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*The historical development of the concept of technology
in Japan*

Abstract: This paper draws upon the historical development of the concept of technology in Japan, dividing it into three periods: the period until the 18th century, wherein Chinese classics constituted the dominant influence; the 19th century, when concepts were reformed through translations of European languages; and the 20th century, when philosophers conducted theoretical debates, including the “Technology Controversy”. Japan has imported concepts related to technology from both China and the West, experiencing a mixture of the words, *gi* 技, *gei* 芸, *gijutsu* 技術, *geijutsu* 芸術, art, technique, technology, and so forth. The development of philosophical analysis had to wait until the development of actual technologies and sciences in Japan itself. From the onset of the 20th century onward, philosophical debate became active among intellectuals such as Aikawa Haruki 相川春喜, who defined technology as a complex of material means of social labor, and Taketani Mitsuo 武谷三男, who stated that “technology is a conscious application of objective laws in human practice” and criticized Aikawa’s definition.

Introduction

The purpose of this essay is to outline a brief history of the development of Japanese concepts corresponding to “technology”.

In contemporary Japan, the word “technology” is conventionally translated as *gijutsu* 技術, *kagaku gjutsu* 科学技術, or *tekunoroji* テクノロジー. For example, the word “philosophy of technology” is *gijutsu tetsugaku* 技術哲学 (*tetsugaku* is “philosophy” in Japanese). *Kagaku gjutsu* is a term that indicates both science (*kagaku* 科学) and technology (*gijutsu* 技術). Nevertheless, the word *gijutsu* is also used as a translation of other words, “technique” or “art”, and does not correspond with just one word. For example, a commonly used Japanese dictionary, *Kōjien* 広辞苑, defines *gijutsu* as follows: “1. [origin: *Records of the Grand Historian, Biographies of Usurers*] skill of doing something adroitly. Art. 2. (*technique*) technique to modify or process natural things by applying science for usage in human life”¹.

1 *Kōjien* 広辞苑, 6th edition, Iwanami Shoten, Tokyo 2008, digital version.

In Japan, there were no notable thoughts on technology for an extended period. In this regard, the country was within the Chinese cultural tradition. In the encounter with the West, people employed some words, including *gijutsu* 技術, from Chinese classics for translating Western ideas, but making such translations was not straight forward nor simple. Around the time of WWII, several philosophers proposed various ideas concerning technology. Some were involved in a dispute labeled the “Technology Controversy” (*gijutsuron ronsō* 技術論論争), related to whether we should consider technology as a system of means of labor or a system that ensures a conscious application of objective laws in human practices.

This paper draws upon the historical development of the concept of technology in Japan, dividing it into three periods: the period until the 18th century, wherein Chinese classics constituted the dominant influence; the 19th century, when concepts were reformed through translations of European languages; and the 20th century, when philosophers conducted theoretical debates, including the “Technology Controversy”.

1. Concepts of technology operating in Japan until the 18th century

Saigusa Hiroto² 三枝博音 (1892–1963), a pioneer in the field of the history of technology in Japan, noted the following: “Japan was late in developing concepts and thoughts of technology”³. Chinese classics regarding technology were read in Japan, but there were no remarkable thoughts or theories born in Japan. Saigusa explained the lack of theories by stating that the development of actual tools or machines in the society is necessary for the development of theories of technology, but “in Japan, people rather underestimated mechanical technology and had a tendency of ingenuity and secrecy of process independent from means (like an attitude ‘Kobo does not choose a brush for writing [*kobo fude wo erabazu* 弘法筆を選ばず, A poor workman blames his tools]’”. Saigusa also lamented that “unfortunately, Japan had no development in science to underline ‘quality’ or ‘certainty’ of technology, therefore, no sophisticated theory of technology as was observed in the West was born, such as those cautioning not to confuse technology with science”⁴.

