

LANNA TAI OF THE 16TH CENTURY: A PRELIMINARY STUDY OF THE SINO-LANNA MANUAL OF TRANSLATION¹

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Abstract

Our current understanding of the historical phonology of the Lanna Tai language, a variety of Southwestern Tai spoken by the majority in the northern part of Thailand, is largely limited to two stages: modern dialects and the reconstructed Proto-Southwestern Tai. This paper presents a study on an intermediate stage in the 16th century by applying a graphemic analysis to the Chinese transcription of the pronunciation of the Lanna Tai vocabulary as it appears in the Lanna version of the Sino-Xenic Manual of Translation (Chinese: 華夷譯語 Huá-Yí Yìyǔ), a Chinese document produced in the early 16th century for communications on diplomatic mission between the Ming Chinese imperial court and the Lanna kingdom (Yongbunkoat 1968; Shintani 1974). By comparing the correspondences between the Chinese characters and the transcribed Lanna Tai lexical items, this study shows that 16th century Lanna Tai differs from modern Lanna Tai dialects in terms of retaining the original contrast between the pairs of (1) *r and *h, (2) *x and *k^h, and (3) *c^h and *s. On the other hand, 16th century Lanna Tai might have not fully symmetricised the Proto-Southwestern Tai vowel inventory since there is evidence for the acquisition of only the two long non-front mid vowels *o: and *ɔ:, but not for the front mid-vowel *e: and two short non-central low vowels *ɛ and *ɔ. In addition, the tone system of the 16th century was almost identical to the modern dialects as well. This study is the first to propose the sound system of Lanna Tai in an intermediate stage between the proto-language and the current language.

Keywords: Lanna Tai, Historical Phonology, Chinese Philology
ISO 639-3 codes: zho/chi, cmn, tai, tha

1 Introduction

The Lanna Tai² is a Tai language currently spoken by the local Thai people in the provinces of Chiang Mai, Chiang Rai, Lamphun, Lampang, Prae, Nan, Phayao, and some neighboring provinces of the upper central part of Thailand (Pankhuenkhat 1982; Kamboonchoo 1985:1; Thianthaworn 1998:3; Wimonkasem 2004; Wimonkasem 2006; Kantong 2007:5; Akharawatthanakun 2012:162).³ The Lanna Tai language can be divided into 2 dialect groups: Mae Hong Son, Chiang Mai, Lamphun and Chiang Rai form the Western

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² Although the Lanna Tai is known by at least four other alternative terms, namely *Tai Yuan*, *Thai Phayap*, *Northern Thai*, and *Kam Meuang* (Thianthaworn 1998:3; Burutphakdee 2004:4, 7; Chumbia & Wongpolgan 2012; Akharawatthanakun 2012:161), the author personally prefers *Lanna Tai* simply out of undesirability to use four other existing alternative terms.

³ The area comprises a formerly independent polity called *Lanna* (Burutphakdee 2004:7, 19; Chumbia & Wongpolgan 2012; Akharawatthanakun 2012:162) prior to its annexation to Siam in the 19th century (Strecker 1979; Rungreungsri 1991; Burutphakdee 2004:9; Wimonkasem 2004; Wimonkasem 2006).

dialects, while Lampang, Phayao, Phrae and Nan form the Eastern dialects (Kamboonchoo 1985:1-2; Burutphakdee 2004:2), with high mutual intelligibility despite slight differences (Burutphakdee 2004:5).

Currently, the phonology of the period between its modern form and Proto-Southwestern Tai remains unknown: whether there was a symmetric vowel system, a contrast between *k^h and *x, between *h and *r, or between *s and *c^h, and how many tones there were. The consistent correspondence between the Siamese /r/ and /c^h/ to the Lanna Tai /h/ and /s/ respectively led us to question whether pre-modern Lanna Tai used to contrast the pairs /r/ and /h/ as well as /c^h/ and /s/ like in modern Siamese or not, and if so, when did the contrast collapse?

Following the methodology of Yongbunkoet (1968), Shintani (1974), Davidson (1987), and Endo (2009), this study proposes a phonological sketch of the Lanna Tai in the 16th century based on a careful examination of the Lanna Tai version (Chinese: 八百 bābāi) of the Sino-Xenic Manual of Translation (Chinese: 華夷譯語 Huá-Yí Yiyǔ), a glossary of foreign languages where the pronunciation of foreign vocabulary was transcribed through the use of Chinese characters. This study found that in the 16th century, there were more consonants, fewer vowels, and a tone system largely similar to that of the present day.

2 Background

2.1 Modern Lanna Tai Phonology

Modern Lanna Tai dialects currently possesses about twenty consonant phonemes (Katsura 1969; Rungreuangsrī 1991; Thianthaworn 1998:21, 23-31; Burutphakdee 2004:32; Wimonkasem 2006:9; Akharawatthanakun 2012:173, 180, 183, 665) as presented in Table 1, where italicized phonemes can be used as final consonants.

Table 1: Lanna Tai consonant phonemes

(Adapted from Thianthaworn (1998:38, 100), Burutphakdee (2004:32-34), and Wimonkasem (2006))

Manner & Voicing		Place				
		Labial	Alveolar	Palatal	Velar	Glottal
Stops	voiceless	<i>p</i>	<i>t</i>	<i>c</i>	<i>k</i>	<i>ʔ</i>
	aspirated	<i>p^h</i>	<i>t^h</i>		<i>k^h</i> [<i>k^h~x</i>]	
	voiced	<i>b</i>	<i>d</i>			
Fricative	voiceless	<i>f</i>	<i>s</i>			<i>h</i>
Nasal	voiced	<i>m</i>	<i>n</i>	<i>ɲ</i>	<i>ŋ</i>	
Approximant	voiced	<i>w</i>	<i>l</i>	<i>j</i>		

Whereas Siamese has /r/ or /c^h/,⁴ Modern Lanna Tai has /h/ or /s/,⁵ respectively (Burutphakdee 2004:16). Among the northern provinces, /k^h/ might be phonetically realized as a fricative by some speakers (Katsura 1969; Akharawatthanakun 2012:665, 678-683).

In terms of vowel phonemes, Modern Lanna Tai possesses nine pairs of short and long monophthongs, and three diphthongs (Pankhuenkhat 1982; Rungreuangsrī, 1991; Thianthaworn 1998:21, 23-31; Burutphakdee 2004:16, 18, 34-35; Wimonkasem 2006:41-42; Akharawatthanakun 2012:174-175, 181-182, 186, 666). In some dialects though, the three diphthongs monophthongized into their respective long mid vowels due to Lue and Khuen influence (Akharawatthanakun 2012:689-697). Otherwise, the vowel inventory is exactly as in Siamese (Burutphakdee 2004:16), as presented in Table 2.

⁴ Lanna Tai at Ratchaburi & Saraburi had recently re-acquired /c^h/ in loan words such as ‘tea’ (Thianthaworn 1998:68).

⁵ The realization of /s/ the Lanna Tai at Lopburi is dental /θ/ (Thianthaworn 1998:21).

Table 2: Lanna Tai vowel phonemes

(Adapted from Thianthaworn (1998:49; 102-103) and Burutphakdee (2004:36-37))

	Front	Central	Back
High	i, i:	ɯ, ɯ:	u, u:
Mid	e, e:	ɤ, ɤ:	o, o:
Low	ɛ, ɛ:	a, a:	ɔ, ɔ:
Diphthong	ia	ua	ua

Following Gedney's (1972) notation of the hypothetical tones by multiplying the reconstructed tones with the original consonant classes: the four reconstructed tones are *A, *B, *C, *D while the four consonant classes are (1) original voiceless sonorants, voiceless fricatives and voiceless aspirated stops, (2) original voiceless unaspirated stops, (3) original pre-glottalised, and (4) all the original voiced consonants, Modern Lanna Tai contrasts six tones in live syllables (Chaengphrai 1977:43; Pankhuenkhat 1982; Rungreungsri 1991; Thianthaworn 1998:21, 23-31; Burutphakdee 2004:16, 18, 38; Kantong 2007:7; Akharawatthanakun 2012:176, 181-182, 187, 190), namely Tone 0 (A34), Tone 1 (A12), Tone 2 (B123), Tone 3 (B4), Tone 4 (C123), and Tone 5 (C4). The six tones resulted from the tone split conditioned by the laryngeal features of the Proto-Southwestern Tai onset: Tone A split between all the voiceless phonemes and the rest, while Tone B, C, and D split between voiced phonemes and the rest (Strecker 1979; Thianthaworn 1998:99; Wimonkasem 2006:43-46).

Moreover, Tone D split according to vowel length as well. In all Lanna dialects, the tones in long dead syllables are the same as the corresponding B Tones (Thianthaworn 1998:99), that is, DL123 = Tone 2 and DL4 = Tone 3. What distinguishes Lanna dialects from one another is the split and merger patterns of the tones in short dead syllables. For example, while DS123 = A12 in Chiang Mai (Wimonkasem 2006), Saraburi, and Nakorn Pathom dialect (Thianthaworn 1998:59, 82, 103-105), DS123 = A34 in Lampang and Chiang Rai (Akharawatthanakun 2012:178), DS123 = C123 in Phrae and Nan (Akharawatthanakun 2012:178), and DS123 = C4 in Lopburi (Thianthaworn 1998:59, 82, 103-105). Table 3 illustrates the tone split and merger patterns of Lanna Tai, with the number for labeling tones following Rungreungsri's (1991) notation.

