

The Jiangnan Arsenal: A Microcosm of Translation and Ideological Transformation in 19th-century China

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Volume 61, Special Issue, 2016

Sciences en traduction
Sciences in Translation

URI: <https://id.erudit.org/iderudit/1038684ar>
DOI: <https://doi.org/10.7202/1038684ar>

[See table of contents](#)

Publisher(s)

Les Presses de l'Université de Montréal

ISSN

0026-0452 (print)
1492-1421 (digital)

[Explore this journal](#)

Cite this article

Lung, R. (2016). The Jiangnan Arsenal: A Microcosm of Translation and Ideological Transformation in 19th-century China. *Meta*, 61, 37–52.
<https://doi.org/10.7202/1038684ar>

Article abstract

The Jiangnan Arsenal (1865-1912), a publicly-funded bureau dedicated to the production of military equipment in late Qing China (1664-1911), was established in response to China's painful defeat in the two Opium Wars (1839-1842 and 1856-1860). The Arsenal's translation department, staffed by a total of fifty Chinese scholars and nine Westerners at different times, was set up in 1868 to translate and publish translations of Western books and treatises on science and technology. It was the first official unit charged with this task. Its stated pragmatic function was to assist the arsenal technicians in their production of weapons, although the translations were also marketed to outsiders. Viewed organically, the Arsenal's translation department was in many ways a reflection of the ideological and social transformations experienced by China, the Chinese scribes, and the Western oral translators in the late 19th century. A study of this translation institution is therefore relevant to translation studies in three regards. First, the Arsenal's four decades of existence and its emphasis on the function of translation suggest the importance of translation to imperial China's pursuit of modernization. Second, the voluminous translated texts published by the Arsenal reflect the collaborative efforts of Western missionaries and Chinese literati, typical in the second half of the 19th century. Third, the Arsenal's combined role, encompassing both translation and publication, inspired the emergence of journals that published translated articles on Western science, technology, social sciences, and literature at the turn of the 20th century. China's modernization agenda was significantly advanced by the resulting broader exposure to Western ideas, even though the direct role played by the Arsenal remained rather limited.

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RÉSUMÉ

L'Arsenal Jiangnan (1865-1912), financé par les fonds publics et spécialisé dans la production d'équipements militaires à la fin de la dynastie des Qing (1664-1911), a été créé en réponse à la douloureuse défaite de la Chine dans les deux guerres de l'opium (1839-1842 et 1856-1860). Le service de traduction de l'Arsenal, fondé en 1868 et doté à certains moments de cinquante intellectuels chinois et de neuf occidentaux, avait pour mission de traduire en chinois des livres occidentaux et des traités de science et de technologie. Il s'agissait de la première entité officielle chargée de remplir cette tâche. En principe, la fonction des ouvrages traduits était d'aider les techniciens de l'arsenal dans leur production d'armes. Cependant, ces ouvrages ont également été commercialisés auprès du public. Le service de traduction de l'Arsenal était à bien des égards le reflet des transformations idéologiques et sociales vécues par la Chine, les scribes chinois et les traducteurs oraux occidentaux à la fin du 19^e siècle. L'étude de cette institution vouée à la traduction est donc pertinente en traductologie, et ce, à trois égards. Premièrement, les quatre décennies d'existence de l'Arsenal et son accent sur sa fonction spécifique montrent l'importance de la traduction pour la Chine impériale dans sa poursuite de la modernisation. Deuxièmement, les nombreuses et volumineuses traductions publiées par l'Arsenal révèlent les efforts de collaboration, caractéristiques de la deuxième moitié du 19^e siècle, entre les missionnaires occidentaux et les lettrés chinois. Troisièmement, le rôle mixte de l'Arsenal, englobant à la fois traduction et publication, a favorisé l'émergence de revues publiant des articles traduits relatifs à la science, la technologie, les sciences sociales et la littérature de l'Ouest au tournant du 20^e siècle. Même si le rôle direct joué par l'Arsenal est resté plutôt limité, il n'en reste pas moins que le programme de modernisation de la Chine a bénéficié de façon considérable de la diffusion accrue des idées occidentales.

ABSTRACT

The Jiangnan Arsenal (1865-1912), a publicly-funded bureau dedicated to the production of military equipment in late Qing China (1664-1911), was established in response to China's painful defeat in the two Opium Wars (1839-1842 and 1856-1860). The Arsenal's translation department, staffed by a total of fifty Chinese scholars and nine Westerners at different times, was set up in 1868 to translate and publish translations of Western books and treatises on science and technology. It was the first official unit charged with this task. Its stated pragmatic function was to assist the arsenal technicians in their production of weapons, although the translations were also marketed to outsiders. Viewed organically, the Arsenal's translation department was in many ways a reflection of the ideological and social transformations experienced by China, the Chinese scribes, and the Western oral translators in the late 19th century. A study of this translation institution is therefore relevant to translation studies in three regards. First, the Arsenal's four decades of existence and its emphasis on the function of translation suggest the importance of translation to imperial China's pursuit of modernization. Second, the voluminous

translated texts published by the Arsenal reflect the collaborative efforts of Western missionaries and Chinese literati, typical in the second half of the 19th century. Third, the Arsenal's combined role, encompassing both translation and publication, inspired the emergence of journals that published translated articles on Western science, technology, social sciences, and literature at the turn of the 20th century. China's modernization agenda was significantly advanced by the resulting broader exposure to Western ideas, even though the direct role played by the Arsenal remained rather limited.

