

Sound changes in the *Heart Sutra**

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Jang, Youngjun. 2011. Sound changes in the *Heart Sutra*. *Studies in Phonetics, Phonology and Morphology* 17.1. 87-102. The purpose of this paper is to examine the phonological changes in Sino-Korean vocabularies used in the *Heart Sutra*. Considering the fact that religious scriptures are truly conservative in terms of linguistic changes, the *Heart Sutra* can provide a quite reliable test ground where we can investigate the sound changes that Sino-Korean vocabularies have undergone. By comparing the various pronunciations of the Chinese characters used in the *Sutra* in Chinese, Japanese, Korean, and Vietnamese, we have found that the way the *Sutra* is pronounced in Modern Korean is drastically different from the one it was read earlier. This state of affairs is also true of Chinese, since the sound system of Chinese has also changed a lot since then on. On the basis of principled reconstruction of the earlier sounds, we hopefully show that Korean version (and Chinese version, too, for this matter) of the *Sutra* must have been similar to the original Sanskrit version before the sound changes involved occurred. In so doing, we also show what kinds of phonological rules are in operation in these sound changes found in the *Sutra*. (Chung-Ang University)

Keywords: sound change, reconstruction, translation, palatalization, Sino-Korean, Sanskrit, *Heart Sutra*, transcription, Cantonese, Mandarin Chinese, historical linguistics

1. Introduction

When a foreign sound is borrowed, it tends to be assimilated to the existing similar sound of the target language. For example, English interdental fricative /θ/ tends to be considered as alveolar fricative /s/ or alveolar stop /t/ by many Korean learners of English and /s/ by Chinese learners of English (see Rau et al. 2009). However, this kind of adjustment seems to occur as a last resort. That is, foreign sounds are perceived and assimilated to the corresponding sounds of the target language as closely as possible. Thus, English bilabial stop /p/ is perceived to correspond to /p/ in Korean, and English velar stop /k/ to /k/ in Korean, even though these sounds may not be exactly the same ones in terms of phonetic properties. These sounds are simply considered as corresponding to their counterparts of Korean, respectively. Foreign sounds that have no corresponding or identical sounds in the target language, however, cannot avoid adjustment in some sense.

If the sound of a loan word is different from the sound of the corresponding word in the source language, then there are two logical

* My special thanks go to Xiaocheng Fei, Jeong-yeol Mo, and Kilyong Lee for their detailed corrections of my phonetic transcriptions of Chinese and Sino-Japanese. Without their help, this paper would not appear as it is now. I would also like to thank anonymous reviewers of this journal for their valuable comments. All errors, however, are my own.

possibilities that we can think of. Either there is no similar sound in the target language and thus it has to be altered in some way or other, or there is sound change in one of the two sounds of the source language and target language or in both languages. Compare the English “coffee” and its adopted vocabulary in Korean and Japanese.

(1) coffee [kʌfi] ↔ [kʰʌpʰi] ↔ [koçi]

As well known, English labio-dental fricative /f/ has no corresponding sound in Korean. Thus it is assimilated to or perceived as the equivalent of /p/ in Korean and /h/ in Japanese.

Now, let us consider the following phrase from the first line of the mantra of the *Heart Sutra* (Sanskrit, *Prajñāpāramitā Hṛdaya Sutra*; Sino-Korean, 般若波羅密多心境[panyapalamiltasimkyeng]).

(2) a. aje aje pala aje palasung aje mojisapah (Sino-Korean)
[atçe atçe pala atçe palasun̄ atçe motçisapaha]
b. gate gate para gate parasamgate bodhisvaha (Sanskrit)
[gāte: gāte: pa:rəgāte: pa:rəsəṅgāte bo:dʰi sua:fiə]

We see in (2) that there must have been some sound change either in one of the two texts or in both of them. It is clear that sound change occurred in Korean translation and not in Sanskrit, contrary to the general tendency that adopted sounds are more conservative than their source sounds. The reason is clear. Suppose that (2a) was the original. Then we have to be forced to believe that the initial sounds of each syllable in (2b) were inserted in that language, because the borrowed forms do not have initial sounds. This is hardly convincing. Clearly it is the other way around: the initial sounds of each syllable in (2b) dropped off in (2a) for some reason.

In this paper, we investigate various versions of the *Heart Sutra* translated into neighboring countries and try to show what kinds of phonological processes have been involved. Section 2 is a short introduction to the *Sutra* and its translation into Korean. Section 3 deals with the phonological processes involved. Finally, section 4 concludes the paper.

2. Translation of the *Heart Sutra*

The *Heart Sutra* is part of the Perfection of Wisdom (Prajñāpāramitā) class of Mahāyāna Buddhist literature. It is made up of 14 *shlokas* in Sanskrit (one *shloka* is composed of 32 syllables) and 262 characters in Chinese. This short version makes itself one of the most highly abbreviated and most frequently chanted versions of the Perfection of Wisdom texts which exist in various lengths up to 100,000 *shlokas*. The *Sutra* that we discuss in this paper is the short one that has 262 Chinese characters.

For our purpose, however, it is important to note that the longer version of 100,000 *shlokas* were introduced into Chinese Buddhism,

but the *Sutra* under discussion had in fact been composed by a Chinese Buddhist and back-translated into Sanskrit (for relevant discussion, see Mair 2002), which will be discussed shortly. What this suggests is that the sounds of the Sanskrit version represent the sound system of Chinese during the period in which the 262-word Chinese *Sutra* had been translated into Sanskrit. The Chinese version is frequently chanted in its local system of pronunciation during ceremonies in China, Japan, Korea, and Vietnam. We examine the pronunciations of the *Sutra* in these languages as extensively as possible.

