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A Comparative Study of the Chinese Translation of *Science Primers*: *Physics*—From the Analysis of the Paratextual Context

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Abstract

The American textbook *Science Primers*: *Physics* was translated into Chinese in the late Qing Dynasty and it had two Chinese translations. One is *Gezhi Qimeng*: *Gewu Xue* translated jointly by Young John Allen and Zheng Changyan, and the other is *Xixue Qimeng Shiliu Zhong*: *Gezhi Zhixue Qimeng* rendered by Joseph Edkins. The paratext provides information about background, purpose and process of translation, and reflects translator's motivation and translation style, which is a significant basis for comprehending of the translation, publication and acceptance of the Chinese translations of *Science Primers*: *Physics*.

Keywords

Chinese Translations of *Science Primers*: *Physics*, *Gewu Xue*, *Gezhi Zhixue Qimeng*, Paratextual Information

1. Introduction

In modern China, the wave of "Western Learning" in the late Qing Dynasty was a momentous event. Since the 1860s, protestant missionaries have translated a large number of Western scientific and technological works into Chinese in response to the call for "power and wealth" and "scientific enlightenment", which was seen as another climax in the translation of Western scientific and technological works after the late Ming and early Qing dynasties. The introduction of Western scientific knowledge through translation activities at this time immensely contributed the late Qing Dynasty's socioeconomic advancement and the modernization of science.

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According to Zhou (1937: p. 434), a total of 468 Western scientific works on astronomy, mathematics, physics and chemistry were translated or compiled by the London Missionary Society, School of Combined Learning and Translation Department of the Kiangnan Arsenal, among which the number of physics works was about 98.

Science Primers: *Physics* (shorted as *Physics* in the following part) was translated at that time, and there are two Chinese translations. One is *Gewu Qimeng*: *Gewu Xue* (《格物启蒙：格物学》) jointly translated by Young John Allen and Zheng Changyan and the other one is *Xixue Qimeng Shiliu Zhong*: *Gezhi Zhixue Qimeng* (《西学启蒙十六种：格致质学启蒙》) translated by Joseph Edkins. Both Chinese translations were used as coursebook and reprinted several times. Li (1898: preface) and Zeng (1898: preface) held that the book was excellent for enlightenment in that content covered basic scientific knowledge and it was easily understood.

The concept paratext was put forward by French narratology theorist Gérard Genette. It refers to the auxiliary elements of the text that exist around the text, such as cover, titles, acknowledgments, prefaces, introduction, notes, postscript, illustrations, appendixes, interviews, book reviews, and so on (Genette, 1997). The paratext is both a descriptive and a coordinating element. It serves as a threshold for readers, complements the information of the translated text to access to the text and is a crucial means of comprehending translators' translation ideas and translation strategies reflected in the two Chinese translations.

2. Basic Information about *Science Primers*: *Physics*

Physics by Balfour Stewart is one volume of the MacMillan Company's *Science Primers* series. Stewart, Thomas Huxley and Henry Roscoe co-edited this series, with Roscoe's *Chemistry*, Sir Archibald Geikie's *Geology*, Stewart's *Physics* and Lockyer's *Astronomy* being the first to be published in 1872, followed by Huxley's *Introductory*, Hooker's *Botany*, and Jevons' *Logic*. Each volume in the series had an initial circulation of 10,000 copies and was sold for one shilling. In 1875, Stewart's *Physics* was sold about 7000 copies (Lightman, 2007: p. 390).

According to the information on the cover of *Physics* (1901)[1], *Physics* was reprinted many times by MacMillan Company. Besides the Macmillan Company's publication, there is also Appleton Company's publication in New York. The difference among editions is whether the section of problem was added and whether the price of the instrument changed.

Katy (as cited in Lightman, 2007: p. 390) argues that *Science Primers* is a good example, whose publication indicates that publishers began to market more mainstream scientific knowledge to the lower classes. *Science Primers* has been widely disseminated worldwide and has been translated into many languages such as Chinese, Japanese, German, Czech, Russian, Icelandic and Gujarati. Es-

[1]*Physics* was first printed in 1872, reprinted in 1874, 1875, 1876, 1878, 1879, 1880, 1881 and 1883, revised in 1884 and reprinted again in 1885, 1886, 1888, 1890, 1891, 1894, 1895, 1897, 1898, 1900 and 1901.

pecially, this series was published several times as one of the popular elementary textbooks during the Meiji Restoration, which shows its importance to the course of modernization of Japanese education (Mitsuko, 1980: p. 240; Takaishi, 1991: p. 197; Tetsuo, 1992: p. 74).