MOTS-CLÉS/KEYWORDS

science, histoire, co-traduction, Arsenal Jiangnan, tradition en Chine
 science, history, co-translation, Jiangnan Arsenal, China's tradition

1. Introduction

From the late 18th century onwards, Britain was most keen to forge further trading ties with Qing China (1664-1911), rather than being indefinitely confined to the port of Canton.¹ It targeted China as a potentially lucrative market to absorb massive quantities of its manufactured goods. However, China was complacent about its self-containment and seclusion, with little appetite for British products. It ignored Britain's successive diplomatic attempts for further commercial interactions in the Macartney mission (1792-1794) and the Amherst mission (1816-1817).² Yet, even without a mandate, British merchants' opium was smuggled, in huge quantities, into China all the same. Seeing the horrendous decades-long damage inflicted on its people and economy by this proliferating opium, China decided to burn the British opium warehouses in Canton. This triggered the First Opium War (1839-1842) with Britain,³ resulting in China's defeat. China's military weaknesses were further exposed in the Second Opium War (1856-1860), with the joint forces of Britain and France craving additional trading and territorial privileges in China, and the Taiping Rebellion (1850-1864),⁴ a massive internal riot that nearly brought the empire to its demise.

These foreign and domestic threats on China highlighted the imminent need to reform and strengthen the nation. Deeply convinced that military superiority was the key to Western victories, China was eager to learn from Western science and technology in order to improve its defense. These political and ideological contexts thus set the stage for China's Self-Strengthening program (1861-1895).⁵ The creation of the Jiangnan Arsenal (江南機器製造總局, 1865-1912, hereafter, the Arsenal), with the ultimate goal of counteracting further western aggression, was one of the major measures in this reform program. An important element of the Arsenal was establishing a state-sponsored translation department in 1868. The mission of this department was to produce Chinese translations of western books dealing with the pure sciences and technology. Understandably, in the early stages of this institutional attempt to educate and inform the country about western learning, polyglots were rare in China. In view of this linguistic disadvantage, western missionaries in China with some knowledge of Chinese were crucial to kick-start the translation project. In practice, the translation of the scientific and technical contents into Chinese invariably posed a challenge for the three parties involved, namely, the government, Chinese associates or scribes, and foreign oral translators. Yet, all of these main players took on the challenge, and each of them underwent some kind of transformation in the Arsenal's translation project.

This article examines China's first systematic project of science translation. It discusses how the national agenda to undertake science translation placed the government, Chinese literati cum scribes, and foreign translators in new positions in the social milieu during China's most dramatic encounter with modernity. This article will also attempt to analyze how each group, as a social actor, perceived its roles and evaluated its experiences in the pursuit of translation. It must be stressed that, here, translation is more than the simple linguistic transfer of western languages into Chinese on subjects relating to science. For the purpose of this article, translation also refers to the translation or transplantation of Western scientific culture into Chinese civilization, an altogether different level of meaning. It is the result of these two levels of translation, in terms of language and culture, which finally facilitated the ideological transformation of China at the time.

This article contains four sections. The first presents the background of the creation of the translation department in the Arsenal. The three sections that follow focus on a discussion of the ideological transformation of Qing China and its amateurish translating agents, namely the Chinese scribes and the foreign oral translators, in the translation project.

2. Background of the Arsenal and Its Translation Department

The institution that brought about the scientific transformation of 19th-century China was the Arsenal and its translation department. It was the icon of China's first active and systematic attempt to learn from the scientific and technological advancements of the West.⁶ In short, the aims of the Arsenal were: to strengthen China, to hire western technicians to assist in the building of shipyards, arsenals, and machines for the production of weapons, to master the skills of Western military production, and, eventually (and rather naively), to surpass the West.

It should be noted, however, that before the creation of the Arsenal's translation department, around 1850, there were already some private (mostly Protestant) efforts to translate astronomy and mathematics publications into Chinese, namely those of the Inkstone Press of the London Missionary Society, which financed the collaboration between missionaries and esteemed scholars specialized in these fields. For instance, with the help of Wang Tao (王韜, 1823-1897), a translator and journalist working at Inkstone Press as a Chinese scribe, Li Shanlan (李善蘭, 1810-1882), collaborated with Alexander Wylie (1815-1887), Joseph Edkins (1823-1905), and Alexander Williamson (1829-1890) for the Chinese rendition of some prominent science texts, namely John Lindley's *Elements of Botany* (1849) and Augustus de Morgan's *Elements of Algebra* (1835). The pioneering Chinese associates in the Arsenal's translation department, such as Xu Shou (徐壽, 1818-1884) and Hua Hengfang (華蘅芳, 1833-1902), were keen readers of the Chinese translations of Western science publications produced by the Inkstone Press. They were also inspired by this collaboration format, which was adopted throughout the Arsenal's translation department.

After the Arsenal's formation, Xu Shou and Hua Hengfang recommended to Zeng Guofan (曾國藩, 1811-1872), a more liberal scholar-general, the establishment of a translation department in the Arsenal. It was not a smooth process, because Zeng was more concerned with the urgent production of Western artillery. He was not

instantly convinced of the practical value of translation at the time. It took almost two years before this groundbreaking proposal was accepted and enacted. These Chinese literati had a vision: “not only to instruct themselves, but to diffuse the knowledge they had acquired with so much pain, among their fellow countrymen” (Fryer 1880: 72). Zeng discusses the need for a translation unit within the Arsenal in his 1868 essay:

Now translation is the foundation of modern manufacture. Mathematics is used by foreigners as the mother of manufacturing science. Its wonder is explained by words and drawings. Being handicapped by the difficulty of language, although we know how to manufacture things, we are unable to understand the principles of manufacturing [...]. When the translation bureau is set up, capable and intelligent students will be selected to be trained as translators [...]. (Zeng, 1868, Bennett’s translation, 1967: 21)

In Zeng’s essay, the plan to train the next generation of translators, as a measure to widen the scope of Western learning, was also mapped out. This statement, coming from a prime official, was suggestive of how much stakes China put on translation as a primary mean to save the nation. Indeed, in the second half of the 19th century, translation was pivotal in the national agenda. It was revered as the root of the capacity to imitate the modern manufacturing of the West. With the translation of Western knowledge into Chinese, China was convinced that it would soon master the production of Western weapons. The mission of the Arsenal’s translation department was to translate Western books on science and engineering for the benefit of the Arsenal’s technical experts. As we shall see, the translation department, which took up only three percent of the Arsenal’s annual spending (Tsien 1954), in fact made a far greater impact than its artillery production branch did in modernizing China.