The *Heart Sutra* is generally thought to have been composed in the 1st century CE in the Kusan Empire by a Sarvastivadin monk (for detailed history, see Mair 2002, Nattier 2008). The earliest record of a copy of the *Sutra* is 200-250 CE, which version is attributed to the Yuezhi monk Zhi Qian. It was supposedly translated again by Kumarajiva around 400 CE (but for different opinion, see Nattier 1992).

As mentioned above, Jan Nattier has suggested that the earliest (shortest) version of the *Heart Sutra* was probably first composed in China in the Chinese language from a mixture of Indian-derived material and new composition, and that this assemblage was later translated into Sanskrit. That is, the *Sutra* was back-translated.

The Kumarajiva (402-413) version is titled *Mohopojopolomi shenchouichuan* (Sino-Korean, *Panyapalamiltasimkyengchan*), but the first version that uses *Hrdaya* ‘heart’ (Sino-Korean, *sim* ‘heart’) in the title is Xuanzang’s (649). The *Sutra* was annotated by Wonchuk of the Silla Dynasty, who used the Xuanzang version.¹ Since we are concerned with the pronunciations of the Chinese characters in the *Sutra*, we will not deal with issues about translation or the history of its translation. This much said, it suffices to note that Chinese version (with Sino-Korean pronunciations) of the *Sutra* has been used in Korea.

Finally, let us note that the *Sutra* includes mantra at the end of the text, which is frequently chanted during ceremonies. The mantra is as follows.

- (3) a. Sanskrit: gate gate pāragate pārasamgate bodhi svāhā
 b. Chinese: 揭諦揭諦 波羅揭諦 波羅僧揭諦 菩提娑婆訶
 c. Korean: aje aje pala aje palasung aje mojisapah

Since mantra is usually chanted, original sound value tend to be adopted intact into the target language. For this reason, the mantra of the *Sutra* would best provide a test ground on which various pronunciations of the same Chinese characters can be compared.

Before closing this section, let us make a comment on the Chinese version. Since contemporary Mandarin Chinese is pretty much

¹ The title of Wonchuk’s translation is *Panyasimkyengso* or *Panyapalamiltasimkyengchan*. Wonhyo also translated Xuanzang’s Chinese version into Sino-Korean during the same period as Wonchuk. Silla’s monk Daehyeon also translated the *Sutra*, whose title is *Panyasimkyengkocekki* and *Panyasimkyengju*.

different from, say, the Chinese of Kumarajiva and Xuanzang, we should be very careful when we compare the pronunciations of contemporary Mandarin Chinese and the translated versions of the *Sutra* in other neighboring countries. Fortunately, various dialects of Chinese such as Cantonese and Hakka do show older, more conservative pronunciations. For this reason, we will compare pronunciations of various dialects of Chinese including Cantonese, if necessary.

3. Phonological Processes Involved

In this section, we are concerned with phonological variations among various versions of the *Heart Sutra* in East Asian countries. The *Sutra* is composed of a main text and a mantra, though the latter is rather short. Since mantra is recited almost in its original form, it is quite different from the main text in terms of translation and pronunciation. That's why we divide our discussion into two parts, thereby dealing with the main text and mantra separately. In section 3.1, we examine the sound correspondences among various versions of the mantra, since it is adopted by neighboring countries almost verbatim. Then in section 3.2, we investigate the main text of the *Sutra*

3.1 The title

The Chinese title is somewhat a mixture of transcript and translation. That is, some parts of the title are transcribed from the Sanskrit pronunciations and others are translated from the meaning of the corresponding Sanskrit words.

- (4) a. Sanskrit title: Prajna-paramita-hridaya-sutra
b. Chinese title: (摩訶)般若波羅密多心境

Note that the first two characters 摩訶[maha] 'great' were added by the Chinese translator Kumarajiva, but they sometimes are omitted. Thus let us discuss the title without them. First of all, note that Mandarin Chinese and Cantonese have different pronunciations for the same Chinese characters, which are provided below.²

- (5) a. Mandarin: móhē bōrě bōluómíduō xīnjīng³
[moxə pɔzə poluomituo ɕin tɕiŋ]
b. Cantonese: [maha paŋjak palamita simkjəŋ]
(6) a. Sanskrit: prajna-paramita-hridaya-sutra
b. Mandarin: bōrě-bōluómíduō-xīnjīng
[pɔzuo-poluomituo-ɕintɕiŋ]
c. Cantonese: [paŋjak-palamita-simkjəŋ]
d. Korean: panya-palamilta-simkyeng

² Hereafter, we use Pinyin for Mandarin Chinese and its IPA equivalent in the bracket, and IPA symbols for Cantonese throughout the paper.

³ The Pinyin symbols and IPA are as follows (in the order of Pinyin:IPA): b=p, p=p^h, d=t, t=t^h, g=k, k=k^h, h=x, z=ts, c=ts^h, zh=ts^h, ch=ts^h, sh=s, j=tc, q=tc^h, x=c, and r=z.

