilingual corpora (Chinese and English) to uncover disparities in research structures, the present study endeavors to address this research gap. This study aims to map how two major scholarly

communities (Chinese and English language) emphasize and frame international rules in cyberspace. This can help identify asymmetries in foundational theories and problem-driven topics, facilitate cross-linguistic scholarly dialog, and highlight where theoretical integration and community-building can reduce fragmentation and strengthen cumulative knowledge. Although thematic issues in cyberspace governance are global, this study takes a comparative perspective between Chinese- and English-language corpora. The goal is not to say topics are strictly regional but to show relative emphases influenced by different academic traditions and policy environments.

The present paper aims to explore several key areas within research development and hotspots of international rules in cyberspace governance. Specifically, it will investigate the scientific knowledge foundation, research hotspots, and research areas surrounding international rules in cyberspace. Additionally, it will examine the focus of research on cyberspace governance at different stages, regional disparities, the status of China's academic discourse on international rules in cyberspace, and the research orientations of Chinese scholars within the field of communication. By doing so, this paper seeks to provide valuable directional guidance for future research in China's academic community on the topic of international governance of the Internet.

2. Materials and Methods

2.1. Research Methodology

To comprehensively investigate the development trajectory, knowledge flow trends, and paradigm shifts in international rules of cyberspace governance, this study employs a combination of data-intensive scientific discoveries and "mapping knowledge domains" (MKD) research. This approach aims to visualize the development process and structural relationships of scientific knowledge. For data processing and partial visualization, the English version of CiteSpace 5.7.R2 is utilized, while VOSviewer 1.6.16 is employed for graphical visualization.

CiteSpace can effectively reveal a discipline's developmental trajectory and identify research developments. It has well-developed clustering and burst detection functions, suitable for exploring knowledge evolution over time. VOSviewer offers clear and intuitive visualizations with well-structured network layouts, ideal for two-dimensional representations of multidimensional relationships. Tools like Pajek or Gephi have advantages such as greater flexibility and customizable graphics, but they have higher technical thresholds, which may limit reproducibility for non-technical researchers. Complementary use of CiteSpace and VOSviewer combines the analytical depth of trend analysis and the clarity of graphical visualization, enhancing result reliability and accessibility.

2.2. Data Collection

This study focuses on collecting literature in both the Chinese and English languages. The identification of specialized words is accomplished through expert consultation and a literature expansion method. The literature expansion method involves utilizing highly cited keywords and their associated literature keywords to expand and refine the search terms used in this paper.

In Chinese, the keywords "Internet", "cyberspace", "international", "global", "rules", and "governance" were used to search the Chinese Social Sciences Citation Index (CSSCI) for records from 1998 to 15 September 2020. The CSSCI, established in 1998 by Nanjing University as the authoritative citation index for Chinese humanities and social sciences, provides quality evaluation functions that enhance the precision of sample selection. To improve recall, a supplementary manual search using related terms was conducted on the CNKI database for works prior to 1998, but no additional results were found. After

filtering and de-duplication, 204 valid papers, including all record fields and references, were obtained. Accordingly, 1999 was selected as the starting year of this study.

In the English language, the Web of Science (WoS) database core collection, specifically the Social Science Citation Index (SSCI) database, served as the data source. The search was conducted using the following keywords: "Cyberspace", "Cyber", "International", "Global", "Rule", "Law", "Norms", and "Global Governance". These keywords were combined and arranged, and a comprehensive search was performed across the entire database for articles of the "Article" type in the subject (Topic) field. Initially, 146 articles were obtained, and after removing duplicates, 144 articles remained, encompassing all record fields and references. The data collection process concluded on 3 January 2021.

We use CSSCI to represent Chinese-language social science scholarship and SSCI to represent internationally indexed English-language scholarship. These indices are not fully equivalent in coverage; therefore, we treat them as proxies for two language-based corpora rather than directly comparable country datasets. To enhance comparability, we applied harmonized search strings, inclusion/exclusion criteria, and time boundaries across both corpora. The data collection process ensures a comprehensive selection of literature in both languages, enabling a robust analysis of the research topic in the field of international rules of cyberspace governance.

2.3. Analysis Parameters

Unless otherwise stated, the following basic parameters were consistently applied for CiteSpace analysis in this paper:

Time Range: January 1999 to December 2020;

Time Slice: Time Slice 1, with a threshold of TOP50 (Top n = 50) for each time slice;

Datasets analyzed: Title, abstract, author keywords, and extended keywords;

Network connectivity strength: Calculated using the Cosine algorithm;

Network clipping: Not applied;

Node size: Set to "tree ring history".

These parameters were selected to ensure a standardized and consistent analysis approach throughout the study. By applying these parameters consistently, the research findings and visualizations maintain coherence and facilitate accurate comparisons and interpretations.

3. Results and Discussion

3.1. Publication Number and Publication Trend

In the field of research on international rules of cyberspace governance, the number of Chinese articles surpasses the number of English studies. However, the Chinese literature began a little later than the English literature. Examining the publication trend (refer to Figure 1), a small peak in English publications is observed around 2000, with the initial discussions focusing on the laws and regulations of Internet governance [3]. Since then, both Chinese and English papers have experienced a period of relative stability. However, in the past five years (2016–2020), there has been an explosive growth in publications, with the accumulation of Chinese and English studies accounting for more than half of all published results in the past 20 years.

