

A linguistic analysis of the Lao writing system and its suitability for minority language orthographies

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Standard Lao, the official language in the Lao PDR, is spoken in and around the capital Vientiane. Lexicon, vowels and especially tone inventories of the many Lao dialects in the nation differ tremendously. A new orthography to replace the traditional Pali-based orthography which was hard to teach and learn was established during the Lao language reform in 1975. This study investigates the grapheme-phoneme correspondences of Lao orthography and its applicability to other languages in the multilingual nation. After a short introduction to the Lao language and the linguistic situation in the country, the Lao phoneme inventory and a description of the nature and historical development of Lao script are presented, including some taxonomic considerations discussing the segmental, suprasegmental and syllabic features of this script. This is followed by a linguistic evaluation of the orthography and a summary in the light of how to apply Lao script to other languages spoken in the country. Three minority orthographies based on Lao script illustrate that the almost entirely direct phonemic correspondences, consistency in the formation of multigraphs, the rich grapheme inventory, and the both segmental and syllabic characteristics of this semi-alphabetic script support a direct application to other, even unrelated languages with contrastive suprasegmental features like tone or voice quality. No orthography testing or studies on literacy acquisition have been done on these or any other Lao-script based minority scripts yet, so that firm recommendations regarding the creation of new Lao-script based orthographies cannot be given.

Keywords: Lao orthography; Lao phonology; Alphasyllabary; Abugida; Syllabet; Taxonomy of writing systems.

I wish to thank my colleague at the Payap University Linguistics Institute, literacy consultant Michelle Miller, and Dr Carolyn Dean, CAMA Services Inc. for their input on this paper.

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Lao is one of several Tai-Kadai languages found in the Lao PDR with over four million speakers, with a small minority in Cambodia and over ten million speakers in Northeast Thailand.

This paper provides an overview on Standard Lao phonology and its orthography, with the aim of investigating the script's applicability to other languages. After a short introduction to the Lao language and the linguistic situation in the multilingual nation, Lao consonants, vowels

and tones will be described. An evaluation of where Lao script fits within a taxonomy of writing systems and a brief description of its historical development is followed by a description of the grapheme inventory and the represented linguistic units. A short evaluation of how to apply Lao script to other languages is given in the final section. Examples from three minority orthographies based on Lao script illustrate that the direct phoneme-grapheme correspondences, consistency in the formation of multigraphs, the rich grapheme inventory, and the encoding of both segmental as well as suprasegmental features in this script allow a consistent mapping of Lao symbols to the phonemes of other, even unrelated languages.

THE LAO LANGUAGE

Lao is an isolating tone language where most syllables form individual morphemes. There are only eight bound derivational morphemes (Enfield, 2007). Word order and phrase- or sentence-final particles carry the grammatical information. Temporal adverbs or context express tense. Compounding is common, and there are also polysyllabic loanwords and iconic expressives (e.g. Wayland, 1996). Some syllables that were frequently used in compounds lost their original meaning, contrastive tone, and vowel distinction; they developed into bound ‘minor’ or reduced syllables preceding full syllables with which they form sesquisyllabic words.

Lao dialects differ substantially in lexicon, vowel length, vowel quality, and especially tone (Enfield, 2007). What might be considered Standard Lao is spoken only in and around the capital Vientiane. Even though it the official language for administration, education, media, and national economic activities, people use their own dialect in these situations. Radio stations throughout the country use the regional dialects. There are now several television channels in Lao, broadcasting 24 hours a day, but Thai radio and TV still is very popular. The two main newspapers are available in most district centers at government offices but not readily available elsewhere and not that widely read. In Vientiane however, in recent years there has been a proliferation of journals and magazines about fashion, current events, and culture (mostly regarding popular music and aimed at young people). Although spoken dialects vary tremendously, written standardization is getting much stronger as the amount of printed material like newspapers, magazines, school texts, books, articles, etc. increases and as literacy spreads, while oral variation remains strong.¹

THE LINGUISTIC SITUATION IN LAOS

Laos is rich in linguistic diversity but research on its languages is sparse (Enfield, 2006a). Chazée (1999) identifies one hundred thirty-two different languages belonging to the four major Mainland South-East Asian language families Tai-Kadai, Austroasiatic, Hmong-Mien, and Tibeto-Burman. Some minority languages in Laos serve as trade languages. The 2005 Lao PDR census identifies 49 different ethnic minority groups, with 55% of the population being ethnic Lao. There are no data available on how many people actually consider Lao as their mother

¹ Personal communication with Carolyn Dean, former director of the Lao language school in Vientiane

tongue. A national literacy survey (UNESCO, 2001) revealed that most ethnic minorities, especially women, do not speak the national language. The same is true for children (Enfield, 2006a). Only the men learn Lao through trading and during military service.

