

Original Research Article

## Translating Technology and Culture: Analysis of Translation of Non-literary Chinese Texts in *Science and Civilisation in China*

Yong LIANG<sup>1\*</sup> & Shuli CHANG<sup>2</sup>

<sup>1</sup>Doctoral Candidate, School of Foreign Languages, Southwest Jiaotong University, Chengdu, China

<sup>2</sup>Professor, School of Foreign Languages and International Education, Chengdu Technological University, Chengdu, China

Corresponding Author: Yong LIANG, E-mail: lukeliang@my.swjtu.edu.cn

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### ABSTRACT

Science and Civilisation in China is needless to say important for understanding and studying China and its technology and culture, but the translation of those technical terms and books has been little systematically discussed. The study, through a self-collected bilingual corpus of culture-loaded texts in those volumes, describes the translation features and explains the translation effects brought by the series of Science and Civilisation in China. It finds out that the book editors tried to keep a balance between literal and free translation by maintaining pinyin spelling in Wade-Giles style in translating those cultural and technical terms, while necessary annotation and abundant illustrations are added. The translations of terms keep good consistency though those various volumes are published over decades. The translated texts constitute a significant part in each volume. The study highlights the important role of translation of non-literary texts in introducing Chinese science and culture. It argues that writing or editing books on Chinese science and technology is also a way of translating China and its civilisation, and therefore calls for academic attention on the translation study of more Chinese non-literary works.

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### Introduction

Non-literary texts in this study mainly refer to scientific and technological texts, especially the culture-loaded terms as well as some ancient cultural classics, excluding long and short stories, poems, drama and other typical traditional literary genres. Based on the analysis of the translation of Chinese classical texts in the various volumes of *Science and Civilisation in China* (hereinafter referred to as SCC) edited by Dr. Joseph Needham (1900-1995), the study seeks to discuss the effective ways in introducing Chinese culture and translating traditional cultural terms.

Dr. Joseph Needham, a famous British historian of science and one of the first batch of foreign academicians of the Chinese Academy of Sciences in 1994, devoted most of his life to compiling the series of SCC for nearly 50 years, which contains a total of seven volumes, with more than 30 parts. The book systematically reviews and translates ancient Chinese traditional science and technology and culture, demonstrating and fully affirming the contribution and status of Chinese science and technology civilization in the process of world history.

In order to describe and summarise the gist of long history of Chinese science and technology, this book, undoubtedly, has translated, introduced and studied various ancient Chinese scientific and technological classics, including early scientific thoughts, and texts on chemistry, physics, biology, agronomy, geography, medicine and other relevant classics. In light of the methodology of descriptive translation study (DTS), this study focuses on the translation choices and strategies of non-literary texts, and the dissemination of traditional Chinese culture from the perspective of comparative culture.

## **Literature Review**

### ***Overview of Translation Studies of Chinese Classics and Non-literary Texts***

The study of translation and overseas communication of Chinese ancient classical books is in the ascendant in China. The “National Academic Seminar on Translation of Chinese Classics” sponsored by the professional committee of translation of classics under the China Association for Comparative Studies of English and Chinese has been held for 11 times, the 10<sup>th</sup> conference was in Shanghai in November 2017, and the 11<sup>th</sup> was recently held in the early autumn of 2019 in Xi’an city, Shaanxi province, participated by more than 200 scholars. In the past three years, several new academic associations have been successively established in China, such as the “Bilingual Research Branch of Sinology of China Pre-Qin History Society” was set up in May 2018, and the “Professional Committee of Traditional Culture Translation and International Communication under Chinese Association for Research and Advancement of Chinese Medicine” in July 2019.

In addition, non-literary or applied translation also receives much attention from the scholars in translation studies and owns certain specialized academic platforms for publication in China. The 18<sup>th</sup> National Academic Conference on Scientific and Technological Translation, sponsored by the Science and Technology Translation Committee of Translation Association of China, was held in November 2019 in Jiangxi. Relying on academic journals, such as “Chinese Translators Journal” (one of the core and most prominent journals in translation studies in China), “China Science and Technology Translation Journal” and “Shanghai Journal of Translators”, non-literary translation has also formed a wide influence. At present, this kind of translation activity has the largest demand in the translation market, rather than literary genres. At the same time, it is closely combined with translation teaching and translation practice, and has a broad practical basis.