Given this, what kind of thoughts is to be found in Chinese classics? Firstly, the word *gijutsu* 技術 is said to originate in a sentence of “Biographies of Usurers” (*Huozhi liezhuan* 貨殖列伝) in *Records of the Grand Historian* (*Shiji* 史記, around BC 91): “The reason why people who make a living by their techniques (*jishu* 技

2 In this paper, the family name comes first and the given name comes next for Japanese persons, following the conventional Japanese manner.

3 Saigusa Hiroto, “Theory of Technology (*Gijutsu ron* 技術論)”, in *Compete Works of Saigusa Hiroto* (*Saigusa Hiroto Zenshu* 三枝博人全集), vol. 8, Chūōkōron-sha, Tokyo 1972, p. 480.

4 Ivi, p. 481.

術) – such as medical artisans or others who struggle and work hard – is to receive a huge reward”⁵.

Following this text, “Records on the Examination of Craftsmanship (*Kao gong ji* 考工記)” of *Rites of Zhou* (*Zhouli* 周礼, around BC 30) is considered as *the* text which clearly indicates thoughts concerning technology in the East⁶. “*Tian* 天 (Heaven) has time, *Di* 地 (Earth) has *Qi* 氣 (energy), material has beauty, and a worker (*gōng* 工) has art (*qiǎo* 巧). Combining these four produces goodness”. This means that human art or technique performs its best when merged together with nature.

Such thought was inherited until *The Exploitation of the Works of Nature* (*Tian-gong Kaiwu* 天工開物, 1637), an encyclopedia of technology in China. This book had the idea that human arts are completed in conjunction with nature. It was read by intellectuals in Japan, such as Kaibara Ekiken 貝原益軒 (1630–1714) and Hiraga Gen'nai 平賀源内 (1728–1780). Japanese editions were even published in 1771 and 1830⁷.

Volume 15 of the Japanese first encyclopedia *Illustrated Sino-Japanese Encyclopedia* (和漢三才図会, 1713–) written by Terajima Ryōan 寺島良安 (1654–?) is *gigei* 技芸, *geiki* 芸器. It says “*gi* 技 [technique] is *gei* 芸 [art]. It is *takumi* 巧 [skillfulness]. *Geinō* 芸能. Generally, a skilled one is called a *nō* 能” and “*gijutsu* 技術 starts with Xuan Yuan 軒轅. Rites, music, archery, charioteering, calligraphy, mathematics are called *riku gei* 六芸 [the six arts]”⁸. “The Six arts” are those required for a man to master in order to become an intellectual in Chinese traditional culture. As Iida Ken'ichi 飯田健一 (1926–1997) pointed out, the word *gei* 芸 (originally written as 藝) had a similar meaning to *artes liberales*⁹. As we will see in the next section, this word was used frequently in the translation of the Western idea of technology at the outset.

2. Concepts of technology in 19th century Japan

In the 19th century, Western knowledge was introduced and actively translated in Japan. Iida showed that, during this period, both *geijutsu* 芸術 and *gijutsu* were used to refer to technology¹⁰. Today, the word *geijutsu* in Japan generally means

5 Morohashi Tetsuji, *Comprehensive Chinese–Japanese Dictionary* (*Dai kan wa jiten* 大漢和辞典), Taishukan shoten, Tokyo 1955–1960, vol. 5 “gijutsu 技術”; Noguchi Sadao trans. *Collection of Chinese classical literature* (*Chūgoku koten bungaku taikai* 中国古典文学大系) 12, Heibonsha, Tokyo 1971, p. 341.

6 Iida Ken'ichi, *Technology* (*Gijutsu* 技術), Sanseido, Tokyo 1995, p. 64. This essay owes a lot to Iida's work.

7 Ivi, p. 65.

8 Terajima Ryōan, *Illustrated Sino-Japanese Encyclopedia* (*Wakan sansai zue* 和漢三才図), translated and annotated by Shimada Isao, Takeshima Atsuo, and Higuchi Motomi, *The Eastern Library* (*Tōyō bunko* 東洋文庫), vol. 458, Heibonsha, Tokyo 1985–1991, p. 5. Xuan Yuan is the name of the Yellow Emperor, one of legendary Chinese sovereigns.