- e. Japanese: [panja-palamilta-simkjʌŋ]
hannya-(haramita)-shingyo⁴
[hanja-(haramita)-ɕiŋjo]
- f. Vietnamese: bátnhã-balamâtĐa-tâmkinh
[batnhɛ-ɓalamətɗa:-təmkinh]

The latter part of the Chinese title, namely 心境, and its translated versions in other languages are translation from the Sanskrit words *hridaya* ‘心, heart’ and *Sutra* ‘境, song.’ We will confine ourselves to the discussion of this part only if it shows some sound correspondences among various versions of the title, since our immediate interest is in sound correspondence and the phonological processes involved in.

Now, let us pay attention to the first half part of the title. We see the following sound correspondences from the data given in (6).⁵

(7) Sound changes in the title

	A	B	C	D	E	F	G
Sanskrit	pra	na	ra	mit	ta		
Mandarin	po	zə	lou	mi	tuo	ɕin	tɕiŋ
Cantonese	pa	na	la	mit	ta	sim	kyəŋ
Korean	pa	nya	ra	mil	ta	sim	kjʌŋ
Japanese	han	ja	*	*	*	ɕiŋ	jo
Vietnamese	ɓat	nhɛ	la	mət	ɗa:	təm	kinh

Let us look at the data following the columns. First, in column (A), there are three way variations, namely [p-ɓ-h] correspondences. Sanskrit /p/ became voiced in Sino-Vietnamese, and underwent lenition in Sino-Japanese (for relevant discussion, see Blust 2005). There is nothing particular to mention in Column (B), except the fact that the nasal is aspirated in Vietnamese. In Column (C), /r/ and /l/ seem to be interchangeable. Column (D) shows that the syllable-final /t/ became /l/ in Sino-Korean, which has been quite well-known among Korean philologists. In Column (E), voicing is witnessed in Vietnamese, as shown in Column (A). Regarding Column (F), there are two important points to make: (i) bilabial nasal /m/ became alveolar nasal /n/ in Mandarin Chinese, and (ii) alveolar fricative /s/ became alveolar stop /t/ in Sino-Vietnamese (for further discussion, see Jang, to appear). Regarding (i), sound change from a bilabial nasal to an alveolar nasal is widely attested in Chinese historical linguistics. For example, [vietnam] became [yɛ nan] and [namkjəŋ] ‘south capital’

⁴ For some reason, Japanese title of the *Heart Sutra* omitted the part in the parenthesis, as shown in (6e).

⁵ Chinese character 若 was pronounced as [njak] during the Tang dynasty, the time when the *Sutra* was translated, according to Wang (1990: 219), and as [jak] in Sino-Korean. This character is, however, pronounced as [ja], instead of [jak], in chanting the *Sutra* by the Korean Buddhist believers. This loss of /k/ might be due to the influence of the open syllable structure of Sanskrit via Chinese translation, which in turn was adopted in Korean.

became [nan tɕiŋ].⁶ Finally, in Column (G), the Sanskrit *sutra* ‘song’ is translated to 境[kjəŋ] ‘song.’ The initial /k/ in 境 was palatalized before a front vowel in Mandarin Chinese (see [tɕiŋ]) and became voiced in Japanese (see [g^ho]). The velar nasal /ŋ/ in Chinese became alveolar /n/ in Vietnamese.

To summarize this section, we have seen some phonological processes in the different pronunciations of the Chinese characters used in the *Sutra* in different languages. Some major phonological processes found are as follows:⁷

- (8) a. voicing: /k/→/g/, /p/→/b, β/, /t/→/d/⁸
 b. palatalization: /k/→/tɕ/
 c. lenition: /p/→/h/
 d. lateralization: /t/→/l/
 e. simplification: /ŋ/→/n/⁹
 f. coronalization: /m/→/n/

In the next section, we first examine the final part of the *Sutra*, since it shows similar pattern of sound changes as in the title.

3.2 The mantra

First of all, consider the Sanskrit version of the mantra and its Chinese translation:¹⁰

⁶ This kind of sound change has long intrigued scholars from early on. For example, Saussure (1972: 91) mentions that “m becomes n, as in Latin *jugom* → *zugon*.”

⁷ In this paper, we focus on the changes in consonants, excluding changes in vowels for future research.

⁸ The Pinyin symbols *b*, *d* represent IPA /b, t/, respectively.

⁹ An anonymous reviewer raises a question regarding whether this sound change is a case of simplification. We simply wanted to point out that velar nasal becomes alveolar nasal in Sino-Japanese.

¹⁰ Though the 262-word *Sutra* is believed to be composed in China and back-translated into Sanskrit, the mantra itself is from the longer *Prajnaparamita Sutra* of India.

- (9) a. Sanskrit: gate gate pāragate pārasamgate bodhi svāhā
 [gāte: gāte: pā:rāgāte: pā:rāsāṅgāte bod^hi sua:fiā:]
 b. Chinese: 揭諦揭諦 波羅揭諦 波羅僧揭諦 菩提娑婆訶
 jiēdi jiēdi bōluójiēdi bōluósēngjiēdi púdisuōpōhē
 [tɕjɛtitejɛtipoluotɕjɛtipoluosəŋ tɕjɛti
 p^huty^hisuop^hoxə]¹¹

