

Phonological Adaptation of Sanskrit Loanwords
in *Dàtáng Xīyùjī*

การปรับเสียงคำยืมภาษาสันสกฤตในต้าถังซียุวี้จี้

Apiwat Kumpai
อภิวัฒน์ คุ้มภัย*

บทคัดย่อ

บทความวิจัยนี้มุ่งวิเคราะห์คำยืมภาษาสันสกฤตจำนวน ๑๒๙ คำ จากหนังสือ *ต้าถังซียุวี้จี้* ซึ่งบันทึกการเดินทางสู่ดินแดนตะวันตกของพระถังซัมจั๋งระหว่างปี ค.ศ. ๖๒๖-๖๔๕ โดยศึกษาการปรับเสียงคำยืมภาษาสันสกฤตใน ๒ ระดับคือระดับหน่วยเสียงและกฎเกณฑ์การเรียงหน่วยเสียงในกระบวนการปรับเสียงภาษาต่างประเทศเข้ามาสู่ภาษาแม่พบว่าความคล้ายคลึงทางสัทศาสตร์มีบทบาทสำคัญในกระบวนการปรับเสียง นอกจากนี้ยังพบว่าความคล้ายคลึงกันในการรับรู้เสียงและการกลมกลืนเสียงมีบทบาทในกระบวนการปรับเสียงด้วยเช่นกัน ในระดับของการเรียงหน่วยเสียงพบว่า การปรับเสียงพยัญชนะต้นประสมมักใช้วิธีการแทรกเสียงสระ ส่วนการปรับเสียงพยัญชนะท้ายในภาษาต่างประเทศมักใช้วิธีการสูญเสียงพยัญชนะ นอกจากนี้ยังมีการแทรกเสียงพยัญชนะต้นและพยัญชนะท้ายเพื่อจัดโครงสร้างพยางค์ใหม่ สำหรับคำที่มีหลายพยางค์จะใช้วิธีการสูญ

* ผู้ช่วยศาสตราจารย์ประจำภาควิชาภาษาปัจจุบันตะวันออก คณะอักษรศาสตร์ มหาวิทยาลัยศิลปากร

เสียงสระท้ายพยางค์ ส่วนคำที่มีสระเสียงยาวในภาษาสันสกฤตจะใช้วิธีการ
ทอนเสียงสระให้สั้นลง ผลการวิจัยสรุปได้ว่ากระบวนการปรับเสียงเกิดขึ้นใน
ระดับทางสัทศาสตร์ หน่วยเสียงในภาษาสันสกฤตจะเปลี่ยนเป็นหน่วยเสียง
ที่มีสัทลักษณะใกล้เคียงกันในภาษาจีน ไม่พบหลักฐานที่สนับสนุนทฤษฎี
การปรับเสียงคำยืมที่เกิดขึ้นในระดับของระบบเสียงภาษาผู้รับ

คำสำคัญ : คำยืมภาษาสันสกฤต ต้าถังซียฺวี่จี ภาษาจีนยุคกลาง การปรับ
เสียงคำยืม

Abstract

This research paper aims to analyze 129 loanwords derived from Sanskrit in *Dàtáng Xīyǔjī*, which narrates Xuánzàng's journey to the West between 626 A.D. and 645 A.D. The research examines loanword adaptation at two levels : phonemic and phonotactic. On adaptation of incoming sounds into the native language, it is found that phonetic similarity plays an important role in loanword adaptation. It is noted that perceptual similarity and perceptual assimilation also take part in the adaptation processes. At the phonotactic level, it is observed that the main strategy for resolving onset clusters is vowel epenthesis, while the major method of resolving foreign codas is consonant deletion. The insertion of an initial consonant and a coda is another approach to reorganize syllable structures. The deletion of the vowel in the last syllable is applied to truncate multi-syllables, and the reduction of vowel length is employed to deal with vowel sequence in Sanskrit. The research concludes that when the adaptation occurs at the

phonetic level, Sanskrit phonemes are directly mapped onto corresponding forms in Chinese. There is no evidence in the data to support the theory that loanwords are nativized at the abstract phonological level of the target language.

Keywords : Sanskrit loanwords, *Dàtáng Xīyùjì*, Middle Chinese, loanword adaptation

1. Introduction

Dàtáng Xīyùjì 大唐西域記* or *The Great Tang Records on the Western Regions* is a popular travelogue of Xuánzàng's 玄奘 nineteen-year journey from Cháng'ān 長安 to India between 626 A.D. and 645 A.D. Currently, there are a number of studies undertaken to investigate Sanskrit loanwords in Chinese. These studies focus on etymological descriptions (Zhāng Yǒngyán 1982, Hú Qíguāng 1987, Xú Wénkān 1987, Zhào Zhēnduó 1988, Ji ā ng Shào yú 1989) and phonological adaptation (Chén Shūfēn 2000). Previous works on phonological adaptation demonstrate variability in phonemic substitution patterns and phonological strategies in accommodating Sanskrit loans. However, most of the data used in the studies are primarily collected from Chinese Buddhist scripts in different periods. There are relatively few studies conducted on Sanskrit loanwords in *Dàtáng Xīyùjì*. The goal of this study is to explain the phonological adaptations of Sanskrit loanwords in the

* This study uses Taisho Tripitaka Vol. T51 大正新脩大藏經第五十一冊, No. 2087 大唐西域記.

travelogue both at the segmental and the phonotactic level. The source material is a word list of 129 lexical items. They are identified as originating from Sanskrit in Sir Monier Williams' *Sanskrit–English Dictionary* (1899) and Soothill and Hodous's *A Dictionary of Chinese Buddhist Terms* (1987). Most of them are transliterated terms and hybrids. The words that are fully translated from Sanskrit are excluded from consideration. Some words whose origin is obscure are also discarded from the study. This study contributes to both the research on Sanskrit loanwords in Chinese and Middle Chinese phonology in general.

2. An overview of Sanskrit and Middle Chinese Phonology

2.1 Sanskrit phonology

2.1.1 Sanskrit

Sanskrit belongs to the historical Indo–Aryan family of languages. The pre–Classical form of Sanskrit is known as Vedic Sanskrit, the earliest monument of the Sanskrit language (Gosh 1977 : 48). Classical Sanskrit is considered the standard register as stated in the grammar of Pāṇini, around the 4th century BCE

2.1.2 Vowels

Sanskrit distinguishes between short vowels and long vowels. There are also short and long retroflex approximants or vocalic vowels which do not exist in many languages. The vowels /e/ and /o/ are regarded as allophonic variants of /ai/ and /au/. They are categorized as diphthongs by Sanskrit grammarians even though they are realized phonetically as simple long vowels (Macdonell 1982 : 3).

Table 2.1 Vowel phonemes in Sanskrit

Front-High	Mid-Low	Back-Low	Vocalic vowels
i	a	u	ɾ ɽ
ii	aa	uu	ɽɽ
ai		au	
aaɪ		aaʊ	

2.1.3 Initial consonants

The consonant system involves 36 phonemes, with five places of articulations for stops (bilabial, dental, retroflex, palatal and velar), five for nasals (labial, dental, retroflex, palatal and velar), two for liquids (dental and retroflex), four for fricatives (dental, retroflex, palatal and glottal), and two for semivowels (labiodental and palatal) (Macdonell 1982 : 4).

Table 2.2 Consonant phonemes in Sanskrit

		Labial	Labio dental	Dental	Retroflex	Palatal	Velar	Glottal
Stop	Unaspirated	p b		t d	ʈ ɖ	c j	k g	
	Aspirated	ph bh		th dh	ʈh ɖh	ch jh	kh gh	
	Nasal	m		n	ɳ	ɲ	ŋ	
	Liquid			l	r			
	Fricative			s	ʂ	ʃ		h ɦ
	Semivowel		v			y		

2.2 Middle Chinese phonology

2.2.1 Middle Chinese

Middle Chinese or *Ancient Chinese* as used by famous Swedish sinologist Bernhard Karlgren refers to the Chinese language spoken during the Southern and Northern Dynasties and the Suí 隋, Táng 唐, and Sòng 宋 Dynasties (6th–10th century).