Table 3: Lanna Tai tone split and merger patterns

	A	B	C	DL	DS
voiceless(1)	1	2	4	2	0, 1, 4, 5
plain stops(2)	(A12)	(B1234)	(C1234)	(DL123)	(DS123)
glottalised(3)	0	3	5	3	4, 5
voiced(4)	(A34)	(B4)	(C4)	(DL4)	(DS4)

2.2 Sino-Xenic Manual of Translation

The Sino-Xenic Manual of Translation was a series of manuals of translation used during the Ming and the Qing Dynasties (Shintani 1974; Endo 2009). Due to China's status as a regional power in the Far East (Southeast Asia included), a manual of translation for the languages of most nations that had diplomatic ties with China⁶ was created to achieve effective communication. The target languages are provided in their native scripts with a Chinese translation. The pronunciation of the target language is then transcribed by using the Chinese characters with the approximate sound values. For example, in the Sino-Lanna Manual of Translation, the word <𑜋> *bǎ* 'sky' (Mod. Lanna /fa:⁵/ < Proto-Southwestern Tai *va:^c) while translated as <天> *tiān* 'sky', was transcribed with the Chinese character <法> *fǎ*. Because the manuscript was compiled in 1511 (Yongbunkoet 1968; Shintani 1974), it belongs to version B of Endo (2009)'s classification of the

⁶ The languages included are: Mongolian (Chinese: 韃靼 Dádá), Jurchen (Chinese: 女真 Nǚzhēn), Tibetan (Chinese: 西番 Xīfān), Sanskrit (Chinese: 西天 Xītiān or 梵 fàn), Persian (Chinese: 回回 Huíhuí), Shan (Chinese: 百夷 Bǎiyí), Uyghur (Chinese: 高昌 Gāochāng or 畏兀儿 Wèiwù'ér), Burmese (Chinese: 緬甸 Miǎndiàn), Lanna Tai (Chinese: 八百 bābǎi), Siamese (Chinese: 暹羅 Xiānlúo), Korean (Chinese: 朝鮮 Cháoxiǎn), Japanese (Chinese: 日本 Rìběn), Ryukyuan (Chinese: 琉球 Liúqiú), Vietnamese (Chinese: 安南 Ānnán), Cham (Chinese: 占城 Zhānchéng), Malay (Chinese: 滿刺加 Mǎnlàjiā)

Sino-Xenic Manual of Translation. The manuscript is currently available online at <https://archive.org/details/02076757.cn>.

3. Methodology

As mentioned, this study analyses data from the Sino-Lanna Manual of Translation, or henceforth the manuscript, the Lanna Tai version of a series of manuals of translation for the sake of communication between the Chinese people and the people of the countries that visited China regularly. Although the language recorded in this manuscript was explicitly stated nowhere to be Lanna Tai, it is confirmed by the following the internal evidence:

- 1) The use of the Fakkham script to write Lanna vocabulary⁷
- 2) Vocabulary exclusive to Lanna Tai but absent from Siamese: <𑜉𑜂𑜫> gin ‘body’ (Mod. Lanna /khiŋ⁰/), <𑜇𑜨𑜃𑜫> mam ‘lion’ (Mod. Lanna /mɑ:m⁰/), <𑜇𑜨𑜃𑜫> jaŋ ‘bed’ (Mod. Lanna /co:ŋ⁰/), <𑜇𑜨𑜃𑜫> ree ‘silk’ (Mod. Lanna /rɛ:⁰/)
- 3) Full transcription of the name of Chiang Mai, the capital of the Lanna Kingdom: <猛丙整賣> Měngbǐng Zhěngmài for <ເມີນທອງອາຍໄພ>⁸ Meiaŋ Byaŋ Jyaŋ Hmai (Mod. Lanna /muaŋ⁰.piŋ⁰ ciaŋ⁰.mai²/)

Unusual as they seem, the romanisation of the Fakkham script in this study follows the etymological transliteration of Varasarin (2010). In her system, the corresponding consonant and vowel graphemes are transliterated following the traditional romanization of Sanskrit. In case of additional graphemes for T(h)ai phonemes that do not exist in Sanskrit, such newly added graphemes are transliterated through modification of the corresponding basic graphemes, either by a dot or a macron below. Most unusual to readers would be the transliteration of vowel graphemes based on the component graphs instead of the actual pronunciation. Thus, *ei* represents /ɛ(:)/, *eiā* represents /ua/, and *eā* represents /aw/, due to their component graphs in the T(h)ai scripts.

Similar to other attestation of written Tai dialects in pre-modern period, the Fakkham script makes no use of tone markers. This means that aside from dead syllables, which are naturally subsumed under the tone D label, the rest of the tones are projected either backwards from Modern Lanna or forwards from the reconstructed Proto-Southwestern Tai. Moreover, it was the Chinese translation that enables the identification of the word in question. For example, Proto-Southwestern Tai *k^haw^C ‘rice’ (Mod. Lanna /k^haw⁴/) was attested as <𑜇𑜨𑜃𑜫> *kheā* without the second tone marker, but our assignment of Tone C is secured since the Chinese translation is <米> *mǐ* ‘rice’. Each lexical item has been verified with Rungreuang Sri (1991) to confirm their tonal values. However, some of the lexical items cannot be assigned to any tones, since not only that they are not found in the Modern Lanna Tai dictionary, but also that the Chinese translation provided are rather unclear.

Although both Lanna Tai and Chinese has monosyllabic syllable structure, many Lanna Tai lexical items were recorded as polysyllabic polymorphemic words, meaning that each item were usually transcribed by multiple Chinese characters. Thus, both Lanna Tai and Chinese tokens are treated as syllables, and the sound correspondences will be examined from syllable to syllable. This methodology is primarily applied to the correspondences of the (1) syllable onsets, (2) syllable codas, and (3) tones, but neglect the vowel system entirely, due to the impoverished nature of the Mandarin Chinese vowels. Instead, the Lanna Thai vowel system in the 16th century will be inferred by establishing the relationship between the attested form in the

⁷ The Fakkham script is one of the three native scripts used in the Lanna kingdom (Wimonkasem 2004). The Fakkham script literally means “a tamarind sheath script” due to its curvy-looking appearance. It is used in secular purposes, as opposed to the Tham script (or Dharma script) that is primarily used for religious purposes (Rungreuang Sri 1991; Wimonkasem 2004). Because the Fakkham script originated from King Ramkhamhaeng script (Rungreuang Sri 1991; Wimonkasem 2004), it differs very slightly from the modern Thai script.

⁸ Some other toponyms are Tai polities around Lanna such as <猛艮> *Měnggèn* for <ເມີນເຂົາ> *Meiaŋ Khein* /muaŋ⁰ k^hɿ:n1/ (colloquial name of modern Kentung, Myanmar), <猛勒> *Měnglè* for <ເມີນລີ> *Meiaŋ Lī* /muaŋ⁰ lu:5/ (colloquial name of modern Jinghong, Yunnan), and <猛撾> *Měngzhūā* for <ເມີນອາ> *Meiaŋ Jvā* /muaŋ⁰ c(ə)wa:0/ (original name of Luang Prabang, Lao, probably of Austro-Asiatic etymon as well).

manuscript and the result from the comparison of the modern form to the Pittayaporn (2009)'s Proto-Southwestern Tai form

This study compares phonological forms in Proto-Southwestern Tai and modern Lanna Tai with the Chinese transcriptions. The sound values of the attested forms are given in both Proto-Southwestern Tai values and modern pronunciation and then compared to the sound value of the Chinese characters that are used for the transcription. The Chinese transcription will show whether it matches the Proto-Southwestern Tai or modern form. Since the manuscript was compiled in the 16th century, this study compares the phonology of the Lanna Tai as attested in the manuscript with that of the Mandarin Chinese of roughly the same period: following Tangsiriwattanakul (2018), this study uses Francisco Varo (1703)'s account of Mandarin Chinese which he specifically called Nanjing Mandarin Chinese (hereafter, NMC) as a basis for comparison. It is chosen based on (1) its chronological proximity to the manuscript and (2) Varo (1703)'s testimony of its prestige, as it was widely used by governmental officials. Its consonantal inventory differs very slightly from Modern Standard Mandarin only in terms of (1) the palatalisation of the velars and alveolar sibilants before a palatal glide (*g-* /k/, *k-* /k^h/, *h-* /x/ and *z-* /ts/, *c-* /ts^h/, *s-* /s/ > *j-* /tɕ/, *q-* /tɕ^h/, *x-* /ç/), and (2) the merger of the labiodental approximant /v/, which resulted from palatalized labial nasal, with labiovelar glide /w/. Moreover, NMC is one of the few Mandarin dialects that still retain the Entering tone of Middle Chinese in the form of a final glottal stop (Coblin 2000; 2001; 2002).

