Think Tank Titles: Representation of China's Scientific Image

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***Abstract*—Titles play an important role in informing and engaging the audience. For Think Tank (TT) experts, compiling titles is a key strategy for engaging the audience and ensuring relevance in the digital age. As China's scientific and technological advancements attract growing interest from TTs, it is essential to understand how these titles are constructed. This paper examines 1,800 titles from ten international and Chinese TTs, analyzing variations in the use of quotation marks, high-frequency words, syntactic structure, and content focus. The quantitative analysis reveals that Chinese experts tend to favor simpler, indicative titles, while international TTs commonly use compound formats and interrogative titles when discussing China's science and technology. The qualitative analysis further underscores the contrasting research goals and linguistic conventions between the two groups. This study provides valuable insights into the rhetorical strategies employed in TT title construction with significant implications for how China's scientific image is shaped and communicated within elite discourse.**

***Keywords*—titles, Think Tank (TT), science and technology, China, cross-linguistic**

I. Introduction

With the proliferation of Think Tanks (TTs) worldwide, the ways in which TTs construct and promote their knowledge-based ideas have garnered increasing attention [1, 2], uncovering TTs' intentions to influence political science, economic management, and social ideologies. TTs are widely recognized as organizations conducting research and then disseminating opinions to influence the policy formation and even public awareness [3]. In this context, TTs develop various products, including annual reports, commentaries, testimonies, and others, to market their ideas. Previous studies on TTs have primarily focused on analytical models for their products or the coalition with other discourses, such as media [4, 5]. However, little research has explored promotional functions of these products, focusing specially on the linguistic level.

As integral components of TT products, titles are crafted to convey the main idea, provide an overview of the structure, and capture the audience' attention. Unlike the titles of research articles, news, or online posts which have been widely investigated [6–8], titles of TT products have largely been ignored by scholars. Studying their titles can shed light on how TTs strive to popularize their ideas.

As China continues to emerge as a global leader in this tech-driven era, its scientific breakthroughs are increasingly appealing for many scholars [9, 10], the ways in which these scientific and technological achievements are constructed and represented also merit close examination. Kubalskyi [11] explained that social sciences work actively in promoting scientific development, particularly through media, significantly shaping the public image of science. Some researchers have explored the dissemination of China's scientific and technological progress through social media and academic publications [12, 13]. The study of China's science is also a key research field for TTs worldwide. Many international TTs have produced voluminous reports to share their understandings of China science, influencing the global perception of "China concept" [14]. Nevertheless, the representation of China science in TT discourse remains underexplored.

While comparisons between Chinese and international TTs on their organizations and networks with other entities have been conducted [15], the dissemination and promotional strategies employed by Chinese and international TTs, particularly regarding their titles, have not been thoroughly examined. Few of title studies have focused on translation issues between Chinese and English [16]. Additionally, Xie [17] has compared the English research article titles in Chinese and international contexts. However, limited research has directly compared English and Chinese titles.

The study analyzes 1,800 titles from leading international and Chinese TTs, to identify distinct patterns and features. Focusing on the topic of China's science and technology, this study seeks to offer insights into the diverse promotional and communicative strategies employed by TTs. Specifically, the paper addresses the following research questions:

1) What are the typical formal patterns of titles in think tanks?
2) Are there cross-linguistic similarities and differences in the use of quotes in these titles?
3) Are there cross-linguistic similarities or differences in the structure and the content of these titles?
4) How can we account for the variation?

II. Literature Review

Titles are ubiquitous in the daily life. They are indispensable parts of any written text, like news, online posts, etc. In the digital age, titles are carefully crafted to be eye-catching and to engage a broader audience [18]. More importantly, titles indicate the content of articles and reflect the writers' efforts to package abundant information within a limited word count [19]. Thus, an effect title is essential for most genres.

Titles from various genres, including research articles, traditional news, and opinion pieces, have already been explored [20, 21]. These analyses confirm that titles must be both informative and attractive. For instance, Chen and Liu [22] conducted a diachronic investigation of compound titles in pragmatic research articles and suggested that rhetorical elements in these titles help attract a wider audience. Similarly, in the news genres, journalists employ discursive strategies and rhetorical devices to spark readers' curiosity and encourage engagement. For example, Blom and Hansen [23] observed that in Danish online news, forward-reference

patterns are a key click-bait strategy. Likewise, the nominative, informative, and promotional functions of publicistic text titles have been identified [24]. As an integral part of TT discourse, TT titles also serve to enhance engagement and convey information. However, there has been limited attention given to the investigation of the titles of TT products.

Titles can also function as framing tools, influencing social, political, and cultural contexts [25]. In this way, they go beyond the linguistic level, influencing and being influenced by these contexts. Some researchers have approached titles from this perspective [26, 27]. For example, Montejo and Adriano [28] examined the discursive strategies in the Philippines news headlines and suggested that the news practitioners often demonstrate their political inclinations in the headlines, which may mislead the news audience. In addition, titles can also serve to shape national images, as Sun and Cheung [29] found that the framing patterns and latent ideological thinkings of titles have an effect on constructing China's national image. TTs can influence the construction of a country's image beyond its borders [30]. Examining the patterns and content foci of TTs' titles thus can cast light on how countries' images are presented and perceived internationally.