2.2.2 Middle Chinese initials

From the end of the Táng period, more explicit descriptions of initial consonants have appeared. The oldest known system, that of Shǒu Wēn 守溫, used 30 Chinese characters to distinguish initial consonants. Later in the Sòng period, appeared the systems of 36 initials. As the sì 俟 initial is merged with the chán 禪 initial, there are totally 36 initials in Middle Chinese as illustrated below :

Table 2.3 Consonant phonemes in Middle Chinese

Bilabials	幫 p	滂 ph	並 b	明 m		
Dentals	端 t	透 th	定 d	泥 n	來 l	
Supradentals	知 t̚	徹 th̚	澄 ɖ	娘 ŋ		
Dental	精 ts	清 tsh	從 dz		心 s	邪 z
Retroflex	莊 tʂ	初 tʂh	崇 dz̥		山 ʂ	
Palatal	照 tɕ	穿 tɕh	神 dz̥		審 ɕ	禪 z̥
Velars	見 k	溪 kh	群 g	疑 ŋ	曉 x	匣 ɣ
Laryngeals	影 ʔ	云 ʏ	以 j			
Palatal nasal	日 ñ					

2.2.3 Middle Chinese Finals

Traditionally, the vowels were categorized into Kāikǒu 開口 (open mouth) and Hékǎǒu 合口 (rounded mouth) vowels which were arranged in several different

sub-groups according to their rhymes or yùn 韵.

Jiāng Yǒng 江永, a prominent philologist during the Qīng Dynasty, claimed that the differences between the four divisions were based on the degree of the openness of the mouth when each rhyme was pronounced. In this study, the reconstruction of the finals is primarily based on Wáng Lǐ’s systems. The differences between other systems are as follows :

Table 2.4 Comparisons of Middle Chinese vowels in four divisions

Reconstruction System	Division 1	Division 2	Division 3	Division 4
Karlgren	â, â, ə, u	ɛ, ǎ, a, ǎ, ɒ	iV or jV	ie
Pulleyblank	a, ə, u, o	ae, ai, əi	iV or jV	ɛ
Wáng Lǐ	ɑ, ə, u, o	a, æ, ɐ, ɔ	jV	iaɛi
Dǒng Tōnghé	ɑ, ə, u, o	a, æ, ɐ, ɔ,	jV	ie
Zhōu Fǎgāo	ɑ, ə, u,	a, æ, ɛ, o,	iV	ie
Lǐ Róng	ɑ, ə, u, o	a, ɐ, ɛ, ɔ,	iV	e
Shào Róngfēn	ɑ, ə, u, o	a, ɐ, ɛ, ɔ,	iV	e
Zhèngzhāng Shàngfāng	ɑ, ə, u, o, ʌ	ɣV	iV	e
Pān Wùyún	ɑ, ə, u, o	ɣV	iV	e

2.2.4 Middle Chinese tones

Middle Chinese had four tones classified as píng 平 ‘level’, shǎng 上 ‘rising’, qù 去 ‘departing’, and rù 入 ‘entering’. In modern dialects, the words 陰 yīn and 陽 yáng are added to express two different modern tone patterns. The former expresses the upper-register type which includes those syllables having voiceless

initials. The latter expresses the lower-register type which includes those syllables having voiced initials (Manomaivibool 1975 : 269). Under this scheme, it can be concluded that the first and the second tones of modern Mandarin were derived from the original píngshēng 平聲 syllables.

3. Phonological Adaptation

According to related literature, loanwords often show inconsistent correspondences, and need only meet well-formed conditions within the target language. Loanword forms which are considered illicit will be readjusted in certain ways to fit the set of possible sounds in the native language inventory.

3.1 Vowel Adaptations

3.1.1 Adaptations of [a] and [ā]

3.1.1.1 Sanskrit [a] → Middle Chinese [a]

- | | | |
|--------------|----------------------|----------------------|
| a. Bimbisāra | 頻鞞娑邏 [bin bi sa la] | ‘King Bimbisara’ |
| b. Vipula | 毗布羅山 [bi puH la ʂæn] | ‘name of a mountain’ |

3.1.1.2 Sanskrit [a] → Middle Chinese [a]

- | | | |
|-------------|---------------------------------|--|
| a. Kanishka | 迦膩色迦王
[ka niH sjək ka ɣjwaŋ] | ‘name of a celebrated king of Northern India whose reign began in the first century of our era and who, next to Asoka, was the greatest supporter of Buddhism’ |
| b. kaṣāya | 袈裟 [ka ʂa] | ‘name of a mountain’ |

3.1.1.3 Sanskrit [a] → Middle Chinese [ja]

- | | | |
|-----------|----------------|---|
| a. moca | 茂遮 [məuH tɕja] | ‘an Indian medical plant having Botanical name of <i>Bombax ceiba</i> ’ |
| b. śarīra | 舍利 [ɕjaH liH] | ‘a body; a kind of pearl or crystal-like bead-shaped objects that are |

purportedly found among the cremated ashes of Buddhist spiritual masters'

3.1.1.4 Sanskrit [a] → Middle Chinese [ua]

- a. mahā 摩訶 [mua xa] 'greatness'
 b. stūpa 窣堵波 [suət tuX puɑ] 'a Buddhist monument generally of a pyramidal or dome-like form erected over sacred relics of the great Buddha or on spots consecrated as the scenes of his acts'

3.1.1.5 Sanskrit [a] → Middle Chinese [je]

- a. nivāsana 泥縛些那 [ni bjwək sje naH] 'undergarments'

3.1.1.6 Sanskrit [a] → Middle Chinese [ai]

- a. vinaya 毗奈耶 [bi naiH ja] 'leading out; education; discipline'

3.1.1.7 Sanskrit [a] → Middle Chinese [uan]

- a. panasa 般糝袞 [puan ŋa ʂa] 'the bread-fruit'

3.1.1.8 Sanskrit [an] → Middle Chinese [jɛn]

- a. candana 旃檀樹 [tɕɛn dan ʒjuH] 'sandalwood'

3.1.1.9 Sanskrit [aṅ] → Middle Chinese [jɛŋ]

- a. Gaṅgā 殑伽河 [gɕɛŋH gja ɣɑ] 'the Ganges River'

3.1.1.10 Sanskrit [aṅ] → Middle Chinese [jɛn] ~ [uan]

- a. Nerañjarā 尼連河 [ni ljɛn ɣɑ] 'the river Nerañjarā'
 b. Mañjusrī 曼殊尸利 [muanH ʒju ɕi liH] 'Mañjusri Bodhisattva'

3.1.1.11 Sanskrit [aṅ] → Middle Chinese [ɛŋ]

- a. saṃghārāma 僧伽藍 [sɛŋ gja lɑm] 'a Buddhist monastery'

3.1.1.12 Sanskrit [a] → Middle Chinese [ɑp]

- a. lava 臘縛 [lap bjwək] 'of eight forty-fths of one second'

3.1.1.13 Sanskrit [a] → Middle Chinese [əp]

- a. Gautama 喬答摩 [gɕeu tɔp muɑ] 'the Lord Buddha'

3.1.1.14 Sanskrit [a] → Middle Chinese [jəp]

- a. Licchavi 栗帖婆子 ‘an ancient republic which existed in
[lit tɕhjəp bua tsjɛ] what is now Bihar state of India’
- b. Kāsyapa 加叶波 [ka ɕjəp pua] ‘the monk Kāsyapa’

3.1.1.15 Sanskrit [a] → Middle Chinese [jɛp]

- a. Kapilavastu 劫比羅伐率堵國 ‘the name of a region of ancient
[kʲjɛp pi la bjwɛt suɛt Shakya kingdom that is considered
tuX kuək] a holy pilgrimage place for Buddhists,
located close to Lumbini’

3.1.1.16 Sanskrit [a] → Middle Chinese [ɑt]

- a. Kosala 僑薩羅國 ‘name of the country of Kosala’
[kʲjɛu sɑt la kuək]

3.1.1.17 Sanskrit [a] → Middle Chinese [uat]

- a. Mathurā 秣菟羅國 ‘name of the country of Mathurā’
[muat thuH la kuək]
- b. kambala 頌鉢羅 [ʋam puat la] ‘kambala cloth’

3.1.1.18 Sanskrit [a] → Middle Chinese [jɛt] ~ [jɛt]

- a. makara 摩羯羅魚 [mua gjɛt la ŋjo] ‘the makara fish’
- b. Śākala 奢羯羅城 [ɕja gjɛt la zjɛŋ] ‘the ancient capital of Takka’

3.1.1.19 Sanskrit [a] → Middle Chinese [jɛt]

- a. Kusinagar 拘尸那揭羅國 ‘the place of the Buddha’s nirvana’
[kju ɕi naH kjɛt la kuək]
- b. Aviddhakarṇa 阿避陀羯刺拏 ‘the name of Aviddhakarṇa monastery’
[ʔɑ bjeH da kjɛt lat ŋa]

3.1.1.20 Sanskrit [a] → Middle Chinese [jwɛt]

- a. vana 伐那 [bjwɛt naH] ‘forest’
- b. śravaṇa 尸羅筏拏月 ‘the month of śravaṇa’
[ɕit la bjwɛt ŋa ŋjwɛt]

3.1.1.21 Sanskrit [a] → Middle Chinese [ak] ~ [ak]

- a. Mahā 莫訶河 [mak xa ɣɑ] ‘the river Mahā’
 b. upāsaka 烏波索迦 [ʔu puɑ sak ka] ‘the title of masculine followers of Buddhism’