The Arsenal was comprised of three units, apart from its artillery plant. Besides the translation department, there was a Western language school for training technical translators and interpreters, as well as a school for weapon production. Our focus will be on the translation department, since the other two units were under-enrolled and of limited impact. After all, the next generation of translators could not be quickly nurtured through the learning of Western languages. The few dozen bright students enrolled did not speak English and had little previous exposure to scientific subjects. The educational ideals of the Arsenal, though admirable, were not considered practical or sustainable. The translation department is relevant to translation studies because it represents a case in which a nation’s destiny was believed to be closely connected to translation. It was a time when translation was not considered a source of leisurely amusement, as with poems or songs. Translation was, at the time, taken as a serious pursuit in the hope of reversing the empire’s course of disintegration.

3. Ideological Transformation of Late Qing China

It is ironic that Qing China put so much faith in science translation in its hope to save the country from imperialistic aggression. In the Chinese tradition, much influenced by Confucian moral and literary values, artistic creation was highly treasured, while science was downplayed as a petty craft, and translation, as a minor art and “a contaminated stream” (黎 Li 2006; my translation). This intellectual bias against translation is reminiscent of the emphasis on creativity and originality typical of the modern concept of literature in the Romantic period. As Theo Hermans observes:

[a]n allegedly derivative form like translation was therefore disdained as second-hand and second-rate. What little attention had been paid to it had never risen above the level of judgmental criticism, which always found translations falling short of the ideal of exactly reproducing their originals in every nuance and detail, and thus constantly pushed translation back into its subordinate place. (Hermans 1999/2004: 31)

But as Benjamin Disraeli argues, “what Art was to the ancient world, Science is to the modern” (Disraeli 1844/1989: 13). China started to have a higher regard for science, especially after its military defeats in the Opium Wars. Of course, China could cling to its Sino-centric superiority rhetoric all it wanted, but being defeated in two consecutive wars simply pointed to its vulnerability in the face of Western military prowess. In the doldrums, China could only turn to Western learning through the translation of science and technical knowledge, before it had a chance to rebound and expel the foreigners or “barbarians.”⁷ Yet its mastery of Western science at the time could only be realized through translation, a craft previously frowned upon ideologically.

With this pragmatic goal in mind, time-honored principles and moral standards that hindered progress would have to be compromised with or rectified. China found itself in this dire yet opportune situation in the mid-19th century. The urge to master the production of Western artillery came as a stark contrast to Emperor Qianlong’s (r. 1736-1795) dismissal of the first British attempt in 1793 to forge trading relations through the Macartney mission. In his letter to King George III, the Emperor wrote, “there is nothing we lack [...]. We have never set much store on strange or ingenious objects, nor do we need any more of your country’s manufactures” (Teng and Fairbank 1979: 19). Obviously, Macartney failed to market anything of scientific importance in this embassy visit, although he meant to use science to impress China.

In fact, the imperial government had not the faintest idea about the military prowess and wealth of Britain then and was still very much fixated on the image of foreign countries as petty tributary states, hoping to be blessed by Chinese culture. Commercially, before 1842, China considered itself the world. Not being informed, or caring to be informed, of any modern worldview, the secluded empire thought the opening of the Canton port for international trade was nothing more than a mercy granted to Westerners, and it continued to view them with contempt. Blinded by its Sino-centric pride, the imperial government was unaware of changes in the global power balance. It was not until its defeat in the Opium Wars that China came to realize the disparities between its national strength and that of Western countries. Inequitable treaties with heavy indemnities were thus imposed on China, which could not go on hiding in its comfort zone, distancing and ignoring its counterparts. According to the terms of the Treaty of Tientsin, effective as of 1860, eleven more treaty ports in China were open to foreign trade, territories were ceded to Britain and France, foreign vessels were allowed to navigate in the Yangtze River, and missionaries were from then on free to preach all over China.

The humiliation inflicted on China by these treaty terms caused reform-minded intellectuals and officials to plan to revive the country. In practice, modern arsenals were built in different cities, and modern schools teaching foreign languages and Western subjects were established. While the Arsenal was meant to produce Westernized ammunition, its translation department served to promote science education and to nourish the next generation of scientists and translators. Translation

was considered a quick and pragmatic way to achieve an immediate immersion into Western learning. Yet, the imperial government had not anticipated the potential impact of the translated works which, once in print and widely circulated, could no longer be contained. The circulation of published translations of science and social science texts, decades later, also served to ideologically uproot the empire. Not having this foresight, though, the government was convinced of the benefits of Western learning for the empire, despite the shame of admitting its weakness in modern knowledge. In an article written in 1880, John Fryer (1839-1928), the Head of the Arsenal's translation department, said:

She is therefore willing to be taught even by the "Foreign barbarian" such useful things as she feels she is ignorant of. But she must do this of her own accord, and in her own way, or not at all. This willingness to be taught and to pay for being taught is one of the most hopeful features that has appeared in her intercourse with foreign countries and is deserving of the highest commendation. (cited in Bennett 1967: 27)

Fryer spelled out the exact mentality of late Qing China. Notwithstanding its institutional support for the learning of Western scientific knowledge, China was embracing this ideological transition with the much-reiterated notion of "Chinese Studies for the essence, Western Studies for [technological] applications" (Wright 2000: 22). This pragmatic formula stressed that Western learning was restricted only to practical matters, while Chinese studies still commanded a prime position in Chinese culture. This slogan certainly aided China's quest, with greater ease, for Western learning. From 1861 onwards, the pace of the reform movement accelerated, with the more progressive scholar-officials and intellectuals advocating a systematic translation of western publications on science and technology. Recognizing that, in the context of China, translation was really the foundation of manufacturing, an emphasis on translation was only logical.