In (9b), the bold-faced Chinese word 僧[suŋ] was translated from the Sanskrit *sam* ‘monk.’ Except this case, all the remaining parts of the mantra were transcribed from the Sanskrit pronunciations. Thus we can conjecture that the Chinese translation must have been pronounced as similarly to the Sanskrit pronunciations as possible at the time of its translation. The pronunciations that we see in (9b) is, however, quite different from the original Sanskrit pronunciations. Considering the time span in between, this is quite expected, of course. Recall that the *Sutra* is believed to have been translated in around 649 CE. Thus, we have to reconstruct the sound system of this period in order to know how the mantra was pronounced at that time. To reconstruct the pronunciations of the Chinese characters used in the mantra when it was translated from Sanskrit into Chinese, let us compare various versions of the mantra.¹²

- (10) MC: [tɕjɛtitejɛtipoluotɕjɛtipoluosəŋ tɕjɛti p^huty^hisuop^hoxə]
 C: [gate gate pala gate palasəŋ gate bodi sbaha]
 SK: [atɕe atɕe pala atɕe palasuwŋ atɕe motɕisapaha]
 SJ SJ: [g^hate g^hate hara g^hate haraʃjo g^hate bozisoβaka]
 SJ: [g^hate g^hate hara g^hate haraɕo g^hate bodz̄isowaka]
 SV: [gate gate paragate parasam gate bodhi svaha]

It is generally assumed that the borrowed sounds are more conservative than those of the source language in terms of sound change. Thus, scholars use the pronunciations of the borrowed or exported words in order to reconstruct the earlier pronunciations of the source words. For example, the seminal works of Kalgren, e.g., Kalgren (1954, 1992), took advantage of this methodology. In order to reconstruct Archaic Chinese, Middle Chinese and Early Modern Chinese, for example, he collected data from various Sino-vocabularies from Korean, Japanese, Vietnamese and various dialects of Chinese spoken in the continent.

Cantonese, Sino-Korean, Sino-Japanese, and Sino-Vietnamese are clearly expected to preserve more archaic pronunciations than Mandarin Chinese. Except for Sino-Korean, this kind of general approach seems to be readily working and in a correct way. That is, Cantonese, Sino-Japanese, and Sino-Vietnamese do seem to keep pronunciations of the characters used in the mantra of the *Heart Sutra*, most similar to those of Sanskrit version, specific, minor differences

¹¹ The alveolar stop in *jiēdi* [tɕjɛti] is pronounced as almost a weakened [d] or a tap [r].

¹² S=Sanskrit, MC=Mandarin Chinese, C=Cantonese, SK=Sino-Korean, SJ=Sino-Japanese, and SV=Sino-Vietnamese.

put aside. This is clearly shown in (9) and (10) above. The sound correspondences can be summarized as follows.

(11) Sound changes in the mantra

	A	B	C	D	E	F	G	H	I	J
S	ga	te	pa	ra	sam	bo	dhi	s	va	ha
MC	tɕjɛ	ti	po	lou	səŋ	p ^h u	t ^h i	suo	p ^h o	xə
C	gat	te	pa	la	səŋ	po	ti	so	pa	hə
SK	a	tɕe	pa	la	suŋ	mo	tɕi	sa	ba	ha
SJ	g ^j a	te	ha	ra	ɕo	bo	ɕi	so	wa	ka
SV	ga	te	pa	ra	sam	bo	dhi	s	va	ha

As in the title, the mantra shows that similar phonological rules/processes are involved in the various pronunciations of the source words. Let us examine them step by step.

In Column (A) and (B), voiced velar stop /g/ is palatalized in Mandarin Chinese and totally disappeared in Sino-Korean. Let us see what happened to this sound in the course of history, especially in Sino-Korean. Note that 揭 is composed of 扌 ‘hand’ and 曷. In his seminal book *Hane Eeumsa* (A history of Chinese linguistics, 1990/1997), Wang Li claims that 曷 was pronounced as [k^hat] during the Sui, Tang, and Song dynasties. Therefore, we know that 揭 was also pronounced as [k^hat], since Chinese characters of this pattern have the same pronunciation as the second element, while the first constituent contributes to the meaning of the whole composite word. What about 諦 ‘truth’? The same principle applies to this character. As predicted, 諦 is composed of 言 ‘language’ and 帝 ‘emperor.’ Since 帝 was pronounced as [ti] during the Tang dynasty, we know that 諦 was also pronounced as [ti]. Therefore, the first two letters, namely 揭諦, must have been pronounced as [k^hat t^hi] during the time when the *Sutra* was translated. This reconstruction is indeed borne out, as the more conservative pronunciations of Cantonese show (see table in (11)). It follows from this discussion that the Sanskrit pronunciation of the first two syllables in the mantra must have been kept in Chinese translation of it during the time when it was translated. This is summarized below.

- (12) a. Sanskrit: ga-te
 b. Ancient Chinese: gat-te¹³
 c. Cantonese: gat-te
 d. Mandarin: jiē-dì [tɕjɛ-ti]

What then would have happened to Sino-Korean pronunciations of these characters? We have to account for two relevant facts: namely (i) disappearance of the initial consonant /g/ and (ii) the change of /t/ to /tɕ/ in Sino-Korean version of the mantra. Regarding (i), we see that

¹³ Ancient Chinese (a term used by Karlgren 1954/1992), also called Middle Chinese by other scholars, refers to the Chinese spoken during Sui, Tang, and Song dynasties (around 6th to 10th century).