Varo (1703) recorded NMC as having five tones, which are still present in modern speech. The five tones are (1) Tone 1 or Clear Level (Chinese: 清平 Qīngpíng), (2) Tone 2 or Muddy Level (Chinese: 濁平 Zhuópíng), (3) Tone 3 or Rising (Chinese: 上聲 Shǎngshēng), (4) Tone 4 or Departing (Chinese: 去聲 Qùshēng), and (5) Tone 5 or Entering (Chinese: 入聲 Rùshēng), whose contours were described as mid-level, low-falling, sharp falling, rising, and rising with a final glottal stop, respectively. Historically, the Middle Chinese level tone (Chinese: 平聲 Píngshēng) split into Tone 1 after original voiceless initials but Tone 2 after original voiced initials, while the rest of the tones remained phonemically stable, except for the rising tone after voiced obstruents which merged into the departing tone. Each Chinese syllable is assigned to one of these tones. However, the romanisation of Chinese characters are simply given in modern Mandarin Pinyin in this article, which means that a provided transcription like *x-* /ç-/ might go back to NMC /x/ as much as *h-* /x/.

The manuscript contains eighteen chapters, covering many aspects of life from astrology to international affairs. There are a total of 778 lexical items translated from Lanna Tai into Chinese, each item comprised of at least one Chinese character per syllable, making a total of 1,266 syllables altogether. Since many Lanna Tai lexicon items in the manuscript are compounds, any syllables that appear more than once are counted together as one, except for syllables with multiple transcriptions. This resulted in 690 non-identical syllables for the analysis. In sorting out the correspondances between the two languages, retentions and innovations are identified and distinguished from one another through the three following proposed principles:

1) *The Principle of Impoverished Stimuli*

If two (or more) different phonemes of the older stage of a language (Proto-Southwestern Tai in this case) which are still distinct in the modern form (Modern Lanna Tai in this case) are transcribed by a single phoneme in another language (NMC in this case), a merger with a later split is not implied: such transcriptions arose due to lack of such distinctions in NMC.

2) *The Principle of a Lost Contrast*

If two (or more) different phonemes of the older stage of a language which merged in the modern form are transcribed by a single phoneme in another language, a merger prior to the time period of the manuscript (16th century in this case) is implied.

3) *The Principle of a Preserved Trace*

If two (or more) different phonemes of the older stage of a language which already merged in the modern form are transcribed by different phonemes in another language, a merger postdating the time period of the manuscript is implied.

4.Lanna Tai Phonology in the 16th Century

4.1 Vowels

The vowel phonemes and the vowel system will be discussed first for better understanding of the transliteration of the 16th century Lanna Tai vocabulary as found in the manuscript. Since the vowel system of Mandarin Chinese, including NMC, is very impoverished, the proposed vowel system relies on a two-step analysis: (1) comparison of the Proto-Southwestern Tai forms with the modern Lanna forms, i.e., principle #1 which proves the continuation of certain vowel phonemes from Proto-Southwestern Tai regardless of the actual NMC data and (2) establishing patterns between the vowel phonemes and the Fakkham vowel graphemes in the manuscript, i.e., a simple graphemic analysis. Whereas step #1 suggests no substantial change in the phonemic inventory of the vowels between Proto-Southwestern Tai to modern Lanna Tai, step #2 gives a clearer picture to the situation in the 16th century: although the modern Lanna Tai vowel system is characterised by a fully symmetricised inventory (see Table 2), not all the acquired vowels were present in the 16th century, as presented in Table 4.

Table 4: Vowel inventory of the Lanna Tai in 16th century and the graphemic representation

	Front		Central		Back	
	Short	Long	Short	Long	Short	Long
High	◌ [◌] i *i	◌ [◌] ī *ī:	◌ [◌] i *u	◌ [◌] ī *u:	◌ [◌] u *u	◌ [◌] ū *u:
Mid	◌ [◌] e *e	-	◌ [◌] (ə) ei(a) *ɾ & *ɾ:		◌ [◌] ā / ◌ [◌] a *o	◌ [◌] o *o:
Low	-	◌ [◌] ee *e:	◌ [◌] ah / ◌ [◌] ă *a	◌ [◌] ā *a:	-	◌ [◌] ǎ / ◌ [◌] a *ɔ:
Falling Diphthongs	◌ [◌] ẽ / ◌ [◌] ya *ia		◌ [◌] (ə) eiə *uaa		◌ [◌] vǎ / ◌ [◌] va *ua	
Rising Diphthongs	◌ [◌] ai *aj		-		◌ [◌] eā *aw	

As shown in Table 4, the italicized transliteration and the proposed phoneme are provided for each vowel grapheme. It should be mentioned here, however, that the fakKHAM1954 font fails to capture the graphical difference between the grapheme of /i/, /i:/, /u/, and /u:/, making them appear identical. Table 5 compares the graphemes as found in the manuscript with what was rendered in the fakKHAM1954 font.

Table 5: Comparison of the manuscript form and the fakKHAM1954 font

manuscript	◌ [◌]	◌ [◌]	◌ [◌]	◌ [◌]
fakKHAM1954	◌ [◌]	◌ [◌]	◌ [◌]	◌ [◌]
Siamese equivalent	◌ [◌]	◌ [◌]	◌ [◌]	◌ [◌]
Transliteration (Varasarin, 2010)	<i>i</i>	<i>ī</i>	<i>ı</i>	<i>ĩ</i>

Regardless of the small defect, it is revealed through step #2 that there were graphemes for almost all Proto-Southwestern Tai vowel phonemes. Vowels of different lengths are usually denoted by different graphemes, except for /ɾ/ and /ɾ:/ which share the same grapheme and can only be told apart by rechecking with modern forms.

Some of the vowels have allographic variation with specific rule(s) of usage, which is signaled by the slash. First of all, <◌[◌]> ă denotes short *a in open syllables, whereas the visarga <◌: > āh denotes short *a when followed by glottal stop, which was lacking in Proto-Southwestern Tai and is found in loanwords from Siamese such as <◌[◌]> brăh ‘divine person such as the lord Buddha, monk, or a title for a royalty’ (Mod. Lanna /phaʔ4~5/) and <◌[◌]> gǎhtāt ‘paper’.

For /ɔ:/, /ia/, and /ua/, vowel graphemes <◌[◌]> ǎ, <◌[◌]> ẽ and <◌: > vā are used in open syllables respectively, for example, <◌[◌]> bǎ for *bɔ:^B ‘father’ (Mod. Lanna /pɔ:³/), <◌[◌]> mẽ for *mia^A ‘wife’ (Mod. Lanna /mia⁰/) and <◌: > phvā for *p^hua^A ‘husband’ (Mod. Lanna /phua¹/). There is no confusion between <◌[◌]> ă for short *a in closed syllables and long *ɔ: in open syllables, as they are distinguished by a final consonant: present in the former, but absent in the latter. In closed syllables, the consonant graphemes <◌> Ø *ʔ, <◌> y *j, and <◌> v *w were used as matres lectionis <◌> a *ɔ:, <◌> ya *ia, and <◌> va *ua respectively, for example, <◌> rān for *rɔ:n^C ‘hot’ (Mod. Lanna /hɔ:n⁵/), <◌> vyañ for *wiañ^A ‘city’ (Mod. Lanna

/wian⁰/), and <ໜວກ> *hmvak* for *^hmuak ‘hat’ (Mod. Lanna /muak²/). Interestingly, the rime /ɔ:j/ was represented by <໊> *y*, the consonant grapheme for the original *ʔ, as the grapheme for *ʔ <໊> was employed as a mater lectionis for /ɔ:/. In this case <໊> is transliterated as *ay* instead of *y*, for example, <໊໊> *tay* for *^ʔdo:j^A ‘hill’ (Mod. Lanna /do:j⁰/).

Because fakKHAM1954 font lacks <໊> *â*, which represents either (1) /ua/ in open syllables when used with <໊> *v*, forming the aforementioned <໊> *vâ*, or (2) short /o/ before final /-m/ e.g., <໊> *lâm* *lom^A ‘wind’, this <໊> *â* is rendered with <໊> instead. As <໊> *â* is absent in Thai orthography, Varasarin (2010)’s system had no equivalence, and I therefore transliterated it as *â*. Short /o/ before other finals is otherwise understood as the inherent vowel when two consecutive consonant graphemes denote a single form. The first consonant represents the initial, while the second consonant represents the final, and thus in the Varasarin (2010) system’s an *a* is employed in a similar manner to the inherent vowel of most Indic scripts, for example, <໊> *pan* for *^ʔbon^A ‘up above’ (Mod. Lanna /bon⁰/), <໊> *nak* for *^ʔnok^D ‘bird’ (Mod. Lanna /nok⁴⁻⁵/) and <໊> *kañ* for *^ʔkoŋ^A ‘arrow’ (Mod. Lanna /koŋ¹/). No graphic confusion exists between /-om/ and /-am/ since /-am/ is represented by a special grapheme <໊> *ã*: <໊> *gâm* for *^ʔyom^A ‘sharp edge’ (Mod. Lanna /k^hom⁰/) vs <໊> *gã* for *^ʔyam^A ‘gold’ (Mod. Lanna /k^ham⁰/).