9 Ivi, pp. 67–68.

10 Ivi, p. 70ff.

“arts”, or rather “fine arts”, but during the Meiji era, *geijutsu* also incorporated science and technology. This reflects the complexity of the word “arts”, which means not only *fine arts* but also skill or technique.

For example, in the “Legend” (1825) of *Overall View of the Atmosphere* (*Kikai kanran* 気海観瀾, 1827), the first book concerning physics in Japan, Aochi Rinsō 青地林宗 (1775–1833), said the following: “each *geijutsu-ka* 芸術家 (specialist of *geijutsu*) has his words. That is to say, the words of each discipline, astronomy, geoscience, medicine, mathematics: predecessors have often translated them”.¹¹ Here, we see that the word *geijutsu* 芸術 is used in a sense which includes the natural sciences.

More famously, Sakuma Shōzan 佐久間象山 (1811–1864) proposed the phrase “Eastern morality, Western technology (*Tōyō no dōtoku, seiyō no geijutsu* 東洋の道德 西洋の芸術)” in *Record of Conscience* (*Seikenroku* 省譽録) written in 1854 and published in 1871. This word expresses Sakuma’s proposition that Japan should maintain its Eastern tradition in terms of its morality and political system, but also import Western science and technology. Here we can see the word *geijutsu* being used to signify technology¹².

In 1873, as part of a participation at the international exposition held in Wien, the Meiji government translated the list of exhibit categories. At this point, a new term *bijutsu* 美術 (fine arts) was born, signifying paintings, scriptures, architectures, and handicrafts. In Japan, such a concept did not exist until the Edo era¹³. Therefore, we see the words *gijutsu*, *geijutsu*, and *bijutsu* around “arts” and “technology”, despite many other words having existed alongside them. In *Dictionary of Philosophy* (*Tetsugaku jii* 哲學字彙, revised and enlarged edition, 1884), “Art” was translated as “*jutsugi* 術技, *gei* 芸, *giryō* 伎倆”, and “Technology” was translated as “*shogeigaku* 諸芸学”¹⁴.

Fukuzawa Yukichi 福沢諭吉 (1835–1901), a representative of enlightenment scholars in Japan at that time, insisted upon the importance of development of technology in his country. He introduced the American constitution in *Things Western* (*Seiyō Jijō* 西洋事情), in which he translated “science and useful arts” as *bungaku gigei* 文学技芸. In *An Encouragement of Learning* (*Gakumon no susume* 学問のすすめ, 1872–1876), he wrote “we should be a farmer, be a merchant, be a scholar, be an official, write texts, write newsletters, talk about laws, learn *geijutsu*, and launch industry”. Here, *geijutsu* connotes technology¹⁵, but later on, he used

11 Aochi Rinsō, *Overall View of the Atmosphere* (*Kikai kanran* 気海観瀾) in Saigusa Hiroto, ed., *Complete Works of Classics of Chemistry in Japan* (*Nihon kagaku koten zensho* 日本科学古典全書), vol. 6, Asahi Shimbun Sha, Tokyo 1978, pp. 12–13.

12 Annotation by Iijima Tadao, in Sakuma Shōzan, *Record of Conscience* (*Seikenroku* 省譽録), Iwanami shoten, Tokyo 1944, p. 25.

13 Ikezawa Noriaki, “Historical Materials Related to Fine Arts (*Bijutsu kanren shiryō*)”, in Kato Shūichi et al., eds., *Collection of Japanese modern thoughts* (*Nihon kindai shisō taikēi* 日本近代思想大系), Iwanami Shoten, separate volume, Tokyo 1992, pp. 169–184, p. 170.

14 Inoue Tetsujirō and Ariga Nagao, *Dictionary of Philosophy* (*Tetsugaku jii* 哲學字彙), Tōyōkan Shoten, revised and enlarged edition, Tokyo 1884, p. 11, p. 125.