Without translated texts of science and engineering, China could hardly equip itself with the means of artillery production, following the western models. In the history of China, this was the first and only time during which translation was given so much esteem and support, and so much hinged on an organized and institutionalized translation project. As Tsien Tsuen-hsuei puts it, "this new period was characterized by official sponsorship of translation and a general appreciation of the importance of western scientific knowledge" (Tsien 1954: 314). David Wright points out the simplicity of the government's mindset regarding the self-strengthening and translation agenda when he says, "it was hoped that these measures would counter the increasing threat of western aggression without allowing the Chinese populace to be infected by foreign ideas about politics or religion" (Wright 2000: 22). This explains the government's overwhelming preference for scientific and technical subjects in its translation plan. Yet, it was exactly this calculated selection, having left out social science knowledge about governance and politics, which was partly held responsible for the failure of the reform movement. The reform in artillery production alone simply could not empower China without thorough political reforms. Nevertheless, state patronage of the translation department over four decades or so had triggered a large-scale program of science translation.

The transformed mindset of the Chinese government can also be detected by analyzing the mentality of the two groups of translators working in the Arsenal, namely Chinese scribes and foreign translators. After all, these social groups were in

close connection with the aspirations of their patron, the government. Apart from monetary rewards, the prestige of working for the government was appealing to both the Chinese literati, who did not make it through the regular civil examination track, and the missionaries, who found the connection with ruling elites conducive to their ultimate pursuit of spreading the gospel. In the following sections, their social and ideological transformation will be discussed.

4. Social and Ideological Transformation of the Chinese Scribes

A translation partnership between traditional Chinese scholars and Western missionaries, to systematically translate Western scientific knowledge, was previously unthinkable. However, the mid-19th century was a time of change and transition in China, and the translation collaboration between these two social groups was exactly what China yearned for in its reform program. The team was certainly not perfect, but it managed to fulfill the goals of the translation department. Paul St-Pierre (1993) suggests that the function of translation is hardly neutral, since translation as a cultural practice is often shaped and conditioned by the contexts in which the rendition is produced. He observes that:

[...] translation as the regulated transformation of original texts [...] [underlines] the fact that an original text and its translation are dynamically connected to each other, precisely through the criteria governing their relations, rather than in a static, predetermined relation of equivalence. (St-Pierre 1993: 61)

Semantic equivalence, among other concerns, was certainly not fully achieved in China's first systematic translations of Western science and technology during the second half of the 19th century, because of the translators' limited linguistic and subject expertise. Given its historical bias against foreigners and alien cultures, China had not cultivated an educated and bilingual populace to act as translators in the mid-19th century. Fortunately, a small group of protestant missionaries who had mastered a reasonable degree of spoken and written Chinese could translate science texts orally, which would then be written into classical Chinese by their Chinese associates. This mode of cooperation between gentry-scholars and missionaries was not new in the Chinese translation tradition, given the limited personnel with bilingual subject proficiency before the 20th century. Similar styles of co-translation took place also in earlier centuries; for instance, in the sutra translation of the 2nd through the 6th centuries, and, much later, in the Chinese translation of books on astronomy and mathematics in the 16th and 17th centuries. In this partnership, the missionaries served as oral translators, explaining the original text in spoken Chinese, line by line, to their Chinese associates, who would then render the meaning into Chinese, which may or may not have been polished or verified subsequently. Fryer describes the procedure of this team translation model as follows:

The foreign translator, having first mastered his subject, sits down with the Chinese writer and dictates to him sentence by sentence, consulting with him whenever a difficulty arises as to the way the ideas ought to be expressed in Chinese, or explaining to him any point that happens to be beyond his comprehension. The manuscript is then revised by the Chinese writer, and any errors in style are corrected by him. In a few cases the translations have been carefully gone over again with the foreign translator, but in most instances such an amount of trouble has been avoided by the native writers,

who, as a rule, are able to detect errors of importance themselves, and who, it must be acknowledged, take great pains to make the style as clear and the information as accurate as possible. (Fryer 1880: 80)

It must be noted that although they had the same mission within the Arsenal, their agendas differed. For some Chinese scholars who had suffered due to the limited path to civil officialdom, working in the Arsenal in collaboration with Westerners turned out to be a new and much esteemed career opportunity. For this social group, the origin of Western science was in China;⁸ therefore, the pursuit of Western science was, so to speak, revisiting the Chinese scientific tradition. It is true that the pursuit of science was not respectable in the Confucian tradition, but the social and political climate of the second half of the 19th century gave it a new impulse. The Chinese scribes were therefore convinced that it was entirely legitimate to collaborate with foreigners for the lofty goal of strengthening China. As David Wright explains,

[t]raditional Chinese science did not suddenly die; nor did modern Western science suddenly arise in China to take its place. The process was, rather, a gradual transformation. As the missionary textbook-translators were beginning the new phase of post-Jesuit transmission, they were in contact with Chinese scholars still working within the traditional paradigms on problems which had long been of interest to natural philosophers in China. As the Chinese scientists came to read of the new ideas from the West, they often discovered within them concepts strikingly reminiscent of the native tradition. The introduction of Western science in mid-nineteenth-century China thus often appeared to them as a stimulus to and development of the native Chinese tradition rather as the importing of totally new ideas. (Wright 2000: 24)

The enthusiasm of these Chinese scholars was vividly captured in Fryer's account of his experience in the translation department. He observes that the gentry-scholars were rather motivated by their curiosity about the new knowledge pertaining to nature.