A glimpse of phonological change from Proto-Southwestern Tai to the 16th century Lanna Tai came from step #2 of the analysis. First of all, there is evidence that for the acquisition of two additional long mid vowels for 16th century Lanna Tai: /o:/ in words such as <໊> *ron* ‘hall’ (Mod. Lanna /ho:ŋ⁰/) and <໊> *con* ‘robber’ (Mod. Lanna /co:n¹/), and /ɤ:/ in <໊> *Meiṇ Kveiṇ* ‘country’ and <໊> *Meiṇ Khein* ‘Kengtung’ (Mod. Lanna /muəŋ⁰ khɤ:n¹/). While the two words for /o:/ are found having long vowels in Modern Lanna Tai as well, only <໊> *Meiṇ Khein* survived with /ɤ:/ in Modern Lanna: <໊> *Kveiṇ* in <໊> *Meiṇ Kveiṇ* is clearly a transcription for Chinese <國> *Guó* ‘country’, which appears as a term for an administrative level together with <໊> *kiñ* for <京> *Jīng* ‘capital’, <໊> *Meiṇ Tū* for <都> *Dū* ‘metropolis’, <໊> *Meiṇ Pān* for <邦> *Bāng* ‘state’, <໊> *Bū* for <府> *Fǔ* ‘prefect’, and <໊> *Syan* for <縣> *Xiàn* ‘country’. Meanwhile, there are no evidence of /e:/, /ɛ/, and /ɔ/ in the 16th century. Their absence though cannot preclude that they had not been acquired by the 16th century, it was only their status that cannot be confirmed with any certainty.

Lastly, Proto-Southwestern Tai diphthongs *au had already merged with *aj by the 16th century, as vocabularies with either *au and *aj were all denoted by same grapheme <໊> *ai* and transcribed by NMC -ai rime, as exemplified in Table 6. According to Principle #2, it thus seems that Proto-Southwestern Tai diphthongs *au and *aj had already merged into a single *aj prior to the 16th century.

Table 6: Comparison between Proto-Southwestern Tai *au and *aj in the 16th century

Chinese Translation	Manuscript	Proto-Southwestern Tai	Modern Lanna	Chinese Transcription	16 th Century Lanna Tai (vowel)
輝 huī ‘bright’	໊ <i>sai</i>	* ^ʔ sau ^A	saj ¹	賽 sài	*aj
新 xīn ‘new’	໊ <i>hmai</i>	* ^h mau ^B	maj ²	賣 mài	
腸 cháng ‘intestine’	໊ <i>sai</i>	* ^ʔ saj ^C	saj ⁴	賽 sài	
線 xiàn ‘thread’	໊ <i>hmai</i>	* ^h maj ^C	maj ¹	賣 mài	

4.2 Initials

There are a total of 31 distinct Fakkham consonant graphemes used in this manuscript, as presented in Table 7, provided with their italicised Siamese etymological equivalents as well as their Roman transliterations following Varasarin (2010)’s notation as mentioned earlier. Whereas consonant clusters of stops + /t/ and a few original voiceless sonorants were written as ligatures, consonant clusters of stops + /l/ or /w/ and original voiceless sonorants were simply expressed as two consecutive graphemes (i.e., a digraph) and thus are not presented in Table 7.

Table 7: Fakkham consonant graphemes and ligatures

	ก ก	ข ข	กฺขร	ข ข	ด ด	กฺกร	ด ด	ง ง		ย อย		ว ว
	k	kh	khr	kh	g	gr	g	ṅ		y		v
	จ จ	ฉ ฉ			จ จ	จ จ	ญ ญ	ญ ญ	ญ ญ	ย ย		ส ส
	c	ch			j	j	ñ	hñ	hñ	y		s
ด ด	ต ต	ถ ถ			ด ท		น น	น หน	ร ร	ร ร	ห ร	ท ท
t	t	th			d		n	hn	r	r	hr	h
ป ป	ฝ ฝ	ผ ผ	ฝ ผ	ฝ ผ	บ พ	บ พร	บ พ	ม ม	ม หม	ล ล		อ อ
p	p	ph	phr	f	b	br	b	m	hm	l		(Ø)

As the graphemes of the Fakkham script are represented by the fakKHAM1954 font in this paper, there are two graphical differences from the attested graphemes in the manuscript: <จ> *j*, <จ> *j*, and <ถ> *th* in the manuscript have longer tails than the font, and the tail of the subscripted /-r-/ in the cluster did not extend all the way to the front of the consonant as the font. Table 8 compares the graphical difference between the manuscript version and the fakKHAM1954 font. Table 9 shows the correspondences between each Fakkham grapheme and examples of Chinese characters adopted for the transcription.

Table 8: Comparison of the manuscript form and the fakKHAM1954 font

manuscript	จ	จ	ถ	กฺขร	กฺกร	ฝ ผ	บ พร	บ พ
fakKHAM1954	จ	จ	ถ	กฺขร	กฺกร	ฝ ผ	บ พร	บ พ
Siamese equivalent	ช	ช	ถ	ขร	กร	ผ	พร	พร
Transliteration (Varasarin, 2010)	<i>j</i>	<i>j</i>	<i>th</i>	<i>khr</i>	<i>gr</i>	<i>phr</i>	<i>br</i>	<i>hr</i>

Table 9: Fakkham graphemes and their transcriptions

Fakkham Grapheme	Manuscript	Proto-Southwestern Tai	Modern Lanna Tai	Chinese Transcription	NMC Initials	Percentage ⁹	Proposed 16 th century Lanna Tai Initial
ก k	ไก <i>kai</i>	*kaj ^B	/kaj ² /	盖 gài	/k/	100	*k
ข kh	เข <i>kheā</i>	*k ^h aw ^C	/k ^h aw ⁴ /	拷 kǎo	/k ^h /	100	*k ^h
กฺขร khr	กฺขร <i>khrah</i>	?	?	苛 kē	/k ^h /	100	*k ^h
ข kh	เข <i>kheā</i>	*χaw ^C	/k ^h aw ⁴ /	毫 háo	/x/	100	*x
ด g	ดา <i>gā</i>	*ga. ^C	/ka. ⁵ /	戛 jiá	/k/	100	*k
กฺกร gr	กฺกร <i>grān</i>	*gra.n ^C	/k ^h a:n ⁵ /	堪 kān	/k ^h /	100	*k ^h
ด g	ดา <i>gā</i>	*yam ^A	/k ^h am ⁰ /	罕 hǎn	/x/	100	*x
ง ṅ	เณ <i>nein</i>	*ŋɛn ^A	/ŋɛn ⁰ /	恩 ēn	/Ø/	70	*ŋ
	เณ <i>nee</i>	*ŋɛ:?	?	耶 yé	/Øj/	30	
น หน hn	เณ <i>hneen</i>	*hŋɛ:n ^A	/hŋɛ:n ¹ /	恩 ēn	/Ø/	50	*ŋ
	น หน <i>hnīp</i>	^h ŋi:p ^D ?	?	一 yī	/Øj/	50	
จ c	จ <i>cā</i>	*cam ^A	/cam ¹ /	暫 zàn	/ts/	6.25	*c
	จ <i>cai</i>	*cau ^A	/caj ¹ /	寨 zhài	/tʂ/	93.75	
ฉ ch	ฉ <i>chā</i>	?	?	察 chá	/tʂ ^h /	100	*c ^h

⁹ This percentage is calculated from the total number of attestation of each sound, for example, 100% use of /k/ for <ก> *k* means that for every instance of <ก> *k*, only NMC /k/ is employed, whereas for other graphemes with variations in transcription, the percentage of each variant is as presented, such as <จ> *j*, shows 96% transcription by NMC /tʂ/ and 3% transcription by NMC /ts/.