The concept of national image is especially pertinent in the case of China [31]. A significant body of research has explored various dimensions of China's national image [32–34]. For instance, Sun [35] analyzed Australian media coverage of China's response to the COVID-19 pandemic, revealing China's image portrayed by those media. Additionally, Oldac [36] investigated the impact of China's scientific advancements on science systems in Muslim-majority countries and found a generally positive presentation. Given the centrality of science and technology in global discourse, as well as China's growing international prominence in these fields, it is therefore important to examine how China's scientific and technological advancements are represented and disseminated through various channels, especially through TTs. Besides, previous studies have not adequately investigated the function of titles in representing China's science and technology advancements.

Much of the existing literature comparing international and Chinese TTs primarily focuses on their organizational system [37, 38]. However, the strategies employed by these TTs, particularly in title construction, remain largely underexplored. This study thus identifies common patterns in TT titles and examines how international and Chinese TTs present China's science and technology. Additionally, it examines the underlying reasons for any observed variations in title strategies.

III. Materials and Methods

A. The Corpora

This study compiled two corpora of the titles in TTs (refer to Table 1): one from seven international TTs, *Atlantic Council* (ACUS)[1], *Brookings Institution* (Brookings)[2], *Carnegie Endowment for International Peace* (CEIP)[3], *Center for a New American Security* (CNAS)[4], *Center for Strategic and International Studies* (CSIS)[5], *Information Technology and Innovation Foundation* (ITIF)[6], and *RAND Corporation* (RAND)[7], and the other from three Chinese TTs, *Institutes of Science and Development, Chinese Academy of Sciences* (CASISD)[8], *Institute of Scientific and Technical Information of China* (ISTIC)[9], and *Shanghai Institute for Science of Science* (SISS)[10]. The following criteria were applied to select the TTs for inclusion:

- China's science and technology is a primary topic for the TTs;
- The TTs are authoritative and influential as evidenced by some plausible TT reports [39, 40];
- The TTs release similar products, including reports, commentaries, and other publications.

The titles for both corpora were gathered using *Octoparse*[11], a web scraping software, to conduct a comprehensive search across the websites of each TT. The data collection covered a period from 1946 to 2024, starting from the dissemination of each TT's first product. For the international TTs, titles related to China's science were manually extracted with the assistance of *Python* (version 3.11.7)[12], and keyword searches, resulting in a final total of 900 titles. The corpus of Chinese TTs contained 1,142 titles. For the purpose of data balancing, the number of Chinese titles was randomly sampled down to 900 (refer to Table 1). The token count for the international database is 9,823 while the Chinese corpus contains 15,513 tokens.

Table 1. Corpus size and composition

TTs	Titles	Tokens
International TTs	900	9,823
Chinese TTs	900	15,513
Total	1,800	25,336

B. Analytical Framework

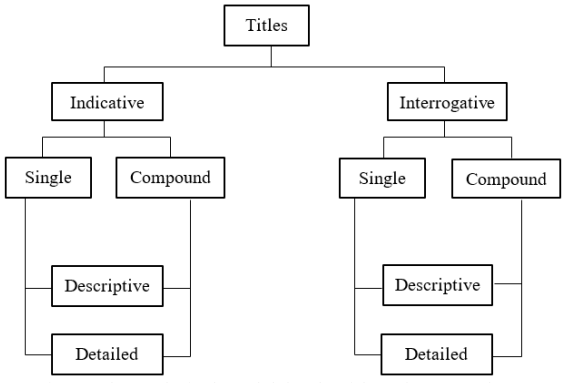

Fig. 1. The analytical model for the titles of TTs products.

To examine how experts from TTs craft titles to represent China's science, the study drew on Hyland and Zou's [41] analytical model for titles with slight modifications based on the observed data (refer to Fig. 1). The model primarily

[1] https://www.atlanticcouncil.org/
[2] https://www.brookings.edu/
[3] https://carnegieendowment.org/
[4] https://www.cnas.org/
[5] https://www.csis.org/
[6] https://itif.org/
[7] https://www.rand.org/
[8] http://www.casisd.cn/
[9] https://www.istic.ac.cn/
[10] https://www.siss.sh.cn/
[11] https://www.bazhuayu.com/
[12] https://www.python.org/

focuses on structural patterns and content foci of titles, as these factors significantly impact audience engagement and the information conveyed [42]. Milojević [43] has listed key characteristics for title analysis, including the use of non-alphanumeric characters, syntactical structure, type, and word analysis, among others.

1) Quotes in titles

Quotes are employed to capture the audience's attention by highlighting specific expressions or references. Technically, quotation marks can emphasize any segment of text, regardless of whether it constitutes a complete or incomplete grammatical structure. Basically, quotation can be categorized into five kinds: pure quotation, direct quotation, indirect quotation, mixed quotation, and scare quotation [44]. Pure quotation refers to the linguistic aspect of the mentioning and it is relatively rare in the data at hand (1a). Therefore, the remaining four types of quotation were utilized for classifying the quotes in TT titles.