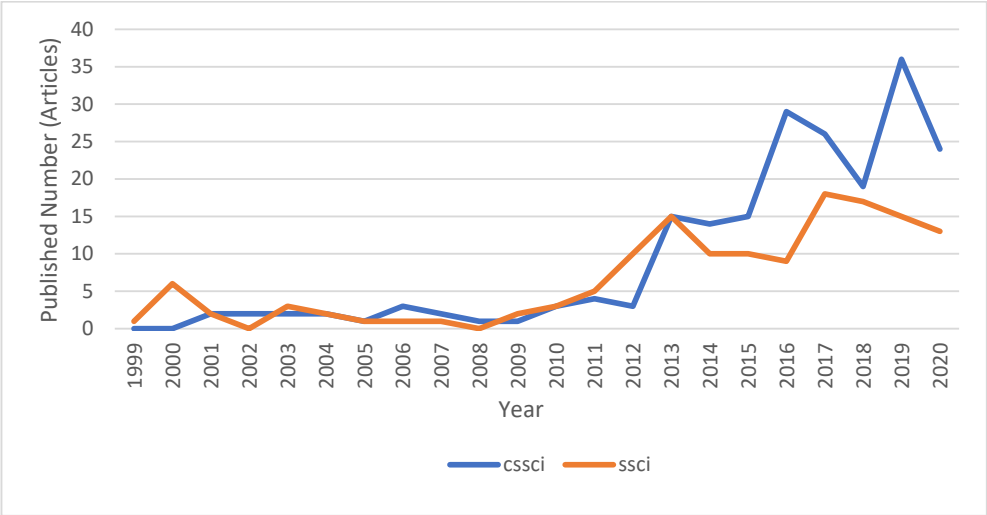


Figure 1. Comparison of publication trends between Chinese and English databases.

In recent years, the number of publications in SSCI journals has remained relatively stable, with a slight decline. On the other hand, the number of publications in CSSCI journals has shown significant variation. After experiencing a decline in 2018, the total number of CSSCI publications rapidly increased to 36 in 2019. Although there was a slight decline in 2020, the total number of publications remained higher than in 2018 by 24. The year 2020 was marked by controversies, particularly related to the United States' actions against TikTok and WeChat, international cyber hacking operations and cyber deterrence, data privacy protection in the context of epidemic prevention, and the regulation of internet platform-based enterprises and their responsibilities. These increasingly complex situations have made research on international norms in cyberspace a long-term concern in the field of internet governance.

3.2. Analysis by Country/Region

The United Kingdom (UK) and the United States (US) are the primary sources of SSCI journal publications in the field of international rules of cyberspace governance and hold significant academic influence. Chinese scholars, on the other hand, have been gaining momentum. In terms of the number of publications (refer to Table 1), the US accounts for the highest proportion, with over 40.24% of the publications, while the UK accounts for 14.02%. Chinese scholars have published six articles, ranking third in total numbers, but accounting for only 3.66% of the publications.

Table 1. Top 10 WoS-SSCI papers by country/region.

	Country/Region	Intermediary Centrality	Degree Centrality	Frequency	Brust	Year	Half-Life
1	United States of America	0.48	14	66	3.56	2000	14.5
2	England	0.32	9	23	/	2003	13.5
3	People's Republic of China	0.08	5	6	/	2012	4.5
4	Malaysia	0.06	2	3	/	2013	1.5
5	Netherlands	0.03	4	6	/	2013	3.5
6	Republic of Korea	0.01	3	4	/	2017	0.5
7	Republic of Singapore	0.01	4	3	/	2017	−0.5
8	Commonwealth of Australia	0	3	7	/	2006	11.5
9	Kingdom of Sweden	0	3	1	/	2019	−0.5
10	Kingdom of Denmark	0	3	1	/	2019	−0.5
11	Canada	0	2	7	/	2003	8.5

In terms of academic influence, US scholars have an intermediary centrality of 0.48, and UK scholars have an intermediary centrality of 0.32. According to the regularity of knowledge dissemination, higher intermediary centrality indicates greater importance of the nodes and a greater impact on network transmission when these nodes are removed [4]. Therefore, the studies from the UK and the US have absolute academic influence in this field.

In terms of chronological order, Chinese scholars entered the field of SSCI publication in 2012, indicating a shorter time of accumulation. However, their degree centrality and intermediary centrality rank third, suggesting that their research has gained attention to a certain extent. The higher the intermediary centrality, the greater the importance of the nodes, and the greater the impact on network transmission after removing these points.

The academic dialog in the field of international normative cooperation in cyberspace is based on collaboration and cooperation among countries. In terms of association (refer to Figure 2), research conducted in the UK, China, Korea, Singapore, and Canada shows a high degree of correlation among national studies. Similarly, research in Sweden, Denmark, and Australia also exhibits a high level of association among each other's studies.