3.1.1.22 Sanskrit [a] → Middle Chinese [əɔk]

- a. upāsaka 優波塞 [ʔəu puɑ sək] ‘the title of masculine followers of Buddhism’

3.1.1.23 Sanskrit [a] → Middle Chinese [jwək]*

- a. aśvayuja 頰濕縛庾閏月 [ʔat tɕjəp bjwək jiuX zja ŋjwət] ‘the month of aśvayuja’
 b. Jivaka 時縛迦 [zi bjwək ka] ‘a private doctor of the Buddha’

3.1.1.24 Sanskrit [ā] → Middle Chinese [a] ~ [ɑ]

- a. karṇikā 羯尼迦樹 [kjet ni ka zjuH] ‘a Karnika flower’
 b. Apalāla 阿波邏羅 [ʔɑ puɑ la la] ‘the nāga a of the source of the river Śubhavāstu (Swat) of Udyāna’

3.1.1.25 Sanskrit [ā] → Middle Chinese [ua]

- a. māgha 磨伽月 [mua gja ŋjwət] ‘the month of māgha’
 b. māra 魔 [mua] ‘the demon who tempted Gautama Buddha by trying to seduce him with the vision of beautiful women’

3.1.1.26 Sanskrit [ā] → Middle Chinese [ja]

- a. saṃghārāma 伽藍 [gja lam] ‘a Buddhist monastery’

3.1.1.27 Sanskrit [ā] → Middle Chinese [je]

- a. saṃghāṭi 僧祇支 [səŋ gje tɕje] ‘a Buddhist monk’s coat’

3.1.1.28 Sanskrit [ā] → Middle Chinese [jɛn]

- a. dhyāna 禪 [zjɛn] ‘a state of deep meditative absorption’

* In the data, only the character 縛 [bjwək] is found to render the Sanskrit [a]

characterized by lucid awareness and achieved by focusing the mind on a single object'

3.1.1.29 Sanskrit [ā] → Middle Chinese [uan]

a. nivāsana 涅槃僧 [niet buan səŋ] 'undergarments'

3.1.1.30 Sanskrit [ā] → Middle Chinese [uat]

a. mārgaśīrṣa 末伽始羅月 'the month of mārgaśīr ṣa'
[muat gja ɕi la ŋjwət]

b. pātra 鉢 [puət] 'an alms bowl'

3.1.1.31 Sanskrit [ā] → Middle Chinese [jwək]

a. nivāsana 泥縛些那 [ni bjwək sje na] 'undergarments'

3.1.2 Adaptations of [u] and [ū]

3.1.2.1 Sanskrit [u] → Middle Chinese [u] ~ [əu]

a. tuṣṭita 堵史多 [tuX sjaX ta] 'the Tuṣṭita heaven'

b. tuṣṭita 兜术他 [təu ʃjuət tha] as 11 a

3.1.2.2 Sanskrit [u] → Middle Chinese [jəu]

a. upadeśa 优波提婆 'instruction, discussions of doctrine'
[ʔjəu puə dei sa]

3.1.2.3 Sanskrit [u] → Middle Chinese [juət]

a. Kulūta 屈露多國 'an ancient Kingdom in north India
[kjuət luH ta kuək] famous for its rock temples'

3.1.2.4 Sanskrit [u] → Middle Chinese [juk]

a. Mucalinda 目支鄰陀 'a naga who protected the Buddha
[mjuk tsje lin da] from the elements after his enlightenment'

3.1.2.5 Sanskrit [ū] → Middle Chinese [u]~[juət]~[jəu]

a. sūtra 素達纜 [suH ta lamH] 'canonical scriptures'

b. sūdra 戌陀羅 [sjuət da la] 'the lowest Varna in the traditional

3.1.4.2 Sanskrit [e] → Middle Chinese [i]

- a. Veda 毗陀 [bi da] 'knowledge'

3.1.4.3 Sanskrit [e] → Middle Chinese [jwɛi]

- a. Veda 吠陀 [bjwɛi da] as above.

3.1.5 Adaptations of [o]

3.1.5.1 Sanskrit [o] → Middle Chinese [ju]~ [u]

- a. Yasodhara 耶輸陀羅 [jia ɕju da la] 'the daughter of King Suppabuddha'
b. kapotaka 迦布德迦 [ka pu tək ka] 'a dove; the Kapotaka Vihara'

3.1.5.2 Sanskrit [o] → Middle Chinese [jɛu]

- a. Kosala 憍薩羅 [kjɛu sat la] 'an ancient Indian region, corresponding roughly in the present day Uttar Pradesh state'

3.1.5.3 Sanskrit [o] → Middle Chinese [ak]

- a. loka 洛迦 [lak ka] 'a world'

3.1.6 Adaptation of [ai]

3.1.6.1 Sanskrit [ai] → Middle Chinese [jɛi]

- a. caitra 制怛羅月 [tɕjɛi tət la ŋjwət] 'the month of Caitra'

3.1.7 Adaptation of [au]

3.1.7.1 Sanskrit [au] → Middle Chinese [jɛu]

- a. Kauśambi 憍賞彌國 [kjɛu ɕjaŋ mje kuək] 'the capital of the Vatsas ; one of the Mahajanapadas (Great Kingdoms) of ancient India.'

3.1.8 Counter arguments against vowel length in Middle Chinese

Pulleyblank (1984,1991) claims that vowel length is a main feature of Middle Chinese phonology since it distinguishes Grade I rhymes (一等韻 yī děng yùn) from Grade II rhymes (二等韻 èr děng yùn). However, in the research of Sanskrit loanwords in *Dàtáng Xījùjì*, there are no distinctions between short and

๑๗๖ อภิวิธานน์ คำมกัย

long vowel in transliterating Sanskrit terms. It is also found that within the same word there are short and long vowels transliterated with the same Chinese characters as shown below.

- a. Rāhula 羅怛羅 la ɣuX la ‘the only son of Siddhartha Gautama’
b. Mahāmāya 摩訶摩耶 muɑ xa muɑ ja ‘the mother of Siddhartha Gautama’
c. jambū/jambu 瞻部 zjɛm buH ‘a jambu tree’

From the above examples, it is plausible that there were no long vowels in Middle Chinese. The reconstruction of Pulleyblank (1991) using vowel length to distinguish these two rhymes seems problematic. On the other hand, the reconstruction by Martin (1953), Lǐ Róng (1956) and Wáng Lì (1985) using vowel quality to distinguish these two rhymes are empirically tenable.

3.2 Consonant adaptation

3.2.1 Velars

The velar consonant substitutions are fairly straightforward. Voiced velars in Sanskrit generally correspond to voiced or voiceless velars in Middle Chinese. Voiced aspirated velars in Sanskrit were rendered as unaspirated in Middle Chinese.

3.2.1.1 Sanskrit [k] → Middle Chinese [k]

- a. Kusinagara 拘尸國 [kju ɕi kuək] ‘the Place of Buddha’s nirvana’
b. kauśeya 驕奢耶 [kʃeu ɕja ja] ‘silk cloth, silk petticoat or trousers, a woman’s lower garments of silk’

3.2.1.2 Sanskrit [g] → Middle Chinese [g] ~ [k]

- a. yoga 瑜伽 [ju gja] ‘joining or integrating all aspects of the individual’
b. nyagrodha 尼拘律樹 [ni kju ljwet zjuH] ‘a banyan tree’

3.2.1.3 Sanskrit [gh] → Middle Chinese [g]

- a. saṃgha 僧伽 [səŋ gja] ‘the group of monks and nuns who renounced secular life and dedicated themselves to Buddhist practice’

3.2.2 Palatals

There were no palatal affricates or nasals in Middle Chinese. Thus, Sanskrit palatals were nativized as the alveolo-palatals in Middle Chinese.