Most of the minority languages are found in the sparsely populated hills which cover about 70% of the nation, whereas ethnic Lao live in the Mekong valley (Ngaosyvathn, 2000). Most ethnic minorities speak indigenous Austroasiatic languages, with some 600 000 Kmhmu' speakers alone (National Statistics Center of the Lao PDR, 2005). Hmong is spoken by 8% of the population. It commonly uses a Roman-based alphabet (Enfield, 2006a) which must not be used for any official purposes since Lao people cannot decipher the script. Generally, there is no official approval or authorization of scripts for ethnic minority languages in Laos but it is possible to explore different ways to teach Lao to ethnic minority people, including the use of Lao script to write their languages².

LAO PHONEME INVENTORY

Lao has 19 consonants and 12 vowels with contrastive length. The orthography indicates six tones, but two of them are hard to distinguish (cf. Rehbein & Sayaseng, 2004) so that other descriptions only report five tones (Enfield, 2007; Mollerup, 2005; Becker, 2003). The following presentation of Lao phonemes is based on Diller (1996), Becker (2003), Rehbein and Sayaseng (2004), Mollerup (2005), Enfield (2007), and the author's own observations.

CONSONANTS

Standard Lao consonant phonemes are shown in Table 1. All consonants occur as syllable onsets. The approximants /w j/ as well as the oral and nasal stops /p t k m n ŋ/, with the plosives being unreleased, serve as codas.

TABLE 1
Vientiane Lao consonants

<i>Manner/Place of Articulation</i>	<i>Labial</i>	<i>Alveolar</i>	<i>Alveolopalatal</i>	<i>Postpalatal</i>
Oral stop	p ^h p b	t ^h t d	c	k ^h k
Nasal stop	m	n	ɲ	ŋ
Fricative	f	s		h
Approximant	w	l	j	

The pronunciation of the labio-velar approximant /w/ varies between syllable-initial unrounded approximant [β~v] and syllable-final rounded vowel [u]. The aspirated velar stop has the

² Personal communication with Ari Vitikainen, World Renew, Laos: According to the Director of the Inclusive Education Center, these issues were discussed at the 5th Meeting of the Lao Revolutionary Party Central Committee about the Implementation of the Regulations Concerning Ethnic Minorities and Religion in Vientiane, 2007.

allophones [k^h~χ]. The post-alveolar stop is being described as palatal /c/ by Enfield, and as an alveolo-palatal affricate /tʃ/ by Diller, and by Rehbein and Sayaseng. For Thai, Harris (1972) similarly chooses the alveolo-palatal affricate symbol but points out that the fricative release noise is short and not very perceptible, and that voiceless unaspirated alveolo-palatal stops are very common. Since there is no official IPA symbol for alveolo-palatal stops, palatal symbols are used to represent them.

The interpretation of the glottal stop presented in this paper follows Rehbein and Sayaseng (2004) and Diller (1996) because of its unique behavior, suggesting a suprasegmental status. Reasons for this interpretation are

- (1) Lao script uses the symbol for the vowel /ɔ/ to mark the syllable onset, so there is an association with a vowel, not a consonant.
- (2) Final bilabial, alveolar, and velar stops are written, whereas final glottal stops are not.
- (3) Only short vowels can be produced with a final glottal stop when spoken slowly and clearly but other plosives occur after both short and long vowels. This suggests that the glottal stop is a redundant feature marking the end of a short syllable in distinct speech when there is no contrastive consonant fulfilling this role.

VOWELS

Standard Lao has 9 monophthongs and 3 diphthongs with contrastive length, shown in Table 2.