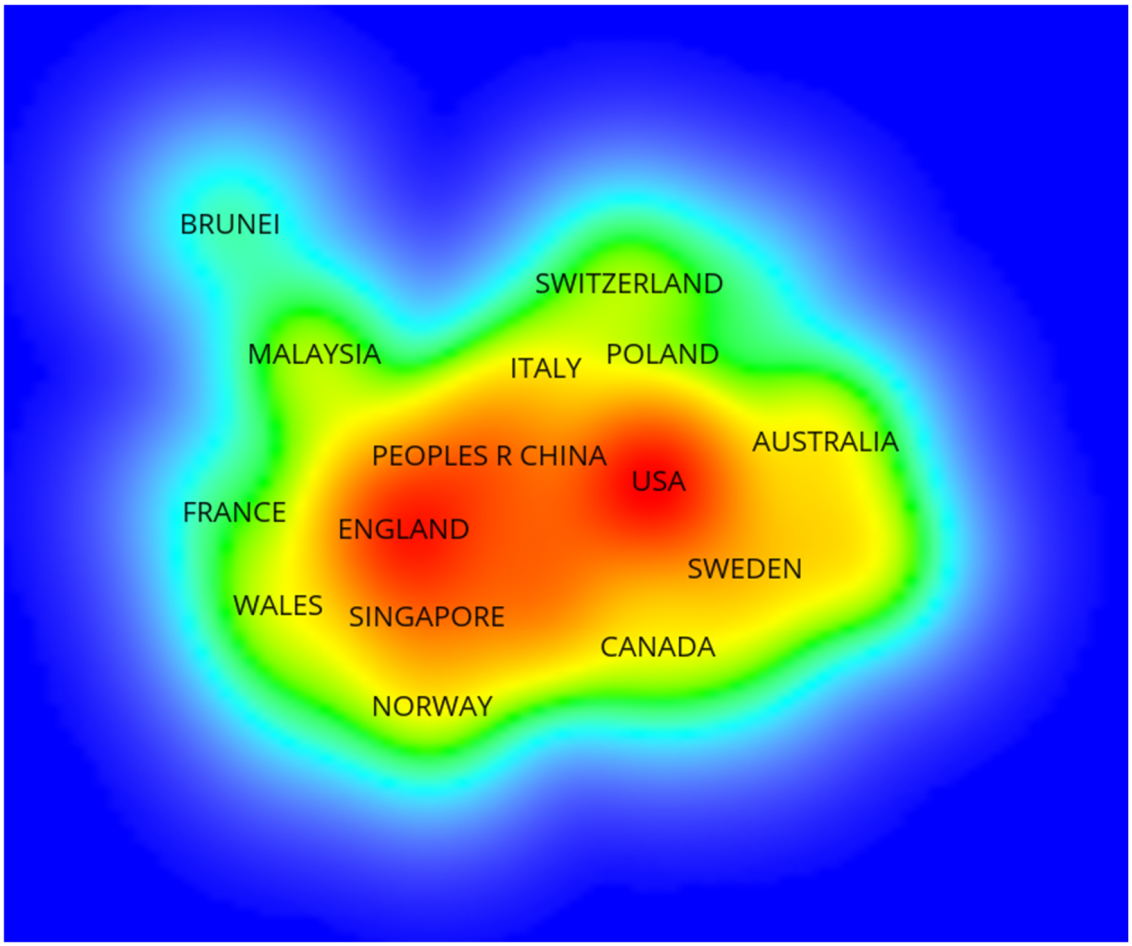


Figure 2. Density map of Social Sciences Citation Index (SSCI) papers published by country, generated using VOSviewer. Data sourced from the Web of Science (WoS) SSCI database. The map visualizes the normalized publication density of countries, with the Association Strength normalization applied to adjust for differences in total publication output across nations. The color gradient (blue → green → yellow → orange → red) indicates increasing density: red denotes the highest concentration of SSCI papers. The layout is determined by the VOS algorithm, which positions countries with stronger normalized publication activity closer to the center, highlighting core (high-density) and peripheral (low-density) nations in social science research output.

There are a few scholars from countries such as South Africa, Iran, Greece, New Zealand, Brazil, and Israel who have shown interest in research in this area. However, the academic dialog and exchange through literature citations with research from other countries are limited. This suggests that there is relatively limited collaboration and cross-referencing for research findings between these countries and other nations in the field of international normative cooperation in cyberspace.

3.3. Analysis by Subjects

The analysis of subjects provides insights into the research perspectives of scholars in the field of international normative cooperation in cyberspace. Since the CSSCI journals do not contain subject fields, two types of field analysis are used in this paper: the category function of CiteSpace for documents in the WoS database and sourcing analysis for the CSSCI journals, in order to compare the different focuses of Chinese and foreign scholars in this topic area.

In SSCI journals, the focus on international rules in cyberspace is primarily seen in the fields of business and economics, international relations, law and government governance (refer to Figure 3). Scholars in law and government governance were the earliest to pay attention to this field, followed by communication, international relations, political science, and information science. The research in these areas has been steadily growing since 2000, indicating sustained and strong research attention, with many influential studies emerging.

