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RESEARCH ARTICLE

Analyzing the Translation and Impact of Popular Science Literature in China: A Case Study Approach

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Abstract

This study delves into the translation history and profound influence of the renowned popular science book, 'One Two Three… Infinity,' within the Chinese context. Initially published in 1946, its introduction to China was delayed until 1978 due to the Cultural Revolution (1966-1976), which impeded the development of the popular science publishing sector. The first Chinese translation, despite utilizing outdated terminology and censoring certain names for political, economic, and cultural reasons, achieved significant circulation and impact. It became an essential read for college students, especially those studying science, at the end of the 1970s, serving as an enlightening resource. In 2002, a new rendition by Science Press offered a fresh perspective, maintaining its status as a beloved science text. Subsequent translations in 2019 by Liu Xiaojun and Yue Xia, along with Zhang Butian, have surpassed the original 1978 translation in quality and engagement, with Zhang Butian's version exemplifying the unique allure of popular science literature. This paper assesses the evolving translation approaches and their implications for science education and popular science dissemination in China.

Keywords: one two three… infinity, English-Chinese translation, popular science.

1 Introduction

One Two Three… Infinity [1], authored by the esteemed popular science writer George Gamow, is widely regarded as one of the most iconic works in popular science literature. First published in 1946 and reissued multiple times, it is celebrated as "the most classic popular science work of the 20th century." Covering a broad range of scientific topics—from the origins of mathematics to the emergence of life and the universe—the book seamlessly weaves together concepts from mathematics, physics, biology, and philosophy. Renowned for its accessible, engaging language and captivating content, the book has also made a profound cultural impact in China, as highlighted by Shi Chunrang in A Study of Translation of Science Popularization Text in China in the Past Century [2], which provides an overview of its translations and cultural significance.

In the context of artificial intelligence (AI), works like One Two Three… Infinity offer valuable insights into how complex scientific concepts can be

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effectively communicated to diverse audiences. AI technologies, particularly those driven by natural language processing (NLP) and machine learning, can play a transformative role in enhancing the dissemination and comprehension of such works [3–6]. For instance, AI-powered translation systems can further popularize the book across linguistic and cultural boundaries, ensuring the retention of its original clarity and engagement. Additionally, AI-driven content recommendation systems can personalize learning experiences, guiding readers to explore interrelated scientific topics discussed in the book, such as the intersection of mathematics and biology [7–9].

Moreover, AI can contribute to the analysis of the book's influence by employing sentiment analysis and cultural impact studies through large-scale data mining of its reviews, citations, and translations [10–12]. By integrating AI, the principles of accessibility and interdisciplinary exploration championed by One Two Three… Infinity can reach new audiences globally, perpetuating its legacy as a cornerstone of scientific literacy.

2 Bao Yongning's translation and its impact

2.1 Bao Yongning's 1978 translation

One Two Three… Infinity stands as one of the pioneering works of popular science introduced to China during the nascent stages of the reform and opening-up era. The conclusion of the Cultural Revolution in 1976, a tumultuous decade spanning from 1966 to 1976, marked a period of eager anticipation for cultural and intellectual resurgence, with a palpable thirst for knowledge among the populace. Given the decade-long hiatus in the publication of science popularization materials, the Chinese edition of One Two Three… Infinity, released in 1978, was met with enthusiastic reception, distinguishing itself as one of the initial popular science books published post-Cultural Revolution.

One Two Three… Infinity, translated by Bao Yongning and issued by Science Press [13], experienced an exceptional reception upon its first publication, with an initial print run of 550,000 copies. Its subsequent reprints within just two years further underscored its significant impact. This translation emerged as an essential read for college students throughout the late 1970s and early 1980s, leaving a lasting impression on many who encountered it during their university years. It effectively served as an enlightening resource on science education in China, particularly in introducing computer science to a generation of students previously unfamiliar with the subject.

The translation process was notably influenced by the political, economic, and cultural context of the era, adhering to the prevalent standards and expectations of translation practices of the time, as illustrated in Figure 1. The Chinese edition commenced with the author's foreword from the 1961 edition, indicating that it was based on The Viking Press's 1961 edition. Interestingly, the translation's cover features only the author's name, omitting that of the translator.

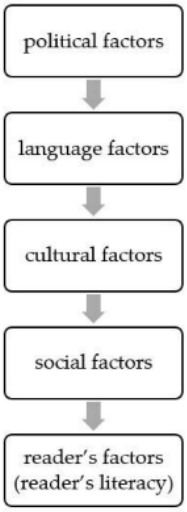

Figure 1. The code of translating process in 1970s in China.