TABLE 2
Vientiane Lao vowels

	<i>Front</i>	<i>Central</i>	<i>Back</i>
Close	i i:	ɯ ɯ:	u u:
Mid	e e:	ɤ ɤ:	o o:
Open	ɛ ɛ:	a a:	ɔ ɔ:
Diphthongs	ia i:a	ɯa ɯ:a	ua u:a

Enfield (2007) interprets diphthongs and long monophthongs as sequences of two vowels but Lao script has separate short and long diphthong graphemes, pronounced as such by the consultant available for this study. If short diphthongs were sequences of two vowels, long diphthongs would be sequences of three vowels. Furthermore, the pronunciation of medial <w> as vowel [u] requires the interpretation of long and short vowels, whether monophthongs or diphthongs, as one single vowel; otherwise, sequences like /ue:/ as in /kue:ŋ/ ‘city, province’ would also have to be interpreted as sequences of three vowels. Since, to the author’s knowledge, there is no further research on the interpretation of Lao diphthongs available, diphthongs are treated as single vowels.

TONES

Tone varies significantly depending on the Lao dialect; Lao linguists identified five tones on long and three tones on short vowels, together with up to 15 allotones (Rehbein & Sayaseng, 2004). Diller (1996), Cummings (2002), and Rehbein and Sayaseng (2004) identify six tones as indicated in the writing system but Rehbein and Sayaseng mention that the high and the mid tone are hard to distinguish and are most likely merging. Similarly, Enfield (2007) identifies only five tones, but he identifies a high rising and a mid level tone. Mollerup's phrase book (2005), Becker's Lao dictionary (2003) and the Lao language teaching material developed by Dean (2008) also distinguish only 5 tones.

An educated female Kmhmu' speaker in her early twenties from Laos who was available for this study reports that only five tones are taught in Vientiane schools. The words with a low tone spelling are pronounced with a mid tone by her, matching Enfield's (2007) description best. The order of the five tones taught at school is shown in Table 3. The first column describes the tone as realized by the language consultant. The tone names in capital letters are an approximation of the available descriptions, matching Becker's (2003) tone marks.

TABLE 3
Standard Lao tones

<i>Phonetic realization</i>	<i>Tone</i>	<i>Tone mark</i>	<i>Other descriptions^a</i>	<i>Example</i>
231	LOW	à	low (B) low falling (C, M) falling (D) mid-falling (E) low rising-falling (R&S)	k ^h à: "slave"
33	MID	a	mid (B, C, D, M, R&S) mid level (E) low (C, D, R&S)	k ^h a: "galangal"
52	FALLING	â	falling (B) high falling (C, D, E, M, R&S)	k ^h â: "commerce"
34	HIGH	á	high (B, C, D, M, R&S) mid rising (E)	k ^h á "stuck"
14~11	RISING	ǎ	rising (B, C, D, M) low rising (R&S) low rising or low level (E)	k ^h ǎ: "leg"

It is almost impossible to identify one Vientiane standard variety (Enfield, 2007), as can be seen by the varying descriptions given in this section and by the different tonal interpretations of the writing system. More in-depth studies on Lao tone are needed.

^aNote: Letters in parentheses are initials. B: Becker (2003); C: Cummings (2002); D: Diller (1996); E: Enfield (2007); M: Mollerup (2005); R&S: Rehbein and Sayaseng (2004).

LAO ORTHOGRAPHY

Lao script originated from an adaptation of Old Khmer to Thai script in the 13th century, when tone marks also were added (Diller, 1996). Thai and Lao underwent many sound shifts that the writing system never was adjusted to. Former consonant phonation contrast changed into tonal contrast, and some consonant types developed still another tone so that the three sets of consonant graphemes called ‘classes’ with the labels ‘high’, ‘mid’ and ‘low’ most likely reflect former tone values (Diller, 1996). The result of this development is that for two sets of consonant graphemes, the high and the low class, the two alternants refer to one and the same consonant phoneme but indicate tone via contrastive orthographic features inherent in these two classes. A third consonant grapheme set called mid class has no contrastive alternants and carries only one inherent tone. Thus, Lao orthography, like modern Thai orthography, indicates tone consonant-inherently for the mid class consonants and via contrastive orthographic features for the high and low class consonants, modified by the syllable type and tone diacritics.

Whereas Thai orthography still renders Indic etymology, the Lao orthography has been simplified several times in recent decades. Numerous graphemes have been eliminated, such that the current orthography is nearly a phonological representation (Diller, 1996).