3. General Information about Chinese Translation: *Gewu Xue* and *Gezhi Zhixue Qimeng*

Both Chinese translations were published in the late Qing Dynasty. At that time, China had to sign unequal treaties due to the defeat of the Second Opium War, which forced China to increase the number of trading ports and give foreigners a series of rights in China, resulting in strengthening the political invasion and plundering of China by the Western powers and further facilitating their cultural penetration into China. Furthermore, the defeat of the Second Opium Wars led to the deepening of China's semi-colonization and the Qing government was beset with internal and external trouble. Given this situation, some officials advocated the use of advanced production technology to enrich the country and strengthen the army in order to get rid of the difficulties and maintain the power of the Qing government. Hence, they initiated the Westernization movement to learn advanced Western technology by founding the new-type schools to cultivate translators and developing institutions to translate and publish Western works. Within this historical background, *Gewu Xue* and *Gezhi Zhixue Qimeng* were published.

3.1. Allen and Zheng's Chinese Translation: *Gewu Xue*

The Translation Department of the Kiangnan Arsenal was the largest government-run translation institution during the Westernization movement, which translated and published a large number of Western scientific and technological works and was of great influence. In the 1870s, the Translation Department of the Kiangnan Arsenal paid special attention to the translation of a series of introductory textbooks, aiming at laying the foundation for students' scientific and technological studies (Elman, 2005: p. 322). In 1873, Fryer chose *Science Primers* and arranged for John Allen and Zheng Changyan to translate them jointly, which was called the *Gezhi Qimeng* series. The series consisted of four volumes, i.e., *Gewu Xue*, *Tianwen Xue*, *Dili* and *Hua Xue*. The translation of the series was completed in 1875 and was printed and published by the Translation Department of the Kiangnan Arsenal between 1879 and 1880.

Young John Allen's Chinese name is Lin Lezhi (林乐知) and he styled himself as Rongzhang (荣章). During his primary education in private schools, Allen accumulated a fund of knowledge about history, literature and current affairs and politics, which laid the foundation for later translations of history books. While studying at Emory University in Oxford, Allen studied philosophy, religion, mathematics and science, which had significant impact on his thought and laid groundwork for the future spread of Western learning. In addition, Allen learned Chinese by studying the *Three Character Classic* and later tried to preach

in Chinese, and his Chinese language skills improved as he worked as a translator.

As a missionary, Allen not only concentrated on preaching, but also worked diligently on translating. In an article entitled "A Critique of New Terms in China" ("论新名词之辨惑") published in the *Wan Kwoh Kung Pao* (《万国公报》) in 1904, Allen comprehensively summarized and demonstrated his ideas on translation.

In Allen's (1904: p. 594) view, there were more than 200,000 scientific and technological terms in English, but only 60,000 in Chinese at that time and Chinese who were traditionally conservative attached great importance to the traditional Chinese as well as being a high degree of confident in it. In addition, the authority of the traditional Chinese had led to the reluctance on the part of the Chinese to compose and accept new vocabularies. As a result, Chinese translators cannot have the corresponding Chinese words to introduce the new ideas and things due to the huge disparity in the number of scientific and technological terms, which further led to the ineffective communication of information or the deletion of content (1904: pp. 594-595).

According to Allen (1904: pp. 595-596), China must create new terms and he proposed three methods for this. It was to imitate the Western pronunciation, to imitate the meaning or to explain the meaning of the Western terms. In addition, it was possible to borrow words from other countries and transform them into native words with local culture. As English frequently borrowed words from German and French, Chinese could borrow such words from Japanese in that Japanese was of Chinese origin and Japan had more applicable new terms from translating Western works earlier than China. Allen (1904: p. 596) also put forward the idea for creating lists of translated terms in order to accumulate and continue to use such new vocabularies. Besides, some applicable ones could be added to the dictionary and those that are not applicable could be further modified. He finally concluded that it was essential for China to be open-minded in creating and accepting new terms as well as ideas, customs and politics in order to promote reform and progress in all areas in China (1904: p. 596).