15 Nagai Michio, ed., *Japanese Classics 33 Fukuzawa Yukichi*, (*Nihon no meicho 13 Fukuzawa Yukichi* 日本の名著33福沢諭吉), Chūōkōron-sha, Tokyo 1984, p. 104.

the word *geijutsu* in an article “On diplomacy (*Gaikō ron* 外交論)”, which appeared in the newspaper *Jiji shinbō* 時事新報 in 1883. In this article, he cautioned the use of *gijutsu* (art, technology) without scientific knowledge and encouraged people to come to an understanding of science beforehand.

Nishi Amane 西周 (1829–1897), who collaborated with Fukuzawa in the Meiji 6 Society (*Meirokeisha* 明六社), is a key figure in the establishment of the concept of *gijutsu*. In his *Encyclopedia* (*Hyakugaku renkan* 百学連環, 1870), he translated several key concepts in “science and arts (*gakujutsu gigei* 學術技芸 or *gakujutsu* 學術 in short term)” as follows:

*Gaku*学 (science) and *jutsu*術 (arts)
Kansatsu 觀察 (*theory*), *jissai* 實際 (*practice*)
Tanjun no gaku 單純の学 (*Pure Science*), *tekiyō no gaku* 適用の学 (*Applied Science*)
Gijutsu 技術 (*Mechanical Art*), *geijutsu* 芸術 (*Liberal Art*)¹⁶.

As we see at the end, Nishi clearly distinguished *gijutsu* and *geijutsu*. However, both of them were “arts”, i.e., further distinguished from “science”.

Nakamura Masanao 中村正直 (1832–1891) translated *Self-Help* (1859) by Samuel Smiles and published it with the title of *How Westerners Decide Their Own Purposes in their Lives* (*Saigoku rissbi hen* 西国立志編) in 1871. This book was extremely popular alongside Fukuzawa’s *An Encouragement of Learning* (above) and introduced Western technology and science to the Japanese people.

Kume Kunitake 久米邦武 (1839–1931) edited *Record of a Tour of the United States and Europe by the Japanese Envoy Extraordinary and Ambassador Plenipotentiary* (*Tokumei zenken taishi bei-o kairan jikki* 特命全權大使米歐回覽實記), in which he used the word *gijutsu* to describe modern industrial technology as distinct from *geijutsu* and *bijutsu*.

Sano Tsunetami 佐野常民 (1823–1902) participated in the international exposition in Wien and wrote “Reports of Learning of Technology” (*Gijutsu denshu shimatsusho* 技術伝習始末書) with other participants. We can see 24 categories of “*gijutsu*” in this report, namely, sericulture, agriculture, type-printing, shipbuilding, weaving, mapping, photography, and so forth.

As seen above, Japanese language experienced a big change in the 19th century through the importation of Western science and technology. “*Geijutsu*”, “*gijutsu*”, “*bijutsu*”, and other words were used as translations of “arts” and “technology”. As the use of these words was becoming fixed, philosophical debates properly commenced in the following century.

16 Nishi Amane, *Encyclopedia* (*Hyakugaku renkan* 百学連環), in *Complete Works of Nishi Amane* (*Nishi Amane zenshū* 西周全集), vol. 1, Nippon Hyōron Sha, Tokyo 1945, pp. 12–15. English words originally written by Nishi Amane are shown in “().” Those in “[]” are added by me to explain the meaning of Japanese words.

3. Concepts of technology in 20th century Japan

Japanese vocabulary got closer to its contemporary usage in the early 20th century. In the dictionary *New Translation, English-Japanese Dictionary (Shinyaku Eiwa Jiten 新訳・英和辞典)* published in 1902, “Art” was translated as follows: “1. *gei* 芸, *gijutsu* 技術. 2. *kōkei* 狡計, *kōsaku* 好策, *kigi* 詭議, 3. *jukuren* 熟練, *kikō* 機巧”, “Technic” as “*gi* 技, *ginō* 技能, *gijutsu* 技術”, “Technics” as “1. *gijutsu* 技術, *geijutsu* 芸術. 2. *gakugo* 学語, *jutsugo* 述語, *senmongo* 専門語, *gakujutsuteki jibutsu* 學術的事物, *senmonteki jibutsu* 専門的事物”, and “Technique” as “*gi* 技, *gijutsu* 技術”¹⁷. In addition, in *Great Japan Encyclopedia (Nihon Hyakka Daijiten 日本百科大辞典, 1908)*, we can find words “*gijutsukan* 技術官 [technical official]” and “*gijutsuteki bungyō* 技術的分業 (*Technische Arbeitsteilung* [technical division of labor])”¹⁸.