the velar stop /g/ underwent lenition and became /h/ first, and further became assimilated to the following vowel. This is not at all different from what Saussure mentioned earlier with regard to the lenition of /p/→/h/→∅. Indeed, lenition is found in Column (C), where /p/ became /h/ in Sino-Japanese.¹⁴ Regarding (ii), the alveolar stop /t/ became palatalized in front of a front vowel and became /tɕ/ in Sino-Korean. Due to these phonological processes, Ancient Chinese /ga-te/ became /a-tɕe/ in Sino-Korean. This can be summarized as follows:

(13) 揭諦[ga-te] → [ha-te] → [a-tɕe]

In Column (F), /p/ became /m/ in Sino-Korean. In Column (G), the aspirated alveolar stop /dh/ in Sanskrit became unaspirated in Chinese translation and was palatalized in Mandarin Chinese. In Column (I), we see that the voiced labio-dental /v/ in Sanskrit became fortified to /p/ in Chinese translation, which in turn was voiced in Sino-Korean. The same sound was vocalized in Sino-Japanese, just like bilabial stop becomes vocalized in Spanish. Finally in Column (J), we see the phonological process opposite to lenition. That is, the velar fricative /h/ became strengthened and pronounced as /k/ in Sino-Japanese. This is an opposite sound change to the usual lenition process that is found in the change of /k/→/h/ in Indo-European (see the Indo-European *corn* versus *horn*, or *centum* versus *hundred*).

3.3 The main text

As mentioned in the introduction, the main text consists of 262 Chinese characters. However, there are 110 characters in total, ignoring repeated tokens of each character. We examine these 110 characters for any potential phonological processes that they might have undergone while they are pronounced in various languages. The 110 characters will be divided into 11 groups for the ease of exposition.

The main text of the *Sutra* is mixture of translation and transcript, as mentioned earlier. The following are examples of phonetic transcription of the Sanskrit version.

(14) a. bodhisattva: 菩薩[posal]
 b. bodhi-sattva: 菩提薩陀[polisalt^ha]
 c. sari-putra: 舍利-子[salitɕa]
 d. anuttara(m) samyaksambodhi(m):
 阿耨多羅三藐三菩提 [anjoktalasammjosamposi]

Note that Sanskrit *bodhi-sattva* is transcribed 菩提薩陀 as (14b) or the abbreviated form 菩薩 as in (14a). Since this phrase also appears in the mantra that we already discussed in the previous section, we do

¹⁴ This phonological process is so well-attested in Sino-Japanese that we encounter numerous examples of this. For example, Chinese 北海島 is pronounced as [pukhæto] in Sino-Korean, while it is pronounced as [hokkaido] in Sino-Japanese.

not repeat our discussion here again. As for (14c), the first two syllables are transcribed as 舍利, and remaining part *putra* is translated as 子. As for (14d), the phrase *anuttaram samyaksambodhim*, which means ‘unexcelled ultimate perfect insight,’ is transcribed, with the phrase-final *m* omitted.

Now, we examine the sound changes in various translations of each Chinese character of the main text immediately. First take a look at the following:

- (15) 罣-減-皆-見-竟-界-故-苦-空-恐
 guà-jiǎn-jiē-jiàn-jìng-jiè-gù-kǔ-kōng-kǒng (M)
 [kua-tɕiɛn-tɕiɛ-tɕiŋ-tɕiɛ-ku-k^hu-k^hoŋ-k^hoŋ]
 guà-gǎm-kai-kin-gìng-kai-gù-kǔ-hōng-hǒng (C)
 [kua-kam-kai-kiŋ-kai-ku-k^hu-hoŋ-hoŋ]
 ga-gam-gye-gyen-gyeng-go-go-gong-gong (SK)
 [ka-kam-kje-kjʌn-kjʌŋ-kje-ko-ko-koŋ-koŋ]
 ka-gen-kai-gen-gyo-kai-ko-ku-ku (SJ)
 [ke-gen-kai-ken-ɣo-kai-ko-ku-ku-ku]

In (15), we see that the velar stop /k/ is palatalized in front of a front vowel in Mandarin (see Cantonese [kiŋ] and Mandarin [tɕiŋ]). In addition, the voiceless velar stop in Mandarin (e.g., [k^hoŋ]) is weakened to become /h/ in Cantonese (as in [hoŋ]).¹⁵

- (16) 觀-究-垢-乃-老-耨-能-多-大-度
 guān-jiū-gòu-nǎi-lǎo-nòu-néng-duō-dà-dù (M)
 [kuan-tɕiou-kou-nai-lao-nou-nəŋ-tuo-ta-tu]
 guān-jiū-gòu-nǎi-lǎo-nòu-néng-duō-dà-dù (C)
 [kuan-tɕiu-kou-nai-lao-nou-nəŋ-tuo-ta-tu]
 guan-gu-gu-nay-no-nyog-nung-da-dae-do (SK)
 [kuan-ku-gu-næ-no-ŋjok-nuŋ-ta-tæ-to]
 kan-ku-ku-nai-ro-noku-no-ta-dai-do (SJ)
 [kan-ku-ku-nai-ro-noku-no-ta-dai-do]

In (16), together with the palatalization of /k/, the syllable-final /k/ is lost in Mandarin (see Sino-Korean [ŋjok] versus Mandarin [nou]). Voiceless alveolar stop /t/ in Cantonese and Sino-Korean is voiced in Sino-Japanese (see Sino-Korean [to] versus Sino-Japanese [do]).