(1) a. "Table" is a noun.
b. 构建"开源"创新体系 助力我国关键数字技术"弯道超车" (CASISD)
"Building an 'open-source' innovation system to facilitate 'China's leapfrogging' in key digital technologies."
c. 中科院学者：重组重点实验室 战略需求为导向 (CASISD)
"CAS scholars: Restructuring key laboratories with a focus on strategic needs."
d. Clinton tells China 'it is vita' to curb increasing number of cyber attacks (ACUS)
e. Did China "Destroy" Globalization? (ITIF)

Due to the constrained length of titles, direct quotations are often abbreviated or fragmented [45]. In such cases, a series of semantically related quotes are embedded at intervals within titles (1b). Indirect quotation, on the other hand, involves rephrasing others' words using the writer's own language (1c). This type of quotation captures the essence of the original content. The third type, mixed quotation (1d), combines both direct and indirect quotation. Scare quotation, a metalinguistic tool, uses quotation marks to highlight a word or phrase, signaling irony, skepticism, or a deviation from its conventional meaning [46]. For example, in (1c), saying "Did China 'Destroys' Globalization" suggests that the expert is questioning the validity of the term of 'destruction'.

2) Structure of titles

Hyland and Zou [41] suggested a dichotomy between indictive (2a–b) and interrogative (3a–b) titles (refer to Fig. 1). Indicative titles merely describe the subject of the article, while the interrogative ones present the subject in the form of a question.

(2) a. The EU's new tariffs are just the start of the EV trade saga with China (ACUS)
b. 纳米研究前沿分析报告 (CASISD)
"Nano Research Frontier Analysis Report."
(3) a. How the Chinese government is financing its way to becoming a techno-superpower? (ACUS)
b. 什么样的城市有利于企业家成长? (SISS)
"What kind of cities are conducive to entrepreneurial growth?"

Titles can be classified as either single or compound types. Single titles consist of a single sentence, while compound titles are characterized by the presence of punctuation marks such as colons or dashes, which indicate that additional explanations or details follow. In the Chinese titles, spacing is inserted between the components. Semantically, the second part usually elaborates on the first part (4). Based on this structure, the study ultimately classified these titles as compound titles as well.

(4) 优化人才体制 释放创新活力 (CASISD)
"Optimize the talent system and unleash innovation vitality."

3) Content of titles

In terms of the content of the title, the model [41] also has two types: one concerning the description (6a–b) and the other entailing details (7a–b) (see Fig. 1).

(5) a. Beijing's Bitskrieg: China's Revolution in Cyber Warfare (ACUS)
b. 增强新污染物治理能力须完善三项关键制度 (CASISD)
"Enhancing the ability to manage emerging pollutants requires improving three key systems."
(6) a. China Could Potentially Defeat U.S. in Conflict Over Taiwan by Limiting Military Access, RAND Study Finds (RAND)
b. 以智库双螺旋法为范式，推动智库科学化发展 (CASISD)
"Promote the scientific development of think tanks using the 'double helix' model as a paradigm."

The titles in examples (6a–b) mainly describe the topic of the articles. In contrast, example (7b) demonstrates the paradigm or the approach of the review, while example (7a) presents the findings of the research, providing readers with additional details. According to Hyland and Zou [41], single titles generally convey the main topic. The distinction between descriptive and detailed ones is typically applicable to compound titles. However, upon examining the titles of TT products, the study finds that many single sentences also entail details, like research approaches (8). Thus, the framework proposed by Hyland and Zou [41] is slightly modified (refer to Fig. 1).

(7) 基于国际重大科技奖项计量的颠覆性技术识别研究 2020 (ISTIC)
"Identifying disruptive technologies through major International Science and Technology Awards (2020)."

C. Coding and Analysis

The two corpora of TT titles were searched for quotations marks, High-Frequency (HF) words using *Python* (version 3.11.7) with the *jieba* tool [47] and *Antconc* [48]. The structural patterns of titles were first examined with assistance of *Python* (version 3.11.7). Subsequently, the results were manually reviewed. To make sure the reliability of coding process, the procedure was repeated after one month. Intra-reliability tests were conducted for both corpora, yielding an agreement rate of 97.4% for the Chinese TTs titles and 97.5% for international ones. The statistical significance of the results was determined by Chi-Square test,

and Fisher's exact test. The results are discussed in the following sections.

IV. Result and Discussion

Following the analytical framework and procedure, the author analyzed all the patterns and content foci of the titles in the two corpora. Table 2 presents the overall distribution of titles with different features.

Table 2. Distribution of TT titles with different features

	International TTs		Chinese TTs		LL[1]	*p*
	Raw.	%	Raw.	%		
Indicative	698	77.6	868	96.4	0.13	0.001**
Interrogative	202	22.4	32	3.6	7.85	0.000**
Total	900	100.0	900	100.0		
Single	563	62.6	709	78.8	0.45	0.001**
Compound	337	37.4	191	21.2	2.22	0.000**
Total	900	100.0	900	100.0		
Descriptive	889	98.8	856	95.1	4.15	0.59
Detailed	11	1.2	44	4.9	0.24	0.000**
Total	900	100.0	900	100.0		

[1] LL = Log Likelihood Ratio.
** denotes $p < 0.01$.