Dictionary of General Terms (Futsū jutsugo jū 普通術語辞彙, 1905) was a dictionary which provided a detailed description of a term “*geijutsu* 芸術” in relation to “*gijutsu* 技術”. There, we find a phrase “See the section of *geijutsu* (1)” under “*gijutsu*”. The definition of “*geijutsu*” is written as follows:

The word *geijutsu*, in its widest sense, holds the same meaning as *gijutsu* (*technics*), which includes a skilled activity combining thoughts (ingenuity, design, idea, etc.) and *waza* [skills], and the products of this activity. In this sense, the elaborate works and methods used to create these works are all termed *geijutsu*. Examples include a mechanist who creates a clock, a gold lacquer master who makes lacquerware, and an architect who builds a house. In this case, the distinction from other general works or products is purely based on the ingenuity of their thoughts and *waza*. Therefore, we can only detect the distinction relatively. In addition, the difference between produced and natural things is based on the fact that the *waza* or works involve artificial ingenuity and technique¹⁹.

Although *geijutsu* is the main term, here we find the idea that distinguishes between skilled and non-skilled activity and between artificial and natural.

Dictionary of Economy (Keizai Daijisho 経済大辞書, 1910–1916, 5 volumes) defined “*gijutsu* 技術 (*Technique, Technik*)” as the “combination and application of human knowledge to an action that aims to produce expected quality”²⁰. It lists three further categories of *gijutsu* in terms of their purpose, namely, “*seisanteki gijutsu* 生産の技術 (*Produktionstechnik* [production technique])”, “*keieiteki gijutsu* 経営の技術 (*Betriebstechnik* [business technique])”, and “*koekiteki gijutsu* 交易の技術 (*Verkehrstechnik* [transportation technique])”.

17 Kanda Naibu et al., eds. *New Translation, English-Japanese Dictionary (Shinyaku Eiwa Jiten 新訳・英和辞典)*, Sanseidō, Tokyo 1902, p. 56, p. 1001.

18 *Great Japan Encyclopedia (Nihon Hyakka Daijiten 日本百科大辞典)*, Sanseidō Henshūjo, Tokyo 1908, p. 1366.

19 Tokutani Toyonosuke and Matsuo Yujiro, *Dictionary of General Terms (Futsū jutsugo jū 普通術語辞彙)*, Keibun-sha, Tokyo 1905, pp. 262–263.

20 Kiga Kanju “*Gijutsu* [Technology]” in *Dictionary of Economy (Keizai Daijisho 経済大辞書)*, vol. 2, Dōbunkan, Tokyo 1911, p. 684.

As Japanese industries dramatically developed around the period of the WWI, the status of technical experts or engineers (*gijutsusba* 技術者) also arose in Japanese society. In 1918, Naoki Rintarō 直木倫太郎 (1876–1943) published a book entitled *From the Life of Technique* (*Gijutsu seikatsu yori* 技術生活より). He reflected the following:

I believe that ‘*gijutsu* 技術 [technology]’ is the latest specialty in the world. Therefore, the status of the new class in the society, ‘*gijutsuka* 技術家 [technicians]’, is not justifiably recognized together with its appellation. Even if it is recognized to some extent, it is underestimated and trampled on. However, if looked at closely, this situation should be attributed not to the obstinacy and laziness of the society but rather to the unpreparedness and nonchalance of technicians themselves or their timid and cowardly prudence²¹.