It was in this busy little city [Wuxi, Jiangsu, Shanghai] that a little *coterie* of intelligent scholars was formed, all deploring the hollow and unsatisfying nature of the ordinary routine of Chinese studies. They determined to push their investigations in a more useful and promising field by endeavoring to become acquainted with the great laws of nature, and to gather as much information as they possibly could respecting the various branches of science and art. Without organizing themselves into a Society these aspirants for intellectual light used to have occasional meetings of an informal kind for mutual improvement, each person explaining any new facts or ideas he had acquired... Frequent papers were written and circulated from one to another, while queries were continually started by individuals asking for more information on difficult subjects. A pile of such manuscripts accumulated in the house of Mr. Hsu [Xu Shou], who with his son [Xu Jianyin (徐建寅, 1845-1901)] formed a sort of center for this little oasis in the midst of a vast desert of ignorance. (Fryer 1880: 77)

It seems that, apart from working as team translators in the Arsenal, the Chinese associates would also hold informal home meetings to discuss scientific matters of interest, in a bid to benefit from the exchanges. The scientific knowledge of these Chinese scribes was not at all superficial, as evidenced in a letter Xu Shou wrote to Hua Hengfang:

I suspect there is an error in [my understanding of] the nature of mercury in the thermometer, because the experiments have not gone well. Today I have carried out

experiments based upon the method we discussed previously, and I find that its nature is [such that] it is able to expand and contract. It was an easy matter to establish [its behavior] [whether by] using fire to bake it, [or] using my breath to warm it [...]. Regarding the nature of the expansion and contraction of mercury, have we not looked at each other and laughed at the way in which, in the past, because we did not understand it, we used *li* 理 [principles] and *qi* 氣 [matter-energy] to discuss this matter, seeking profundity through suchlike superficialities! (Wright's translation 2000: 41)

The joy and satisfaction arising from the study of the physical state of mercury with like-minded friends speaks to these trailblazing experts' level of immersion within Western science. The story of these Chinese assistants is solid proof of their transformation by Western learning, which was neither relevant to the civil examination content nor an esteemed discipline in traditional Chinese scholarship. Clearly, they were keen students of science; it was not all about money or vanity. Table 1 lists the more prominent and prolific Chinese associates in the collaboration team. Throughout the history of the Arsenal, there were close to fifty Chinese associates.

TABLE 1

Major Chinese associates in the Jiangnan Arsenal (adapted from 王 Wang 2000: 35)

Name of Chinese Associates	Period of Service	Published Translations
Xu Shou 徐壽	1868-1884	25
Hua Hengfang 華蘅芳	1868-1874	11
Xu Jianyin 徐建寅	1868-1875	12
Li Fengbao 李鳳苞	1869-1872	11
Zhao Yuanyi 趙元益	1869-1890; 1894-1902	20
Zheng Changyan 鄭昌棧	1877(?) - 1902	18

It is doubtful, though, whether their hard work and scientific expertise were adequately appreciated. The conversion from colloquial Chinese into fine classical Chinese certainly put their linguistic skills and their understanding of science to the test. Yet these Chinese associates did not always earn the professional respect they deserved for this tough job. Fryer, for example, had a tendency to blame his Chinese colleagues for the limitations of the translations. He says: "The responsibility for whatever undue haste or carelessness may characterize my work rests rather on my Chinese colleagues than myself" (Fryer 1890: 536). Besides, the foreigners' colloquial Chinese was sometimes of questionable quality. Hua Hengfang mentioned, in his Preface to the Chinese translation of Charles Lyell's *Elements of Geology* (1838), which he co-translated with Daniel MacGowan, the tormenting hours spent trying to understand MacGowan's speech. At times, "Hua had to rely on his facial expressions and gestures in order to make sense of his explanations" (王 Wang 2000: 38; my translation).

An account of the ideological and social transformation of the Chinese associates would be incomplete without mentioning Xu Shou's son, Xu Jianyin. Xu Jianyin was a successful candidate in the civil examination, having been awarded the rank of district magistrate. Fryer was close to him and had a high regard for young Xu's talent. In a letter to his cousin, Fryer wrote:

[Xu Jianyin] is younger than the rest and has made quite a strong friendship with me and tells me all his affairs as though I were his brother. He is the cleverest Chinaman I ever met and I am but a child compared to him in many respects. We sometimes argue different points of view up till midnight. (cited in Wright 2000: 55)

Xu Jianyin was appointed as the Second Counselor to the Chinese legation in Berlin in 1879. With his co-translating experience in the Arsenal and his subsequent diplomatic position in Germany, Xu came to realize that China lagged far behind the Western countries in technology. He became rather pessimistic about China's strength in the arms race. Upon his return to China in 1881, Xu made recommendations to the government about the direct purchase of Western weapons, rather than manufacturing them domestically. Xu's case also gives us a more all-round image of the Chinese associates working closely with Westerners in the Arsenal. His talent and vision about the future of China, which were related to his scribing experience in the Arsenal, were unique at the time.

5. Social and Ideological Transformation of the Missionaries

Qing China's 1720 edict had criminalized the preaching of Western religions in China. Therefore, no missionaries were allowed to stay in China, and any secret dissemination of religious materials to indoctrinate the Chinese was strictly forbidden. Westerners not affiliated with trading companies – missionaries, for instance – were not allowed to stay in Canton or any other part of China. Besides, Westerners were restrained from learning Chinese or purchasing Chinese books, and the teaching of Chinese to foreigners was a crime.⁹

Yet, after 1860, Westerners with knowledge of Chinese were suddenly in demand because of the institutional support for science translation. Most Westerners with a certain level of proficiency in spoken or written Chinese in those days happened to be connected to Protestant Christianity. Missionaries were thus no longer stigmatized, and all the laws and rules against interaction with them became obsolete. In any case, the terms of the Tientsin Treaty giving missionaries access to all of China, segregation laws served no purpose and made little sense. Most importantly, these missionaries found themselves elevated to a new role or career path in the provision of language and translation services to the government. They were entrusted not only to work as oral translators in the Arsenal, but also to select and purchase the scientific and technical texts to be translated.