Fakkham Grapheme	Manuscript	Proto-Southwestern Tai	Modern Lanna Tai	Chinese Transcription	NMC Initials	Percentage ⁹	Proposed 16 th century Lanna Tai Initial
ສ s	ສູນ <i>sūn</i>	*su:ŋ ^A	/su:ŋ ¹ /	送 sòng	/s/	100	*s
ຊ j	ຊູ <i>jū</i>	*ju:ʔ	ʔ	阻 zǔ	/ts/	3	*c
	ຈາງ <i>jān</i>	*ja:ŋ ^C	/ca:ŋ ⁵ /	章 zhāng	/tʂ/	96	
ຊ ຈ j̄	ຊື <i>jī</i>	*zuu: ^C	/suu: ⁵ /	塞 sè	/s/	100	*s
ນູ ñ	ນູຍ <i>ñāy</i>	*ɲa:j ^C	/ɲa:j ⁵ /	埃 āi	/Ø/	8.33	*ɲ
	ນູ <i>ñā</i>	*ja: ^B	/ja: ³ /	鴨 yā	/Øj/	41.66	
	ນູອມ <i>ñam</i>	*ɲo:m ^C	/ɲo:m ⁵ /	遠 yuǎn	/Øɥ/	50	
ຫຍ hñ	ເຈຍ <i>hñai</i>	*ɲauɥ ^B	/ɲaj ² /	碍 ài	/Ø/	50	*ɲ
	ຫຍາ <i>hñā</i>	*ɲa: ^C	/ɲa: ⁴ /	牙 yá	/Øj/	50	
ດ t	ເດອາ <i>teen</i>	*de:ŋ ^A	/de:ŋ ⁰ /	領 líng	/l/	76	*d
	ດາວ <i>tāv</i>	*ʔda:w ^A	/da:w ⁰ /	鬧 nào	/n/	8	
	ດ້າ <i>tǎ</i>	*ʔdam ^A	/dam ⁰ /	旦 dàn	/t/	16	
ຕ t̄	ຕານ <i>tan</i>	*ton ^C	/ton ⁴ /	敦 dūn	/t/	100	*t
ຸ th	ເືອນ <i>thein</i>	*tʰɲŋ ^A	/tʰɲŋ ¹ /	騰 téng	/tʰ/	100	*tʰ
ດ d	ດ້ວ <i>dai</i>	*daj ^A	/taj ⁰ /	歹 dǎi	/t/	100	*t
ນ n	ນ້າ <i>nǎ</i>	*nam ^C	/nam ⁵ /	南 nán	/n/	100	*n
ນຸ hn	ເນືອ <i>hneiɥ</i>	*ɲnuu: ^A	/nuu: ¹ /	能 nài	/n/	100	*n
ປ p	ປ້າ <i>pai</i>	*bauɥ ^A	/bauɥ ⁰ /	擺 bǎi	/p/	58	*b
	ປານ <i>pān</i>	*ba:n ^C	/ba:n ⁴ /	蠻 mán	/m/	41	
ປ̄ p̄	ປ່າ <i>pā</i>	*pa: ^B	/pa: ² /	八 bā	/p/	100	*p
ປ ph	ເປີນ <i>phein</i>	*pʰɲŋ ^C	/pʰɲŋ ⁴ /	朋 péng	/pʰ/	100	*pʰ
ຸ phr	ຸ່ນຸ້ <i>phrām</i>	*pʰrom ^A	/pʰom ¹ /	噴 pèn	/pʰ/	100	*pʰ
ຸ f	ຸ່ນ <i>fan</i>	*fon ^A	/fon ¹ /	忿 fèn	/f/	100	*f
ບ b	ບຸຍ <i>byan</i>	*biaŋ ^A	/piaŋ ⁰ /	丙 bǐng	/p/	100	*p
ຸ br	ຸ່ນຸ້ <i>brūk</i>	*bru:k ^D	/pʰu:k ³ /	僕 pú	/pʰ/	100	*pʰ
ຸ b̄	ຸ່ນ <i>bǎ</i>	*va: ^C	/fa: ⁵ /	法 fǎ	/f/	100	*f
ມ m	ເມືອ <i>meiɥ</i>	*muauŋ ^A	/muauŋ ⁰ /	猛 měng	/m/	100	*m
ມຸ hm	ມອກ <i>hmaɥ</i>	*hmɔ:k ^D	/mɔ:k ² /	莫 mò	/m/	100	*m
ຍ y	ຍິນ <i>yīn</i>	*ɲi:ŋ ^A	/ɲi:ŋ ⁰ /	影 yǐng	/Øj/	85.71	*ɲ
	ຍ້ <i>yǎ</i>	*ɲo: ^A	/ɲo: ⁰ /	岳 yuè	/Øɥ/	14.29	
ື ȳ	ຍິນ <i>yen</i>	*ʔjen ^A	/jen ⁰ /	印 yìn	/Øj/	100	*j
ຣ r	ຣອນ <i>ran</i>	*rɔ:n ^C	/hɔ:n ⁵ /	樂 luán	/l/	100	*r
ຸ hr	ຸ່ນຸ້ <i>hrvā</i>	*ɲrua ^A	/hua ¹ /	路 lù	/l/	100	*r
ລ l	ລັມ <i>hlām</i>	*lom ^A	/lom ⁰ /	倫 lún	/l/	100	*l
ຫລ hl	ຫລານ <i>hlān</i>	*ɲla:n ^A	/la:n ¹ /	爛 làn	/l/	100	*l
ວ v	ວີ <i>vī</i>	*wi: ^A	/wi: ⁰ /	雨 yǔ	/Øɥ/	14.3	*w
	ວອກ <i>vək</i>	*wɔ:k ^D	/wɔ:k ³ /	俄 é	/Øw/	50.0	
	ວັນ <i>vǎn</i>	*wan ^A	/wan ⁰ /	挽 wǎn	/v/	35.7	
ຫວ hv	ເວີວ <i>hvai</i>	*ɲwaj ^C	/waj ⁴ /	歪 wāi	/Øw/	100	*w
ຫ h	ຫີ <i>hī</i>	*hauɥ ^C	/huu: ⁴ /	黑 hēi	/x/	100	*h
ອ (Ø)	ອຸນ <i>un</i>	*ʔun ^B	/ʔun ² /	温 wēn	/Ø/	77.78	*ʔ

Fakkham Grapheme	Manuscript	Proto-Southwestern Tai	Modern Lanna Tai	Chinese Transcription	NMC Initials	Percentage ⁹	Proposed 16 th century Lanna Tai Initial
	ᨾᩣ᩠ᩃ <i>eev</i>	*ʔɛ:w ^A	/ʔɛ:w ⁰ /	咬 yǎo	/Øj/	22.22	

4.2.1 Phonemes with a single transcription pattern

Each of the phonemes in Table 10 corresponds to only one transcription pattern in Table 9, that is, transcriptions with a complete use of certain NMC phonemes, meaning that their phonemic values are secure enough to be proposed as part of the consonantal inventory of the 16th century Lanna Tai. Using principle 2, the completion of tone split was established long before the 16th century since all the original voiced and voiceless pairs were not distinguished.

Table 10: Consonant inventory of the 16th century Lanna Tai - preliminary

Manner & Voicing		Place							
		Labial			Alveolar		Palatal	Velar	
Stops	Voiceless Unaspirated	ᨾ <i>p</i>	*p	ᨿ <i>t</i>	*t		ᨻ <i>k</i>	*k	
	Voiceless Aspirated	ᨾᩣ <i>ph</i>	*p ^h	ᨿᩣ <i>th</i>	*t ^h	ᨻᩣ <i>ch</i>	*c ^h		
	Voiced								
Fricative	Voiceless	ᨾ᩠ <i>f</i>	*f	ᨿ᩠ <i>s</i>	*s		ᨻ᩠ <i>kh</i>	*x	ᨻ᩠ᩣ <i>h</i>
		ᨾ᩠ᩣ <i>br</i>					ᨻ᩠ᩣ <i>gr</i>		
Nasal	Voiced	ᨾ᩠ᩣ <i>hm</i>	*m	ᨾ᩠ᩣ <i>hn</i>	*n				
		ᨾ᩠ᩣ <i>m</i>		ᨾ᩠ᩣ <i>n</i>					
Approximant	Voiced			ᨾ᩠ᩣ <i>hl</i>	*l				
				ᨾ᩠ᩣ <i>l</i>					
Trill	Voiced			ᨾ᩠ᩣ <i>hr</i>	*r				
				ᨾ᩠ᩣ <i>r</i>					

Although *c^h has no place in Proto-Southwestern Tai, its existence in 16th century Lanna Tai is confirmed through the consistent transcription of items with <ᨻᩣ> *ch* by NMC /tʂ^h/. Clearly, this *c^h was distinct from *s of the same period, whose transcription was consistently NMC /s/, showing no overlapping between the two. This *c^h may have been acquired through contact with local Austroasiatic languages (though I can provide no explicit evidence for this speculation) and most likely existed for a shorter period of time compared to other phonemes, before eventually merging with *s. It should be noted, however, that this *c^h was gained from either Chinese loanwords or words entirely of unknown origin, as shown in Table 11.

Table 11: The 16th century aspirated palatal stop

Chinese Translation	Manuscript	Chinese Transcription	Proposed 16 th Century Lanna Tai initials
麥 mài ‘wheat’	ᨾ᩠ᩣᨾ᩠ᩣ <i>kheā.chā</i>	拷察 kǎochá	*c ^h
揖 yī ‘to salute’	ᨾ᩠ᩣᨾ᩠ᩣ <i>chān.yee</i>	唱也 chàngyě	
紬 chóu ‘silk, damask’	ᨾ᩠ᩣᨾ᩠ᩣ <i>ree.chyav</i>	紬 chóu	
雲南 yúnnán ‘Yunnan’	ᨾ᩠ᩣᨾ᩠ᩣ <i>meiān.chee</i>	猛車 měngchē	
朝 cháo ‘imperial court’	ᨾ᩠ᩣ <i>cheā</i>	朝 cháo	

Meanwhile, the phoneme *x is proposed for the graphemes <ᨻ᩠> *kh* and <ᨻ᩠ᩣ> *g* despite having the exact same transcription as <ᨻ᩠ᩣ> *h*. Using principle #1, no merger should be assumed since Chinese languages never contrast [x] and [h]: the closest phoneme to transcribe Lanna *h is inevitably NMC /x/ due to the articulatory

proximity of the two sounds. Moreover, in some Chinese languages, [x] and [h] are free variants of the same phoneme, which differs only in geographical distribution: [x] is preferred among the northern dialects, while [h] is preferred elsewhere (San 2000). Tokens with <ɛ> *kh* correspond to Proto-Southwestern Tai *q, *x, and *ɣ, while tokens with <ɔ̄> *g* correspond to Proto-Southwestern Tai *g and *ɣ, as demonstrated in Table 12.