The basis of Lao script is the orthographic syllable. Each syllable has a consonant base indicating tone, a possible tone mark to replace this tone, one up to three symbols to notate the vowel, and a possible final consonant. The actual tonal value assigned by the tone mark depends on the consonant class it is added to. Vowel symbols have a different status from consonant graphemes in that they are not in a linear order corresponding to their position in the utterance. Rogers (2005) describes the Tibetan abugida with a diagram, modified here for Lao script in Figure 1.

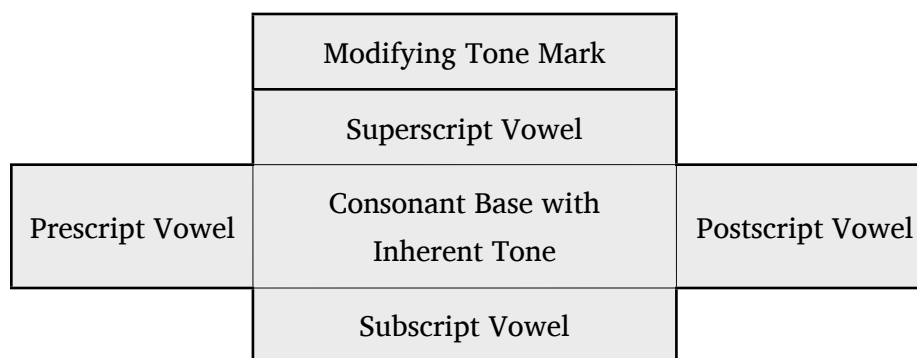


Figure 1. The orthographic syllable in Lao script

THE STATUS OF LAO SCRIPT WITHIN A TAXONOMY OF WRITING SYSTEMS

The two terms most commonly and often interchangeably used to classify the Brahmi-based scripts of Asia are abugida and alphasyllabary. Daniels (1996) coined the term ‘abugida’. Like alphabets, abugidas derive from abjads (Daniels, 2000) but are an independent type of script

where syllables are written with consonant graphemes carrying a specific inherent vowel, usually /a/, with varying vowel diacritics modifying the consonant base to replace the inherent vowel (Daniels, 1996). Devanagari is an abugida following Daniel's definition but is called an alphasyllabary by Bright (1996), defined by the non-linear graphic arrangement and subordinate character of vowels. In short, for both abugida and alphasyllabary the placement of graphemes deviates from the temporal order of the phonemes they represent, but abugidas have inherent vowels whereas this feature plays no part in the definition of the term alphasyllabary.

Later, Bright (1999) argues that labels for scripts should be based on the same type of criteria. 'Alphabet' and 'abjad' both focus on the graphic arrangement of symbols, whereas the term 'abugida' is based on an additional functional criterion, the inherent vowel. Furthermore, if the consonant grapheme represents a CV sequence for only one vowel, and in every other case an overt vowel symbol has to be added, the definition is based on an exception, not the norm, and the inherent vowel could be interpreted as a 'zero' alternant (Bright 1999). Therefore, Bright's use and definition of the term alphasyllabary is in line with other writing systems like alphabets and abjads in that it refers to the graphic arrangements of consonants and vowels. The term alphasyllabary also reflects that the non-linear vowel arrangement and their symbolization through diacritics placed around the initial consonant grapheme represent a syllabic organization, even when a writing system has separate overt symbols for all vowels.

The concept of linearity is not the most suitable criterion for a taxonomy of writing systems because even alphabets have varying degrees of linearity. The phonological value of medial vowels in English is affected by the presence of the final <-e> and makes the orthography less linear than "phonetic" Spanish, and alphabets and syllabaries can both be seen as linear, on either the phonemic or the syllabic level (Faber 1992). Therefore, next to the fact that vowel graphemes in abugidas and alphasyllabaries do not represent the temporal order of the phonemes they stand for, it is important to keep in mind that the definitions for both terms involve unequal graphic prominence, depending on whether they represent vowels or consonant.