For the missionaries, the appeal of publishing translations of Western science and technical books, with government support and mandate, was that the gospel could travel wider and farther. It was the belief of the missionaries that Western science was blended with God's voice,¹⁰ and the 'scientific package' was perceived to be able to enhance their status and image. The preface to the Chinese translation of John Lindley's *Botany* (1849), rendered by Li Shanlan together with Alexander Williamson and Joseph Edkins, is laden with overt reference to the power of the Christian god:

Williamson and Edkins are both Christian missionaries, serving God diligently, and in their spare time they have translated this book. Plants and animals are all made by God. [Just as] by examining the skill used in making a machine [you] can know the skill of the artisan, or by seeing the manner in which the fields are cultivated [you] can know the hard work of the farmer, so by seeing the intricate beauty and subtle wonders

of plants you can see the intelligence and wisdom of God. These two men have therefore assiduously translated this book, so that it is certain that scholars reading [it], if they have doubts, [will become] aware of the necessity of the existence of God, and because of this [they will] fear [Him], inwardly cultivating the control of their body and mind, and outwardly cultivating [their] filial piety, brotherliness, sincerity and loyalty, fearing to transgress God's will: [this being so], how can their translation of this book fail to be of great benefit to others? (Wright's translation 2000: 24)

The Christian message was probably prominent because this translation was published by the Inkstone Press, which was sponsored by the Church of England. For the missionaries working in the Arsenal however, similar messages would be found more often in their personal writings or letters, not in the prefaces to their translations.

Foreign translators played an essential role in the translation department. Table 2 lists the more important oral translators, often related to the Church, in the Arsenal.

TABLE 2

Major oral translators in the Jiangnan Arsenal (adapted from 王 Wang 2000: 35)

Name of Oral Translators	Period of Service	Published Translation
J. Fryer (British)	1868-1896 (in China); 1897-1903 (in America)	93
D. MacGowan (American)	1868	2
A. Wylie (British)	1868	2
C. Kreyer (American)	1868-1878	19 (navigation; military tools)
Y. Allen (American)	1871-1881	10 (history and geography)
Shu Gaodi 舒高第 (Chinese) ¹¹	1878-1912	17
H. Loch (British)	unknown	3
F. James	1897-1898	5
E. Williams	1898-1901	7

Among the foreign translators, John Fryer, Carl Kreyer, and Young John Allen were the longest serving translators in the Arsenal, yet Fryer was inarguably the most prolific of all. He was one of the major oral translators involved in the translation of scientific and engineering works in the Arsenal and the director of its translation department from 1868 to 1912. Fryer was recruited, with an annual salary of eight hundred pounds, to head the Arsenal's translation department. Westerners were no longer marginalized, but, especially for those with some Chinese knowledge, very much embraced as an asset to China's early modernization program. The fact that China's imperial court had bestowed the third official rank to Fryer, the fourth to Allen, and the fifth to Kreyer, for their oral translation contributions to the Arsenal, was a testimony of its transformed attitude towards translators and missionaries. Considering that, in the imperial tradition, translation officials were usually confined to the seventh through the ninth ranks, the government did indeed favor these foreign translators.

Fryer was well aware that he was a treasured asset in the government. His confidence was reflected in a letter to his brother stating that, "as I am the first on the list there is the possibility of my eventually obtaining a tolerably high position in China" (Fryer [1869], cited in Bennett 1967: 25). But, was this grand favor justified?

In terms of subject expertise, even Fryer, with only a teaching certificate, had to study, as an amateur, books of different science sub-disciplines,¹² in preparation for his oral translation duties. Given the foreign translators' various limitations, it is possible that China might have overrated these missionaries or Westerners regarding their linguistic and subject knowledge. Considering China's anti-foreign sentiments before the first half of the 19th century, the court's move to enlist them as high ranking officials for their translation services was implausible.

Before taking up the headship of this department, Fryer had sour relations with the Church in England, which had for years refused to confer him the status of priest, despite his decade-long education services in Hong Kong and Beijing.¹³ His initial agenda in the Arsenal was more in advancing his career and grooming his reputation as a Chinese expert. To him, the headship was certainly a decent source of income and associated prestige. Although he found translation to be a dull and thankless task, Fryer later on developed a sense of mission to help modernize China. But again, he was realistic about how much the department could possibly achieve. In an article published in 1880, Fryer recalled:

Nothing but a strong sense of duty, and a firm belief that this kind of labor is one of the most effective means under Divine guidance for bringing about the intellectual and moral regeneration of this great country has suffered to render endurable to the translator the long and weary years of close and continuous application which it has involved. (Fryer [1880], cited in Bennett 1967: 26)

It was not until a few years later that he came to realize the impact of his translation on the wider scope of awakening China. He said:

Looking at it [the Translation Department] in a philanthropic point of view it seems to me to be second to none of the various means that are now employed by Missionary societies—especially as it gives [access to Western ideas] to the class of Chinese who form the most important part of the nation and who can be reached in no other way. (Fryer [1869], cited in Bennett 1967: 24)

In fact, the Arsenal's translations did bear fruit, since they enhanced intellectuals' interest in and knowledge of Western scientific development. Many of its translations were sold out quickly, and pirated copies were found in the capital. The generation of readers groomed by translated publications was inspired.¹⁴ A conscientious reader at the time wrote in frustration to a science magazine column of "Readers' Inquiries":