Miyamoto Takenosuke 宮本武之輔 (1892–1941), who later became a technical officer specializing in civil engineering, published an article “On the essence of technology policy” (*Gijutsu seisaku no shintai wo omou* 技術政策の真諦を思ふ) in the journal *Engineering* (*Kogaku* 工学) from March to June 1919. He stated the following:

An English man, Tredgold [Thomas Tredgold], stated ‘technology [*gijutsu*] is to direct the great sources of power in nature for the use and convenience of man’. I would like to rephrase it as ‘technology is the economic use of the power in nature’. When we cannot apply a new invention economically, it has no value as a technology regardless of its scientific contribution. Therefore, it is correct to believe that the final purpose and foremost mission of technicians are to ensure facility operation of technology theoretically and economically²².

Miyamoto became a core member of the Japan Workmen Club (*Nippon Kōjin Club* 日本工人倶楽部), the first Japanese association of engineers established in 1920. There, Miyamoto and other members promoted the self-awareness of technicians as leading actors, thereby encouraging the improvement of their social status.

In 1932, the Research Group on Materialism (*Yuibutsuron kenkyūkai* 唯物論研究会) was founded by Tosaka Jun 戸坂潤 (1900–1945), Saigusa Hiroto 三枝博音 (above), Oka Kunio 岡邦雄 (1890–1971), Aikawa Haruki 相川春喜 (1909–1953), and others. Specifically, they addressed the question of “what is technology?” in explicit academic terms. Their discussion, referred to as the “Technology Controversy” (*gijutsuron ronsō* 技術論論争), involved intellectuals from outside their research group and continued until the post-WWII era.

21 Naoki Rintaro, *From the Life of Technique* (*Gijutsu seikatsu yori* 技術生活より), self-publishing, 1918, p. 2.

22 Miyamoto Takenosuke, “On the essence of technology policy” (*Gijutsu seisaku no shintai wo omou* 技術政策の真諦を思ふ), *Technology, Society, Life* (*Gijutsu, shakai, jinsei* 技術・社会・人生), Kōgyō Zasshi-sha, Tokyo 1934, p. 17.

Tosaka published a book titled *Philosophy of Technology* (*Gijutsu no tetsugaku* 技術の哲学) in 1933. He insisted that technology has two aspects: a subjective aspect such as technique or intelligence and an objective aspect. Tosaka considered this objective aspect not only as a *natural* entity but also as a *social* entity. He argued as follows:

Here, the issue is that technology always has twofold characteristics. According to what we have seen above, technology detached from a social relationship of production can never exist in reality or as an ideal, and the essence of technology can never be purely technological or purely engineering. It should be nothing other than a historical categorization. Only in a certain economic relationship, as content of a relationship of production given historically, technology can be technology. It is incorrect to say that technology and economy as independent entities are accidentally connected with each other in the real world. The fact is that technology has twofold characteristics, the purely technological moment as well as the economic moment²³.

Criticizing Tosaka, Aikawa published a book titled *Theory of Technology* (*Gijutsu ron* 技術論) in 1935. Aikawa said “technology is, according to the regime of historical materialism, a complex of material means of social labor at a certain developmental stage of material productivity of human society, or in one word, a system of means of labor”²⁴. As Aikawa himself observed, his definition was considered a conclusion of the Research Group on Materialism²⁵.

However, Miyamoto Takenosuke (above) strongly criticized such a theory, i.e., technology as a system of means of labor, since regarding technology purely as means will lead to an underestimation of the social status of technicians²⁶. Miyamoto insisted that technology is rather “applied science”.

Besides the Technology Controversy, some philosophers discussed technology in their context. For example, Nishida Kitarō 西田幾多郎 (1870–1945), a representative figure of the Kyoto School of philosophers (and who also was Tosaka’s teacher), had the idea that the “world” transforms by itself in its self-realization and that human creativity is a part of the creativity of the world. Nishida suggested that “human technology” is “technology of the heaven (*ten* 天)”²⁷.