Table 12: The velar fricative in the 16th century

Chinese Translation	Manuscript	Proto-Southwestern Tai	Modern Lanna	Chinese Transcription	16 th Century Lanna Tai (initials)
青 qīng ‘green/blue’	ຂອວ <i>khvav</i>	*xiəw ^A	k ^h iaw ¹	嗅 xiù	*x
商 shāng ‘sell/trade’	ຂອຍ <i>khāy</i>	*qa:j ^A	k ^h a:j ¹	害 hài	
翎 líng ‘feather’ 毛 máo ‘fur’	ຂຸ <i>khan</i>	*ɣon ^A	k ^h on ¹	混 hùn	
夕 xī ‘evening’	ຫີ <i>qǎ</i>	*ɣam ^B	k ^h u:n ⁰	罕 hǎn	
夷人 yí rén ‘Tai people’	ອຸ <i>gan</i>	*gon ^A	k ^h on ⁰	混 hùn	

Another phoneme proposed here is the *r of <ɰ̄> *hr* and <ɣ> *r*, whose modern reflexes are consistently /h/. This phoneme is consistently transcribed by NMC /l/, similar to <ɰ̄> *hl* and <ɣ> *l*. While principle #1 forbids the idea of a merger between the two since it is impossible that the two merged but later re-split into /l/ and /h/, principle #3 confirms that <ɰ̄> *hr* and <ɣ> *r* represent a distinct phoneme *r which later became /h/ in modern dialects. NMC /l/ was employed because it was the closest liquid phoneme in the 16th century. Although tokens with <ɣ> *r* correspond to /r/ in Siamese, tokens with <ɰ̄> *hr* corresponds to /h/, which was originally *hr in Proto-Southwestern Tai. In Table 13, the Chinese transcription of the 16th century vocabulary with different Proto-Southwestern Tai initials such as *h, *hr, *r, *l, or *hl are compared and contrasted with one another.

Table 13: Comparison of Proto-Southwestern Tai /h/, trills, and laterals in the 16th century

Chinese Gloss	Manuscript	Proto-Southwestern Tai	Modern Lanna	Chinese Transcription	16 th Century Lanna Tai (initials)
五 wǔ ‘five’	ຫາ <i>hā</i>	ha: ^C	ha: ³	哈 hā	*h
鵝 é ‘goose’	ຫານ <i>hān</i>	ha:n ^B	ha:n ²	汗 hàn	*r
石 shí ‘rock’	ຫຼິນ <i>hrin</i>	ʰrin ^A	hin ¹	吝 lìn	
六 liù ‘six’	ຫຼິດ <i>hrak</i>	ʰrok ^D	hok ¹	路 lù	
虹 hóng ‘rainbow’	ຽນ <i>ruñ</i>	ruŋ ^C	huŋ ⁵	隴 lǒng	
熱 rè ‘hot’	ຮອນ <i>ran</i>	ro:n ^C	ho:n ⁵	樂 luán	
薪 xīn ‘firewood’	ຫລິວ <i>hlvā</i>	ʰlua ^A	lua ¹	路 lù	*l
騾 luó ‘mule’	ຫລໍ່ <i>hlā</i>	ʰlo: ^C	lo: ⁴	羅 luó	
伯 bó ‘older uncle’	ຫຼັງ <i>lūn</i>	luŋ ^A	luŋ ⁰	隴 lǒng	
深 shēn ‘deep’	ເລິດ <i>leik</i>	lɤk ^D	lɤk ⁵	勒 lè	

4.2.2 Phonemes with multiple transcription patterns

Yet in Table 9, there are some phonemes which show multiples transcription patterns. For instance, <ɛ> *c* and <ɛ> *j* are transcribed by either /tʃ/ or /ts/. Since no Tai languages contrast alveolar and retroflex affricates as NMC did, the phoneme *c which is usually realised phonetically as affricate [tɕ~ts] among the Tai dialects is proposed for the 16th century Lanna Tai.

The second case is the phonemes *b and *d for <ɰ> *p* and <ɔ̄> *t* respectively. While this *b was transcribed with NMC /m/ and /p/, *d was transcribed with NMC /l/, /n/, and /t/. The choice of transcription is best viewed as a compromise for phonemes that were voiced and stop consonants: while the use of NMC /p/ and /t/ implies a stop quality, the use of NMC /m/ and /n/ implies voicing. Since NMC by that time no longer had voiced stops, the nasals were the closest equivalent. The use of /l/ further confirms that the phoneme in question wasn’t a nasal. However, whether they were simple voiced stops [b] and [d] or still pre-

glottalised [ʔb] and [ʔd] is entirely unknown. Nonetheless, the two phonemes were a distinct kind of non-voiceless stops, which this study labeled phonemically as *b and *d.

The last group consists of phonemes which are lacking in NMC: glottal stop, dorsal nasals, and semi-vowels. Among them, the easiest case is the phoneme /w/ for <ᵛᵛ> hv and <ᵛ> v. While <ᵛ> v was transcribed variously by NMC /Øw/, /Øʉ/, and /v/, <ᵛᵛ> hv was found transcribed by NMC /Øw/ alone. Nonetheless, their transcription suggests an attempt by NMC speakers to capture the lip rounding quality of /w/ due the lack of a proper phoneme /w/. For example, the use of NMC /Øʉ/ for <ᵛ> v is found exclusively with front vowels. Using principle #2, the merger of *^hw and *w into modern /w/ must have predated the 16th century.

The last four phonemes are *ʔ for <ᵛ> Ø, *ŋ for <ᵛᵛ> hñ and <ᵛ> ñ, *ɲ for <ᵛᵛᵛ> hññ, <ᵛᵛ> ñ, <ᵛ> y, and *j for <ᵛᵛ> ɣ, all of which are transcribed by NMC /Ø/, /Øj/, and /Øʉ/: *ʔ and *ŋ are mostly transcribed by /Ø/, or by /Øj/ before front vowels, while *ɲ and *j are mostly transcribed by /Øj/, or /Øʉ/ before back vowels, and very few by /Ø/, suggesting that the palatal quality of *ɲ and *j distinguished them from the non-palatal *ʔ and *ŋ for the NMC-speaking scribes. Using principle #1 though, these four phonemes are confirmed by their modern Lanna Tai equivalents. However, these four phonemes descended from seven earlier distinct phonemes in Proto-Southwestern Tai: *ŋ and *ɲ resulted from the merger of the original voiced-voiceless pairs, the original *j became the 16th century *ɲ, and the 16th century *ʔ and *j continued the original *ʔ and *ʔj. Principle #1 prevents an erratic proposal that these phonemes coalesced in the 16th century then somehow spilt afterwards.

Even though <ᵛ> y represents Sanskrit /j/ while <ᵛᵛ> ñ represents Sanskrit /ɲ/, *ɲ is proposed for both phonemes because their use in the manuscript does not match with their Proto-Southwestern Tai value, implying the merger of two phonemes prior to the compilation of the manuscript. In turn, a distinct *j is proposed for <ᵛᵛ> ɣ as the direct descendant of an earlier *ʔj, based not only on the modern Lanna Tai reflexes, but also on the consistent use of <ᵛᵛ> ɣ for etyma with Proto-Southwestern Tai *ʔj. Like *b and *d however, it is entirely unknown whether the phoneme *j at that time was realised as simple palatal glide [j], or still a pre-glottalised sound [ʔj] similar to the original form as NMC surely had only /j/ and not /ʔj/, so either [ʔj] or [j] would be perceived as /j/ for NMC-speakers. Table 14 compares tokens with <ᵛᵛ> ɣ, <ᵛ> y, and <ᵛᵛ> ñ graphemes and their Proto-Southwestern Tai origins, including the ones with mismatching spellings.

Table 14: Comparison of Proto-Southwestern Tai palatal continuants in the 16th century

Chinese Gloss	Manuscript	Proto-Southwestern Tai	Modern Lanna	Chinese Transcription	16 th Century Lanna Tai (initials)
‘cool’	ᵛᵛu ɣen	ʔjen ^A	jen ⁰	印 yìn	*j [ʔj~j]
占 zhān ‘occupy’	ᵛᵛyū	ʔju: ^B	ju: ²	育 yù	
婆 pó ‘grandmother’	ᵛᵛyā	ja: ^B	ɲa: ³	鴨 yā	*ɲ
難 nán ‘difficult’	ᵛᵛyān	ja:k ^D	ɲa:k	押 yā	
染 rǎn ‘dye’	ᵛᵛyām	ɲa:m ^C	ɲa:m ⁵	遠 yuǎn	
長 cháng ‘long’	ᵛᵛyāw	ɲa:w ^A	ɲa:w ⁰	咬 yǎo	
‘remaining’	ᵛᵛyān	ɲaŋ ^A	ɲaŋ ⁰	養 yǎng	
婦 fù ‘wife’ 女 nǚ ‘woman’	ᵛᵛyān	ɲi:ŋ ^A	ɲi:ŋ ⁰	影 yǐng	

Adding all the remaining phonemes to the inventory results in a total of 23 initial consonant phonemes in Lanna Tai as shown in Table 15.