To assess the statistical significance of the observed differences between the two databases, Fisher's exact test was applied. Six *p*-values were calculated and then combined with Fisher's method (Fisher $\chi^2 = 235.937$, df = 12, $p = 0.000$). The results revealed a significant difference in the distribution of title types between the two databases, indicating a strong association between the TTs from different regions and their titles.

To gain a deeper understanding of the differences in titles between these two groups of TTs on the topic of China's science and technology, the study also examined the HF words of each corpus. The results are presented in Table 3.

Table 3. High-frequency words in the titles of TTs

No.	International TTs	Raw	Chinese TTs	Raw
1	China	710	研究 (Research)	337
2	Chinese	160	创新 (Innovation)	228
3	Tech	59	发展 (Development)	161
4	Innovation	53	建设 (Build)	99
5	Technology	49	技术 (Technology)	90
6	Military	47	上海 (Shanghai)	84
7	Cyber	44	报告 (Report)	68
8	New	43	中国 (China)	65
9	Competition	41	体系 (System)	56
10	Digital	38	新 (New)	53

Through a comparative analysis of HF words, the study reveals several noteworthy patterns. In addition to words directly related to the topic, like "China", "technology", and "innovation", two corpora frequently use the term "new". The word "new" is consistently employed to describe advancements in science and technology. The finding aligns with Zhao *et al.* [49], who identified "new technology" as a key term within the Technology Innovation Management (TIM) field. Both corpora emphasize "new" technologies when discussing the scientific and technological development in China.

However, significant differences are observed in the use of specific HF words. Words such as "military", "cyber", and "competition" are predominant in international TTs, whereas Chinese TTs feature terms like "development", "build", and "system". These discrepancies can be attributed to the differing research objectives. The primary purpose of TTs is to influence policy-making. In this context, securing governmental support is a critical step, as Hart and Vromen [50] noted that getting sufficient support is key to TTs. International TTs tend to focus on the impact of China's science and technology on their countries or even on global dynamics to meet authoritative expectations, while their Chinese counterparts usually concern the central issue for the Chinese government to figure out appropriate development paths for science and technology.

A. Focusing on the Mentioning: Quotes in Titles

As a metalinguistic device used to mention some expressions [51], quotes in titles are connected with the presentation of information. We first analyzed the frequency and types of quotation marks in the titles, revealing considerable variability in two sub-databases (refer to Table 4). As shown in Table 4, the overall percentage of titles containing quotation marks within the databases is 9.9%, with 57 English titles and 122 Chinese ones. The results contrast with the finding of Terentieva *et al.* [45], who reported that 15% press headlines were included from a database of 1,730 collected headlines ($\chi^2 = 15.9$, $p < 0.001$). Thus, compared to the news genre, TT discourse, as one genre of elite discourses [52], tends to feature quotation marks less frequently in titles. This suggests that quotation is not a primary tool used by TT experts to structure information or capturing the audience's attention when crafting titles.

Though the overall use of quotation marks in titles is relatively low (9.9%), a significant difference is observed between international and Chinese TTs in terms of their use of quotation in title construction ($\chi^2 = 20.77$, $p < 0.001$). Both two corpora exhibit a high proportion of direct quotation in their titles (see Table 4). By incorporating excerpts from authoritative sources, such as government officials or academics, direct quotation serves to engage audiences more effectively, allowing them to encounter the original ideas or perspectives directly, without intermediary summarization (8a–b).

Table 4. Distribution of quotes in TT titles

TTs	International TTs		Chinese TTs		Chi-square (χ^2)	*p*
	No.	%	No.	%		
Direct quotation	28	49.1	100	82.0	0.13	0.07
Indirect quotation	18	31.6	5	4.1	7.85	0.000**
Mixed quotation	5	8.8	4	3.3	0.45	0.27
Scare quotation	6	10.5	13	10.6	2.22	1
Total	57	100.0	122	100.0		

** denotes $p < 0.01$.

(8) a. Unleashing "'new' quality productive forces": China's strategy for technology-led growth (Brookings)

b. 社会研发机构发展须“多元投入 需求牵引” (CASISD)

"The development of social R&D institutions must involve 'diverse investments and demand-driven approaches'."

Both titles in (8a–b) employ direct quotation, thereby increasing the informativeness of the titles. International experts tend to incorporate policy terms from China, like "new quality productive forces", allowing the audience to quickly grasp the gist of reports or commentaries. The approach may help readers decide whether to engage with the content. As for Chinese experts, they are more likely to directly quote actions or recommendations associated with China's scientific and technological development in titles.