Translating of Western books is the main way to learn Western advanced concepts and theories in the late Qing Dynasty, and using Chinese words to express the meaning of Western concepts and terms in the translation process is the essential factor in conveying the content of the original work. Allen's ideas on translations has been systematically summarized and comprehensively presented in this article. On the one hand, he emphasized the significance of openness and acceptance of the new words for translating, and on the other hand, he indicated that traditionally conservative thought and high confidence in Chinese culture was one of factors for the backward of China at that time by analyzing the issue of translation. It is evident that Allen works on translation in order to not only introduce Western learning to Chinese, but more importantly, to appeal to Chinese people to learn and accept new ideas and new things with an open mind for advancing the social progress in China.

It is only known that Zheng Changyan, the Chinese intellectual, came from Haiyan, Zhejiang Province, and became the translator of the Translation Department of the Kiangnan Arsenal in 1880. He translated about 16 books, mostly in cooperation with Young John Allen and Shu Gaodi.

3.2. Edkins' Chinese Translation: *Gezhi Zhixue Qimeng*

On December 10, 1880, Sir Robert Hart mentioned that all *Science Primers*, *History Primers* and *Geography Primers* published by the Macmillan Company should be mailed, and the cost would be charged to the A-account of the Inspector General Customs in Beijing (Chen, 1990: p. 469). *Science Primers*, *History Primers* and *Geography Primers* were new textbooks widely adopted in Western schools.

In 1881, Joseph Edkins left the London Mission Society and was hired by Hart as the translator of the Inspector General Customs. Joseph Edkins' Chinese name is Ai Yuese (艾约瑟) and he styled himself as Dijin (迪瑾). He was a missionary of London missionary Society, a famous sinologist and translator. He graduated from the University of London, where he studied literature, history and science, laying the foundation for his subsequent translations of works related to the natural science and the humanities. After coming to China, Edkins and other missionaries founded the London Missionary Society Press, where they translated and published many books introducing Western politics, culture, history and science with Chinese intellectuals. Later, Edkins, as the translator of the Inspector General Customs, translated the *Xixue Qimeng Shiliu Zhong* series. In addition, Edkins mastered several languages, and attached great importance to the learn and study Chinese and grammar, and he also learned dialects and published works related to Chinese, laying the foundation of language for him to translate.

Despite his extensive experience in translation, Edkins discussed his views on translation less frequently, and there are only a few translation ideas mentioned in the *Xixue Lveshu* (《西学略述》). In the part of "Translation" in the section of "Literature", Edkins (1898b: p. 29) put forward that translated text may be obscure due to differences between languages and therefore, in terms of translation, the first thing to do is to make the translation concise, clear, fluent and easy to be understood on the basis of being faithful to the source text, and secondly, it is the best to strictly translate word for word and sentence by sentence without any addition, omission or adaptation, otherwise the translated text will be not smooth and logic, resulting in confusion of readers.

Edkins (1898b: preface) was arranged by Hart to translate the newly published Western textbooks that were into Chinese as *Xixue Qimeng Shiliu Zhong* series and he spent five years finishing it. In this series, there are 16 volumes, namely *Gezhi Zhixue Qimeng*, *Tianwen Qimeng* (《天文启蒙》), *Huaxue Qimeng* (《化学启蒙》), *Dili Zhixue Qiming* (《地理质学启蒙》), *Xixue Lveshu*, *Gezhi Zongxue Qimeng* (《格致总学启蒙》), *Dizhi Qimeng* (《地质启蒙》), *Zhiwuxue Qimeng*

(《植物学启蒙》), *Dongwuxue Qimeng* (《动物学启蒙》), *Shenli Qingmeng* (《身理启蒙》), *Fuguo Yangmince* (《富国养民策》), *Bianxue Qimeng* (《辩学启蒙》), *Xila Zhilve* (《希腊志略》), *Luoma Zhilve* (《罗马志略》) and *Ouzhou Shilve* (《欧洲史略》), among which only *Xixue Shulve* was written by Edkins and other 15 volumes were translated. *Xixue Qimeng Shiliu Zhong*, as a science textbook for School of Combined Learning and other government-run schools, was published in 1886 with the preface by Li Hongzhang. The publication of *Xixue Qimeng Shiliu Zhong* signified the cooperation between missionaries and the Qing government and was significant in disseminating more advanced science in schools and academies in the late Qing Dynasty (Elman, 2005: pp. 323-324).