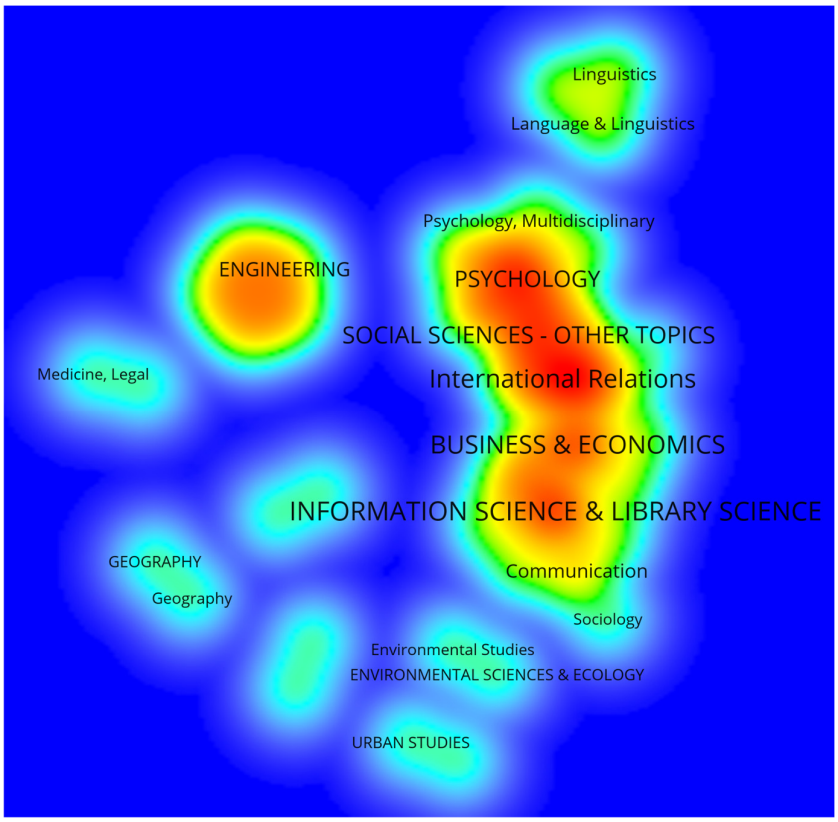


Figure 3. Density map of Social Sciences Citation Index (SSCI) papers published by discipline, generated using VOSviewer. Data sourced from the Web of Science (WoS) SSCI database. The map visualizes the normalized publication density of disciplines, with the Association Strength normalization applied to adjust for differences in total publication output across nations. The color gradient (blue → green → yellow → orange → red) indicates increasing density: red denotes the highest concentration of SSCI papers. The layout is determined by the VOS algorithm, which positions countries with stronger normalized publication activity closer to the center, highlighting core (high-density) and peripheral (low-density) disciplines in social science research output.

Among the top 10 disciplines ranked by mediated centrality, Business and Economics ranked first with a mediated centrality of 0.34 and a degree centrality of 7. International Relations and Information Sciences tied for second place with a mediated centrality of 0.21 and a degree centrality of 7. Communication science was ranked ninth. Although the number of articles in Government governance and Law is high, their research directions are more dispersed, resulting in a sixth ranking in terms of intermediary centrality and a second ranking in terms of degree centrality.

The top ten journals of Chinese scholastic cited literature in the field of international normative cooperation in cyberspace are listed in Table 2. These journals cover various disciplines such as political economy, international relations, journalism and communication, and general social science. One notable feature that distinguishes CSSCI from SSCI is the high prominence of communication science in this field.

Table 2. Degree centrality of CSSCI-related citations in the top 10.

Sort by	Journal Name	Degree Centrality	Count
1	*Contemporary International Relations*	93	6
2	*Chinese Journal of Journalism & Communication*	82	7
3	*Modern Communication (Journal of Communication University of China)*	81	4
4	*Contemporary Communication*	78	4
5	*Journal of International Security Studies*	76	1
6	*International Forum*	70	5
7	*World Economics and Politics*	69	6
8	*Global Review*	67	3
9	*Frontiers*	67	3
10	*Foreign Theoretical Trends*	64	4
11	*Exploration and Free Views*	58	3

The degree of subject concentration indicates that CSSCI journals focusing on this field are relatively clustered in Chinese. In contrast, subjects like psychology, engineering, and geography, which are prominent in the English SSCI subject categories, are not as prevalent in the Chinese journals. This suggests that there is significant potential for relevant research disciplines and interdisciplinary expansion in the Chinese field of international normative cooperation in cyberspace.

3.4. Analysis of Research Developments and Basic Knowledge

In the mapping of knowledge domains, the analysis of research developments and basic knowledge is conducted through co-citation analysis of the fundamental knowledge, which is a collection of co-cited literature. Co-citation analysis involves examining the relationship between two papers when they appear together in the reference list of a third cited paper. This analysis allows for the exploration of the research developments through the cited literature. The node type used in the analysis is "reference".

3.4.1. WoS Literature

Based on the SSCI-indexed English-language literature in Web of Science, the co-citation network shows a Modularity Q of 0.917, indicating a well-partitioned structure with clear community boundaries, and a mean silhouette of 0.9632, suggesting high cluster validity. Using the log-likelihood ratio (LLR) to derive cluster labels, four major thematic groupings emerge: cyberspace governance, private actors, intelligence agencies, and the *Tallinn Manual*. As visualized in Figure 4, citations are both concentrated within clusters

and cross-cutting across them, reflecting a tightly knit yet interdisciplinary knowledge base. Within this network, the *2013 and 2017 versions of the Tallinn Manual collectively* functions as a central reference point rather than an exclusive corpus: it crystallizes earlier doctrinal debates in international law and provides a widely shared touchstone for subsequent scholarship.