However, there is a significant difference between international and Chinese TTs in their use of indirect quotation when formulating titles ($\chi^2 = 16.88$, $p < 0.001$), though the overall frequency of indirect quotation is lower (see Table 4). Table 4 illustrates that international TTs use indirect quotation more frequently (31.6%). Indirect quotation typically takes the form of the information accompanied by the author's interpretation or summary (9a–b).

(9) a. If the US and EU don't set AI standards, China will first, say Gina Raimondo and Margrethe Vestager (ACUS)

b. 以科技创新支撑中国式现代化 — 代表委员谈学习贯彻党的二十大精神 (CASISD)

"Supporting China's modernization through scientific and technological innovation: Delegates and committee members discuss learning and implementing the spirit of the 20th National Congress of the Communist Party of China."

Indirect quotation attributes the sources, thereby, distancing the writer from the content's responsibility. Moreover, this strategy can enhance the perceived authenticity of the information presented in the title [45]. As a result, international experts cite the statements of renowned scholars or policymakers (10a–b) to fulfill the objective of TTs in establishing credibility [53].

(10) a. Judy Asks: Should Europe Ban Huawei's 5G? (CEIP)

b. Busch in The Hill: Biden must do better than Trump's tariffs in challenging China on intellectual property (ACUS)

When indirect quotation is combined with direct speech, it results in mixed quotation forms (11a–b). As shown in Table 4, the proportion of mixed quotations is the lowest in both international (8.8%) and Chinese TTs (1.24%). By blending indirect and direct quotation within a single title, mixed quotation not only enables the concise presentation of essential information, but also enhances the appeal of the title by incorporating original speeches.

(11) a. China wants to 'divide western alliances through bits and bytes', warns Pompeo (ACUS)

b.《中国科学院院刊》潘教峰研究员访谈：科技发展不要忘记“为了人”这一初心 (CASISD)

Scare quotation is often used to "emphasize irony or non-literal uses of expressions" [54]. Scare quotation is less frequent in the titles of both international (10.5%) and Chinese TTs (10.6%), and the difference is also not significant ($\chi^2 = 0.00$, $p = 1$) (refer to Table 4).

(12) a. Is China's economic espionage the 'most aggressive' in the world? (ACUS)

b. The EU's "Softball" Approach to Artificial Intelligence Will Lose to China's "Hardball" (ITIF)

c. 新“雁阵”引领新时代人才强国新格局 (CASISD)

"The new 'goose formation' leads the new pattern of talent development for a strong nation in the New Era."

In examples (12a–c), the title (a) carries an ironic tone, suggesting that the idea presented is implausible. Titles (12b–c) convey non-literal meanings for terms such as "softball", "hardball", and "goose formation". The two references to "balls" metaphorically represent the varying levels of policy support for the development of Artificial Intelligence across different regions and countries. Meanwhile, the term "goose formation" symbolizes an abundance of talent. Figurative and non-literal language often enhances the appeal of expressions by making them more humorous or engaging. Humorous titles can increase the attractiveness of articles and then attract a larger audience [55]. In this regard, both international and Chinese experts employ scare quotes as a strategy to engage readers.

B. Representing China Science: Titles Structure Patterns

In this section, the ways in which TT experts structure their titles are demonstrated. As mentioned above, at the first level of titles structure, Hyland and Zou [41] primarily distinguish between 'indicative' and 'interrogative' types. Additionally, based on non-alphanumeric characters such as colons and hyphens, as well as the semantic meanings of the titles, titles are further classified into single and compound types.

1) The patterns of titles: Indicative or interrogative?

At the syntactic level of titles, the titles are basically classified into indicative and interrogative ones. TT experts use indicative titles to present statements and interrogative ones to pose questions. As illustrated in Table 5, indicative titles are overwhelmingly employed in both corpora. The overall percentage of indicative titles in the two databases is 87% compared to 13% for interrogative titles. The results are congruent with Hyland and Zou's [41] finding that indicative titles are used more frequently in research articles, which hints that TT discourse bears similar characteristics with academic discourse. Indicative titles directly present the topic of the text, enabling readers to grasp the main information with "the least cognitive and procedural efforts" [56]. This makes them more audience-friendly, which may explain the overwhelming use of indicative titles in both databases.

Table 5. Distribution of syntactic forms in TT titles

	International TTs		Chinese TTs		Chi-square (χ^2)	*p*
	No.	%	No.	%		
Indicative	698	77.6	868	96.4	9.68	0.01**
Interrogative	202	22.4	32	3.6	108.61	0.000**
Total	900	100.0	900	100.0		

** denotes $p < 0.01$.

Indicative titles allow experts to concisely present the subject of TT products (13a–b). Therefore, the audience can immediately grasp the main topics (13b) or directly review experts' policy-related suggestions (13a).

(13) a. To Stay Ahead of China in AI, the U.S. Needs to Work with China (CNAS)

b. 人工智能在能源领域的应用及前景研究 (ISTIC)

"Researches on the applications and future prospects of Artificial Intelligence in the energy sector."