Miki Kiyoshi 三木清 (1897–1945), a disciple of Nishida, also had the idea that human technology is based on the technology of nature. He examined it more

23 Tosaka Jun, *Philosophy of Technology* (*Gijutsu no tetsugaku* 技術の哲学), in *Complete Works of Tosaka Jun* [*Tosaka Jun zenshū* 戸坂潤全集], vol. 1, Keisō shobō, Tokyo 1966, p. 256.

24 Aikawa Haruki, *Theory of Technology* (*Gijutsu ron* 技術論), Mikasa Shobō, Tokyo 1935, p. 8.

25 Ivi, p. 9.

26 Nakamura Seiji, *History of the Technology Controversy, New Edition* (*Shimpan, Gijutsuron ronsō shi* 新版・技術論論争史), Aoki Shoten, Tokyo 1995, pp. 74–75.

27 Nishida Kitarō, “Artistic Creation as Historical Formation [Rekishiteki keiseisayō toshitenno geijutsuteki sōsaku 歴史的・形成作用としての藝術的創作]”, in *Complete Works of Nishida Kitarō* [*Nishida Kitarō zenshū* 西田幾多郎全集], vol. 9, Iwanami Shoten, Tokyo 2004, p. 248.

rigorously than Nishida in his books *Philosophy of Technology* (*Gijutsu tetsugaku* 技術哲学, 1938) and *Logic of Imagination* (*Kosoryoku no ronri* 構想力の論理, 1938–unfinished). There, he proposed the following:

Technology modifies a given form and gives it a new form. *Transformation* is the foundational action of technology. That is also the foundational concept of history. History is metamorphosing. Technical nature is historical nature, and human history is created technologically from the beginning. Our technology participates in its transformation as action of formation in the historical world²⁸.

Watsuji Tetsurō 和辻哲郎 (1889–1960), an ethicist who insisted upon the foundational character of human relationships for our existence, instead criticized the idea of “*gijutsu*” as an abstract concept. He argued that our movements possess social meanings as human actions, i.e., a primitive man’s technique is more basically an action of “hunting” according to his social role²⁹. He also located artifacts in our daily life as “expressions” of our human relationships, such as the way that house “expresses” a family. In this sense, he considered artifacts, as well as the natural environment, as part of our human relationships and of our existence³⁰.

In 1940, Saigusa Hiroto (above), who was a founding member of the Research Group on Materialism, published *History of Technology* (*Gijutsu shi* 技術史), the first full-scale research on history of technology in Japan³¹. In its introduction, Saigusa said that “technology is a mean as process”. Later, in *Philosophy of Technology* (*Gijutsu no tetsugaku* 技術の哲学, 1951), he also defined technology as a “judgmental process of formation by objective laws in human practical production”. However, he also said that “(social) technology is a system of means of labor”.

The Research Group on Materialism was suppressed and dissolved during WWII, but the Technology Controversy re-emerged following the war. One of the key figures was Taketani Mitsuo 武谷三男 (1911–2000), a physician. He proposed that “technology is a conscious application of objective laws in human practice (practices of production)”³² and criticized the theory of technology as a system of means of labor. Taketani’s idea was inherited by Hoshino Yoshiro 星野芳郎 (1922–2007) and Tanaka Kichiroku 田中吉六 (1907–1985). The theory of technol-

28 Miki Kiyoshi, *Philosophy of Technology* (*Gijutsu tetsugaku* 技術哲学), in *Complete Works of Miki Kiyoshi* [*Miki Kiyoshi zenshū* 三木清全集], vol. 7, Iwanami Shoten, Tokyo 1967, pp. 253–254.

29 Watsuji Tetsurō, *Ethics* [*Rinrigaku* 倫理学], in *Complete Works of Watsuji Tetsurō* [*Watsuji Tetsurō zenshū* 和辻哲郎全集], vol. 10, Iwanami Shoten, Tokyo 1962, p. 250.

30 For more information about Watsuji’s understanding of technology and his ethics, see Inutsuka Yū “A Moral Ground for Technology: Heidegger, Postphenomenology, and Watsuji”, in Thomas Taro Lennerfors and Kiyoshi Murata, eds., *Tetsugaku Companion to Japanese Ethics and Technology*, Springer, Berlin 2019.