Bao Yongning, the translator, highlighted in the postscript the inclusion of numerous footnotes within the translation. This approach was necessitated by the significant disparities between China and the United States concerning middle school curricula, extracurricular reading subjects, and even daily customs, which could render some book content unfamiliar to Chinese readers.

2.2 Bao Yongning's 2002 translation

In 2002, Science Press issued a refreshed translation of One Two Three… Infinity, adorned with a cover featuring George Gamow, the American author, alongside the translator Bao Yongning, and the reviewer Wu Boze [14]. Wu Boze undertook the task of re-translating the book, basing his efforts on the updated version of the original text published by Dover Publications Inc. in 1988. The dynamic evolution of science and technology necessitates periodic updates to popular science literature. To this end, publishers frequently commission authors or specialists to revise

bestsellers, with most new editions undergoing some degree of revision, and One Two Three… Infinity was no exception.

Liu Bing, a professor at Tsinghua University's Institute of Science, Technology and Society, known for his work in the popularization of scientific information in China, penned a prologue titled "Classical Popular Science, Famous Translation" for this new edition. He noted that Bao Yongning, having relocated to Canada and preoccupied with other commitments, delegated the revision task to Wu Boze, who then updated the translation to align with the 1988 version. Wu Boze, in his postscript, praised the translation for its readability, buoyant tone, engaging illustrations by Gamow, and the lively metaphors and anecdotes about scientists it contains.

Liu Bing highlighted the significant impact of releasing the revised Chinese edition on the nation's popular science publishing sphere for two primary reasons: firstly, the 1978 translation provided essential knowledge during a pivotal time; secondly, securing the copyright allowed readers to experience the updated rendition of Gamow's esteemed work. Liu Bing's introduction not only reflects on the challenges of translating and publishing scientific works in China but also offers an academic perspective on popular science literature. He distinguishes between mainstream popular science books, accessible to general readers, and "advanced popular science" texts, which demand a higher level of pre-existing knowledge and engagement from readers. An excellent popular science book, according to Liu, transcends mere language and scientific accuracy; it should also inspire with its spirit, method of thinking, unique viewpoint, and blend of scientific and humanistic elements.

To enhance reader engagement, the 2002 edition introduced layout modifications, including a brief author bio and a declaration on the cover identifying the book as a classic of 20th-century science. Additionally, it featured Bao Yongning's postscript, emphasizing the significant legacy of the work, Gamow's exceptional literary and scientific prowess, and reflections on the translation process. These supplementary texts are instrumental in enriching readers' comprehension of both the original and translated works.

2.3 The similarities and differences between Bao Yongning's translation of 1978 version and the 2002 version

2.3.1 Similarities

1)Both versions exhibit linguistic precision.

The 2002 edition largely mirrors the 1978 version in terms of its catalogue, content, illustrations, and annotations, adhering closely to the original text both in content and form through primarily literal translation methods. This approach ensures fidelity to the original's meaning and stylistic nuances, with some of the original text's syntactic structures nearly directly translated into Chinese [15].

2)Vocabulary reflects the translators' distinct styles.

The word choices in both versions reveal the unique styles of the translators. For instance, the phrase "in Caesar's office" was rendered as "Kai Sa's yamen," and "which would have taken many hours of hard work" was translated as "zhe ke yao hao fei jig e zhongdian de jianku laodong ya." Terms like "yamen" and "zhongdian," chosen by translators such as Bao Yongning and Wu Boze, reflect their personal backgrounds. Born in the 1940s, these translators grew up with such vocabulary, which, while once common, has become less prevalent in modern primary school textbooks, and even rarer in contemporary newspapers, magazines, and online content. This highlights how a translator's cultural background can influence their word selection [16]. Today's children might only encounter these words when reading ancient Chinese classics, indicating a shift in linguistic familiarity across generations.

2.3.2 Differences

The differences between the 1978 and 2002 versions are highlighted as follows:

1)Greater Fidelity in the New Version:

The 1978 edition saw the omission of specific nations' and individuals' names, which were reinstated in the 2002 version for increased accuracy.