- (17) 倒-道-得-等-羅-提-離-利-藐-滅
 dào-dào-de-děng-luó-tí-lí-lì-miǎo-miè (M)
 [tau-tau-tə-təŋ-luo-t^hi-li-li-miao-mie]
 dào-dào-de-děng-luó-tái-lí-lì-miǎo-miè (C)
 [tao-tao-tə-təŋ-luo-t^hai-li-li-miao-miet]
 do-do-duk-dung-la-je-li-li-mak-myel (SK)

¹⁵ See footnote (13). Change of /k/ to /h/ is widely attested cross-linguistically. For example, Zhengis Kan is pronounced as [zeŋgis han] in Mongolian, and Buxara is pronounced as [buhara] in Uzbekistan. Sino-Korean 韓國 is pronounced as [hankuk], while it is pronounced as [kaŋkuk^hu].

[to-to-tuuk-tuŋ-la-tɕe-li-li-mak-mjʌl]
do-do-doku-to-ra-dai-ri-ri-myaku-metsu (SJ)
[do-do-toku-to-ra-dai-ri-ri-m'ak-metsu]

In (17), the syllable-final /k/ is lost in Mandarin and the alveolar stop /t/ is palatalized in Sino-Korean. In addition, the syllable-final /l/ in 滅 (/t/ in Cantonese), which underwent the process of lenition from Chinese /t/ into Sino-Korean and palatalized in Sino-Japanese, is absent in Mandarin (see [mie]).

- (18) 明-夢-無-味-蜜-波-般-槃-法-菩
míng-mèng-wú-wèi-mì-bō-bō-pán-fǎ-pú (M)
[miŋ-məŋ-u-uei-mi-po-po-p^han-fa-p^hu]
míng-mèng-mú-mèi-mìt-bō-bō-pán-fǎ-pú (C)
[miŋ-məŋ-mu-mei-mit-po-po-p^han-fa-p^hu]
myeng-mong-mu-mi-mil-pa-pan-pan-pep-po (SK)
[mjʌŋ-moŋ-mu-mi-mil-pan-pa-pan-pʌp-po]
myo-mu-mu-mi-mi-ha-han-han-ho-bo (SJ)
[m'o-mu-mu-mi-mi-ha-han-han-ho-bo]

In (18), we see that the bilabial nasal /m/ in Cantonese and Sino-Korean is vocalized or rounded in the environment of back vowel in Mandarin (compare Cantonese [mu] and Mandarin [wu]). The syllable-final /l/ in Sino-Korean, which corresponds to /t/ in Cantonese, as repeatedly mentioned, has disappeared in Mandarin, as discussed above. Compare Cantonese [pat] and Sino-Korean [pul], together with the Mandarin [pu].¹⁶ As well-known, the so-called syllable-final consonants such as /p, t, k/, which are called Chinese characters of entering tone, all lost their final consonants in Mandarin Chinese. In addition to the loss of /l/, the syllable-final /p/, as we see in Sino-Korean 法[pʌp], is lost in Mandarin. In case of this particular character, the bilabial stop /p/ became fricative in Mandarin (see [fa]) and became further weakened in Sino-Japanese, as in [ho].¹⁷

- (19) 復-不-佛-鼻-舍-死-薩-三-想-相
fù-bù-fó-bí-shè-sǐ-sà-sān-xiǎng-xiāng (M)
[fu-pu-fo-pi-ʂə-si-sə-san-ɕiaŋ-ɕiaŋ]
fù-bat-bù-bí-shè-sà-sí-sān-xiǎng-xiāng (C)
[fu-pat-pu-pi-ʂe-sa-si-san-ɕiaŋ-ɕiaŋ]
bu-bu-bul-bi-sa-sa-san-sam-sang-sang (SK)
[pu-pu-pul-pi-sa-sa-san-sam-saŋ-saŋ]
bu-fu-butso-bi-sa-sa-san-san-so-so (SJ)
[bu-ϕu-butsu-bi-ɕa-ɕi-satsu-san-so-so]

¹⁶ 不 has two pronunciations in Sino-Korean: In front of a homorganic sound, the syllable-final /l/ drops, while it is maintained otherwise. For example, 不自然 is pronounced as [pu-tɕajʌŋ], whereas 不可能 is pronounced as [pul-kanuŋ].

¹⁷ Chinese character 復 is usually pronounced as [puk] in Sino-Korean, but it is read as [pu], if it is used in Buddhist scriptures such as the *Sutra*.

In (19), all the sound changes are already discussed so far, except the fact that the alveolar fricative /s/ in Sino-Korean is palatalized in front of a front vowel in Mandarin (compare Mandarin [çiaŋ] with Sino-Korean [saŋ]). In addition, the syllable-final /t/ in Archaic Chinese is palatalized in Sino-Japanese (as in [butso]) and lateralized in Sino-Korean (as in [pul]) and lost in Mandarin (as in [pu]).