3.2.2.1 Sanskrit [c] → Middle Chinese [tʃ]

- a. Campaka 瞻博迦國 *'name of the country, Campaka'*
[tʃɛm pak ka kuək]
- b. Campā 瞻波城 *'the ancient capital of Aṅga, located on the confluence of the Campā and Ganges rivers'*
[tʃɛm puɑ zjɛŋ]

3.2.2.2 Sanskrit [ch] → Middle Chinese [tʃh]

- a. Chaṇḍaka 闍鐸迦 *'a servant of the Buddha before he renounced secular life'*
[tʃhjenX dak ka]

3.2.2.3 Sanskrit [j] → Middle Chinese [z] ~ [tʃ] ~ [g]

- a. jambu 瞻部樹 *'a tree described in Buddhist scriptures as a lofty and enormous tree that abounds in Jambudvīpa'*
[zjɛm buH zjuH]
- b. Gurjara 瞿折羅國 *'the kingdom of Gurjara in Indian'*
[kju tʃɛt la kuək]
- c. Jivaka 耆婆 [gi buɑ] *'a private doctor of Buddha'*

3.2.2.4 Sanskrit [ñ] → Middle Chinese [ɲ]

- a. Kauṇḍīnīa 憍陳如 [kʃeu dʒen ɲjo] *'a Buddhist bhikkhu in the sangha of Gautama Buddha and the first to become an arahant'*

3.2.3 Retroflexes

As earlier mentioned, Sanskrit has retroflexes series which correspond to their counterparts in Middle Chinese. Hence, the adaptations are fairly straightforward. It should be noted that the voiced aspirated retroflexes were rendered as unaspirated in Middle Chinese. There are some cases where Sanskrit retroflexes were

rendered as the alveolo-palatals or the alveolar stops in Middle Chinese. The exact reason for this adaptation is not known but I assume it may be due to inaccurate transliteration. It is also found that, intervocalically, the voiceless palatal stop [t̪] is rendered with the voiced palatal stop [d̪].

3.2.3.1 Sanskrit [t̪] → Middle Chinese [t̪] ~ [d̪]

- | | | |
|-------------|--------------------|--|
| a. Pāṭali | 波咤厘城 | <i>‘the capital of Magadha in ancient India’</i> |
| | [pua t̪a li z̪jɛŋ] | |
| b. nīlapīṭa | 尼羅蔽荼 | <i>‘blue deposit’</i> |
| | [ni la bei d̪a] | |

3.2.3.2 Sanskrit [d̪] → Middle Chinese [d̪] ~ [d] ~ [t]

- | | | |
|--------------|----------------------|---|
| a. Draviḍa | 達羅毗荼國 | <i>‘province of Draviḍa in South India’</i> |
| | [dat la bi d̪a kuək] | |
| b. Daṇḍaloka | 彈特山 | <i>‘the Daṇḍaloka mountain’</i> |
| | [dan dək ʃæn] | |
| c. Daṇḍaloka | 彈多落迦山 | <i>as 9b</i> |
| | [dan ta lak ka ʃæn] | |

3.2.3.3 Sanskrit [d̪h] → Middle Chinese [d̪] ~ [d]

- | | | |
|-----------|--------------|---|
| a. āṣāḍha | 頽沙荼 | <i>‘the eight month in the Indian lunar year’</i> |
| | [ʔat ʃa d̪a] | |
| b. āṣāḍha | 阿沙陀 | <i>as 10a</i> |
| | [ʔa ʃa d̪a] | |

3.2.3.4 Sanskrit [ŋ] → Middle Chinese [ŋ] ~ [n]

- | | | |
|-------------|-----------------|---|
| a. Pāṇini | 波爾尼 | <i>‘an Ancient Indian Sanskrit grammarian from Pushkalavati’</i> |
| | [pua ŋiX ni] | |
| b. Vāraṇasī | 婆羅那斯 | <i>‘a city situated on the west bank of the River Ganga in the Indian state of Uttar Pradesh’</i> |
| | [bua la naH si] | |

3.2.4 Dentals

Sanskrit dentals were realized as alveolars in Middle Chinese. Voiced aspirated ones were realized as unaspirated in Middle Chinese.

3.2.4.1 Sanskrit [t] → Middle Chinese [t]*

- a. muhūrta 牟呼栗多 [mjəu xu li ta] ‘for a span of minutes’
b. Asita 阿私多 [ʔa si ta] ‘a hermit ascetic of ancient India’

3.2.4.2 Sanskrit [th] → Middle Chinese [th]

- a. Mathurā 秣菟羅國 [muat thu la kuək] ‘a city in the Indian state of Uttar Pradesh’

3.2.4.3 Sanskrit [d] → Middle Chinese [d]

- a. Draviḍa 達羅毗荼國 [dat la bi ḍa kuək] ‘province of Draviḍa’
b. Nanda 難陀 [nan da] ‘the younger half-brother of the Buddha’

3.2.4.4 Sanskrit [dh] → Middle Chinese [d]

- a. Sindhu 信度 [sinH duH] ‘the Sindhu river’
b. Ayodhyā 阿瑜陀國 [ʔa ju da kuək] ‘the kingdom of Lord Rāmacandra’

It is found that Sanskrit [dh] was also rendered as [z] as in 禪 [zjɛn] for the Sanskrit word dhyāna. However, only one word is found in the list.

3.2.4.5 Sanskrit [n] → Middle Chinese [n]

- a. Ananda 阿難 [ʔa nan] ‘one of many principal disciples who had the most retentive memory’
b. Nalanda 那蘭陀 [naH lan da] ‘the name of an ancient university in Bihar’

3.2.5 Labials

Sanskrit labials were realized faithfully as their corresponding counterparts in Middle Chinese. Only the voiced aspirated labial [bh], which did not exist in Middle Chinese, was rendered as unaspirated.

* In the data, only the character 多 [ta] is found to render the Sanskrit syllable [ta]

3.2.5.1 Sanskrit [p] → Middle Chinese [p]

- | | | |
|------------|-------------------------|--------------------|
| a. pura | 布羅 [puH la] | 'a country' |
| b. pippala | 畢鉢羅樹 [pjet pua la zjuH] | 'the pippala tree' |

3.2.5.2 Sanskrit [ph] → Middle Chinese [ph]

- | | | |
|-------------|-------------------------|-------------------------|
| a. phālguna | 頗勒窣拏月 | 'the month of Phālguna' |
| | [phua lek guX ɳa ŋjwət] | |

3.2.5.3 Sanskrit [b] → Middle Chinese [b]

- | | | |
|----------------|-------------------|---|
| a. brāhmaṇa | 婆羅門 [bua la muən] | 'of the brāhmaṇas' |
| b. bodhisattva | 菩薩 [bu sat] | 'a being that compassionately refrains from entering nirvana in order to save others' |

3.2.5.4 Sanskrit [bh] → Middle Chinese [b]

- | | | |
|---------------|------------------------|-------------------------|
| a. bhādrapada | 婆羅鉢陀月 | 'a month of Bhādrapada' |
| | [bua la puat da ŋjwət] | |

3.2.5.5 Sanskrit [m] → Middle Chinese [m]

- | | | |
|---------------|-----------------|--|
| a. mayūra | 摩裕羅 [mua ju la] | 'a peacock' |
| b. abhidharma | 阿毗達摩 | 'Buddhist works which contain detailed scholastic reworkings of doctrinal material appearing in the Buddhist Sutras' |
| | [ʔa bi dat mua] | |

3.2.6 Approximants

Onset approximants (semivowels and liquids) were realized as their corresponding phonemes in Middle Chinese. The retroflexes [ɹ] and the labiodentals [v], which did not exist in Middle Chinese, were nativized as the liquids [l] and the labial stops [b] without exception.

3.2.6.1 Sanskrit [y] → Middle Chinese [j]

- | | | |
|-----------|-------------------|--|
| a. Gayā | 伽耶城 [gja ja zjeŋ] | 'a city in Gaya district in the Indian state of Bihar' |
| b. vinaya | 毗奈耶 [bi naiH ja] | 'a discipline' |

3.2.6.2 Sanskrit [r] → Middle Chinese [l]

- a. sūtra 修多羅 [sɬəu ta la] ‘a rope or thread that holds things together or a collection of such aphorisms in the form of a manual’

In some cases, it is found that Sanskrit [r] was rendered as the final consonant [-t] in Middle Chinese. This may be due to the perceptual similarity or the perceptual assimilation between these two sounds (see 3.1.1.24 a). In the first case, it can be explained that Sanskrit [r] which occurs post-vocally and the final [-t] in Middle Chinese are more confusable than other pairs, thus the final [-t] is chosen to substitute Sanskrit [r] since it creates less dissimilarity. In the second case, it can be explained through the perceptual assimilation approach that these two sounds are both coronal. The [r] > [t] mapping preserves the major articulator by realizing [r] as [t], which is a coronal consonant, rather than labial consonants. The other mappings [r]-[p], [r]-[k], [r]-[m], [r]-[n] and [r]-[ŋ] are less confusable.* It is evident that the adaptation denotes the confusability of the two sounds which can be perceived by the listeners.

3.2.6.3 Sanskrit [l] → Middle Chinese [l]

- a. Takṣaśīla 呬叉始羅城 ‘the ancient capital of the eastern Punjab’
[ta tʂa ʃi la zjɛŋ]

In some cases, it is found that Sanskrit [l] was rendered as the final consonant [-n] in Middle Chinese (e.g. Rāhula > 羅雲 [la ɣ jwən] ‘the son of Siddhartha Gautama’). This may be due to the perceptual similarity between these two sounds. The reason is that the liquid [l] and the nasal [n] are both sonorants and they still preserve the major articulator. Thus, they are more confusable than [l]-[m], [l]-[ŋ], [l]-[p], [l]-[t] and [l]-[k].