At present, the translation studies of Chinese classics are focusing mainly literature and philosophy, such as the translation and introduction of four famous classical novels (e.g. *Dream of the Red Chamber (Honglou meng)* (see Zhang 2019), *Outlaws of the Marsh (Shuihu zhuan)* (see Wang 2019), *Daode jing, Zhuangzi, Liezi*, the thirteen classics of Confucianism, modern and contemporary literature, such as the works of some well-known Chinese writers Mo Yan (China’s first Nobel Prize winner for literature), Jin Yong, Qian Zhongshu, etc., and translation of general traditional Chinese terms of modern works (Liang 2019). The translation and cross-cultural research of non-literature classics are not enough. The reasons of this phenomenon may be due to the fact that researchers are relatively familiar with literature and cultural classics, however, the professional knowledge of the text on science and engineering is difficult to grasp and the interest is relatively small. In the context of “going out” of Chinese culture, this is exactly the field that needs to be expanded and further studied.

### ***Research on the Translation and Studies of SCC***

As for the studies of SCC, some scholars at home and abroad have studied and commented on its translation and influence. Li and Li (1997) studied the translation strategies of Traditional Chinese Medicine (TCM) in SCC by Dr. Needham, and summarized several translation techniques, such as translating upon deep understanding of TCM terms, and constructing new words by combining morphemes. Zheng (2001), based on her practical English-Chinese translation practice of some parts of SCC, compared the differences between her translation and those in a Taiwan version and highlighted that “The translation of scientific masterpieces is different from that of literary works, ... and their principles of translation ‘faithfulness, smoothness and aptness’ should be consistent”. (p.34) The former two researchers focused on either one area of non-literary texts in SCC or the translation principles

during E-C translation, which can be said is the typical representative of research models in the translation studies in China.

Besides, apart from the emphasis only on translation, Li and Liu (2017) analysed four aspects in the publication of SCC (i.e. the origin, characteristics, significance and influence of the publication) and proposed that joint efforts should be made to help “Chinese ancient scientific and technological classics to ‘go out’”. (p.98) Indeed, for the introduction of Chinese culture to other cultures, the factors besides translation should also be emphasized and discussed. Without enough attention from both the authorities in translation and the public, systematic planning, responsible and first-class translators, and sufficient funding supports, the initiative of promoting classical Chinese culture overseas cannot achieve satisfactory results.

In regard to the study and comments of SCC, early in 1982, Prof. Sivin (1982) pointed out the prerequisite of asking the Needham question, and the complex relations and dimensions in Scientific Revolution. Moreover, Korean scholar Yi (2017), through the description of Joseph Needham’s contribution to the introduction of Chinese ancient technology and science, gave new consideration to the study of history on science and the famous question proposed by Needham, “Why modern science had not developed in Chinese civilization?” (p.83), which is again addressed by Hsia and Schäfer (2019), especially focusing on the aspects of “themes, methods, and approaches” (p.94) in SCC. However, in the former-mentioned as well as most of the researches about SCC, the translation phenomenon in the series of the books is not addressed.

Prof. Kuo (2019) reexamined Needham’s papers on Chinese medicine and also Part 6, Vol.6 of SCC on medicine and biological technology, and called for the efforts in academia to renew Needham’s life project in “situating Chinese medicine as a living tradition” (p.116) and further discussed the relationship of science and culture, emphasising that “the core concern of Needham’s life project is inevitably culture”. (p.121) Kuo’s study brings readers back to Needham’s historical project in introducing China to the world and especially the efforts on explaining the TCM theory and practice, which is to a large extent different from western medical theory, but the translation of Chinese medicine is clearly not his main concern.