31 Iida Ken’ichi, *Technology* (*Gijutsu* 技術), *op. cit.*, p. 125.

32 Taketani Mitsuo, “Theory of Technology (*Gijutsu ron* 技術論)”, in *Selection of Taketani Mitsuo’s Works* (*Taketani Mitsuo chosakushū*), vol. 1, Keisō shobō, Tokyo 1968, pp. 125–141, p. 139.

ogy as means was inherited by Oka Kuniō岡邦雄 (above) and Yamada Sakaji山田坂仁 (1908–1987). Nakamura Seiji中村静治’s books, *History of the Technology Controversy* (*Gijutsuron ronsō shi* 技術論論争史, 1975)³³ and *Introduction to Theory of Technology* (*Gijutsuron nYūmon* 技術論入門, 1977)³⁴ describes the situation of the Technology Controversy.

More recently, Imamichi Tomonobu今道友信 (1922–2012) proposed the term “technological conjunction” (*gijutsu renkan*) in his *Eco-Ethica*. With this term, Imamichi indicated that our environment is no longer solely constituted by the natural environment, but rather by the complex of machines which surround us. He wrote the following:

Since the wild nature could not secure human life, human beings made machines. The world where these machines are connected with each other is technological conjunction and it has become part of our environment along with nature. [...] Of course, needless to say, nature is our environment, and atmosphere, sunlight, and the earth are extremely important. But in terms of our daily life, we cannot talk about our environment without referring to technological conjunction³⁵.

Lastly, although not often mentioned in the discussion concerning technology, it would be interesting to examine the folk art movement in Japan, *mingei undō* 民芸運動, which began in 1926. Yanagi Muneyoshi (Sōetsu) 柳宗悦 (1889–1961), the founding father of this movement, coined the term *mingei* 民芸, the short form of *minshūteki kōgei* 民衆の工芸 (hand-crafted art of ordinary people). Going against the standard view of “beauty” in fine arts and against mechanization, Yanagi pointed out that objects of daily use, like bowls, teapots, or tables made by nameless craftsmen, often have a certain “beauty”. This beauty arises because these materials were made for “use (*yō* 用)”, and if materials are made without consideration of use, such beauty will (perhaps inevitably) be lost³⁶.

Conclusion

As shown above, Japan has imported concepts related to technology from both China and the West. The development of philosophical analysis had to wait until the development of actual technologies and sciences in Japan itself. From the onset of the 20th century onward, philosophical debate became active, e.g., as represented by the “Technology Controversy”.

33 Nakamura Seiji, *History of the Technology Controversy* (*Gijutsuron ronsō shi* 技術論論争史), vol. 1 & 2, Aoki Shoten, Tokyo 1975.

34 Nakamura Seiji, *Introduction to Theory of Technology* (*Gijutsuron nYūmon* 技術論入門), Yūhikaku, Tokyo 1977.

35 Imamichi Tomonobu, *Eco-Ethica: Introduction to Ecosystem Ethics* (*Eco-Ethica: Seiken rinrigaku nYūmon* エコエテイクー生圏倫理学入門), Kōdansha, Tokyo 1990, pp. 184–185.

36 Yanagi Muneyoshi, *What is Mingei?* (*Mingei towa nanika* 民藝とは何か), Kōdansha, Tokyo 2006. This book contains Yanagi’s English essay entitled “Nature of Folk-crafts”.

The purpose of this essay has been to draw out the historical development of concepts of “technology” in Japan in a summary fashion. It could not therefore deeply examine or explore several related issues. These would be, for example, historical use(s) of the term *waza* 技/業 [technique, skill, performance], *jutsu* 術 [art, technique], or *shokunin* 職人 [artisan, craftsman]. The use of the word *kagaku gi-jutsu* 科学技術 [science and technology] in Japan is also an important topic since it combines science and technology in one word and does not distinguish them precisely. Further research along these lines is therefore required.