* Although [n] is a coronal consonant, there is no evidence that the post-vocalic [r] is realized as [n]. This supports the idea that the pair [r]-[t] is more confusable than the pair [r]-[n].

3.2.6.4 Sanskrit [v] → Middle Chinese [b]

- a. Uruvelā 優樓頻螺 [ʔju lu bin la] ‘a locality on the banks of the Nerañjarā’
 b. Mālava 摩腊婆國 [mua la bua kuək] ‘a city in central India’

3.2.7 Fricatives

Sanskrit fricatives were represented by their corresponding phonemes in Middle Chinese. There are some cases where the fricatives were rendered as the retroexes or the alveolo-palatals. It is assumed that this may be due to inexact transliteration.

3.2.7.1 Sanskrit [ś] → Middle Chinese [ɕ] ~ [ʃ]

- a. śākya 释迦 [ɕjək ka] ‘name of the clan or tribe into which the Buddha was born’
 b. Śalātura 沙羅堵羅國 [ʃa la tuX la kuək] ‘the birthplace of Pāṇini’

3.2.7.2 Sanskrit [ʃ] → Middle Chinese [ʃ]

- a. pauṣa 報沙月 [pauH ʃa ɲjwət] ‘the month of Pauṣa’
 b. vibhāṣā 毗婆沙 [bi bua ʃa] ‘The Mahā-Vibhaṣā Arguments for Sarvāstivada’

3.2.7.3 Sanskrit [s] → Middle Chinese [s]

- a. Kosala 驕薩羅國 ‘an ancient Indian region, corresponding roughly in area with the region in the present day Uttar Pradesh state’
 [kjɛu sat la kuək]

3.2.7.4 Sanskrit [h] → Middle Chinese [ɣ]

- a. Rāhula 羅怛羅 [la ɣuX la] ‘the only son of Siddhartha Gautama’
 b. Nagarahāra 那揭羅曷國 ‘the town of Nagarahāra’
 [naH kjət la ɣat kuək]

3.3 Syllable Structure Sinicization

There are several strategies applied to adopt Sanskrit loans in Middle Chinese :

Indic form of Udyāna, the name by which Xuán Zàng knew the region'

3.3.3 Insertion of a coda

Although the syllable structures of Sanskrit and Middle Chinese are similar in that they allow for both open and closed syllables, a final consonant is sometimes added to some loanwords coming into the language having open syllables. The motivation for this approach is the maintenance of the preferred syllable of CVC, as shown in the following examples :

- a. āmra 庵沒羅樹 [ʔa(m) muat la zjuH] 'the mango tree'
 b. Srugha 室祿迦 [ɕit lu(k) ka] 'the town to the north of Hāstināpura

The nasal [m] is added after the central vowel [a] and the voiceless velar [k] is added after the back vowel [u]. In the above examples, it can be noticed that the inserted coda of the preceding syllable shares the same phonetic feature as that of the onset of the following syllable.

3.3.4 Deletion of the marginal consonants

Sometimes loanwords coming into the language have consonant clusters which are considered unacceptable in the language, one of the consonants is deleted and the other is rendered as its phonetically closest correspondent. The examples of the deletion of marginal consonants are illustrated below :

- a. kṣana 剎那 [tʂhat naH] 'a moment, an instant, a short period of time'
 b. rākṣasī 羅剎 [la tʂhat] 'evil demons'
 c. yakṣa 夜叉 [jaH tʂha] 'evil demons'

The extra-consonant [kʂh] occurring within the onset of the syllable is considered extra-syllabic. This putative segment certainly undergoes the deletion rule to conform to the syllable structure of the language. As a result, the voiceless velar [k] in the consonant cluster [kʂh] was deleted, the retroflex fricative was rendered as

the retroflex affricate [tʂh].

3.3.5 Deletion of the semivowel coda

We know that in Middle Chinese the nasals [m], [n], [ŋ], and the stops [p], [t], [k] are possible codas in the syllables. The main approach employed to transliterate the word with a semi-vowel coda is to delete the semivowels in order to bring the source language syllable into conformity with the system of the native language.

- a. kalpa 劫 [kʲɛ()p] *'a day of Bhramā or one thousand Yugas, a period of four thousand, one hundred and three millions of years of mortals'*

3.3.6 Deletion of the vowel in the last syllable

There are instances where the language deletes the vowel in the last syllable of the word. This is common especially in the case of multi-syllabic loans. When the vowel is deleted, what remains is the initial consonant which in turn functions as the coda of the preceding syllable, as in the following examples :

- a. nirvāna 涅槃 [niet buan ø] *'liberation from existence; dead, deceased, defunct; liberation, eternal bliss; absolute extinction of individual existence'*
- b. Vimālakirti 毗摩羅詰
[bi mua la khjet ø] *'the first Zen Buddhist Master aside from the Buddha himself'*

3.3.7 Reduction of vowel length

As earlier indicated, the nucleus position within the Middle Chinese syllable can be occupied by only the short vowel. It is evident that the language does not allow long vowels in its syllable structure. When loanwords containing long vowels entered the language, their length was systematically reduced by the native phonological system. This can be seen in the following examples :

๑๘๖ อภิวัตน์ คัมภีร์

- a. Mahā 摩诃 [mua xa] ‘greatness’
b. avīci 阿鼻獄 [ʔa bi njok] ‘the last and deepest of the eight hot hells’

The long central unrounded vowel [ā] in Sanskrit was rendered as the short low back vowel [a] and the long close front unrounded vowel [ī] in Sanskrit was rendered as the short high front unrounded [i].

4. Conclusion

After looking at adaptation patterns, I will here present four approaches that are relevant when considering phonological adaptation of Sanskrit loanwords in Middle Chinese.

4.1 Phonetic Similarity between Sanskrit and Middle Chinese

When looking at the phonemic inventory of the two languages, we will find a number of the faithful matches between the donor language and the recipient language. I will give three examples to illustrate phonetic similarity from the adaptation of Sanskrit loanwords in *Dàtáng Xīyǔjì*. The first example comes from the adaptation of voiced aspirated labial stops. Middle Chinese normally adapts Sanskrit voiced aspirated labial stops as unaspirated ones since the language lacks an aspiration contrast in voiced stops. However, there are some cases in which a voiced aspirated dental stop [dh] was adapted as a voiced alveolo-palatal sibilant [z] rather than [d] since the *duān* 端 series do not occur in Division 3 rhymes. The examples are as follows;

- (1) a. *bhādrapada* > 婆羅鉢陀月 [bua la puat da njwət] (see 3.2.5.4 a)
b. *dhyana* > 禪 [zjæn] (see 3.2.4.4)
c. *māgha* > 磨伽月 [mua gja njwət] (see 3.1.1.25 a)

Secondly, Sanskrit retroflex stops and nasals were realized as their counterparts in Middle Chinese. Pulleyblank (1984 : 168) notes that a notable feature

of the southern fanqie of the sixth century is that they fail to make a clear distinction between the plain dentals [t], [tʰ], [d], [n] and their retroflex initials [tr], [trʰ], [dr], [nr] since there was no distinction between the two classes. However, the transcriptions of Sanskrit terms in *Dàtáng Xīyùjì*, which was edited in *Cháng' ān*, displayed the distinction between the two classes. In the data, there are also some cases in which the voicing contrast is shown especially in the intervocalic position as in (2c). The examples are shown below;

- (2) a. koṭi > 拘胝 [kju ʈi] (see 3.1.3.1 b)
 b. Pāṭali > 波吒厘 [pua ʈa li] (see 3.2.3.1 a)
 c. nīlapitṭa > 尼羅蔽荼 [ni la bei ʈa] (see 3.2.3.1 b)

Thirdly, Sanskrit palatal stops are variably adapted as alveolo-palatal sibilants except for the palatal nasal [ɲ] which is realized as the nasal stop [n] or the alveolo-palatal nasal [ɲ]. The examples are shown below;

- (3) a. candana 梅檀樹 [tɕjɛnX dan zjuH] (see 3.1.1.8 a)
 b. moca 茂遮 [məu tɕja] (see 3.1.1.3 a)
 c. Chaṇḍaka 闍鐸迦 [tɕhjɛnH dak ka] (see 3.2.2.2 a)
 d. Mañjusrī 曼殊室利 [muan zju cit liH] 'Mañjusri' (see 3.1.1.10 b)
 e. Kauṇḍīñña 憍陳如 [kjɛu djen ñjo] (see 3.2.2.4 a)

From the above examples, it is obvious that the input to the native phonology is realized in the surface phonetics of the Sanskrit forms. This reveals that the role of phonetic similarity is the highest priority in adapting the non-native forms.