4. A Comparison of Paratexts of the Two Chinese Translations

The comparative analysis of the paratexts will be conducted from aspects of preface, title, illustrations and the tables of the source text and the two Chinese translations.

4.1. The Deletion and Adaptation of the Preface

Prefaces are of great value to translation studies, as they are important information for objectively evaluating translators and translations and reconstructing the norms of translation in a particular historical period (Sun, 2005: p. 54).

Translation of Allen and Zheng does not refer to the preface of the original author, while Edkins writes himself the preface to the book on the basis of the preface of the original author. Edkins (1898a: preface) explains the meaning of "Ge Zhi" and "Gezhi Zhixue", the contents of the book and the way and order to study. First, "Ge Zhi" means "Ge Wu Zhi Zhi" and "Gezhi Zhixue" is one of the subjects of "Ge Zhi" to study the natures of things. The book is organized for new beginner to introduce basic knowledge and experiments, aiming to allow students to experience the experiments first-hand so that they can understand the principles and become familiar with instruments of the experiments and thus improve their ability to observe and experiment. Edkins recommends that read *Huaxue Qimeng* and then *Gezhi Zhixue Qimeng*, which is in line with the advice of the original author in the preface.

4.2. The Name of "Physics" in Chinese

Since the Ming Dynasty, Western physics was introduced into China. The translators basically used the existing Classical Chinese expressions to render the concept "physics" as "Ge Zhi", "Ge Wu", "Zhi Xue", "Xing Xue" and "Xingxing Xue". In order to find out which one is the main translation of the physics, the author counted and sorted out the Chinese translations of "physics" in the English-Chinese dictionaries of the late Qing Dynasty by searching in the *English-Chinese Dictionary Database*.

According to **Table 1**, it can be seen that in the late Qing Dynasty, "Ge

Table 1. A list of translations of "physics" in the *English-Chinese Dictionary Database*.

Year	Explanation in English	Chinese translation
1847, 1848	natural philosophy	性学，性理，格物之学
1866-1869	the science of nature	性学，性理，格物
	to study physics	学性理、格物
1872	natural philosophy or physics	性学、性理、格物之学
1884	the science of nature	性学、性理、格物
	to study physics	学性理、格物
1899		性理、格物之学
	to study physics	学性理
1908	n. The science of nature, or of nature objects; that branch of science which treats the leaves and properties of matter, and the forces upon it, especially that department of natural science which treats of the causes (as, gravitation, heat, light, magnetism, electricity, etc.) that modify the general properties of bodies; natural philosophy.	物理学、形性学、质学、格物学、形理学
1915	the science of the forces which are at work in inanimate nature	物理学

Wu" and "Xing Xue" was relatively prevalent Chinese name for physics. In addition, "Ge Zhi" was also used as the translation name of physics-related works (Hu, 1998: p. 41; Dai, 2001: p. 3), however, many scholars believe that only "Gewu Xue" is close to physics in meaning as a comprehensive name for the physics including force, heat, sound, light, and electricity, while "Ge Zhi" often refers to science in general, including natural sciences such as physics, chemistry, and geology (Yang, 1987; Jin, 1992; Jin & Liu, 2004; Cai, 2001; Zhang, 2007).

Allen and Zheng choose "Gewu Xue" and Edkins translates it as "Gezhi Zhixue Qimeng". Edkins (1898a: preface) writes that "格致也就是格物致知" ("Ge Zhi means Ge Wu Zhi Zhi"), and in fact, both "Ge Wu" and "Ge Zhi" are cited from "Ge Wu Zhi Zhi" that is an important cognitive theory in traditional Confucian culture and emphasizes the study on the nature of things. The expressions "Ge Wu" and "Ge Zhi" come from the "致知在格物，物格而后知至，意诚而后心正，心正而后身修，身修而后家齐，家齐而后国治，国治而后天下平" (CCL Corpus, 2003). ("First of all, people should do their best to investigate the nature of everything in the world in order to gain a thorough understanding of the various types of knowledge. Then they will have firm beliefs and decent characters as a result of their thorough awareness of the world, allowing them to effectively manage family relationships and then rule the country to achieve harmony in society") which indicates that the exploration and awareness of the nature of things is essential approach to expand knowledge. It is possible to deduce that