Compared to international experts, Chinese experts use indicative titles more frequently ($\chi^2 = 9.68, p < 0.01$) (14a–b). Title (14a) highlights one focus of Chinese TT research, namely talent cultivation, while title (14b) specifies one important branch of China's science and technology. Unlike international TTs, which focus on prominent scientific and technological issues related to China, Chinese TTs tend to introduce and promote more specific branches of scientific and technological advancements. Given this difference, indicative titles are more suitable for Chinese experts, as they allow for a straightforward and easily understandable presentation of the broader subjects of their work.

(14) a. 青年科技创新人才成长规律与路径研究 (SISS)

"Research on the growth patterns and pathways of young innovative talents in science and technology."

b. 科学数据出版的发展趋势 (ISTIC)

"Development trends in scientific data publishing."

Interrogative titles are often regarded as clickbait in the online environment (15a–b). These titles present the topic of articles in the form of questions, which can arouse the curiosity of the audience. The overall proportion of interrogative titles is low in both databases (refer to Table 5). However, a significant difference between international and Chinese TTs in the use of interrogative titles was revealed ($\chi^2 = 108.61, p < 0.001$) (18a–b). International TTs aim to investigate the scientific and technological development of China and offer their perspectives. Interrogative titles on the one hand enable them to better mark their opinions [57]. On the other hand, the underlying responsibility of answering the questions plausibly in interrogative titles can enhance the common ground between writers and the audience. In this sense, the following comments may seem more acceptable for the audience.

(15) a. How China's Human Capital Impacts Its National Competitiveness? (CSIS)

b. 国家科技治理体系如何完善? (CASISD)

"How can the National Science and Technology Governance System be perfected?"

(16) a. What Can Patent Data Reveal about U.S.-China Technology Competition? (CSIS)

b. How Developed Is China's Arms Industry? (CSIS)

2) The formats of titles: Single or compound?

At the second level of title structure (see Fig. 1), we examine the formats of titles in the two groups of TTs. Single titles consist of only one sentence (17a–b), while compound titles typically contain two or more sentences, often with the use of punctuation like colons (18a–c). Some Chinese titles are sorted as compound titles even without typical punctuation, relying only on a single inserted space and their semantic meanings, as mentioned in section three (18b). The single titles in (17a–b) directly guide the audience to understand the main subject of the research or commentaries through straightforward presentations. Hyland and Zou [41] noted that the transparent and directive features of single titles make the audience feel more comfortable. Compound titles, on the other hand, provide more information and details, such as examples for the topic (18a) or the specific policy orientations (18b). Though compound titles have an edge over single titles in terms of the detailed information and vivid expressions (18c), Table 2 shows that international and Chinese experts tend to use single titles: 70.7% versus 29.3% compound titles across the 1,800 titles.

(17) a. 为高质量发展注入澎湃科创动力 (CASISD)

"Infusing robust scientific and technological innovation to drive high-quality development."

b. China's AI Agenda Advances (CNAS)

(18) a. New Frontiers of Chinese Defense Innovation: Artificial Intelligence and Quantum Technologies (CNAS)

b. 以"四个全面"为指导 推进新型城镇化可持续发展 (CASISD)

"Guided by the 'Four Comprehensives', promoting sustainable development of New Urbanization."

c. Letting the Fox in the Hen House: Why the U.S. Should Restrict Chinese Control of the IMF? (ITIF)

Previous studies concluded that scholars in the soft sciences, such as the arts, tend to prefer compound titles [41, 58]. Most TTs' products mainly focus on policy suggestions or reviews of the development of science and technology, showing similarities with soft science by and large. Therefore, this result contradicts the findings in academic discourse. To explain this discrepancy, we turn to the features and goals of TTs.

Although research in soft sciences generally target broader audiences compared to hard science studies, most audiences are still members of the academic community. In contrast, TT products are often targeted at a wider audience, including government officials, journalists, business communities, and even the general public [5]. Therefore, transparency and clarity might be two factors that TT experts consider when crafting titles to market their products. Moreover, considering that TT products related to China's science and technology rarely involve complex concepts or theories requiring detailed elaboration (refer to Table 3), single formats can satisfy their demands well. These may account for the wide distribution of the single titles in the two databases.

In general, the Chinese experts incline to use single titles ($\chi^2 = 78.8, p < 0.01$), while the international experts prefer compound titles ($\chi^2 = 21.2, p < 0.001$) (refer to Table 2). Importantly, the differences are significant (see Table 6).

Table 6. Distribution of formats of TT titles

		International TTs		Chinese TTs		Chi-square (χ^2)	*p*
		No.	%	No.	%		
Indicative	Single	423	60.6	689	79.4	11.4	0.000**
	Compound	275	39.4	179	20.6	35.45	0.000**
	Total	698	100.0	868	100.0	9.68	0.001**
Interrogative	Single	140	69.3	20	62.5	0.03	0.85
	Compound	62	30.7	12	37.5	0.13	0.72
	Total	202	100.0	32	100.0	108.61	0.000**

** denotes $p < 0.01$.

Additionally, we examine the distribution of single and compound titles within the categories of indicative and interrogative titles (see Table 6). For both forms, the number of single titles is notably high in both databases. As shown in Table 6, for indicative titles, international and Chinese experts exhibit significant differences in terms of the use of single ($\chi^2 = 11.4$, $p < 0.001$) and compound titles ($\chi^2 = 35.45$, $p < 0.001$). However, no significant differences are observed in the category of interrogative titles (refer to Table 6).