According to the review of the articles, most of the studies mainly focus on some specific areas, such as medicine, agriculture, publishing, etc. Meanwhile, the number of achievements related to translation research is small, among which the research on the translation of classics and technical terms is relatively rare, not to mention the systematic research on the translation and introduction of classics in these volumes. Thus, the research about the translation of non-literary classics involved in the volumes has much space to explore. The research questions are designed as follows:

- (1) What are the contents and translation strategies (analysed from the theory of translation norms) of non-literary texts in SCC?
- (2) Do the editors keep consistent in translating technical terms in SCC, and if so, to what extent?
- (3) How does translation of non-literary texts help introduce Chinese science and technology?

## Research Methods

As the chief editor, Joseph Needham’s volumes in the history of science and technology in China was originally written in English, contributed or co-edited by different scholars from various academic background. Most of the participants were well-known researchers whose experiences or works related to the Chinese studies or Needham Research Institute at Cambridge, England. By describing the translated texts of these technical Chinese terms and some sentences, both quantitative and qualitative analysis are conducted.

In Translation Studies, DTS receives much attention for its advantage as one of effective ways in promoting empirical study. As a pioneer in DTS, Holmes' (1972) classification of translation domains contributed to the founding and beginning of DTS. By focusing on the translated texts, i.e. a product-oriented approach, Toury (1995) in the book *Descriptive Translation Studies and Beyond* mainly discussed the function of the translation in the

target culture, or its role in the literary ‘polysystems’ proposed by Even-Zohar (1990). Pym, Shlesinger and Simeoni (2008) further gathered academic views to discuss more beyond DTS contributed by nearly 20 scholars in Translation and Interpreting Studies (TIS), among which the topics, e.g. self-translation, norms, universals, and sociological turn, are still often discussed presently. Although scholars criticized the limitation of its dominant focus on target languages in DTS, for example, Hermans (1995) called for attention on “the translator”, the fruitful achievements applied by the direction of DTS cannot be overlooked, which, the paper holds, will still serve as a significant approach in TIS. Furthermore, the product norms and process norms in translation are the main focuses in discussion based on the research findings.

In this study, as for text analysis, the paper focuses on the second volume of the series “history of scientific thought”, the fourth volume “physics and physical technology” (including three parts, which are selectively studied), and the fifth volume “chemistry and chemical” (including 14 parts, among which key volumes are selected for research) and sixth volume “biology and biological technology” (including 6 parts, among which the translation of TCM is mainly discussed).

Besides, by taking Vol. 5, Part I Paper and Printing for case study, the paper closely analyses the translation strategies of non-literary terms and sentences, consistency of terms in translation by comparing with other volumes, and explains the possible effects by translating these terms in the given way. Furthermore, the paper, through the way of close reading of the text and adopting the concept of norms in translation studies, finds out the historical changes regarding to translation of phrases in the publication of those volumes in the span of more than half century.

### Research Findings

The first part of research findings is a general analysis of volumes published in different time, ranging from 1950s to the 21<sup>st</sup> century, which aims to map a panoramic picture of the publication history and variants in those translated texts. The volumes involve the translation of many traditional Chinese cultural and technical phrases from Source Text (ST) in traditional Chinese form to Target Text (TT). This study explores those terms from 4 volumes, including 6 books, so as to find some similarities and differences in them. The findings of chronological comparison are as shown in table 1.

Table 1. Translation of Non-literary Terms and Chinese Classics in SCC

Volume	Contents	ST Terms	TT Terms & Pages
Vol. 2 Needham (1956)	History of Scientific Thought	a) 機械 b) 器械; c) 《易經》	a) Mechanism ( <i>chi-chieh</i> ), p.125; b) Apparatus ( <i>chhi-chieh</i> ), p.125; c) <i>I Ching</i> (The Classic of Changes) [Book of Changes], p.596
Vol. 4 Part I Needham, Wang, & Robinson (1962)	Physics	a) 硝; 石膏 b) 《墨經》; c) 《三才圖會》; d) 《天工開物》	a) Natron ( <i>hsiao</i> ); gypsum ( <i>shih kaol</i> ), p.110; b) <i>Mo Ching</i> (The Book of Master Mo), p.352; c) <i>San Tshai Thu Hui</i> (Universal Encyclopaedia) p.354; d) <i>Thien Kung Khai Wu</i> (The Exploitation of the Works of Nature), p.357
Vol. 4 Part III	Civil Engineering	a) 水工; b) 春料;	a) The assistant engineer ( <i>shui kung</i> ), p.342;