the meanings of the "Ge Wu" and "Ge Zhi" are associated with investigating nature of things and thus have the connection with what the physics examines. Wang (2012: p. 94) holds that "Ge Wu Zhi Zhi" is closely related to the development of science and technology in ancient China and the prevalent empirical orientation in Ming and Qing Dynasties leads to "Ge Wu Zhi Zhi" has the scientific denotation and thus paves the way for the exchange between modern China and Western science and technology.

"Zhi Xue" and "Xingxing Xue" are seldom used as translations of "physics". Edkins (1898a: preface) gives the definition of "Gewu Zhixue" and it means that to explore the different properties of all things and everything has its own nature, for instance, there is solid, liquid and gas. In addition, in the note of *Gewu Zhixue*, the translator writes that "格致者，格物致知之谓。是举宇内各种学问而尽赅之矣。是书专论物质体变诸事，为格致学中首要之一门。按西名之意，当称质学或体学乃可，而前人译此学之书，有以格物名之者，嫌其未符实义，爰颜之曰格物质学" (cited in, Zhang, 2007: p. 117). ("'Ge Zhi' means 'Ge Wu Zhi Zhi' and it refers to continuously learning all kinds of knowledge by inquiring into the nature of things. This book introduces the change in nature of things, which is one of the primary disciplines related to 'Gezhi Xue'. According to the meaning of Western physics, the previous translation of physics as 'Gewu Xue' is not appropriate, and 'Ti Xue' or 'Zhi Xue' is more closed to its meaning, therefore I render it as 'Gewu Zhixue'") However, Amelung (2004: p. 389) argues that these translations are also at question, because "Ti Xue" is frequently used as the translation of "Jiepou Xue" (解剖学) and "Zhi Xue" is occasionally used as a translation of "chemistry". "Xingxing Xue" has a meaning of body and nature and it was first used as the translation of physics by Li Di, who mentioned that "内有形性一学，所包尤广，曰重学，曰水学，曰气学，曰声学，曰热学，曰光学，曰磁学，曰电学，凡入门，分之各为一学，合之总称形性学" (Li, 1899: preface). ("The subjects treated by Xingxing Xue are very broad, including Zhong Xue, Shui Xue, Qi Xue, Sheng Xue, Re Xue, Guang Xue, Ci Xue and Dian Xue. All these are as individual subject when they are divided and when they are taken together, they are called Xingxing Xue") All of these definitions imply that translators translated physics into Chinese based on what physics investigates.

There are two possible reasons for the elimination of "Zhi Xue" and "Xingxing Xue". On the one hand, unlike "Ge Wu" which has an empirical meaning as well as a deeper traditional cultural connotation, they only mentioned the subject of physics. On the other hand, it is related to methods and ideas for translating terms that were mostly used throughout the late Qing Dynasty. According to Fryer (1880: p. 18), the major method of translation at that time was to use terms already accessible in Chinese that can be found in dictionaries. It can be presumed that the bilingual dictionaries of the late Qing Dynasty at that time mostly used "Ge Wu" as the translation of physics, which also laid the foundation for this name to become more prevalent than "Zhi Xue" and "Xingxing Xue".

Based on the analysis, it can be inferred reasons that the translators of the two Chinese translations used the concepts of "Ge Wu" and "Ge Zhi" to correspond to Western concepts related to physics, science and technology. On the one hand, the existing expression has the similar connotation and was familiar to the intellectuals of the late Qing Dynasty, with which the acceptance of the translations is enhanced, and on the other hand, this way of translation also catered to the mainstream translation trend of the time, giving scientific meanings to old concepts, further constructing a context suitable for the old-fashioned intellectuals of the late Qing Dynasty to accept new Western concepts, and laying the foundation for the further dissemination of physics.

"Wuli Xue" as the name of physics book was in 1900. Toyohachi Fujita (藤田丰八) translated Iimori Tingzuo's (饭盛挺造) *Wuli Xue* and it was published by the Translation Department of the Kiangnan Arsenal, marking the first time that Chinese words in Japanese were borrowed from Japan and the first physics book was entitled as "Wuli Xue" in China, and "Wuli Xue" has been used as the translation of physics ever since.