Table 15: Consonant inventory of the 16th century Lanna Tai – expanded

Manner & Voicing		Place					Glottal
		Labial		Alveolar		Palatal	
Stops	Voiceless Unaspirated	ပံ <i>p</i> /p/	တံ <i>t</i> /t/	ဆံ <i>c</i> /c/	ဂံ <i>k</i> /k/	ဝံ (Ø) /ʔ/	
	Voiceless Aspirated	ပံ <i>ph</i> /p ^h /	တံ <i>th</i> /t ^h /	ဆံ <i>ch</i> /c ^h /	ဂံ <i>kh</i> /k ^h /		
	Voiced	ပံ <i>p</i> /b/	တံ <i>t</i> /d/				
Fricative	Voiceless	ဖံ <i>f</i> /f/	ဆံ <i>s</i> /s/		ခံ <i>kh</i> /x/	ဟံ <i>h</i> /h/	
Nasal	Voiced	မံ <i>hm</i> /m/	နံ <i>hn</i> /n/	ယံ <i>hñ</i> /ɲ/	ဝံ <i>ṅ</i> /ŋ/		
Approximant	Voiced	ဘံ <i>hv</i> /w/	ဘံ <i>hl</i> /l/	ဃံ <i>ɹ</i> /j/			
Trill	Voiced		ဝံ <i>hr</i> /r/				

4.3 Final consonants

Since Modern Lanna Tai inherits most of the Proto-Southwestern Tai finals, the same could be said of the 16th century. However, the correspondences show some interesting implications. As seen in Table 13, the Lanna Tai /-m/ was mostly transcribed by reflexes of Middle Chinese /-n/, and less so by reflexes of Middle Chinese /-m/, suggesting the merger of the two final consonants in NMC by the 16th century. Meanwhile, the correspondence in Table 16 simply suggests that Middle Chinese final stops had merged into the final glottal stop in NMC. Cases where the Proto-Southwestern form and the Modern reflex match, but the attested form in the manuscript shows peculiarity, such as <ဟမဂ> *hmak* in place of the expected <ဟဝ> *mat* for *mɔt^D ‘ant’ (Mod. Lanna /mɔt⁴⁻⁵/), <ဟခဂ> *mək* in place of the expected <ဟဝ> *pat* for *pɔ:t^D ‘blind’ (Mod. Lanna /bɔ:t²/) and <ဟမဝ> *hmvat* in place of the expected <ဟမဂ> *hmvak* for *hnuak^D ‘deaf’ (Mod. Lanna /nuak²/). These misspelt tokens confirm that it was the Chinese scribes who wrote down the Lanna Tai vocabulary, and that they spoke a dialect whose the mother tongue could not differentiate final stops of different places of articulation perfectly, for if it were Lanna speakers, such mistakes could not have taken place.

Table 16: Correspondance of final nasals

Middle Chinese		Final Nasal		
		-m	-n	-ŋ
Final Nasal	-m	22.64	9.01	0
	-n	75.47	82.89	2.4
	-ŋ	1.89	8.1	97.6
Total		100	100	100

Table 17: Correspondence of final stops

Middle Chinese \ Lanna Tai		Final stops vs open syllable				
		-Ø	-k	-t	-p	
final stops vs open syllable	清平	14.95	0	3.7	0	
	濁平	12.1	5	0	0	
	上聲	20.28	5	3.7	11.11	
	去聲	25.98	11.67	14.81	7.41	
	入聲	-k	10.68	36.67	40.74	25.93
		-t	9.61	20	29.63	33.33
-p		6.41	21.67	7.41	22.22	
Total		100	100	100	100	

Most interestingly, the result seems to suggest that modern final glottal stop had already developed in 16th century Lanna Tai: final glottal stops were found in words which had no origin in Proto-Southwestern Tai, mostly loanwords or new words unique to the Lanna Tai in the 16th century whose modern pronunciation contains a final glottal stop: <𑜄𑜂𑜫> *yěh* ‘do, commit’ (Mod. Lanna /niaʔ^{0-1~4-5}/), <𑜄𑜂𑜫> *běh* ‘goat’, <𑜄𑜂𑜫> *brāh* ‘Buddha’ (Mod. Lanna /phaʔ^{4~5}/), <𑜄𑜂𑜫> *děvāhtā* ‘angel, deity’ (Mod. Lanna /te:⁰.waʔ⁴⁻⁵.da:⁰/). Note that the grapheme <𑜄𑜂𑜫> *ǎh* represents final /-h/ in Sanskrit. It is possible that syllables with a final glottal stop were sometimes perceived as open syllables as the place of articulation of a glottal stop are less distinct than the final stops /-p/, /-t/, /-k/, leading to transcriptions by non-checked tones, as shown in Table 18.

Table 18: Correspondences of the final glottal stop

Lanna Tai	Middle Chinese tones					Total
	清平	上聲	入聲			
			-k	-t	-p	
-ʔ	4.76	52.38	-	23.81	19.05	100

4.4 Tones

The correspondence between the NMC tones and the twenty hypothetical tones (see Table 3) of the Lanna Tai in the 16th century is not clear-cut, since multiple NMC tones correspond to the same Lanna Tai tones, and vice versa. However, a majority count suggests a preference for using particular NMC tones to represent each of the Lanna Tai tones, as demonstrated in Table 19. The highest percentage is represented in bold, whereas the second, and sometimes the third, highest percentages are represented as in underlined italics if they have some implications.

Table 19: Tonal correspondence in percentages (Unchecked Syllables)

		1 (清平)	2 (濁平)	3 (上聲)	4 (去聲)	5 (入聲)
A	1	4.26	5.32	8.51	71.28	10.64
	2	19.51	0	7.32	58.54	14.63
	3	3.03	6.06	54.55	<u>33.33</u>	3.03
	4	7.63	<u>20.34</u>	54.24	7.63	10.17
B	1	4.55	9.09	0	68.18	18.18
	2	8.33	0	20.83	58.33	12.50
	3	11.11	22.22	11.11	33.33	22.22
	4	23.33	13.33	23.33	16.67	23.33
C	1	31.58	<u>26.32</u>	10.53	<u>18.42</u>	13.16
	2	87.50	0	0	<u>6.25</u>	<u>6.25</u>
	3	<u>14.29</u>	42.86	0	<u>14.29</u>	<u>28.57</u>
	4	<u>27.91</u>	39.53	<u>13.95</u>	2.33	<u>16.28</u>
DL	1	0	0	0	0	100
	2	0	0	0	7.69	92.31
	3	0	0	0	33.33	66.67
	4	0	7.41	3.70	14.81	74.07
DS	1	5.56	0	0	22.22	72.22
	2	0	0	0	7.14	92.86
	3	0	0	14.29	0	85.71
	4	4.76	4.76	47.62	9.52	33.33

The correspondences between the Lanna Tai tones and the NMC tones confirms characteristic tone split patterns for the Lanna Tai language. First of all, Tones A and B show a split that corresponds with modern tones: A12-34 and B123-4. In the correspondences of Tone C, a peculiar result is seen: C12-34. However, the actual data only shows 7 tokens for Tone C3. Thus, the split as shown by this data should not be taken as evidence for the split C12-34. For D Tones, only DS123-4 can be seen from the data, but not DL123-4. This is probably because the transcription of these tokens was mainly directed towards capturing the final stops (i.e., using NMC Tone 5 (入聲)). The split of DL123-4 is warranted indirectly by the split of other tones, as theoretically it was the allophonic split of the tones that led to the loss of voicing contrast which became redundant once the emerging tonal contrast became the primary cue of contrast.

Due to the lack of discernible patterns, however, the split between DL123 and DS123 cannot be confirmed at all. One potential implication for the lack of split for D123 into DL123 and DS123 according to the vowel length is that such a split might have been a more recent change, postdating the 16th century at the very least. Otherwise, the split was simply not captured by how Lanna Tones were transcribed using NMC tones. The split according to vowel length can be considered a more recent change as the durational difference between short and long vowels can certainly affect the realisation of the same tone: contours cannot be fully realised within a shorter duration, not to mention that all the pitch heights might be accordingly reduced due to lack of time and space. The lack of split in D123 is comparable to modern Siamese dialects where the majority has no split and only a few dialects are reported with a split into DL123 and DS123.

The result allows us to propose the tone system of the Lanna Tai of the 16th century as shown in Table 20, which unintentionally closely resembles that of modern Lanna Tai.