4.2 Articulatory and perceptual similarity

According to the perceptual assimilation model (PAM), the adaptation that changes the place of articulation is primarily due to the perceptual assimilation. This model correctly selects as optimal the mapping which changes the place of articulation but not the major articulator. However, the system is not designed to account for segments in context like the perceptual similarity model developed by

Steriade (2000). Thus, I propose the combination of the perceptual and articulatory information in the investigation of phonological adaptations of Sanskrit loanwords in Middle Chinese since the two factors are both significant in forming the judgment of confusability which allow borrowers to select a mapping for non-native sounds based on perceptual and articulatory similarity to native phonological categories. In what follows, I single out the two noteworthy cases in the research.

4.2.1 Adaptation of a retroflex approximant

In the adaptation of Sanskrit loanwords, a retroflex approximant [ɻ] was realized as the liquid [l] without exception but in the post-vocalic position appears as zero (deletion) or the dental stop [t] in some cases. For example, *karṇikā* > 羯尼迦樹 [kɛt ni ka zjuH] (see 3.1.1.24 a). Here we have one interesting question : why is a post-vocalic retroflex approximant realized as the dental stop [t]? When considering the adaptation, we see interesting featural adaptation : devoicing and the change in place of articulation. As Middle Chinese allowed only the nasal codas [-m], [-n], [-ŋ] and the stop codas [-p], [-t], [-k], the adaptation of a [ɻ] as [t] is the best candidate in this case since the two sounds create less dissimilarity and were very close in the place of articulation. The retroflex approximant is not nativized as the nasal coda since the change in nasality may result in input-output dissimilarity. The adaptation of [ɻ] as [p] is unattested since the mapping changes the major articulator while the adaptation of [ɻ] as [k] is not appropriate as it may generate greater dissimilarity. Thus, the change in the place of articulation (from coronal to dorsal) is systematically rejected in this case.

4.2.2 Adaptation of a liquid

Pre-vocally, a liquid in Sanskrit is realized as its counterpart in Middle Chinese without exception. In some cases, it is realized as [n] (e.g. *Rāhula* > 羅雲 [la ɣjwən]). Contrary to the adaptation of a retroflex approximant in 4.2.1, the nasality is considered as minimal modification. The adaptation of [l] as [m] is unattested since it changes the major articulator while the adaptation of [l] as [ŋ] is rejected since

the two sounds differ in the place of articulation and thus create greater dissimilarity. The adaptation of [l] as [n] is also displayed in Thai as the word Rāhula is nativized as ร่าหูล [raahún].

4.3 Chronology of loanwords

We cannot deny that the chronological development of foreign loanwords must also be taken into account since older loanwords may look different from more recent ones for a number of reasons. Firstly, the influence of the native L1 phonology may have been different in the past since the L1 phonology itself was different. Secondly, older loanwords may have been exposed to sound changes in the language due to their longer presence in the language (Chang 2003 : 9). Other factors may change as well. For instance, the difference in the education and the dialect of the borrowers may differ across two different periods of time. For example, kambala > 額鉢羅 [Yam puat la] (see 3.1.1.17 b). The voiceless velar stop [k] in Sanskrit is realized as the voiced velar fricative [ɣ] in Middle Chinese. LI Fāngkuī (2003) points out that the voiced velar fricative [ɣ] in Middle Chinese is derived from the voiced velar stop [g] in Old Chinese. In his case, it is possible that the initial consonant of the word 額鉢羅 [Yam puat la] may be read as *g in Old Chinese, which is phonetically close to the initial of the Sanskrit word. Another explanation may be due to the inexact transliteration during the translation process. The point here is that we should not jump to the conclusion that the differences in sound adaptations are merely caused by the differences between the sound systems of the two languages since they may be traced back to the language of the older period.

4.4 Source of the input

Another variable to consider in the adaptation of Sanskrit loanwords is the source of the input. First, are words borrowed through speech or writing? The difference between auditory and orthographic influence may result in different phonological adaptations. In the research, I do not differentiate whether the Sanskrit words were borrowed through an auditory source or an orthographic one since it is not

the scope of the study. This warrants further investigation, especially for one Sanskrit word having different borrowed forms. Here, it should be taken into account that the input may come from the source language directly or through an intermediate language as the shape of a word that comes through a chain of transmission (Chang 2003 : 8). For instance, it is assumed the word 瞿曇 [kju dəm] may be borrowed from the Pāli word *gotama* while the word 喬答摩 [g] ε u təp muɑ] may be borrowed from the Sanskrit word *gautama*.

The frequency of each approach used to deal with Sanskrit loanwords in this study can be described as follows :

Used approach	Frequency
1. Phonetic similarity only	92.24%
2. Combination of phonetic similarity and other approaches	7.76%

From the four approaches above, it can be concluded that “phonetic similarity” plays a major role in adapting Sanskrit loanwords as presented in this study. However, it is found that combining phonetic similarity with the information from other approaches enables us to achieve a more complete understanding of the data rather than the phonetic approach alone.

References

- Adler, Allison. 2005. *Faithfulness and Perception in Loanword adaptation : A Case Study from Hawaiian*. MIT ms.
- Baxter, William H. 1992. *A Handbook of Old Chinese Phonology*. Berlin : Mouton de Gruyter.
- Baxter, William H. 2000. *An Etymological Dictionary of Common Chinese Characters*. (a preliminary draft of 28 October 2000)
- Chang, Charles B. 2009. English loanword adaptation in Burmese. *Journal of the Southeast Asian Linguistics Society* 1 : 77–94.
- Chang, Charles B. 2003. “High-interest loans” : *The phonology of English loanword adaptation in Burmese*. AM thesis, Harvard University.
- Chén, Shūfēn 陳淑芬. 2000. A Study of Sanskrit Loanwords in Chinese. *Tsing Hua Journal of Chinese Studies* 3 : 375–426.
- Chén, Shūfēn 陳淑芬. 2003. Vowel Length in Middle Chinese Based on Buddhist Sanskrit Transliterations. *Language and Linguistics* 4. 1 : 29–45.
- Ghosh, Batakrishna. 1977. *Linguistic Introduction to Sanskrit*. Calcutta : Sanskrit Pustak Bhandar.
- Hefferman, Kevin. 2005. Phonetic similarity and phonemic contrast in loanword adaptation. *Toronto Working Papers in Linguistics* 24 : 117–123.
- Hú Qíguāng 胡奇光. 1987. *Zhōngguó Xiǎoxuéshǐ 中國小學史 (History of Chinese Traditional Minor Study)*. Shànghǎi : Shànghǎi Rénmín Chūbǎnshè.
- Jacques, Guillaume. 2006. *Introduction to Chinese Historical Phonology*. Université Paris V René Descartes ms.
- Jiǎng, Shàoyú 蔣少愚. 1989. *Gǔdài Hànyǔ Cíhuì Gāngyào 古代漢語詞彙綱要 (An Outline of Classical Chinese Vocabulary)*. Běijīng : Běijīng Dàxué Chūbǎnshè.
- Karlgen, Bernhard. 1915. *Etudes sur la Chinologie Chinoise*. Leyde et Stockholm.

- Kenstowicz, Michael. 2003a. The role of perception in loanword phonology. *Studies in African Linguistics* 32 : 95–112.
- Kenstowicz, Michael. 2003b. *Saliency and Similarity in Loanword Adaptation : A Case Study from Fijian*. MIT ms.
- Kenstowicz, Michael. 2005. The phonetics and phonology of Korean loanword adaptation. Paper presented at *First European Conference on Korean Linguistics*. Leiden University, February 2005.
- LaCharite, Darlene & Carole Paradis. 2005. Category preservation and proximity versus phonetic approximation in loanword adaptation. *Linguistic Inquiry* 36 : 223–258.
- Lǐ, Fāngkuì 李芳桂. 2003. *Shàngǔyīn yánjiū 上古音研究 (Studies on Archaic Chinese Phonology)*. Běijīng : Gāoděng Jiàoyù Chūbǎnshè.
- Lǐ, Sījìng 李思敬. 1985. *Yīnyùn. 音韻 (Chinese Historical Phonology)*. Běijīng : Shāngwù Yīnshūguǎn.
- Lǐ, Róng 李榮. 1956. *Qièyùn Yīnxì. 切韻音系 (The Phonological System of the Qièyùn)*. Běijīng : Kēxué Chūbǎnshè.
- Liú, Zhèngtán & Gāo, Míngkǎi et al. 劉正燾, 高明凱等. 1984. *Hànyǔ Wàiláicí Cídiǎn 漢語外來詞詞典 (A Dictionary of Foreign loanwords in Chinese)*. Shànghǎi : Shànghǎi Cǐshū Chūbǎnshè.
- Luó, Chángpéi 羅常培. 1931. An investigation on Middle Chinese supradentals. *Bulletin of History and Philology* 3, 121–157.
- Macdonell, A.A. 1982. *A Sanskrit Grammar For Students*. Oxford : Oxford University Press.
- Manomaivibool, Prapin. 1975. *A Study of Sino–Thai Lexical Correspondence*. Ph.D. dissertation, University of Washington.
- Martin, Samuel E. 1953. The Phonemes of Ancient Chinese. *Journal of American oriental society*, supp. 16.
- Monier Monier–William, Sir. 1899. *A Sanskrit–English Dictionary*. Oxford : Oxford