Needham, Wang, & Lu (1971)	and Nautics	c) 《爾雅》	b) <i>Chhun liao</i> , 'spring supplies', p.342 note c) <i>Erh Ya</i> , Literary Expositor [dictionary], enlarged and commented on c. +300 by Kuo Pho 郭璞, p.711
Vol. 5, Part I Tsien (1985)	Paper and Printing	a) 付梓; b) 活字; c) 《道德經》; d) 《道藏》	a) <i>Fu tzu</i> (to send for engraving on catalpa wood); p. 195 b) <i>huo tzu</i> (movable characters), p.195 c) <i>Tao Te Ching</i> , Canon of the Virtue of the Tao, p.401 d) <i>Tao Tsang</i> (Taoist Patrology) [containing 1464 Taoist works] p.401
Vol. 5 Part 7 Needham, Ho, Lu, & Wang (1986)	Military Technology: the Gunpowder Epic	a) 梨花槍; b) 《水滸傳》; c) 《武經總要》	a) Pear-flower spear ( <i>li hua chhiang</i> ), p.231 b) <i>Shui Hu Chuan</i> (Stories of the River-Banks), p.299 c) <i>Wu Ching Tsung Yao</i> , Collection of the Most Important Military Techniques [compiled by Imperial Order] p.601
Vol.6 Part VI Needham, Lu, & Sivin (2004)	Medicine	a) 針灸 b) 《抱樸子內篇》 c) 疫癘之氣 d) 《黃帝內經靈樞》	a) Acupuncture and moxibustion ( <i>chen chiu</i> ) p.109 b) <i>Pao phu tzu nei phien</i> (Inner chapters of the Preservation-of-Solidarity Master, ca. +320), p.121 c) The epidemic <i>chhi</i> [ <i>i li chih chhi</i> ], p.138 d) <i>Huang ti nei ching, Ling shu</i> (The Yellow Emperor's manual of corporeal [medicine]: the vital axis), p.206

The second part is based on a thorough collection and analysis of translated non-literary terms and Chinese classics in "Paper and Printing" Vol. 5, part I of SCC, because the paper finds that this volume, published in 1985 (basically in the middle of the years for all the extant SCC publications) and authored by Tsien Tsuen-Hsuein (not by Needham), a professor emeritus of Chinese literature at the University of Chicago, can bring the readers more clues on the publication details and translation strategies through comparison with those edited by Needham. The study collects various types of translation of technical and cultural terms, for example, translation of books, articles, printing techniques, institution, etc., and sorts them into different categories to make a comparison, the details are shown in table 2.

Table 2. Translation of Technical and Cultural Terms in “Paper and Printing”, SCC

Stratum	Source Text	Translated Text	Page
Chinese Classics before 1800 A.D.	《儀禮》	<i>I-Li, or Book of Rituals</i>	30-31
	《說文解字》	<i>Shuo Wen Chieh Tzu</i> (Analytical Dictionary of Characters)	35
	《天工開物》	<i>Thien King Khai Wu</i> (The Exploitation of the Works of Nature)	50
	《金剛經》	<i>Diamond Sutra</i>	148
	《論語》	<i>Confucian Analects</i>	198 (fig. 1134)
Chinese and Japanese Books and Journal Articles since 1800 A.D.	中國版畫選	<i>Chung-Kuo Pan Hua Hsuan</i> Selected Specimens of Chinese Woodblock Illustrations (re-engraved in facsimile)	406
	日本古刻書史	<i>Nihon ko kokusho-shi</i> History of Old Japanese Printing	407
	五山版の研究	<i>Gozamban no Kenkyu</i> A Bibliographical Study of Gozamban Editions	417
Books and Journal Articles by the Author Chhien Tshun-Hsun of this Volume	漢代書刀考 (對比J. Winkleman譯)	<i>Han Tai Shu Tao Khao</i> A Study of the Book-Knife of the Han Dynasty (Cf. J. Winkleman) (tr.)	412
	中國古代書史	<i>Chung-Kuo Ku Tai Shu Shih</i> A History of Writing Materials in Ancient China	413
	翻譯對中國現代化的影響 (戴文伯譯)	<i>Fan I tui Chung-Kuo Hsien Tai Hua ti Yin Hsang</i> The Impact of Translation on the Modernization of China (tr. Tai Wen-Pai)	413
Printing	銅鉛字	Movable type in bronze and lead ( <i>thung chhien tzu</i> )	217
	版面	The block face ( <i>pan mien</i> )	222
	版心	The heart of the block ( <i>pan hsin</i> )	222
Character	楷書	The standard script ( <i>khai shu</i> )	223
	隸書	The clerical script ( <i>li shu</i> )	223
	瘦金體	Slender gold style ( <i>shou chin thi</i> )	224
Institution	集賢殿	The Palace of Assembled Worthies (Chi Hsien Tien)	75
	寶鈔司	The Bureau of Imperial Supplies (Pao Chhao Ssu)	123
	國子監	The National Academy (Kuo Tzu Chien)	156