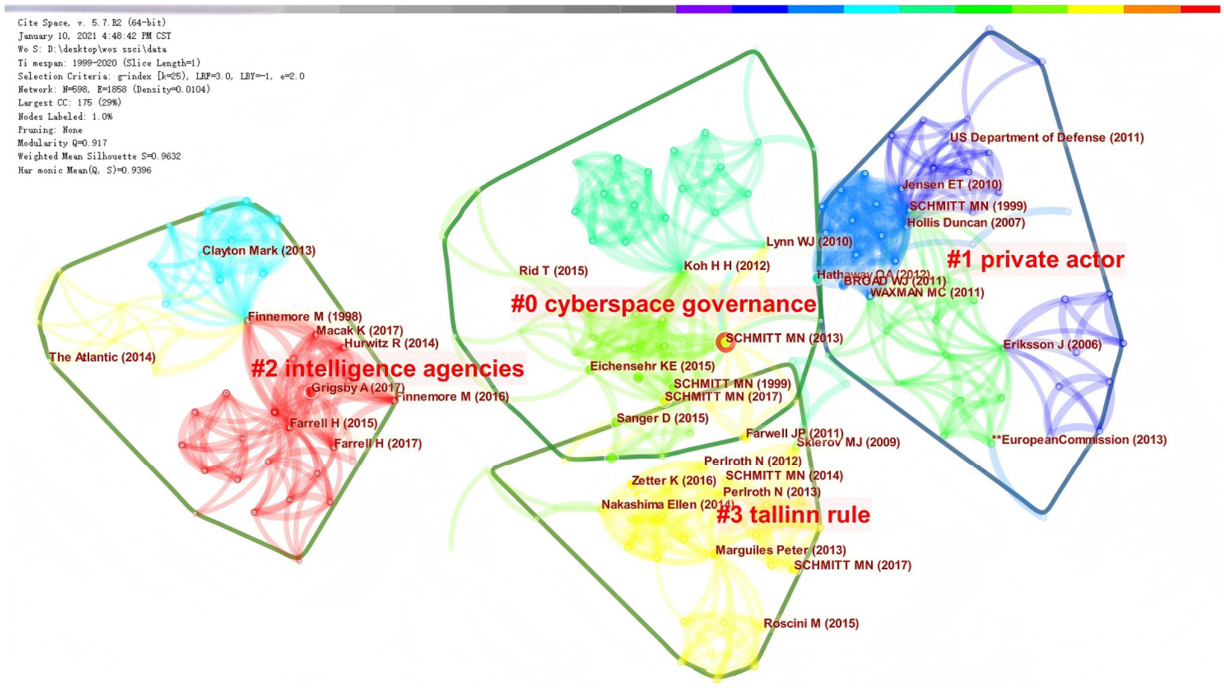


Figure 4. WoS co-citation analysis of global cyberspace governance research (data through 2021). Data source: 144 articles from Web of Science Core Collection (SSCI) using keywords 'Cyberspace', 'Cyber', 'International', 'Global', 'Rule', 'Law', 'Norms', and 'Global Governance'. Visualization generated via CiteSpace. Node size scales with citation frequency.

Notably, works in law, national security, and political science occupy the highest ranks by citation and betweenness (intermediary) centrality, underscoring their bridging role across thematic communities. Key authors include Schmitt, Waxman, Hathaway et al., and the Tallinn Manual Project. Collectively, these references demonstrate that the field's foundational knowledge is anchored in legal scholarship; in this sense, English-language research on international rules in cyberspace originates from—and continues to be structured by—the international law tradition. Table 3 reports the top ten references by betweenness centrality and citation counts.

The analysis reveals that the largest cluster of research in this field is related to international law. Research developments, as indicated by the cited articles, are concentrated in the years 2015 to 2018 and revolve around the discussion of the status and role of international law in the governance of cyberspace. One of the key themes explored is whether it is possible to establish a model of cyber governance that emphasizes state control and whether states can exercise sovereignty over cyberspace.

It is argued that, apart from China and Russia, most countries are hesitant to participate in the formulation of relevant international law in cyberspace. As a result, non-state-driven norms, such as the *Tallinn Manual*, have become the mainstay of governance. However, these norms lack legal effect, creating a power vacuum that requires urgent regulation [5].

While the *Tallinn Manual* aims to establish practical international law in the realm of cyberspace, subsequent practices have led to various conceptual interpretations of the

agreement over time. This exposes the divergence between states' national security interests and the treaty itself [6].

Huang Zhixiong et al. [7] provide a general summary of five controversial areas of legal governance in cyberspace and argue for the need to find the preferred method of developing international law. They suggest that the overall convergence of interests between competing models of cyberspace governance, such as shared responsibility and cooperation, will be mutually beneficial [7].

Table 3. Top 10 SSCI literature mediated centrality and citation counts.

Centrality	Literature Details
33	Schmitt, Michael N. "Computer network attack and the use of force in international law: thoughts on a normative framework." *Colum. J. Transnat'l L.* 37 (1998): 885.
31	Koh, Harold Hongju. "Is international law really State law." *Harv. L. Rev.* 111 (1997): 1824.
29	Schmitt, Michael N., ed. *Tallinn manual 2.0 on the international law applicable to cyber operations*. Cambridge University Press, 2017.
26	Schmitt, Michael N., ed. *Tallinn manual on the international law applicable to cyber warfare*. Cambridge University Press, 2013.
25	Waxman, Matthew C. "Cyber-attacks and the use of force: Back to the future of article 2 (4)." *Yale J. Int'l L.* 36 (2011): 421.
25	Margulies, Peter. "Sovereignty and cyber attacks: Technology's challenge to the law of state responsibility." *Melbourne Journal of International Law* 14.2 (2013): 496–519.
24	Finnemore, Martha, and Kathryn Sikkink. "International norm dynamics and political change." *International organization* 52.4 (1998): 887–917.
23	Hollis, Duncan B. "Why states need an international law for information operations." *Lewis & Clark L. Rev.* 11 (2007): 1023.
23	Jensen, Eric Talbot. "Cyber warfare and precautions against the effects of attacks." *Tex. L. Rev.* 88 (2009): 1533.
21	Hathaway, Oona A. et al. "The law of cyber-attack." *Calif. L. Rev.* 100 (2012): 817.