- University Press.
- Muller, F.M. 1870. *Sanskrit Grammar For Beginners*. London : Longmans.
- Norman, Jerry. 1988. *Chinese*. Cambridge : Cambridge University Press.
- Painted Sculpture On Life of the Buddha*. 1983. Bangkok : Matchon Publishing Press.
- Pān, Wùyún 潘悟云. 2000. *Hànyǔ Lìshǐ Yīnyùnxué 漢語歷史音韻學 (Chinese Historical Phonology)*. Shànghǎi : Shànghǎi Jiàoyù Chūbǎnshè.
- Peperkamp, Sharon & Emmanuel Dupoux. 2003. Reinterpreting loanword adaptations : the role of perception. *International Congress of Phonetic Sciences 15* : 367–370.
- Pilus, Zahariah. 2005. The perception of voicing in English word-final consonants : Examining the perceptual assimilation model. *Malaysian Journal of ELT Research*.
- Pulleyblank, Edwin G. 1984. *Middle Chinese : A Study in Historical Phonology*. Vancouver : University of British Columbia Press.
- Pulleyblank, Edwin G. 1991. *Lexicon of Reconstructed Pronunciation in Early Middle Chinese, Late Middle Chinese, and early Mandarin*. Vancouver : University of British Columbia Press.
- Qiū, Sūlún. 丘蘇伦. 2004. *Dàtáng Xīyùjì 大唐西域記 (Records from the Western Regions of the Great Tang Empire)*. Bangkok : Matchon Publishing Press. (in Thai)
- Sankoff, Gillian. 2001. Linguistic Outcomes of Language Contact. In Peter Trudgill, J. Chambers & N. Schilling-Estes (ed.). *Handbook of Sociolinguistics*. Oxford : Basil Blackwell, 638–668.
- Silverman, Daniel. 1992. Multiple scansion in loanword phonology : Evidence from Cantonese. *Phonology 9* : 289–328.
- Soothill, W. E. & Hodous, Lewis. 1987. *A Dictionary of Chinese Buddhist Terms*. Columbia : South Asia Books.

- Sribunrueng, Kengliang. 1941. *An Autobiography of Táng Sānzàng*. Bangkok : Thai Publishing Company. (in Thai)
- Steriade, Donca. 2002. *The Phonology of Perceptibility Effects : the P-map and its consequences for constraint organization*. MIT ms.
- Taisho Tripitaka Vol. T51 大正新脩大藏經第五十一冊, No. 2087 *Dàtáng Xīyùjì 大唐西域記*. Electronic version 2008. Chinese Buddhist Electronic Text Association.
- Táng, Zuòpān 唐作潘. 1991. *Yīnyùnxué Jiàochéng 音韻學教程 (A Course on Chinese Historical Phonology)*. Běijīng : Běijīng Dàxué Chūbǎnshè.
- Wang, Kefei & Fan Shouyi. 1999. Translation in China : A Motivational Force. *Meta*, XLIV 1 : 7–26.
- Wáng, Lì 王力. 1985. *Hànyǔ Yǔyīnshǐ 漢語語音史 (History of Chinese Phonology)*. Běijīng : Zhōngguó Shèhuì Kēxué Chūbǎnshè.
- Weinreich, Uriel. 1966. *Languages In Contact : Findings and Problems*. The Hague : Mouton & Co.
- Wú, Chéng' ēn 吳承恩. 1999. *Xīyóujì 西遊記 (The Journey to the West)*. (Liú Zhìcōng 劉志聰 & Wáng Shìxǐ 王世喜, Eds.). Hūhéhàotè : Nèiménggǔ Chūbǎnshè.
- Xú, Wénkān 徐文堪. 1987. Luètán Gǔhànyǔ jiècí de sùyuán hé zhǔnquè shìyì wèntí 略談古漢語藉詞的溯源和準確釋義問題 (A Brief Survey of Problems on Origins and Accurate Explanations of Loanwords in Classical Chinese). *Císhū Lùnjí* : 112.
- Yú Fēi et al 于非等. 1991. *Zhōngguó gǔdài wénxué 中國古代文學 (Classical Chinese Literature)*. Běijīng : Gāoděng Jiàoyù Chūbǎnshè.
- Zhāng, Shuāngdì et al 張雙棣等. 2002. *Gǔhànyǔ zhīshì jiàochéng 古漢語知識教程 (A Course on Classical Chinese)*. Běijīng : Běijīng Dàxué Chūbǎnshè.
- Zhāng, Yǒngyán 張永言. 1982. *Cíhuìxué Jiǎnlùn 詞匯學簡論 (A Short Introduction*

วารสารอักษรศาสตร์ มหาวิทยาลัยศิลปากร ปีที่ ๓๓ (๒๕๕๔) ฉบับที่ ๒ ๑๙๕

to Chinese Lexicology). Wūhàn : Huázhōng Gōngxuéyuàn Chūbǎnshè.

Zhào, Zhènduó 趙振鐸. 1988. *Xùgǔxué Shǐlùè 訓古學史略 (A Brief History of Chinese Exegesis)*. Hénán : Zhōngzhōu Gǔjí Chūbǎnshè.

Zhèngzhāng, Shàngfāng 鄭張尚芳. 2003. *Shàngǔyīnxi 上古音系 (Old Chinese Phonology)*. Shànghǎi : Shànghǎi Jiàoyù Chūbǎnshè.

Zhōu Zǔmó 周祖模. 1966. *Qièyùn de xìngzhì hé tāde yīnxi jiǎnchá 切韻的性質和它的音系檢查 (An investigation on the phonological system of the Qièyùn)*. In *Wénxué jí*. Běijīng : Zhōnghuá Shūjú.

Appendix

Below is the list of 129 Sanskrit loanwords studied in the research. The first column contains Sanskrit words arranged according to the alphabetical order. The second column displays the loan forms with reconstructed pronunciation. The meaning of the words is listed in the third column. The meaning that has already been identified in the study is indicated as “id.” The final column displays the approaches used to deal with the loans. Number 1, 2, 3 and 4 represent the four approaches discussed in the study. If more than one approaches are employed, the symbol + is used.

Sanskrit words	Loan forms	Gloss	Approaches
1. abhidharma	阿毗達摩[ʔa bi dat mua]	id.	1+2
2. āmalaka	阿末羅果 [ʔa muat la kuaX]	id.	1
3. āmra	庵沒羅樹 [ʔam muat la zjuH]	id.	1
4. Ananda	阿難 [ʔa nan]	id.	1
5. Apalāla	阿波羅羅[ʔa puə la la]	id.	1
6. Asita	阿私多[ʔa si ta]	id.	1
7. aśvayuja	頰濕縛庚閏月 [ʔat tɕəp bjwək jiuX zja ŋjwət]	id.	1
8. āṣāḍha	頰沙茶[ʔat ʃa ɕa] / 阿沙陀[ʔa ʃa da]	id.	1
9. avīci	阿鼻獄 [ʔa bi ŋjok]	id.	1
10. Aviddhakarṇa	阿避陀揭刺拏[ʔa bjeH da kjət lat ɲa]	id.	1+2
11. Ayodhyā	阿瑜陀國[ʔa ju da kuək]	id.	1
12. bhādrapada	婆羅鉢陀月 [bua la puat da ŋjwət]	id.	1
13. Bimbisāra	頻鞞娑邏 [bin bi sa la]	id.	1
14. bodhisattva	菩薩[bu sat]	id.	1
15. brāhmaṇa	婆羅門 [bua la muən]	id.	1
16. caitra	制咀羅月 [tɕei tat la ŋjwət]	id.	1
17. Campā	瞻波城 [tɕjem puə zjeŋ]	id.	1
18. Campaka	瞻博迦國 [tɕjem pak ka kuək]	id.	1
19. Chanḍaka	闍鐸迦 [tɕhjenX dak ka]	id.	1
20. Daṇḍaloka	彈特山 [dan dək ʃæn] / 彈多落迦山 [dan ta lak ka ʃæn]	id.	1
21. deva	提婆 [dei buə]	id.	1
22. Devadatta	提婆達多 [dei buə dat ta]	id.	1