The third part is an analysis of the number of these translated terms in Vol.5, Part I, *SCC*, through figure 1 below, to depict a map of general introduction (both in the main body and bibliography part of the book) of ancient Chinese science and technology on “paper and printing”. Many non-literary terms are translated and presented in the main body of this volume, and other books, article and related original authors are all listed in the bibliography (divided into A and B parts based on the year of 1800) at the end of the book, which is consistent with the arrangement of other volumes and is also convenient for readers to retrieve information.

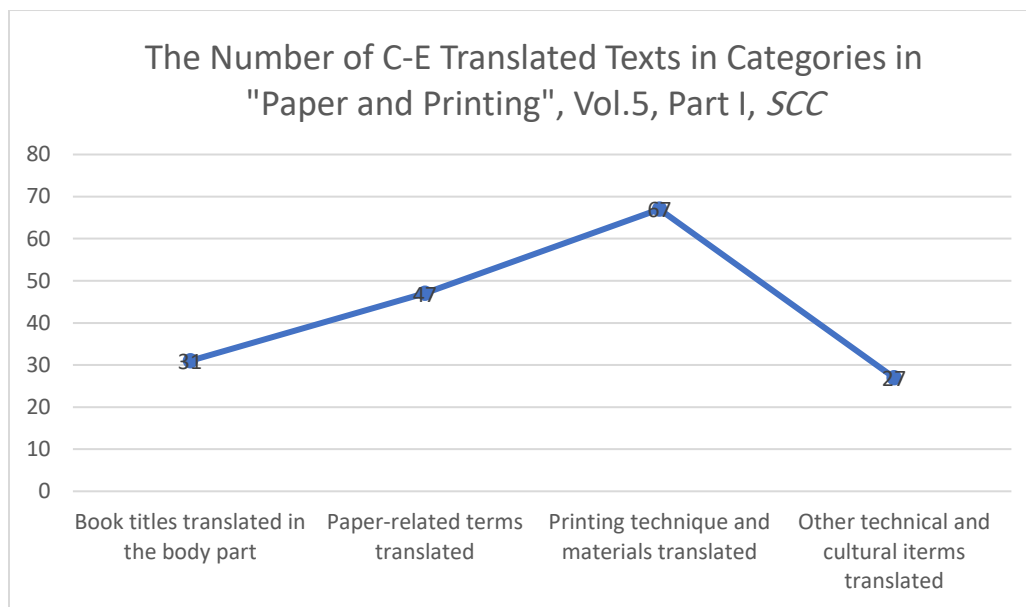


Figure 1. The Number of Translated Texts in Main Body of “Paper and Printing”

Moreover, in the bibliography of volume 5, part I, Chinese and Japanese books and articles for this topic are extensively collected and listed. According to our calculation, in Bibliography A with book and articles before the year of 1800, more than 330 Chinese work titles are cited and translated, and less than 10 Japanese books related to paper and printing are listed. And in bibliography B, there are even more references, including more than 420 Chinese works, nearly 40 Japanese works, and 10 Korean prints. Those publications give the readers not only the translation of the titles, but mostly the publication date, author, translator, and commentaries, if any, etc., which serve as useful resources for researchers and readers to explore more about this topic.