I love science, and have bought several science books and many types of apparatus. I have tried out all the techniques contained therein, but they have not worked. I do not know whether there are mistakes in the books, the equipment is faulty, or whether I am not following the instructions properly during my experimentation. (*Gezhi huibian* [Chinese Scientific and Industrial Magazine] June 1877, cited in Wright 1998: 672; Wright's translation)

The editor who received this reader's note was Fryer. Given the applied nature of the subject matter, the fact that this earnest reader could not carry out the experiment successfully as predicted is suggestive of the questionable quality of the translation. In 1880, Fryer observed that

it is [. . .] to the future that we must look for the chief part of the practical utility of all this translation work. Such a vast nation as the Chinese is not to be started into motion,

and made to follow in the wake of Western civilization all at once. Generation after generation will have to come and go before the complete transformation will be effected, and the intellectual as well as the physical resources of the country will be turned to the best account [. . .] the system of ignoring everything but the Four books and the Five classics at the government examinations, which are the passports to the highest offices in the state, is not destined to last forever. By patiently working on, even the present generation of foreigners engaged in this laborious task of spreading intellectual light may hope to see much good resulting from their efforts. (Fryer 1880: 78; 傅 Fu 1880 (Fryer's writing published in Chinese under his Chinese surname, Fu), cited in 黎 Li 1996: 423)

Fryer was enthusiastic about the cultural impact of science education and of publications initiated by the Arsenal's translation work. In 1884, he established the successful Chinese Scientific Book Depot, of which he was proprietor until 1911, to market science publications in the form of articles, magazines, and books to major cities in China. A work on Krupp's guns translated by Kreyer in 1872 sold 904 copies in eight years. In nine years, a work on coastal defense, first published in 1871, sold 1114 copies. Given the limitations of communication and of the postal service at the time, these figures were indeed encouraging. From then on, Fryer realized that the most effective means of promoting and spreading Western scientific knowledge was through the printed media, not institutional frameworks. Fryer's reflections, coming from someone with twenty-eight years of service in the Arsenal's translation project, must have carried some weight.

6. Conclusions and Implications

Nineteenth-century China was a peculiar time and place, where learned scholars did not speak English, while people who spoke some broken English were often uneducated (in the Chinese tradition), and with questionable integrity.¹⁵ This intellectual lacuna and social vacuum created grand opportunities for Chinese scholars and missionaries with an interest in Western science. Their co-translation of a large number of science and technical texts, with state support, turned out to be a landmark in China's history of translation.

The Arsenal's translation department, in its four decades of existence, witnessed how translation as a social activity transformed the social dynamics of China. Translation, a craft traditionally frowned upon as an unimportant and despicable trade, was, ironically, the tool to facilitate China's understanding of Western ideas and know-how. This is the first time we saw such a large-scale state patronage of translation in the history of China. Unlike the previous translation craze of sutra translation or Jesuit translation, the Arsenal's translation agenda was neither purely religious nor purely intellectual in its essence. The systematic translation of Western science was essentially a call to revive the past glory of the empire. However, with regard to one of the Arsenal's goals, to strengthen China, the immediate impact was not encouraging. China's defeat in the Sino-Japanese War in 1895 is hard evidence of its inferior military strength.¹⁶ Despite decades of institutional effort to translate science and technology, China was further humiliated in the Scramble for Concessions around 1895-1900.

China's ideological transformation, as far as translation studies is concerned, was reflected in three features of the Arsenal. These include the institutional support

for a translation department to produce Chinese translations of Western publications, the hiring of Westerners as oral translators, and the government's recognition that translation was a tool to be used to save the nation. In this article, I argue that the Arsenal's translation department was in many ways a reflection of late 19th-century China's transformed mindset towards Western learning, missionaries, and their interactions with the Chinese. China's ideological transformation can also be traced in the mentality of the Chinese associates and Westerners working in the translation department. These two groups found new social roles and visions in this novel political climate, which accentuated the pragmatic value of Western knowledge. This path of transformation, however, was not entirely self-initiated, but very much driven by the course of events at the time. The government's project of scientific translation was visionary. What came with this vision was China's willingness to break from traditional beliefs and practices. But the active reliance on Westerners for the transmission of Western learning was not imposed on China. It is late-Qing China's change of mindset that mobilized this human resource in order to carry out its translation agenda.

NOTES

1. Before the First Opium War (1839-1842), Qing China's trade with other countries was regulated only through Canton, present-day Guangzhou, the limited scope and corrupted management of which were constant sources of frustration for Western traders. Not enthusiastic about developing commerce with the West, the Chinese government delegated only thirteen merchants (or trading companies) to set rules and conditions to trade with the foreign merchants there. Western merchants became increasingly furious over these franchised traders' exploitations and bullying. They therefore lobbied for trading rights in other Chinese ports as well. Britain was the first to attempt to make changes for its business interests there.
2. The British merchants' grievances over the malpractice of the thirteen-merchant system in Canton were the principal context leading to the Macartney mission. Led by Lord George Macartney (1737-1806), this first British legation was sent to Qing China with the intent to petition for more Chinese ports to be opened for Western traders and for a reduction of trade tariff in Canton. The next British mission, which had similar goals, was led by Lord William Amherst (1773-1857) in 1816, but to no avail. He was not even invited to meet the emperor to initiate any possible lobbying for the British cause.
3. The First Opium War was declared in 1839, after Qing China confiscated and burned warehoused opium owned by British merchants in Canton. It ended in 1842, with China being defeated and forced to sign the Treaty of Nanking. Because of this treaty, Hong Kong was ceded, a large indemnity was paid to Britain, and five ports were opened to major Western powers. In 1856, Britain, allied with France, provoked China again, hoping to seek greater commercial rights there. The British-French military campaign against China, which included burning palaces, ended with the signature of the Treaty of Tientsin in 1858, the terms of which were finally ratified in the Convention of Peking in 1860. This treaty yielded further trading benefits and residence rights to foreigners from Western powers. It also permitted foreigners' travel to, and the movement of missionaries in, the interior of China, together with the legalization of opium trade in China.
4. The Taiping Rebellion was a radical political and religious upheaval, which ravaged seventeen provinces and cost twenty million lives in China. It was organized by Hong Xiuquan (洪秀全, 1814-1864), who claimed to be Jesus' younger brother and to have been bestowed the duty of transforming China through a vision. He failed four times in his civil examination, but during his visit to Guangzhou to take the examination, he picked up some Christian leaflets distributed by the first generation of protestant missionaries in China. Although the Rebellion was Christian in form, its substance was social and political by nature. Many of its advocated ideals were similar to those of the 20th-century communists in China, such as property sharing and equality for women. Most notably, it called for the replacement of Confucianism, Buddhism, and folk religions by Hong's form of Christianity. At the height of his influence, Hong commanded thirty million people to