Example 1:

Original text: "There is a story about two Hungarian aristocrats who decided to play a game in which the one who calls the largest number wins." (P3)

The 1978 translation omitted "Hungary," reflective of the strained Sino-Hungarian relations of the 1960s. Despite a thaw beginning in 1969, full normalization had not been achieved by the 1970s, prompting this

omission. By 1987, with Sino-Hungarian relations entering a new phase of development, the 2002 translation restored "Hungary" to the text, illustrating the impact of changing ideological and political climates on translation practices [17].

Example 2:

Original text: "Thus, King Shirham found himself deep in debt to his vizier and had either to face the incessant flow of the latter's demands, or to cut his head off." (P9)

In the original, "his vizier" refers to "Sissa Ben Dahir." The 1978 version abbreviated the vizier's name to "Xisa●Ban," while the 2002 version provided the full name "Xisa·Ban·Dayier," indicating a shift towards greater completeness in translation.

2)More Consistent Use of Numbers in the 2002 Version:

The approach to translating numbers saw a shift towards uniformity in the 2002 edition, opting for Arabic numerals over a mix of Arabic numerals and Chinese characters used in the 1978 version.

Example 1:

Original text: "We have it indeed on the authority of African explorers that many Hottentot tribes do not have in their vocabulary the names for numbers larger than three." (P3)

Example 2:

Original text: "Measured as far as the largest telescope can penetrate Big Numbers 5 in the sky, the fish in the sea, or grains of sand on the beach were 'incalculable' just as for a Hottentot 'five' is incalculable, and becomes simply 'many'!" (P5)

In the 1978 edition, "three" was rendered as "san" (a Chinese numeral) in Example 1, while "5" remained in Arabic form in Example 2, demonstrating an interchangeable use of Chinese characters and Arabic numerals. Conversely, the 2002 edition adopted Arabic numerals exclusively, reflecting an evolution in translation standards that encompass numerical representation, signifying the broader advances and increasing rigor in translation methodology over time.

3 Translation version of Liu Xiaojun and Yue Xia

The translation version of Liu Xiaojun and Yue Xia was published by Cultural Development Press in 2019 [18]. This version uses more beautiful words to promote the book on the cover.

3.1 Translation style is more modern

Example 1:

Original text: "whereas a clerk in Caesar's office would have represented it in this form:" (P3)

The term "office" from the original text was translated as "yamen" by Bao Yongning, reflecting traditional terminologies tied to the historical context of governmental offices in China. In contrast, Liu Xiaojun and Yue Xia translated it as "zhengfu," which denotes the workspace of modern administrative institutions in contemporary Chinese usage.

Example 2:

Original text: "The best he could have done to comply with the request, would have been to write one thousand M9s in succession, which would have taken many hours of hard work." (P4)

Here, "hours" was rendered as "zhongdian" by Bao Yongning, a term prevalent in older texts, whereas Liu Xiaojun and Yue Xia opted for "xiaoshi," the standard modern Chinese term for "hour."

These examples highlight the stylistic differences between the translations by Bao Yongning and the duo Liu Xiaojun and Yue Xia. Yongning's choices reflect the linguistic preferences of his era, characterized by the use of more archaic expressions. Conversely, Xiaojun and Xia's translations employ contemporary terminology, aligning with modern linguistic norms. This variation in word choice underscores the significant influence of the translators' respective historical and cultural contexts on their work.

3.2 The translation is closer to the original text

Example 1:

Original text: "but such a conversation might actually have taken place if the two men had been, not Hungarians, but Hottentots." (P3)

Bao Yongning translated "Hottentots" as "yuanshi buluo" (primitive tribe), whereas Liu Xiaojun and Yue Xiaxiang rendered it as "hou dun bulou (Hottentots, a primitive tribe in Africa)," incorporating both transliteration and explanatory annotation to achieve closeness to the original text. This approach by Xiaojun and Xiaxiang not only preserves the specific reference to the Hottentots but also provides contextual clarity through the bracketed explanation.

Example 2:

Original text: "Thus in the Hottentot country in the art of counting fierce warriors would be beaten by an American child of kindergarten age who could boast the ability to count up to ten!" (P3)

In this instance, Bao Yongning chose not to translate "American," whereas Liu Xiaojun and Yue Xia included it in their translation, adhering more closely to the original text's specifics. This decision underscores the influence of political and cultural considerations on translation practices, as omitting or including certain details can reflect broader contextual sensibilities [19].

4 Zhang BuTian's translation version

The translation by Zhang Butian was released in 2019 through the Commercial Press and has been incorporated into the series "World Popular Science Translation Works" [20]. This collection, under the editorial and translational guidance of Zhang Butian, a distinguished historian of science and professor at Tsinghua University's Department of History of Science, aims to present classic global popular science literature. "World Popular Science Translation Works" endeavors to elucidate the development and essence of scientific thought in an accessible and authentic manner, offering readers an expedient and straightforward avenue to grasp scientific concepts.