## Discussion

### *Translation strategies*

According to the statistics above, all volumes contain both translation of technical and cultural terms and of a large number of books and articles, either in Chinese or other languages, as the reference materials, which reflect the high-quality research. Besides the explanation or paraphrasing of the terms, the editors of those volume also applied translation strategy of foreignization or as Venuti (1995) proposed “foreignizing translation” (p.20). From the method of foreignization, the readers can gain more source by those Chinese names in Wade-Giles *pinyin*, and this strategy may benefit the cross-cultural communication of technology in a more equal way as “a form of resistance against ethnocentrism...imperialism, in the interests of democratic geopolitical relation” (ibid, p.20). In other words, as Lefevere (1977) records that Friedrich Schleiermacher claims that in this way “the translator leaves the author in peace, ...moves the reader towards him.” (p.74) Thus, English-speaking readers have access to get closer to original Chinese culture and technical books by those names in *pinyin* and retrieve relevant information whenever needed, because many of those Chinese books are not translated into English or other languages before. Therefore, the paper holds that this type of “foreignizing translation” is not only applicable to the summary of Chinese ancient technology, but necessary and appropriate in achieving a balance between literal

and free translation. On the other hand, the method of in-text annotation and explanation, as a mediated way, is also applied in order to meet target readers' needs of high readability of the text.

### **Norms and translation of SCC**

From the translated texts in volumes of *SCC*, the paper considers that two types of norms are the constraints of both the translation product and process. As norms regulate social behaviours, undoubtedly, including translation activities. Toury (1995) regarded translation as "a norm-governed activity" (p.56) and initially brought this concept of norms into translation studies and developed his theory with the key terms of *preliminary norms*, *initial norms* and *operational norms* (pp.58-61) for analysis of translation product (as the main focus) and process. For example, in *SCC*, based on the concept of translation policy mentioned in *preliminary norms*, those works or articles (basically more than 600 entries in each volume as bibliography) chosen and translated (directly from Chinese rather than a second language) by the editor(s) are mainly related to ancient Chinese technology and civilization and closely relevant to the volume topic, thus the references constitute a knowledge bank for other researchers in searching for information or answers for the Needham question. While, in the process of translating the texts, *operational norms* function as the way of affecting both the final translated products and the so-called "black-box" process in translation. In the practical operation of translation, the completeness of the original texts in *SCC* is maintained through both *pinyin* and liberal translation. Generally, as for the editor(s)' choice on translation strategies, the paper finds out that through a mixed translation method (both literal and liberal translation) on the textual level, the compilers of those volume seem to achieve a win-win balance for readers from the world, just as Toury (1980) suggests the translators need to make choice "between two polar alternatives" (p.54) and find a way out in the demand of "adequate" and "acceptable" translation. Apart from the notion of norms by Toury, Chesterman (1997) also initiates a similar but different theory about translation norms, i.e. *expectancy norms* and *professional norms* (pp.64-70), which extends Toury's theory and especially concerns about the process norms. For instance, through the description of *accountability norm* under the umbrella term *professional norms*, more details and aspects during the translation can be revealed, such as translators' concern of "the original writer, the commissioner of the translation, the translator himself or herself, the prospective readership and any other relevant parties." (ibid, p.68)

### **Translation consistency**

The editors do, as much as possible, keep consistent in translating technical and cultural terms in *SCC*. For example, in Vol. 2, the Chinese ancient classic 易經 is translated into *I Ching* (The Classic of Changes) [Book of Changes] in the bibliography (p. 596), which corresponds with that in Vol. 5, Part I (p. 395) and other many cases can be listed as in the same way, i.e. the Chinese book is translated into Wade-Giles *pinyin* in the main body of the book and the full translation by transliteration and free translation is added in the bibliography. Moreover, as for the consistency of terms, along with the publication of series of those volumes, inevitably, the editors made some minor changes in the latest publications, just as editor pointed out in Vol.5, part I "Where there are any differences between the entries ...in Vols. 1-4, the information here...as more correct." (p.389) Besides, in bibliography A and B of each volume, on the one hand, the Chinese names of authors are translated and listed in Wade-Giles *pinyin*, on the other, those foreigners' names are translated into Chinese, both providing direct and useful data for readers and researchers to utilize conveniently. For example, Matteo Ricci, as a pioneer in cross-cultural communication in the 16<sup>th</sup> century, is well-known for his translation of *Elements of Geometry* (*Euclid's*) cooperated with Chinese scientist Hsu Kuang-Chhi 徐光啟 and Ricci's Chinese name and that in *pinyin* is also given as 利馬竇 (Li Ma-Tou) (ibid, p.389). Another example is *Chin Kang Ching* 金剛經 (Diamond-cutter Sutra) attributed to Kumārajīva 鳩摩羅什婆 (ibid, p.390), whose Chinese name is more familiar to Chinese translation scholars and researchers in Buddhist studies.