The concept "Wu Li" has been used in ancient China for a long time, but it does not refer to modern sense of the physics as the subject in natural sciences. In ancient times, the word "physics" usually meant the principles of all things, which was "the physics in broad sense" (Zhang & Hu, 1998).

There are works entitled "Wu Li" in ancient China. For instance, *Wuli Xiaoshi* (《物理小识》) written by Fang Yizhi in late Ming Dynasty, which is an encyclopedic natural science work, covering astronomy, calendars, minerals, plants, animals, medicine and other aspects. It can be seen ancient concept of "Wu Li" covers a much wider range of topics, while modern physics is the discipline that studies the most general laws of motion and the basic structure of matter.

The concept of "Wu Li" was used in China prior to in Japan. The Japanese government first published *Xiaoxue Wuli Shu* (《小学物理学书》) in 1871, which first adopted "Wu Li" as title for physics book, and *Physics* was also translated as *Shishi Wuli Xiaoxue* (《士氏物理小學》) in 1878 and *Xiao Wuli Xue*: *Xinyi* (《小物理学：新訳》) in 1893. Some scholars believe that the Japanese word "Wu Li" originated from Chinese characters and was influenced by ancient Chinese works, but there is not yet sufficient evidence to prove it (Wang, 1995; Hu, 1998; Zhang & Hu, 1998; Cai, 2001).

The transformation of translations of physics indicates that translators adopt national cultural expressions that are familiar to Chinese people to introduce Western physics, which achieves the purpose of translation and the goal of spreading the knowledge of physics. Such translation method constructs the connection between Chinese culture and Western science, facilitating the acceptance of natural science and laying the groundwork for the further development of modern physics.

4.3. The Different Ways of Presenting Illustrations and Tables

The illustrations serve as an interpretive tool to help readers understand the

text. There are 48 illustrations in the source text. The illustrations of Allen and Zheng's version are consistent with that of the source text, and there are 49 illustrations in Edkins' translation with an additional illustration of a telegraph. The author has not yet found the source of that illustration.

By comparing the illustrations in the source text with the two translations, as shown in Table 2, it can be seen that Allen and Zheng's versions are identical to the source text, while Edkins adds some details such as dots and lines that are not marked in the original ones, and he also adds tips next to each illustration to illustrate the experimental equipment and operation steps, which is intuitive and clear.

In addition, there are two tables in the source text. One presents the results of the expansion of each substance and the other shows the freezing point of each substance. When demonstrating the two tables, translators of the two Chinese versions choose different formats and expressions.

As shown in Table 3, the original tables are left-to-right correspondence, with the row of name of substance on the left and the expansion results or freezing point on the right. Allen and Zheng maintain a similar format to the original, but exchange the content of each row in order to cater to the reading order of Chinese people, which means the right-hand side of the table is about the name of substance and the left-hand side refers to corresponding expansion result or freezing point. The table in Edkins' translation shows a top-to-bottom correspondence, which means the name of the substance at the top and the corresponding expansion result or freezing point at the bottom. In ancient China, the order of writing and reading is from top to bottom and then from right to left.

Table 2. A comparison of illustrations in the source text and the two Chinese translations.