Lao script has the same origin as Thai script and looks very similar but has no inherent vowels, so it cannot be regarded as an abugida but qualifies for an alphasyllabary. It is similar to Korean Hangeul in its syllable-based arrangement of consonant and vowel symbols but uses vowel diacritics, whereas Hangeul vowel graphemes are of equal graphic prominence to consonant graphemes which makes it an alphabet (Bright, 1999). Hangeul is processed based on both segmental as well as syllabic features (Cho & McBride-Chang, 2005) and has been suggested to be viewed as an alphasyllabary (Pae, 2011). Hangeul and Lao orthography both spell all vowels and consonants and basically differ in the graphic prominence of vowel symbols, so that Lao script being an alphasyllabary underlines the validity of Pae's suggestion. Since the criterion of unequal graphic prominence of consonants and vowels is not met for Hangeul, the term alphasyllabary in the narrow sense does not apply to it. Excluding the criterion of unequal graphic prominence from the definition, Thai, Lao, and Hangeul could be called 'syllabet', defined by the use of orthographic syllables constituted by phoneme-based graphemes in non-linear graphic arrangement. Just like alphabets have differing degrees of linearity, syllabets may have differing degrees of vowel prominence. This definition suits Brahmi-based scripts where some vowel graphemes are of equal graphic prominence to consonant graphemes, and medial

graphemes in consonant clusters may occur in subscript position, like for Khmer script. In summary, Lao script is not an abugida since it has no inherent vowels. It is an alphasyllabary because it has vowel diacritics, and could be called syllabet if the criterion of unequal graphic prominence is excluded from the definition.

LAO CONSONANT GRAPHEMES

Lao is written from left to right with clause breaks. Punctuation is similar to that used in English but not really standardized. Thirty-three of the 70 graphemes symbolize 19 consonant phonemes, including one vowel grapheme used as a consonant base. Table 4 presents Lao consonant graphemes and their corresponding phonemes. If a consonant phoneme has two graphemes, the alternative grapheme is of a differing consonant class marking a different tone. For a small number of consonant phonemes there are also alternative graphemes for syllable-final representations, following the old etymological spelling. Final plosives, all realized as voiceless and unreleased, are represented with the graphemes for voiced plosives since the distinction of consonant classes indicating tone is not necessary in this environment, and voicing is not contrastive in this position. The tone mark over or next to the consonant phoneme in the table indicates the corresponding grapheme's inherent tone for smooth syllables.

TABLE 4
Lao consonant phonemes and their corresponding graphemes

Consonant type		Plosive			Nasal		Approximant			Fricative	
Tone class		H	M	L	H	L	H	M	L	H	L
Place of articulation											
labial	PHONEME	p ^{hr}	p̣ ḅ	p ^{hr}	m̃	m̄	w̃		w̄	f̣	f̄
	GRAPHEME	ຜ	ປ ບ	ພ	ໝ	ມ	ຫວ		ວ	ຝ	ຟ
alveolar	PHONEME	t ^{hr}	ṭ ṭ	t ^{hr}	ñ	n̄	ɾ		l'(r)	ʃ̣	ʃ̄
	GRAPHEME	ຖ	ດ ຕ	ທ	ໜ	ນ	ຫລ/ຫຼ		ລ(ຣ)	ຮ	ຊ
alv.palatal	PHONEME		ç		ç̃	ç̄		j̃			
	GRAPHEME		ຈ		ຫຍ	ຍ		ຢ			
velar	PHONEME	k ^{hr}	ḳ	k ^{hr}	ŋ̃	ŋ̄					
	GRAPHEME	ຂ	ກ	ຄ	ຫງ	ງ					
glottal	PHONEME		[ʔ]							ḥ	h̄
	GRAPHEME		ອ							ຫ	ຮ

As mentioned earlier, the terms high, mid, and low consonant class most likely reflect former tone values. Today, these classes encode a whole range of tones depending on the syllable structure and the accompanying tone marks. In smooth syllables, for example, high class consonants have a rising tone in Standard Lao, mid class consonants carry low tone, and low class consonants indicate a high tone. Every initial sonorant, fricative, or aspirated plosive has a high class and a low class grapheme. The mid class consonants do not have alternants and are comprised of voiced and voiceless unaspirated plosives, the palatal approximant /j/, and the grapheme assigned to the vowel /ɔ:/ which is used in place of a consonant base to represent vowel onsets realized with a glottal stop.

Vowel-initial syllables which are pronounced with a non-distinctive glottal stop in spoken Lao are marked with this grapheme for two good reasons. First, the writing system requires a base that vowel symbols can be added to (cf. Figure 1). Also, since Lao orthography does not mark word breaks, marking the syllable onset prevents any final consonant preceding a vowel in a text from being mistaken as a consonantal syllable onset. The vowel associated with this grapheme is also used for pronouncing consonants in isolation, like ‘bɔɔ’ and ‘mɔɔ’. The syllable is pronounced with the inherent tone of the consonant base, followed by an example word beginning with the respective consonant. This serves as a symbol name, something like ‘bottle bo’, ‘pig po’ or ‘leaf lo’, and is especially helpful for identifying which of the two grapheme alternants for fricatives and aspirated stops is meant. Vowels do not have names, they are just called ‘vowel ɔ’, ‘vowel ɛ’ etc.