### Translation effects

Hundreds of translated titles of books and articles in one volume, countless explanations of production materials, technical procedures and culture-loaded terms, as well as considerable useful illustrations with annotations and comments are all the features that researchers need to take a closer look in the translation study of *SCC*. Those paratexts constitute an important tool in introducing or translating China and its civilisation. Nevertheless, certain terms, especially widely discussed in sinology study, are translated in different ways in the 21<sup>st</sup> century. For example, the collection of Daoist classics 道藏 *Daozang* is commonly rendered into Daoist/Taoist Canon, rather than “Taoist Patrology” in *SCC*. (Tsien 1985: 401) The word ‘patrology’ has a connection with Christian writing in meaning. Sinologists, especially scholars mainly interested in Daoism, such as Schipper and Verellen (2004), have generally adopted the word canon in translating *Daozang*. From the above analysis, the paper may draw a conclusion that translation of non-literary texts, to a large extent, contributes to the introduction of Chinese science and technology. The role that translation plays in the volumes of *SCC* needs to be recognized and the translation strategies may also shed light on the current C-E bilingual translation practice in the field of technology and culture. Though, seldomly, Needham and other editors of *SCC* are considered as translators, they actually translated Chinese books, articles, names, terms, etc., from the early beginning, and it can be said that by translating historical facts of Chinese technology and civilisation, they have been translating China to the world. History lays the foundation of mutual understanding, and translation helps to share it among west-east communities.

### Conclusion

In summary, for better understanding the works of Needham and other contributors of *SCC*, from the perspective of translation, the study, by collecting and describing translation facts in various volumes of *SCC*, explains mainly their translation strategies, norms relating to translation product and process, possible translation effects and results. The paper argues that translation study of *SCC* not only benefits TIS, especially the views of non-literary translation study, but also benefits re-reading of Needham and recognition of the long-lasting influence of *SCC*. The present study of non-literary translation in the history of science and technology of China complements the relatively less-discussed topic in the translation and introduction of ancient books, and it also leads to a more in-depth and comprehensive understanding in the applied translation study. Through the description of the historical facts and translated phrases from the original English edited books in 4 volumes, this study looks forward to a detailed and corpus-based study of all 7 volumes to promote the international exchange of Chinese traditional culture.

Given that currently Chinese academia actively joins the discussion at the international academic platform, either in the areas of natural science or social science, the cross-cultural communication will be certainly increasing. Translation, serving as an important bridge and link for Chinese culture to communicate with others, will play its part in having an equal, peaceful, and meaningful dialogue among different civilizations. It can not only strengthen mutual understanding between Chinese and foreign people, but also is an indispensable part in communication of technology and culture, as well as for the development of a shared academic community.

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### About the Authors

**Yong LIANG** obtained his B.A. in English Language and Literature, and M.A. in Foreign Linguistics and Applied Linguistics with a specialization in translation studies. Now he is a doctoral candidate in Chinese Language and Literature, interested in Translation Studies and Comparative Literature, at School of Foreign Languages, Southwest Jiaotong University, Chengdu, China.

**Shuli CHANG**, professor of English language and culture, has been teaching English for decades and published widely on educational studies, interested in language teaching, cross-cultural communication, and Translation Studies. Presently, she is the dean of School of Foreign Languages and International Education at Chengdu Technological University, Chengdu, China.

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