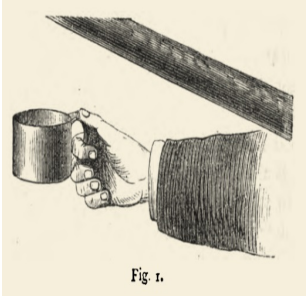
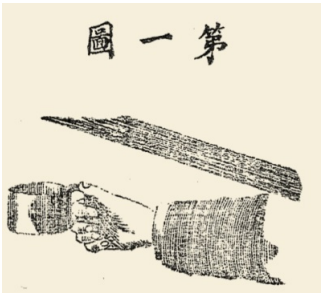
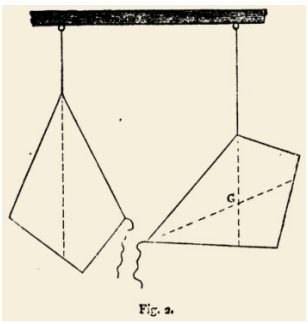
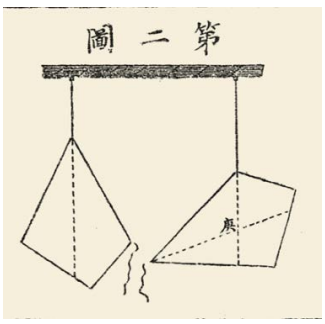
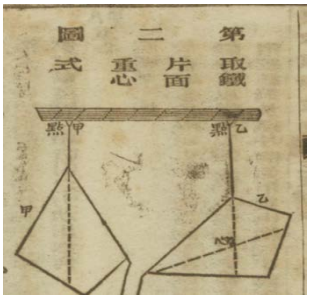
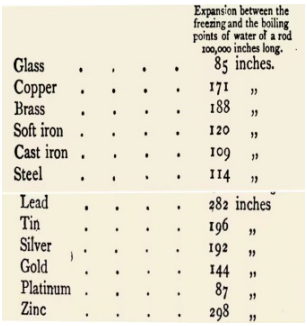
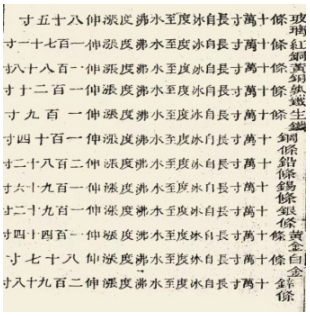
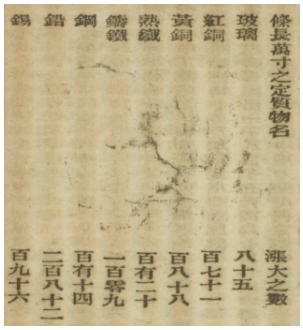
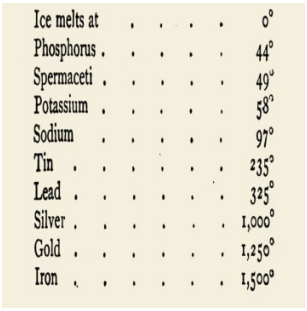
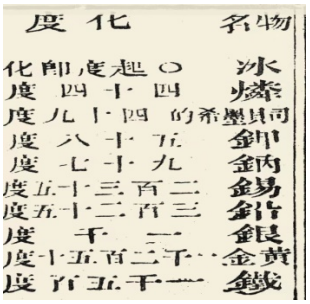
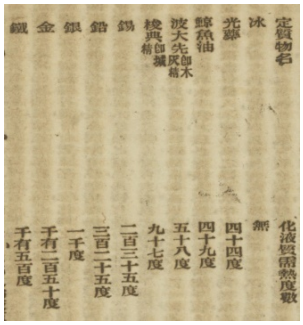
Number	ST (Stewart, 1872)	TT1 (Allen & Zheng, 1880)	TT2 (Edkins, 1898a)
1			
2			

Table 3. A comparison of tables in the source text and the two Chinese translations.

Number	ST (Stewart, 1872)	TT1 (Allen & Zheng, 1880)	TT2 (Edkins, 1898a)
1			
2			

Both Chinese translators choose the target-language oriented method to translate.

5. Conclusion

The late Qing period is a transitional period in which ancient Chinese science gradually gave way to Western science. How Western scientific knowledge is disseminated, accepted and understood through translation activities is a very critical issue in understanding the course of Chinese scientific modernization. Given that the system of knowledge and the content of physics were unfamiliar to society, translators adopt traditional expressions familiar to the target readers when translating to effectively cope with the difficulties of transferring scientific and technological knowledge, and they apply adaptation to the paratext in the source text to cater for the reading habits of readers in the late Qing Dynasty. The paratext is just as significant as the main text in the dissemination and acceptance of the Chinese translations of *Physics* in the late Qing Dynasty.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

Allen, Y. J. [林乐知] (1904). 论新名词之辨惑. 见 *万国公报(第 184 册)* (pp. 594-596).

Allen, Y. J., & Zheng, C. Y [林乐知、郑昌棪] (1880). *格致启蒙: 格物学*. 江南制造翻译局.

Amelung, I. (2004). Naming Physics: The Strife to Delineate a Field of Modern Science in Late Imperial China. In M. Lackner, & N. Vittinghoff (Eds.), *Mapping Meanings: The field of New Learning in Late Qing China* (pp. 381-422). Brill.