The second cluster focuses on the nature of cyber-attacks and the legal liability of private actors involved in cyber-attacks. The cited literature in this cluster, primarily concentrated between 2012 and 2013, highlights the need for the regulation of cyber-attacks under international law.

Currently, the primary normative systems governing cyber-attacks are the laws of war, international treaties, and domestic criminal laws. However, the laws of war offer guidance only for a small subset of cyber-attacks that qualify as armed attacks or occur in the context of ongoing armed conflict [8]. The laws of war also provide limited clarity on the legality of cyber-attacks themselves and when they rise to the level of acts of war justifying a resort to force. Therefore, there is a need to address cyber-attacks within the framework of the laws of war [9]. It is argued that cyber-attacks that do not qualify as armed attacks, such as those targeting the intellectual property rights of other countries, should be considered "transnational damage" and dealt with using traditional international legal principles [10]. To address these issues, establishing international cooperation, agreeing on definitions of cyber-attacks, cybercrime, and cyber warfare, strengthening the basis for information sharing, evidence collection, and criminal prosecution of those involved in cyber-attacks, and establishing new international laws pertaining to cyber-attacks are crucial steps [8].

Overall, this cluster highlights the need to regulate cyber-attacks under international law, beyond the scope of armed conflicts, and emphasizes the importance of international cooperation in addressing the challenges posed by cyber-attacks.

The third cluster focuses on international rule-making subjects and roles in the governance of cyberspace. The main concerns in this cluster revolve around the competition among various actors in the international cyberspace governance rule-making process,

the roles they play in establishing international rules, and the issue of accountability. The research developments in this area, as indicated by the citing literature, mainly emerged in 2020.

Given that existing UN-led negotiation processes are unlikely to achieve diplomatic breakthroughs, more and more states are considering non-state actors as duty bearers, and state-sponsored actors are being held responsible for cybersecurity threats [11]. National security and intelligence agencies also play a significant role in cybersecurity and contribute to the development of regulatory policies, emphasizing the importance of normative practices at the micro level [12].

The fourth cluster focuses on research related to the Tallinn rules and state responsibility in legal science. The research developments in this field are concentrated in 2018. While the research content overlaps with the first cluster, the emphasis is on cyber-attacks and attribution analysis. Some scholars argue that states should be held responsible for the damage occurring in cyberspace and liable for illegal acts [13]. However, the technical and legal challenges of attribution in cyberspace pose obstacles to the effective functioning of the state responsibility framework in international law. The principle of due diligence is suggested as a better and more appropriate standard for attribution in cyberspace [14].

3.4.2. CSSCI Literature

The analysis of CSSCI literature resulted in the identification of five significant co-citation clusters: Internet governance #0, Internet governance #1, international relations norms #2, strategic stability and misperceptions #3. Chinese literature research is concentrated in the field of Internet governance, with a greater focus on the perspectives of political science and international relations.

Both the first and second clusters emphasize Internet governance, but they have different emphases and theoretical bases. Cluster #0 explores macro-concepts related to Internet governance, while Cluster #1 focuses on governance paths and solutions for specific problems. Cluster #0 emerged earlier and investigates topics such as network sovereignty, global internet governance, public goods, and China's path. Cluster #1, on the other hand, examines specific governance solutions and paths, including ecological governance, self-organizing paths, the Digital Silk Road, the "Third Way," the Cyber Community of Destiny, and Sino-European cooperation. The research in Cluster #1 revolves around how China should participate in existing Internet governance issues, such as Internet regulation, space activities, low-intensity military operations, digital Silk Road, and Sino-European cooperation on cyberspace governance.

Cluster #2 focuses on topics such as the value identity of governance processes, current dilemmas, conceptual governance, conceptual distribution, and the Chinese solution. Cluster #4 delves into competition over the path of cyberspace governance in terms of strategic stability, sustainable development, the relationship between major powers, and international security architecture, with a greater emphasis on macro strategies.

Scholars like Chuanying Lu, Zhou, Thomas Reid, Karsten Geier, Robert Jervis, and Thomas Renard have made significant contributions to this field, particularly in exploring the barriers to strategic cooperation and the problem of misperceptions in Sino-European network governance. Their research has laid the foundation for further studies in this area.

3.5. Structural Hole Analysis

The communication discipline in CSSCI journals has a higher focus on international Internet governance. This is different from the WoS journals in the communication disciplines.

However, there is a clear structural hole in the minimal degree of connection between the research of communication scholars and international law, international relations, and

political governance. The two clusters on the right side of the figure above are a series of articles by Hong Yu of Zhejiang University, focusing on the perspective of state and communication (the red connecting line, which also represents the more recent tangent of the emergence of this research). There are also a series of review articles about the research of the journalism and communication discipline on new media (Weibo and WeChat), which mainly focus on the years 2012–2014.

We manually screened and analyzed 37 Chinese papers in an independent CiteSpace project. The variable for this analysis was set at g-index (k = 25), and the keywords of the papers and the co-cited literature were analyzed. The results showed the following categories:

Yan Li and Runxi Zeng studied the conflict between the U.S. and China since the outbreak of the COVID-19 epidemic. They argue that technology and ideology are the two main factors affecting the change in the international Internet governance system [15]. The epidemic has led the U.S. to strengthen its control over the international Internet, and the Internet governance system will not change in the direction China expects in the short term. Hong Yu also examines the issue of Internet governance from both technical and national perspectives. They argue that the national restoration of "people-centered" and "a community with a shared future for mankind" as the value standard and action standard is to serve the construction and improvement of socialism with Chinese characteristics in the global context [16].