When creating indicative titles, Chinese experts prefer single formats (19a), while international experts tend to favor compound formats (19b). Compound titles enable international experts to enliven the topic (20a) or specify the policy opinions (20b). Chinese experts can achieve similar effects through single formats (21a–b). Quirk *et al.* [59] found that in English, "what follows the colon is either a statement of what precedes the colon, or a fulfillment of the claim made". Compound titles, which combine topics with themes, are common in English titles. Similarly, Chinese academic titles also tend to favor compound structures. However, Chinese TT experts prefer single formats, likely due to a focus on conciseness and clarity.

(19) a. 国家特色科技政策梳理与评价研究 (ISTIC)
"Review and evaluation of national science and technology policies with a focus on national characteristics."

b. China's fourteen five-year plan: The technologies that shall not be named (ACUS)

(20) a. Beauty and the Beast: Implications of the US-China Tech War on Climate and Energy (ACUS)

b. Chinese Cyber Espionage: US Must Shout but Also Listen (ACUS)

(21) a. 火星探测"竞技场" (CASISD)
"Mars exploration 'arena'."

b. 国家应建立普惠式青年双创工场 (CASISD)
"The nation should set up inclusive youth innovation and entrepreneurship."

The defining feature of interrogative titles is their ability to entice the audience. According to Table 6, single formats are also major formats in the interrogative types (22a–b). Interrogative compounds account for the smallest proportion among the four types (see Table 6). Similar to indicative compounds in English, interrogative compounds first introduce a topic and then elaborate on it (23a). In comparison with indicative compounds, interrogative types increase engagement, which helps appeal to the audience and promote TT products [23]. However, the proportions of interrogative singles (17.8%) and compounds (8.2%) are both low (see Table 6). This may suggest that TT experts prioritize brevity and directness when crafting titles.

(22) a. Why China's CIPS Matters (and Not for the Reasons You Think)? (CNAS)

b. 如何提升国家创新体系整体效能? (CASISD)
"How to enhance the overall effectiveness of the National Innovation System?"

(23) a. Who Is Winning the AI Race: China, the EU or the United States? (ITIF)

b. 提升上海"五个中心"的核心功能，关键要牵住哪个"牛鼻子"? (SISS)
"To enhance the core functions of Shanghai's 'five centers', the key is to grasp the 'bull by the horns'."

3) Titles content foci: Describing or detailing China science?

According to Fig. 1, we finally examine the content of the titles and try to figure out whether TT experts opt to merely describe the subject or include additional details. Different from the approach of Hyland and Zou [41] that classifying descriptive and detailed titles is only in the group of compound titles, the study expands the scope to investigate the contents of both single and compound titles (refer to Table 7).

According to Table 2, though detailed titles provide more information, descriptive titles account for a larger percentage (96.9%) compared to detailed types (3.1%). Moreover, no significant cross-linguistic difference is observed in the use of descriptive titles ($p = 0.59$). In contrast, Chinese experts use more detailed titles than international experts and the difference is significant ($p < 0.001$) (see Table 2).

Table 7. Distribution of TT titles formats by content

		International TTs		Chinese TTs		Chi-square (χ^2)	*p*
		No.	%	No.	%		
Singles	Descriptive	561	99.6	672	94.8	0.34	0.56
	Detailed	2	0.4	37	5.2	22.06	0.000**
	Total	563	100.0	709	100.0	9.61	0.001**
Compounds	Descriptive	328	97.3	184	96.3	0.00	0.99
	Detailed	9	2.7	7	3.7	0.13	0.72
	Total	337	100.0	191	100.0	30.79	0.000**

** denotes $p < 0.01$.

According to Table 2, though detailed titles provide more information, descriptive titles account for a larger percentage (96.9%) compared to detailed types (3.1%). Moreover, no significant cross-linguistic difference is observed in the use of descriptive.

Descriptive titles primarily concern the topic of the article without offering additional information. Single descriptive titles are prevalent in both databases (refer to Table 7) (24a–b). In compound titles, the situation is more complex. The two or more parts of the title may serve different functions, with the topic often followed by solutions, approaches, or methods, making titles more informative. These titles are classified as detailed titles. However, in most

cases, regardless of the number of parts in a compound title, they just introduce the subject (25a–b). Based on Table 7, it is evident that descriptive compound titles are overwhelming in the two corpora.

(24) a. The Case for the United States and China Working Together in Space (ACUS)
b. 中国智能电网的技术与发展 (CASISD)
"Technology and development of China's smart grid."

(25) a. Smart Manufacturing: A Linchpin in China's Industrial Policy (CNAS)
b. 先导试验区：我国未来产业发展的新引擎 (CASISD)
"Pilot demonstration zones: A new engine for future industrial development in China."