Cai, T. Q. [蔡铁权] (2001). "物理"流变考. *浙江师大学报(自然科学版), (1),* 1-16.

CCL Corpus (北京大学中国语言学研究中心 CCL 语料库) (2003). http://ccl.pku.edu.cn:8080/ccl_corpus

Chen, X. F. [陈霞飞] (1900). *中国海关密档——赫德、金登干函电汇编(1874-1907)(第二卷)*. 中华书局.

Dai, N. Z. [戴念祖] (2001). *中国科学技术史: 物理卷*. 中国科学技术大学出版社.

Edkins, J. [艾约瑟] (1898a). *西学启蒙十六种: 格致质学启蒙*. 上海图书集成印书局.

Edkins, J. [艾约瑟] (1898b). *西学启蒙十六种: 西学略述*. 上海图书集成印书局.

Elman, B. A. (2005). *On Their Own Terms: Science in China, 1550-1900*. Harvard University Press.

Fryer, J. [傅兰雅] (1880). 江南制造总局翻译西书事略. 见 张静庐(辑注). *中国近现代出版史料*(pp. 9-28). 上海书店出版社.

Genette, G. (1997). *Paratexts: Thresholds of Interpretation* (E. L. Jane Trans.). Cambridge University Press.

Hu, S. H. [胡升华] (1998). "物理学"名称考源. *科学, (1),* 41-44.

Jin, G. T., & Liu, Q. F. [金观涛、刘青峰] (2004). 从"格物致知"到"科学"、"生产力"——知识谱系和文化关系的思想史研究. *中央研究院近代史研究所集刊, (46),* 105-157.

Jin, L. P. [金丽萍] (1992). 物理学与格致学. *物理教师, (4),* 28-29.

Li, D. [李杕] (1899). *形性学要*. 徐汇汇报馆.

Li, H. Z. [李鸿章] (1898). 西学十六种序. 见 艾约瑟(编). *西学启蒙十六种: 西学略述(序言)*. 上海图书集成印书局.

Lightman, B. (2007). *Victorian Popularizers of Science—Designing Nature for New Audiences*. The University of Chicago Press.

Mitsuko, S. [末藤美津子] (1980). 明治前半期の科学教育に関する研究(i): t.h.ハックスレーの科学教育思想の受容を中心として. *東京大学教育学部紀要, (20),* 235-244.

Stewart, B. (1872[1901]). *Science Primers: Physics*. MacMillan Company.

Sun, C. K. [孙昌坤] (2005). 简论序言跋语对于翻译研究的意义. *上海翻译, (1),* 54-55.

Takaishi, Y. [高石靖夫] (1991). Science Primers のわが国への受容について: 調査結果より. *日本理科教育学会全国大会要項, (41),* 197.

Tetsuo, I. [磯崎哲夫] (1992). 19 世紀後半のイギリスにおける理科教育の改革: 『Science Primers』を中心にして. *日本理科教育学会全国大会要項, (42),* 74-75.

The English-Chinese Dictionary Database. https://mhdb.mh.sinica.edu.tw/dictionary/index.php

Wang, B. [王冰] (1995). 我国早期物理学名词的翻译及演变. *自然科学史研究, (3),* 215-226.

Wang, X. Q. [王绪琴] (2012). 格物致知论的源流及其近代转型. *自然辩证法通讯, (1),* 94-99+128.

Yang, Y. [杨玉] (1987). 关于中译“物理学”名称的由来. *物理, (1),* 55-57+50.

Zeng, J. Z. [曾纪泽] (1898). 序. 见 艾约瑟(编). *西学启蒙十六种: 西学略述(序言).* 上海图书集成印书局.

Zhang, B. L., & Hu, H. K. [张秉伦、胡化凯] (1998). 中国古代“物理”一词的由来与词义演变. *自然科学史研究, (1),* 55-60.

Zhang, F. [张帆] (2007). 近代“格致学”的传播与辨义. *学术研究, (10),* 99-106+160.

Zhou, S. C. [周寿昌] (1937). 译刊科学书籍考略. 见 胡适, 蔡元培, 王雲五(编). *张菊生先生七十生日纪念论文集*(pp. 409-470). 商务印书馆.