There are four main types of actors involved in the formulation of international rules in cyberspace: states involved in multilateral diplomatic norms, expert groups, industry organizations, and multi-stakeholders. Jun Zou suggests that "multi-stakeholderism" represents the dominant direction of global Internet governance [17]. Jie Gu proposes to break the logic of dichotomy and reshape the theoretical framework of Internet governance from the perspective of new institutionalism [18]. Lina Zhou introduces the trends of Internet content governance in the UK, highlighting the expansion of legislative governance and the end of the era of self-regulation [19].

Another hot topic focuses on the issue of discourse in international cyberspace governance. Weidong Yang analyzes the "dual power" game from the perspective of the field of discourse and rulemaking in cyberspace [20]. Xiaoyan Liu et al. explain the discourse power game from the perspective of international cybersecurity. They argue that, as the military dimension in the concept of cybersecurity is the most controversial and the most significant area of conflict of interest among countries, the rules and discourse proposed by the United States and other cyber-first countries should be carefully identified and responded to. They suggest that it is necessary for China to enhance its discursive power by constructing an "international cyber conflict" regulation system and emphasizing the main position of the United Nations in the creation of international rules on cybercrime [21].

In general, related research in Chinese, especially in the field of communication, involves broader discussions and lacks examination of details. There are more circumstantial examinations of new communication governance challenges brought about by cyberspace, but there is a lack of connection with theories related to cyberspace governance. Additionally, there is a lack of segmented research on new issues brought about by new technologies in the communication dimension, involving personal privacy, user data, blockchain, etc. Middle-range theoretical research is also rare.

3.6. Analysis of the Hot Topics and Research Trends

Hot topics refer to one or more topics of common interest to scholars in a certain field, often with strong temporal characteristics. In the analysis of the hot topics and research trends, the top *n* value was set to 100, and the node types were keywords.

3.6.1. Wos Database

In terms of research trends, the emerging research keywords from 2018 to 2020 include cross-border data flow (2020), governance resilience (2019), ongoing contestation (2018), China (2018), international norm (2018), code (2018), and duty (2018).

Early research in this field focused on the Internet, the World Wide Web, and international law (2000). In 2012, the research scope expanded to include areas such as international governance, cyber security, international law, and cyber warfare. Since 2017, the topics of intellectualization and mobilization with data protection have gained prominence. 2018 marked a turning point as the international community started seeking consensus and embarked on new attempts.

3.6.2. CSSCI Literature

The clustering results indicate that recent research primarily focuses on keywords such as cyber terrorism (2020), international governance, international order, cyber community of destiny, Sino-European relations (2019), and community with a shared future for mankind in cyberspace, international rules, China–US relations, and Chinese solutions (2018).

Currently, the development of the Internet has entered the era of intelligent IoT (2020s). The Internet has transformed society, and the new network civilization faces new geopolitical challenges. Various new issues have provided rich perspectives for different disciplines to delve into this field, and there is still room for further enrichment of relevant studies [22].

4. Summary and Conclusions

Through a comparison and analysis of the literature in the WoS-SSCI database and CSSCI journals, it is found that research on international rules in cyberspace started earlier in English and has a higher degree of literature coupling compared to Chinese research. Chinese scholars have shown significant attention and momentum in later stages, but the mainstream theoretical basis and cited literature in this field are still dominated by British and American studies, indicating a larger academic influence and impact from those countries.

The knowledge base in this field consists mainly of articles, institutional reports, and media reports, with relatively few books. The *Tallinn Manual* is the most widely cited book in this field. In the CSSCI journals, English research is often used as the theoretical basis or source of viewpoints, with many citations of foreign works on international relations and international political science. Notable works include “Network and State: The Global Politics of Internet Governance”, “Governance without Government”, “Code 2.0: Law in Cyberspace”, and “Global Game of Internet Governance”, some of which were published as early as 1992. The challenge for Chinese scholars is to synchronize domestic research with English research in terms of basic knowledge and even surpass British and American research to establish theoretical innovation.

Over the past five years, both English and Chinese literature have seen a relatively high publication trend, but research developments and hotspots differ. While cyberspace sovereignty and cyberspace governance from a globalization perspective are common topics, the research of Chinese scholars is more focused on policy issues and research phases. English literature has a clear theoretical foundation, maintains continuous and in-depth focus on basic topics, and takes a broader perspective, with distinct research areas in law and international relations. Research on cyberspace law and cyber warfare is particularly well developed. English studies also address issues such as inequality in cyberspace and cybercrime in developing countries, broadening the existing research ideas.

Notably, the focus on international rules in cyberspace within the field of communication is a characteristic of Chinese research, providing new perspectives and opportunities for interdisciplinary crossover. However, attention should be given to the structural gap between this existing research and mainstream research on cyberspace governance, both domestically and internationally. This is reflected in the selection of research literature in related fields. Greater attention should be paid to new progress in related English research to establish a new direction for Chinese communication research, moving beyond macro issues to analyze international cyberspace governance.