- (20) 色-生-說-舌-聲-世-所-受-時-是
 sè-shēng-shuō-shé-shēng-shì-suǒ-shòu-shí-shì (M)
 [sə-ʂəŋ-ʂuo-ʂə-ʂəŋ-ʂi-suo-ʂou-ʂi-ʂi]
 sèk-shēng-shuō-shé-shēng-shì-suǒ-shòu-shí-shì (C)
 [sek-ʂəŋ-ʂuo-ʂe-ʂəŋ-ʂi-suo-ʂou-ʂi-ʂi]
 sayk-sayng-sel-sel-seng-sey-so-su-si-si (SK)
 [sæk-sæŋ-sʌl-sʌl-sʌŋ-se-so-si-si]
 shiki-sho-setsu-ze-sho-ze-sho-zu-zi-ze (SJ)
 [çiki-çə-setsu-zetsu-çə-ze-çə-ɕʷu-ɕʷi-dze]

In (20), the syllable-final /k/ in Cantonese and Sino-Korean is lost in Mandarin, whereby we have [sæk] and [se], respectively. Also alveolar fricative /s/ in Sino-Korean is palatalized in Mandarin (see Sino-Korean [sæŋ] and its Mandarin counterpart [ʂəŋ]). The usual /t/ to /l/ change from Archaic Chinese to Sino-Korean and its loss in Mandarin Chinese is also attested, as shown in the contrast between Sino-Korean [sʌl] and Mandarin [ʂe]. Of course, this final stop is palatalized in Sino-Japanese, as shown in [setsu]. The syllable-final velar nasal /ŋ/ is lost in Sino-Japanese (see 生 [ʃo]).

- (21) 識-身-神-實-心-深-阿-眼-礙-厄
 shí-shēn-shén-shí-xīn-shēn-ā-yǎn-ài-è (M)
 [ʂi-ʂən-ʂən-ʂi-çin-ʂən-a-iɛn-ai-ə]
 shík-shēn-shén-shít-sam-shēn-ā-yǎn-ài-è (C)
 [ʂik-ʂən-ʂən-ʂit-sam-ʂən-a-jan-ai-ə]
 sik-sin-sin-sil-sim-sim-a-an-euy-ayk (SK)
 [sik-sin-sin-sil-sim-sim-a-an-ɸi-ek]
 shiki-shin-zin-zitsu-shin-sim-a-an-euy-ay (SJ)
 [çiki-çin-ɕʷin-ɕʷitsʷu-çin-ɕʷin-a-gen-ge-jaku]

In (21), alveolar fricative /s/ in Sino-Korean is palatalized in Mandarin and the final /k/ is lost (see Sino-Korean [sik] and Cantonese [ʂik], compared with Mandarin [ʂi] for 識). The usual /t/ to /l/ change mentioned above and its loss in Mandarin Chinese is also seen, as in Cantonese [ʂit] and Sino-Korean [sil] in contrast to Mandarin [ʂi]. Cantonese 心[sam] changed to [çin] in Mandarin.

- (22) 若-如-亦-涅-五-蘊-曰-遠-有-依
 rě-rú-yì-niè-wǔ-yùn-rì-yuǎn-yǒu-yī (M)
 [ʂə-ʂu-i-niɛ-u-yn-ʂi-yɛn-iou-i]
 rĕk-rú-yĭk-nièt-wŭ-yùn-rì-yuǎn-yŏu-yī (C)
 [ʂek-ʂU-ji-niet-wu-jun-ʂit-juan-jou-ji]
 yak-ye-yek-yel-o-on-wal-won-yu-euy (SK)

[jak-jʌ-jʌk-jʌl-o-on-wal-won-ju-ɰi]
 ya-nyo-yaku-neze-go-on-watsu-on-u-e (SJ)
 [na-ŋo-jaku-ne-go-on-watsu-on-u-e]

In (22), the initial consonant of 若 in Cantonese, which was originally /n/, became rhotacized in Mandarin, but totally disappeared in Sino-Korean (regarding the history of the initial sound of this character, see Wang 1990, 1997). The initial nasal in 涅 dropped in Sino-Korean. The usual /t/ to /l/ change, discussed above regarding 實, is also attested in 日. Compare Cantonese [ʒit] with Mandarin [ʒi]. Also Compare the pronunciations of 日: Sino-Korean [wal] and Mandarin [ʒi] can be accounted for in this way. The syllable-final /l/ in Sino-Korean pronunciation in fact came from the syllable-final /t/ in Archaic Chinese and became lateralized, but it disappeared in Mandarin (for further discussion, see also Jang 2001).

- (23) 意-耳-以-異-一-子-自-在-顛-淨
 yì-ěr-yǐ-yì-yī-zǐ-zì-zai-diān-jìng (M)
 [i-ə-i-i-i-tsi-tsai-tsai-tien-tɕiŋ]
 yì-ěr-yǐ-yì-yit-tɕi-tɕài-tien-jìng (C)
 [ji-eʒ-ji-ji-ʒit-ʒai-tian-tɕiŋ]
 euy-i-i-i-il-ja-ja-jay-jen-jeng (SK)
 [ɰi-i-i-i-il-tɕa-tɕa-tɕæ-tɕʌn-tɕʌŋ]
 i-ni-i-i-il-shi-zi-zai-ten-zo (SJ)
 [i-ni-i-i-itsʉ-ɕi-dʒi-dzai-ten-dʒo]

In (23), the same story of /t/ to /l/ change applies to 一[iɪ] (see Cantonese [ʒit]). As for 顛[tɕʌn], palatalization applies backward. That is, Mandarin Chinese maintains alveolar stop /d/ while that of Sino-Korean underwent palatalization. Considering the fact that Sino-Korean represents the older form of Chinese than Mandarin, it might be the case of backward sound change. As for 耳, Sino-Japanese has /n/ in the initial position, which is lost in all the other variations. Cantonese and Sino-Japanese maintain unpalatalized /t/ for 顛, but Sino-Korean has a palatalized [tɕ]. The final velar nasal [ŋ] in 淨 is lost in Sino-Japanese.