- strike and confront the Qing armies, in the form of civil warfare, in different provinces. It was not until military assistance was given by France and Britain that the imperial government managed to crush the widespread riots and violence.
5. New schools, modeled after Western models of education, were promoted in the second half of the 19th century in major cities. Bright young students aged ten to sixteen were sent to study in America on public funding. This scheme lasted for ten years (1872-1881), but was terminated because of strong opposition from conservatives in the government.
 6. China's first encounter with scientific innovation from the West took place around the late 16th century, when European Jesuit missionaries, such as Matteo Ricci (1552-1610), used their scientific knowledge to impress the gentry-scholars in the late Ming and early Qing imperial courts. During this time, important works on astronomy and mathematics were co-translated with the collaboration of the Jesuit priests and some enthusiastic Chinese officials. The Qing emperors were keenly aware of the ultimate agenda of the missionaries; showcasing scientific knowledge was nothing but a means to their religious end. This agenda was alarming to the Qing rulers, who were displeased with the foreigners' plan to undermine the empire and its stability. From 1724 onwards, when Catholicism was banned in China, only a handful of Catholic priests were allowed to reside in Beijing and Canton, primarily because their specialized talents were deemed to be beneficial to the emperor.
 7. Although the Treaty of Tientsin in 1858 banned China from using derogatory terms such as 夷 (yí), meaning *barbarian*, to refer to British officials and subjects of the Crown in official documents, this term was widely used in Qing China all the same.
 8. Wright (1998: 657) says that: "the Chinese tradition of natural science has an antiquity, scope, and depth that have become evident only in recent decades, through the work of East Asian historians of science and, in the West, the pioneering researches of Joseph Needham and Nathan Sivin." The irony, however, is that when the Jesuit missions went to China in the 16th century, some Chinese scholars denounced their Western scientific knowledge as "alien and uncouth."
 9. Robert Morrison (1782-1834), being proficient in Chinese and familiar with Chinese customs, was known to have translated for the British authorities all the correspondence addressed to the Chinese government in the early 19th century. This alarmed the Chinese court, which then issued a legal note to condemn, in the most severe terms, people who had lent linguistic assistance to Morrison, and threatened that these scribes would be arrested.
 10. *The Origin of Species*, published in 1859, was consciously not selected by the missionaries of the Arsenal to be translated or circulated in China.
 11. Shu Gaodi's family background is neither clear nor well documented. Feng Zhijie (2011: 214) mentions that: "Shu (?1857-1920), originally from Zhejiang, China, was educated in the United States when he was young and studied medicine there later on" ("舒高第浙江人，自幼在美國留學，學習醫學。"; my translation). Upon his return to China in 1877, he was hired to teach English in Shanghai's foreign language school, which became part of the Arsenal in 1870. From 1878 onwards, he also served as an oral translator for the Arsenal's translation unit. Well-versed in English, he was the only oral translator in the Arsenal from 1901 to 1913.
 12. Tsien Tsuen-hsuei gives a critical assessment of the translation of science into Chinese completed by the Protestant missionaries in the first half of the 19th century: "Protestant translations were mostly tracts of an elementary nature [...], though more numerous, their quality in general is not comparable with that of Jesuit translations. Perhaps this is because the Protestant missionaries, except for medical missionaries, were not trained in special fields of science as were the Jesuits." (Tsien 1954: 310)
 13. From 1861 to 1863, Fryer served as a tutor at St. Paul's College in Hong Kong. From 1863 to 1865, he was professor of English language and literature at Tongwen College in Beijing, a government college established for the purpose of giving special advantages to the young men who were to represent China in other countries and to serve as interpreters. He left China in 1896 for a professorship in oriental studies at the University of California, after serving the Arsenal for 28 years. He continued his translation work for the Arsenal in America until 1903.
 14. Running the science magazine and the Shanghai Polytechnic were Fryer's most important private initiatives to promote science education among the Chinese populace. Fryer responded, in his capacity as the magazine editor, to many readers' enquiries in the letters-to-the-editor column. The large number of reader enquiries and the variety of the reader comments were taken as evidence in support of the claim that science education was indeed widely received via translated publications.

15. In a proposal made by Feng Guifen (1809-1874), an eminent scholar, in 1863, in support of the creation of a Tongwen College in Shanghai, he described interpreters working to mediate between the Chinese and Westerners as “lowly civilians with despicable background and dishonest character” (Feng 1863/1996: 399-401; my translation). To Feng, civilian interpreters were unfaithful and unreliable because they only cared about money. This derogatory image of interpreters was typical in late 19th century China.
16. Benjamin Elman (2005) was positive about the translation effort of the Jiangnan Arsenal. He suggests that the late Qing reform was as successful in introducing Western science and technology to China as similar efforts made by Japan. China’s defeat in the Sino-Japanese War (1894-1895) was not a result of its reform failure, but a matter of dysfunctional military organization.

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