Overall, the academic concerns of Chinese scholars regarding international rules in cyberspace receive support at the national level, and Chinese scholars are also visible in English journals. For example, Zhixiong Huang has published numerous papers in both Chinese and English and has been involved in the compilation of the *Tallinn Manual 2.0*. However, to increase the citation frequency and centrality of Chinese scholars' articles and better introduce national-level advocates to the international community through academic discussions, it is necessary to carefully examine the differences between the current hotspots and internationally recognized topics. This will involve building an academic community studying international cyberspace governance rules and enhancing theoretical innovations. As a developing country, China's attempts and efforts to break through the national security paradigm require global attention and involvement from the academic community in the form of discussions on these issues. This study highlights two more specific directions: (1) bridging the structural gap between communication studies and normative international law by fostering joint research programs, and (2) encouraging Chinese scholarship to strengthen cross-lingual dialog by engaging more directly with international theoretical debates.

5. Research Limitations

Although this study offers a systematic comparative analysis of cyberspace governance literature from 1999 to 2020, it has limitations. First, data collection finished on 3 January 2021, so research results, policy documents, and theoretical innovations after this date were excluded. As a result, the findings may not fully reflect recent technological, geopolitical, or academic developments in this fast-evolving field. Second, the study mainly used Chinese and English databases, potentially omitting perspectives from other language communities and restricting the scope for comparative analysis. We limit our claims to relative emphases in each corpus and admit that broader databases like Scopus could be used in future work to expand global coverage and validate the observed patterns. Third, while CiteSpace helped quantitatively map research trends, it may have oversimplified theoretical dialogs behind the data, resulting in a structural rather than in-depth exploration of certain schools of thought. Acknowledging these limitations shows the need for future studies to use more contemporary sources, expand language coverage, and combine quantitative tools with qualitative interpretation. Filling in these gaps can lead to a more comprehensive understanding of international cyberspace governance.

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References

1. Castells, M. An introduction to the information age. *City* **1997**, *2*, 6–16. [CrossRef]
2. Clark, D.D.; Claffy, K.C. Toward a Theory of Harms in the Internet Ecosystem. In Proceedings of the Workshop on Internet Economics (WIE 2019) Report, San Diego, CA, USA, 9–11 December 2019.
3. Post, D.G. Waht Larry Doesn't Get: Code, Law, and Liberty in Cyberspace. *Stanf. Law Rev.* **1999**, *52*, 1439. [CrossRef]
4. Li, J.; Chen, C. *CiteSpace: Text Excavating and Visualization of Science and Technology*; Capital University of Economics and Business Press: Beijing, China, 2016.
5. Mačák, K. From cyber norms to cyber rules: Re-engaging states as law-makers. *Leiden J. Int. Law* **2017**, *30*, 877–899. [CrossRef]
6. Efrony, D.; Shany, Y. A rule book on the shelf? Tallinn manual 2.0 on cyberoperations and subsequent state practice. *Am. J. Int. Law* **2018**, *112*, 583–657. [CrossRef]
7. Huang, Z.; Mačák, K. Towards the international rule of law in cyberspace: Contrasting Chinese and western approaches. *Chin. J. Int. Law* **2017**, *16*, 271–310. [CrossRef]
8. Hathaway, O.A.; Crootof, R.; Levitz, P.; Nix, H. The law of cyber-attack. *Calif. Law Rev.* **2012**, *100*, 87.
9. Nguyen, R. Navigating jus ad bellum in the age of cyber warfare. *Calif. Law Rev.* **2013**, *101*, 1079.
10. Messerschmidt, J.E. Hackback: Permitting retaliatory hacking by non-state actors as proportionate countermeasures to transboundary cyberharm. *Columbia J. Transnatl. Law* **2013**, *52*, 275.
11. Maurer, T. A dose of realism: The contestation and politics of cyber norms. *Hague J. Rule Law* **2020**, *12*, 283–305. [CrossRef]
12. Georgieva, I. The unexpected norm-setters: Intelligence agencies in cyberspace. *Contemp. Secur. Policy* **2020**, *41*, 33–54. [CrossRef]
13. Crootof, R. International Cybertorts: Expanding State Accountability in Cyberspace. *Cornell Law Rev.* **2017**, *103*, 565.
14. Chircop, L. A due diligence standard of attribution in cyberspace. *Int. Comp. Law Q.* **2018**, *67*, 643–668. [CrossRef]
15. Li, Y.; Zeng, R. The COVID-19 and Sino-US Conflict in International Internet Governance. *J. Intell.* **2020**, *39*, 110–115.
16. Yu, H. Internet Governance and States in the Post-American Era. *Chin. J. J. Commun.* **2020**, *42*, 6–27.
17. Zou, J. Global Internet Governance: Mode Reconstruction, China's Opportunities and Participation. *J. Nanjing Norm. Univ. (Soc. Sci. Ed.)* **2016**, *3*, 57–63.
18. Gu, J. Internet governance model and theoretical framework reshaping under the new institutionalism theory. *Contemp. Commun.* **2016**, *1*, 67–70.
19. Zhou, L. New trends of Internet content governance in the UK and international trends. *Shanghai J. Rev.* **2019**, *11*, 81–89. [CrossRef]
20. Yang, W.D. Thinking about the path of 'double power' game in cyberspace from the perspective of field. *J. Mass Commun. Mon.* **2017**, *5*, 94–99. [CrossRef]
21. Liu, X.-Y.; Cui, Y.-H. Cyber Security Rules and International Discourses: Dimensions of Crime and Terrorism. *J. Res.* **2019**, *7*, 30–40+121. [CrossRef]
22. Fang, X.; Zhong, X.; Peng, X. 50 Years of the global Internet: Stages of development and evolutionary logic. *Shanghai J. Rev.* **2019**, *7*, 4–25. [CrossRef]

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