4.1 Providing readers with detailed sub-text information

Zhang Butian's translation, published by the Commercial Press in 2019, enriches the "World Popular Science Translation Works" series with its comprehensive sub-texts, offering readers in-depth insights [20]. This edition includes prefatory material by George Gamow from both 1946 and 1960, ensuring a faithful representation of the original work's scope and intent.

In a thoughtful postscript, Zhang Butian provides succinct biographies of George Gamow and the translators behind the 1978 and 2002 Chinese editions, Feng Yongning and Wu Boze, respectively. This contextual backdrop not only honors past contributions but also sets the stage for Butian's efforts. He addresses the rationale for retranslation—highlighting One Two Three… Infinity as an undoubted classic in popular science literature. This initiative stemmed from the inclusion criteria for the "World Popular Science Translation Works," which Butian edits. The transition from a previous edition published by Science Press to this retranslation under the Commercial Press banner was facilitated by copyright permissions, as the original work had entered the public domain, thus alleviating potential copyright complications [21].

Moreover, Butian's edition distinguishes itself with a meticulously detailed catalog, enhancing accessibility and reader engagement. By not only translating but also expanding upon the original text's subtitles, this version provides a clearer structural overview and invites readers into the narrative with greater ease. The added catalog details serve not merely as navigational aids but also as an engagement tool, boosting the translation's appeal and readability, and by extension, its popularity within the scientific community and beyond.

4.2 Translation being smoother and more faithful

In the postscript of his translation, Zhang Butian openly acknowledged using the 2002 translation by Feng Yongning and Wu Boze, published by Science Press, as a reference. Despite the similarities in word order and word choice between the two versions, Butian's translation is noted for its smoother delivery.

The translation aligns more with Chinese thought patterns:

Example 1:

Original text: "For example, the number 8732 was written by ancient Egyptians: ..." (P4)

While the original text utilizes a passive voice, commonly favored in English, Butian adjusted this to active voice to better resonate with Chinese linguistic preferences. This shift not only makes the translation adhere more closely to Chinese thinking patterns but also enhances clarity and ease of understanding for Chinese readers.

The translation is more concise:

Example 2:

Original text: "For the ancients, very large numbers such as those of the stars, the fish in the sea, or grains of sand on the beach were 'incalculable' just as for a Hottentot 'five' is incalculable, and becomes simply 'many'!" (P4-P5)

Butian optimized the translation for conciseness by focusing on the inherent meaning of the original text rather than a literal word-for-word translation. This approach reflects a nuanced understanding of Chinese linguistic conventions where the emphasis is on meaning rather than repetitive quantification, thus

rendering the translation not only more fluent but also more aligned with reader expectations in Chinese.

The translation is more complete and accurate:

Example 3:

Original text: "The latter notations must be familiar to you, since Roman numerals are still used sometimes to indicate the volumes or chapters of a book, or to give the date of a historical event on a pompous memorial tablet." (P4)

Bao Yongning's translation of this sentence was notably brief, comprising only 7 Chinese characters, which, while potentially sufficient for understanding, lacked detail and precision. In contrast, Zhang Butian's translation extends to 23 Chinese characters, providing a more thorough and accurate depiction of the original text's intent. This detailed approach not only preserves the content's integrity but also enhances the translation's value to the reader by ensuring no subtle nuances are lost.

5 Conclusion

One Two Three… Infinity is a globally acclaimed popular science masterpiece that has made a significant impact. The original publication debuted in 1961, with its inaugural Chinese translation appearing in 1978. This 17-year gap can be attributed to the Cultural Revolution in China, a period during which the popular science publishing sector experienced a notable downturn. The translation efforts during this time were influenced by a confluence of political, economic, and cultural factors, leading to the use of some outdated terminology and the omission or alteration of certain country and personal names. Despite these challenges, the translation achieved widespread circulation and impact in China, becoming a staple reading material for university students of the era. The translations by Liu Xiaojun and Yue Xia, as well as Zhang Butian, released in 2019, both excel beyond the 1978 version in linguistic quality and fidelity to the original. Notably, Zhang Butian's rendition also brings forth a distinctive style befitting of popular science literature.

Conflicts of Interest

The authors declare no conflicts of interest.

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