23. dhyāna	禪 [zjen]	id.	1
24. Draviḍa	達羅毗荼國 [dat la bi ḍa kuək]	id.	1
25. Gaṅgā	殍伽河 [gəŋH gja ɣa]	id.	1
26. Gandhara	健馱羅 [gjenH da la]	Gandhara Kingdom	1
27. Gautama	喬答摩 [gjeu təp mua] / 瞿曇 [kju dəm]	id.	1+4
28. Gayā	伽耶城 [gja ja zjeŋ]	id.	1
29. Gurjara	瞿折羅國 [kju tjeŋ la kuək]	id.	1
30. Indra	因陀羅 [ʔin da la]	id.	1
31. jambū/jambu	瞻部樹 [zjem buH zjuH]	id.	1
32. Jivaka	時縛迦 [zi bjwək ka] / 耆婆 [gi bua]	id.	1
33. kalpa	劫 [kjep]	id.	1
34. kambala	頽鉢羅 [ɣam puət la]	id.	1+3
35. Kanishka	迦膩色迦王 [ka niH sɔk ka ɣjwaŋ]	id.	1
36. Kapilavastu	劫比羅伐窣堵國 [kjep pi la bjwət suət tuX kuək]	id.	1
37. kapotaka	迦布德迦 [ka pu tək ka]	id.	1
38. karṇikā	羯尼迦樹 [kjət ni ka zjuH]	id.	1+2
39. Kāśapura	迦奢布羅 [ka ɕja puH la]	Kāśapura City	1
40. Kāśyapa	加叶波 [ka ɕjəp puə]	id.	1
41. Kauṇḍiñña	僑陳如 [kjeu djen ɲjo]	id.	1
42. Kauśambi	僑賞彌國 [kjeu ɕjaŋ mje kuək]	id.	1
43. kauśeya	驕奢耶 [kjeu ɕja ja]	id.	1
44. Kosala	僑薩羅國 [kjeu sat la kuək]	id.	1
45. koṭi	拘胝 [kju ti]	id.	1
46. kṣatriya	刹帝利 [tshat teiH liH]	id.	1
47. kṣana	刹那 [tshat naH]	id.	1
48. Kulūta	屈露多國 [kjuət luH ta kuək]	id.	1
49. Kusinagar	拘尸那揭羅國 [kju ɕi naH kjət la kuək] / 拘尸國 [kju ɕI kuək]	id.	1+2
50. Kusuma	拘蘇摩 [ku su mua]	Kusuma City	1

51. lava	臘縛 [lap bjwek]	id.	1
52. Licchavi	栗帖婆子 [lit tɕhjəp bua tsjə]	id.	1
53. loka	洛迦 [lak ka]	id.	1
54. Lumbini	腊伐尼 [lap bjwət ni]	id.	1+2
55. māgha	磨伽月 [mua gja ŋjwət]	id.	1
56. mahā	摩訶 [mua xa]	id.	1
57. Mahā	莫訶河 [mak xa ɣa]	id.	1
58. Mahāmāya	摩訶摩耶 [mua xa mua ja]	id.	1
		Mahāvana	1
59. Mahāvana	摩訶伐那 [mua xa bjwət na]	Forest	
60. makara	摩羯羅魚 [mua gjet la ŋjo]	id.	1
61. Mālava	摩腊婆國 [mua la bua kuək]	id.	1
62. Mañjuśrī	曼殊尸利 [muanH ʒju ɕi liH]	id.	1
63. maṇi	摩尼 [mua ni]	id.	1
64. māra	魔 [mua]	id.	1
65. mārgasīrṣa	末伽始羅月 [muat gja ɕi la ŋjwət]	id.	1+2
66. Mathurā	秣菟羅國 [muat thuH la kuək]	id.	1
67. mayūra	摩裕羅 [mua ju la]	id.	1
68. moca	茂遮 [məuH tɕja]	id.	1
69. Mucalinda	目支鄰陀 [mjuk tsje lin da]	id.	1
70. muhūrta	牟呼栗多 [mjəu xu li ta]	id.	1
71. Nadī	捺地 [nat diH]	id.	1
72. Nagarahāra	那揭羅曷國 [naH kjet la ɣat kuək]	id.	1+2
73. Nalanda	那蘭陀 [naH lan da]	id.	1
74. Nanda	難陀 [nan da]	id.	1
75. nārikela	那利芻羅樹 [naH liJ kjei la ʒjuH]	id.	1
76. Nerañjarā	尼連河 [ni ljen ɣa]	id.	1
77. nīlapīṭa	尼羅蔽荼 [ni la bei ɕa]	id.	1
78. nirvāna	涅槃 [niet buan]	id.	1+2
79. nivāsana	涅槃僧 [niet buan səŋ] / 泥縛些那 [ni bjwek sje naH]	id.	1
80. nyagrodha	尼拘律樹 [ni kju ljwət ʒjuH]	id.	1

81. Pāṇini	波爾尼 [pua ŋiX ni]	id.	1
82. panasa	般核娑 [puan ŋa s,a]	id.	1
83. pātra	钵 [puat]	id.	1
84. Pāṭali	波咤厘城 [pua ʈa li zjeŋ]	id.	1
85. pauṣa	報沙月 [pauH ʂa ŋjwet]	id.	1
86. phālguna	頗勒婁拏月 [phua lək guX ŋa ŋjwet]	id.	1
87. pippala	畢鉢羅樹 [pjɛt pua la zjuH]	id.	1
88. pura	布羅 [puH la]	id.	1
89. Rāhula	羅怛羅 [la ʁuX la] / [la ʁjwən]	id.	1
90. rāja	羅閼 [la ɕja]	id.	1
91. rākṣasi	羅刹 [la tʂhat]	id.	1
92. Śākala	奢羯羅城 [ɕja gjet la zjeŋ]	id.	1
93. śākya	釋迦 [ɕjek ka]	id.	1
94. sāla	沙羅 [ʂa la]	Sāla Tree	1
95. Śalātura	沙羅堵羅國 [ʂa la tuX la kuək]	id.	1
96. sam̐ghārāma	僧伽藍 [səŋ gja lam] / 伽藍 [gja lam]	id.	1
97. sam̐ghāṭi	僧祇支 [səŋ gje tɕje]	id.	1
98. saṃgha	僧伽 [səŋ gja]	id.	1
99. Sāriputra	舍利 [ɕjaH liH] / 舍利弗 [ɕjaH liH pjuət]	Sāriputra	1
100. śarīra	舍利 [ɕjaH liH]	id.	1
101. Sim̐hapura	僧訶布羅 [səŋ xa pu la]	id.	1
102. Sindhu	信度 [sinH duH]	id.	1
103. śravaṇa	尸羅筏拏月 [ɕit la bjwet ŋa ŋjwet]	id.	1
104. Śrāvasti	室羅伐悉底國 [ɕjet la bjwet sjet teiX kuək]	id.	1
105. Srugha	室祿迦 [ɕit luk ka]	id.	1
106. stūpa	窣堵波 [suət tuX pua]	id.	1
107. śūdra	戍陀羅 [sjuət da la] / 首陀 [ɕjuX da]	id.	1
108. sūtra	修多羅 [sjəu ta la] / 素達纒 [suH ta lamH]	id.	1

109. Takṣaśila	呬叉始羅城 [ta tṣha ɕi la zjeŋ]	id.	1
110. tuṣita	堵史多[tuX sjaX ta] / 兜术他 [təu sjuet tha]	id.	1
111. ṭinduka	鎮杜迦 [tin duX ka]	Tinduka tree	1
112. Udyāna	烏仗那 [ʔu djaŋH naH]	id.	1
113. upadeśa	优波提婆[ʔjəu puə dei sa]	id.	1
114. upāsaka	烏波索迦[ʔu puə sak ka] / 優波塞 [ʔjəu puə sək]	id.	1
115. upāsikā	优婆斯[ʔjəu puə sje]	id.	1
116. Uruvelā	優樓頻螺 [ʔju lu bin la]	id.	1
117. Vaiśali	吠奢厘[bjwəi ɕja li]	Vaiśali City	1
118. vaiśya	吠奢[bjwəi ɕja]	merchants	1
119. vana	伐那 [bjwət naH]	id.	1
120. Vārāṇasī	婆羅那斯[puə la naH si]	id.	1
121. Veda	毗陀[bi da] / 吠陀[bjwəi da]	id.	1
122. vibhāṣā	毗婆沙[bi puə ʃa]	id.	1
123. Vimālakīrti	毗摩羅詰 [bi muə la khjet]	id.	1+2
124. vinaya	毗奈耶[bi naiH ja]	id.	1
125. Vipula	毗布羅山 [bi puH la ʃæn]	id.	1
126. Viśvantara	蘇達拏 [su dat ṇa]	Prince Visvantara	1
127. yakṣa	夜叉 [jaH tṣha]	id.	1
128. Yasodhara	耶輸陀羅 [jia ɕju da la]	id.	1
129. yoga	瑜伽[ju gja]	id.	1