- (24) 除-諸-照-呪-中-卽-增-知-智-至
 chú-zhū-zhào-zhòu-zhōng-jí-zēng-zhī-zhī-zhì (M)
 [tʂ^hu-tʂu-tʂau-tʂou-tʂuŋ-tɕi-tsəŋ-tʂi-tʂi-tʂi]
 chai-zhū-zhio-zhòu-zhōng-jí-zēng-zhī-zhī-zhì (C)
 [tʂ^hai-tʂu-tʂio-tʂou-tʂuŋ-tɕi-tsəŋ-tʂi-tʂi]
 jey-je-jo-ju-jung-juk-jung-ji-ji-ji (SK)
 [tɕe-tɕe-tɕo-tɕu- tɕuŋ- tɕuŋk-tɕuŋ-tɕi-tɕi-tɕi]
 jey-sho-sho-shu-chu-soku-zo-chi-chi-shi (SJ)
 [dʒo-ɕo-ɕo-ɕu-tɕu-soku-dzo-tɕi-tɕi-ɕi]

In (24), the syllable-initial /tɕ/ in Sino-Korean became aspirated (see Mandarin [tʂ^hu]) or palatalized (see Mandarin [tʂi]) before a front vowel.

- (25) 眞-盡-集-切-觸-捶-怖-行-香-虛
 zhēn-jīn-jí-qiē-chù-duō-bù-hang-xiāng-xū (M)
 [tʂən-tʂin-tʂi-tʂ^hiē-tʂ^hu-tuo-pu-xaŋ-ɕiaŋ-ɕy]
 zhēn-jìn-jí-qiē-chùok-duō-bù-hang-hiāng-xū (C)
 [tʂən-tʂin-tʂi-tʂ^hiē-tʂ^huək-tuo-pu-xaŋ-xiaŋ-xao]
 jin-jin-jip-che-chok-ta-po-hayng-hyang-he (SK)
 [tʂin-tʂin-tʂip-tʂ^he-tʂ^hok-ta-p^ho-hæŋ-hjaŋ-ho]
 shin-zin-shu-sai-soku-ta-fu-gyo-ko-ko (SJ)
 [ɕin-ɕin-ɕu-sai-soku-ta-ɸu-ɸo-ko-ko]

In (25), the usual /t/ to /l/ change is attested in 切. Compare the Sino-Korean [tʂ^he] and Mandarin [tʂ^hiē]. This Chinese character has two pronunciations in Sino-Korean, namely [tʂ^he] and [tʂɿl]. The latter pronunciation is remnant of this phonological change. The velar fricative /h/ in Cantonese and Sino-Korean is palatalized in Mandarin. Thus, 香[hjaŋ, xiaŋ] and 虛[hə, xao] are pronounced as [ɕiaŋ] and [ɕy], respectively. These two characters have undergone so-called backward palatalization in Sino-Japanese, which are sometimes voiced, if conditions are met, as in [g^o]. The same kind of phonological process occurred to 行 and 香 in Sino-Japanese: The voiceless velar stop /k/ is palatalized in Sino-Korean, whereas it remains as it is in Sino-Japanese.

So far, we have examined various phonological processes that are involved in the translation of the main text of the *Heart Sutra* from Archaic Chinese version into Sino-Korean. We have also compared the Sino-Korean pronunciations with those of Mandarin Chinese.

4. Conclusion

In this paper, we have examined the phonological changes that have occurred to the sounds in various versions of the *Heart Sutra* in Sino-Korean, Sino-Japanese, and Sino-Vietnamese. Considering the fact that religious scriptures are truly conservative in terms of linguistic changes, and thus are not sensitive to phonological changes, the *Heart Sutra* can be a quite reliable test ground where we can investigate the sound changes in Chinese and its borrowed vocabulary in neighboring countries. In addition, the *Heart Sutra* sometimes are transcribed almost verbatim, instead of translated, in the languages of these neighboring countries, sound changes involved in the process of transmission are quite transparent. In particular, we can compare the various pronunciations of the Chinese characters used in the *Sutra* in Chinese, Japanese, Korean, and Vietnamese. We have found that the way the *Sutra* is pronounced in Modern Korean is drastically different from the one it was read earlier. This state of affairs is also true of Chinese, since it has also changed a lot.

In Section 3, we have examined the pronunciations of those Chinese characters in the *Heart Sutra*. In section 3.1, we first examined the title and have shown that parts of the title were transcribed. In section 3.2,

we have investigated various phonological processes involved in translation of the mantra of the *Sutra*. Since mantra tends to remain intact across the cultures where it is adopted, we have seen the almost uniform pronunciations of the mantra except that some phonological changes occurred in Sino-Korean version. For example, palatalization and loss of initial consonants are attested in the Sino-Korean version of the mantra. In section 3.3, we have examined 110 Chinese characters used in the *Heart Sutra*, which itself is composed of 262 characters. Various kinds of phonological processes are involved in the version of Archaic Chinese, Mandarin version, and Sino-Korean version.

On the basis of principled reconstruction of the earlier sounds, we have hopefully shown that the way current Korean version is pronounced (and Chinese version, too, for this matter) of the *Heart Sutra* is quite different from the Sanskrit version, and we could figure out various phonological processes relevant for this change.

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received: March 5, 2011

accepted: April 15, 2011