Table 20: Tonesplit and merger patterns of Lanna Tai in the 16th century

	A	B	C	DL	DS
1	4	4 (去聲)	1 (清平)	5 (入聲)	
2	(去聲)		&		
3	3	(1), (3), (5)	4 (去聲)	5 (入聲) 3 (上聲)	
4	(上聲)		2 (濁平)		

Using Varo's (1703) description of the contours of 17th century NMC tones, the characteristics may be assumed as shown in Table 21.

Table 21: Postulated tone contour

	A	B	C	DL	DS
1	rising	rising	mid-rising + glottalisation	rising?	
2					
3	falling	mid-falling	low-falling + glottalisation	rising?	falling?
4					

Tones A12 and A34 might be rising and falling tones respectively, as they were mostly transcribed by NMC Tone 4 and Tone 3 respectively. B123 was also transcribed by Tone 4 similar to A12, but since these two tones differ in modern Lanna Tai, they might just share the rising contour but differ in pitch height, though how they differ exactly is unknown. On the other hand, B4 seemed to be a mid-falling tone as it was transcribed by NMC Tone 1, Tone 3, and Tone 5 equally, where Tone 1 was a mid level tone and Tone 3 a falling tone. C123 might be a mid-rising tone with glottalisation, as it was primarily transcribed by Tone 1, a mid-level tone, and secondarily by Tone 4 and Tone 5 both of which were rising tones, but one of which had final glottal stop. C4 might be a low-falling tone with glottalisation, as it was transcribed by mostly by Tone 2 and Tone 1, a low-falling and mid-level tone, and sometimes also by Tone 3 and Tone 5, both of which are most likely glottalised. The available data do not allow the interpretation of the phonetic characteristic of the tones in checked syllables. However, since B = DL can be assumed based on its preservation in all modern Lanna Tai dialects, we ought to assume as well that their phonetic characteristic was rather similar to the B tones.

5. Lanna Tai of the 16th century, a change in progress

Although both the changes of *r > /h/ and *x > /k^h/ were not fully completed in the 16th century, the data from the manuscript also shows a glimpse of both changes since some lexical items found in the manuscript, very few, however, are similar to their modern form, contrasting with the majority. For the occlusivisation of *x > /k^h/, Proto-Southwestern Tai *qa:^A ‘leg’ (Mod. Lanna /k^ha:¹/) and *qe:n^A ‘arm’ (Mod. Lanna /k^hε:n¹/) are attested as <ᨡᩃ᩠ᨦᩉ᩠ᨦᩁᩬᩁ> *khā* and <ᨡᩃ᩠ᨦᩉ᩠ᨦᩁᩬᩁᩁᩬᩁᩁᩬᩁ> *kheen*, and transcribed by <ᨡᩃ᩠ᨦᩉ᩠ᨦᩁᩬᩁᩁᩬᩁ> *kē* and <ᨡᩃ᩠ᨦᩉ᩠ᨦᩁᩬᩁᩁᩬᩁᩁᩬᩁᩁᩬᩁ> *qiàn* (/tɛ^h/ < /k^h/ before -j-), while the majority of etyma with Proto-southwestern Tai *q- are attested with <ᨡᩃ᩠ᨦᩉ᩠ᨦᩁᩬᩁ> *kh* and transcribed by NMC /x/, for example, *qa:^C ‘to kill’ (Mod. Lanna /k^ha:⁴/) and *qaw^A ‘horn’ (Mod. Lanna /k^haw⁴/) are attested as <ᨡᩃ᩠ᨦᩉ᩠ᨦᩁᩬᩁ> *khā* and <ᨡᩃ᩠ᨦᩉ᩠ᨦᩁᩬᩁᩁᩬᩁ> *kheā* and transcribed by <ᨡᩃ᩠ᨦᩉ᩠ᨦᩁᩬᩁᩁᩬᩁ> *hā* and <ᨡᩃ᩠ᨦᩉ᩠ᨦᩁᩬᩁᩁᩬᩁᩁᩬᩁ> *hào* respectively. This means that by the 16th century, Lanna Tai *x was already on its way to merging with the pre-existing /k^h/.

For the aspiration of /r/ > /h/, despite an overwhelmingly consistent transcription of etyma with Proto-Southwestern Tai *^hr- with /l/, which reflects /r/, there are examples of *^hr- which were transcribed by NMC /x/, for example, among numerous others, *^hraj^A ‘jar’ (Mod. Lanna /haj¹/), *^hra:ŋ^A ‘cinnabar’ (Mod. Lanna /ha:ŋ¹/), and *^hra: ‘to seek’ (Mod. Lanna /ha:¹/), are attested as <ᨡᩃ᩠ᨦᩉ᩠ᨦᩁᩬᩁ> *hai*, <ᨡᩃ᩠ᨦᩉ᩠ᨦᩁᩬᩁᩁᩬᩁ> *hān*, and <ᨡᩃ᩠ᨦᩉ᩠ᨦᩁᩬᩁ> *hā*, and transcribed by <ᨡᩃ᩠ᨦᩉ᩠ᨦᩁᩬᩁᩁᩬᩁ> *hài*, <ᨡᩃ᩠ᨦᩉ᩠ᨦᩁᩬᩁᩁᩬᩁ> *háng*, and <ᨡᩃ᩠ᨦᩉ᩠ᨦᩁᩬᩁᩁᩬᩁ> *hā*, respectively. Moreover, etyma with clusters of unaspirated stops plus *-r- are transcribed by NMC aspirated initials: *granC ‘lazy’ (Mod. Lanna /k^ha:n⁵/) and *bru:k^D ‘tomorrow’ (Mod. Lanna /p^hu:k³/) though attested as <ᨡᩃ᩠ᨦᩉ᩠ᨦᩁᩬᩁᩁᩬᩁ> *grān* <ᨡᩃ᩠ᨦᩉ᩠ᨦᩁᩬᩁᩁᩬᩁᩁᩬᩁ> *brūk*, are transcribed by <ᨡᩃ᩠ᨦᩉ᩠ᨦᩁᩬᩁᩁᩬᩁ> *kān* and <ᨡᩃ᩠ᨦᩉ᩠ᨦᩁᩬᩁᩁᩬᩁ> *pú* respectively. Both the attestation of *^hr- transcription with NMC /x/ and the aspirated transcription of unaspirated stops plus *-r- cluster suggest that aspiration of *r > /h/ had probably begun by the 16th century, but it was yet to be complete.

The attestation of the change in both cases informs us that probably there were still competing variants among Lanna Tai speakers. This is why in the process of compilation, the more conservative forms were recorded as the majority, but a few younger variants slipped through. This is evidence that when a change occurs, it might not spread immediately, but probably needs some time before acceptance and recognition as a norm for the whole linguistic community.

6. Conclusion

The Sino-Lanna Manual of Translation provides us exactly the missing piece we needed: the sound system of the Lanna Tai of an intermediate 16th century stage between modern Lanna Tai and Proto-Southwestern Tai. With regards to initial consonant, 16th century Lanna Tai had a largely similar inventory as that of modern Lanna Tai, with the exceptions that there were still contrasts among the pairs of *x and *k^h, *c^h and *s, and *r and *h, although *x > /k^h/ and *r > /h/ are attested occasionally, suggesting an undergoing change. With regards to final consonant, 16th century Lanna Tai had the exact same inventory as that of modern Lanna Tai, having lost the final *-ɰ but acquired a final *-ʔ. With regards to the vowel, 16th century Lanna Tai had almost fully symmetricised the inventory, having certainly acquired *o: and *ɤ: at the very least, although the status of *e:, *ɛ, and *ɔ were still unconfirmed by the available evidence. With regards to the tones, 16th century Lanna Tai had an almost identical tone split and merger patterns which could give rise to that of modern Lanna Tai dialects.

We obtain not only a sketch of its phonology, but also an insight as to how Proto-Southwestern Tai transformed into Modern Lanna Tai. It is revealed to us not only that devoicing of voiced obstruents occurred prior to the 16th century, but that many mergers were relatively recent developments after the compilation of the manuscript. Having these two discoveries, it is possible to establish the relative chronology of all the sound changes that characterize Modern Lanna Tai. However though, the fully worked out pathway from Proto-Southwestern Tai to Modern Lanna Tai dialects, including the relative chronology between all the characterizing sound changes that shaped Modern Lanna Tai dialects, will appear in Tangsiriwattanakul (2022).

All in all, this study exemplifies how ancient texts can be used as complements to the limitations of the comparative method, which generally makes the best guess based on the currently available data, but there is no way of discovering the intermediate stages between the proto-form and its reflexes in the modern dialects. Moreover, this study is like a rediscovery of the philological origin of modern historical linguistics, but that the kind of methodology once performed on classical languages of ancient civilizations is now proved to be performable on written Tai evidence, from which fascinating results could certainly be borne out. Unfortunately, unlike some of the best-known languages in Europe, both classical and modern, a lot of Tai dialects simply lack written records that can be securely dated back to the medieval period. Regardless, I encourage scholars in the field of comparative historical Tai linguistics to follow our path in using philological sources as means to improve our understanding of the development of the Tai languages.

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