After finishing the coding process, we found that some single titles can be classified as detailed titles (26a–b). Title (26a) specifies the approach to formulate relevant policies, while title (26b) highlights the specific result of policy suggestions. The classification of approaches and results followed the framework proposed by Hyland and Zou [41]. Table 2 indicates that Chinese single detailed titles outnumber their English counterparts, with the difference being significant (χ^2 = 22.6, p < 0.0001). In addition to orienting results, Chinese experts also utilize those detailed titles specifying methods or approaches (see Table 8) (27a–b).

(26) a. A Principle-based Strategy Towards China (ACUS)
b. 建议成立专门的国家公园管理局 (CASISD)
"Recommendation to establish a dedicated national administration."

(27) a. 基于中图法的领域专家推荐方法研究 (ISTIC)
"Research on domain expert recommendation methods based on the Chinese Library Classification (CLC) System."
b. 以智库双螺旋法为范式，推动智库科学化发展 (CASISD)
"Promoting the scientific development of TTs by adopting the Dual-Helix Model of think tank operations."

Table 8. Distribution of TT titles based on contents

		International TTs		Chinese TTs		Chi-square	p
		No.	%	No.	%	(χ^2)	
Descriptive		889	98.8	856	95.1	0.28	0.60
Detailed	Approach	4	0.4	39	4.3	1.39	0.23
	Result	7	0.8	5	0.6	5.55	0.01*
Total		900	100.0	900	100.0		

* denotes p < 0.5.

Table 8 illustrates that in detailed titles, international experts more frequently identify the research results (28). The difference is statistically significant (χ^2 = 5.55, p < 0.05). In contrast, Chinese experts are more likely to emphasize the approach rather than the result when detailed titles (see Table 8) (29). This way reassures the audience that the researcher or expert has applied scientific and plausible solution in their research, which may be conducive to convincing policymakers.

(28) Tariffs Won't Stop China's Mercantilism. Here Are 10 Alternatives. (ITIF)

(29) 基于战略生态位管理模型的新兴技术政策感知机制研究 (CASISD)
"Research on the mechanism of emerging technology policy perception based on the strategic niche management model."

Table 9. Distribution of syntactic types by content foci

		International TTs		Chinese TTs		Chi-square	p
		No.	%	No.	%	(χ^2)	
Indicative	Descriptive	687	98.4	824	95.0	0.21	0.64
	Detailed	11	1.6	44	5.0	12.06	0.000**
	Total	698	100.0	868	100.0	9.68	0.001**
Interrogative	Descriptive	202	100.0	32	100.0	0.00	1
	Detailed	0	0.0	0	0.0	0.00	1
	Total	202	100.0	32	100.0	108.61	0.000**

** denotes p < 0.01.

Table 9 illustrates the classification of syntactic types of titles according to their content foci and shows that all interrogative titles only delineate the topics or subjects of the products without further details. Here, we examine the function of compound interrogative titles in topic description. Arresting questions are followed by more specific statements (30a–b). This strategy reassures the audience that the report or commentary will elaborate on the question. However, although detailed interrogative titles are more attractive and informative, TT experts tend to prefer descriptive indicative titles (see Table 9).

(30) a. The Coming NEV War? Implications of China's Advances in Electric Vehicles (CSIS)
b. 还记得"韩琨"吗？从"星期天工程师"看我国科技人才政策的持续转型 (SISS)
"Still remembering Han Kun?: The ongoing transformation of China's science and technology talent policies be seen through the lens of 'Sunday Engineers'."

V. Conclusion

This study analyzed 1,800 titles from TT products on China's scientific and technological development, sourced from seven international and three Chinese TTs. Our findings show that Chinese experts use quotation marks more frequently than international counterparts. Both groups prefer indicative titles, but international experts favor interrogative titles slightly more. Chinese experts predominantly use single titles, while international experts opt for compound formats more frequently. In terms of content, Chinese titles tend to be more detailed, with a greater focus on the topics themselves. These differences reflect variations in research objectives, linguistic conventions, and academic writing norms between international and Chinese TTs.

The main findings of this study have several important implications. Firstly, the direct cross-linguistic comparison between international and Chinese TT titles helps understand the titles of a specific elite discourse, namely TT discourse, particularly in the context of discussions surrounding China's

scientific and technological advancements. Additionally, the study validates the applicability of the analytical model for research article titles to the TT genre. These findings also provide valuable insights into the construction and dissemination of China's scientific image.

Clearly, this research has a relatively restricted data set. It might be profitable to examine titles from a more diverse range of think tank sources. In addition, the lack of a more detailed categorization of these TTs into specific types such as government, government-operated, and university-affiliated, limits the depth of the qualitative analysis. Future research is expected to conduct a more comprehensive investigation of TT product titles comprehensively under more specific classification of TTs, helping to offer more detailed qualitative information. Moreover, this research focuses primarily on China's scientific discourse in TT titles, which limits the exploration of other important topics. Expanding the scope to include a wider range of subjects could yield more engaging and meaningful findings.

CONFLICT OF INTEREST

The author declares no conflict of interest.

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