Sonorant graphemes by themselves - except the one for the aforementioned /j/ - bear low class consonant tone. Their high class equivalents are digraphs with the prescript high class grapheme for <h>. High class nasal digraphs are written as ligatures, without space between the letters.

Symbol 𐄂 in the cell with the lateral approximant represents the grapheme for /r/. Since the orthography reform in 1967⁴ where Lao spelling was adjusted to its actual Vientiane variety pronunciation, it was no longer officially part of the Lao alphasyllabary because it is pronounced /l/ and occurred only in loanwords. Lately it is used more frequently because of the influence of English (Enfield, 2006a) where it still is pronounced /l/ unless the speaker knows English. It is included in the most recently revised school text books approved by the Ministry of Education in 2007. For example, the current 1st grade Lao text book teaches the letter <r> with the word ຣາດາ /rada/ ‘radar’ as the example word (Lao PDR Ministry of Education, 2011:43).

As seen in the Table 4, word-final /j/ and word-initial /ɲ/ share the same grapheme. They cannot be mistaken across word boundaries because some of the vowel graphemes indicate whether there is a final consonant to come or not, and the alveolo-palatal nasal cannot occur in word-final position at all.

There are no clusters in spoken Lao (Enfield, 2007). Accordingly, the old grapheme clusters formed with <l> or <r> as a medial consonant have been reduced to just the initial consonant. Only the grapheme clusters formed with velar stops and <w> have been kept; here the

⁴ In the course of standardization efforts since the 1930's, this is when the Lao language standardization policy first was laid out clearly, cf. Enfield (2007).

approximant grapheme represents the first segment of a vowel sequence and is pronounced [u] as in /kua:/, /kuɛ:/. In every other medial environment, the grapheme <w> represents the long diphthong /u:a/, and in syllable-final position it stands for approximant /w/ realized as [u]. Thus, the phonemic value for the grapheme <w> depends on its position in the syllable as follows:

Onset: /w/ realized as [v]

C2: /u/

Peak: /u:a/

Coda:/w/ realized as [u]

Apart from this exception, there is a 1:1 mapping for voiced and voiceless unaspirated plosives and the palatal approximant /j/, and a 1:2 mapping for sonorants, fricatives, and aspirated stops due to differing inherent tones. Lao consonant graphemes adequately present Lao phonology and phonotactics. The different consonant classes provide an elegant tool to mark tone, limiting augmentation to only two tone marks.

LAO VOWEL GRAPHEMES

The 38 Lao vowel graphemes are added to the consonant base in prescript, postscript, subscript, superscript, and circumscript positions. 18 single graphemes and 20 conjuncts composed of two to four elements are shown in Table 5, with circles indicating consonant bases or finals. Vowel conjuncts mark vowel quality, length, and position in the syllable. Long and short vowels have different but often related symbols. If a vowel phoneme has two graphemes, one indicates the syllable-medial and one the syllable-final position of the vowel phoneme.

The 12 vowel qualities which each have contrastive length require 24 graphemes. Four special graphemes based on etymological spelling are still in use. These regard the sequences /-am/ and /-aw/, and the sequence /-aj/ with two alternants. Ten of the vowels have additional graphemic variants, depending on whether or not there is a following consonant and thus indicating syllable boundaries. Long monophthongs, close vowels, and central vowels do not have position-dependent variants, except short /a/ and long /ɔ:/. The medial and final graphemes for the short /a/ also serve as shortening symbols; whether the medial or final variant is taken depends on the position of the modified vowel. The other exception is the grapheme for the long back vowel /ɔ:/. Since it also serves as a consonant base for vowel-initial syllables, up to three identical graphemes could be lined up, representing first the syllable onset, second a vowel, and third another syllable onset. The final alternant for vowel /ɔ:/. in this context prevents this from happening.

TABLE 5
Lao vowel phonemes and their corresponding graphemes

Vowel position		Front				Central		Back				
		Short		Long		Short		Long	Short		Long	
Vowel height		medial	final	medial	final	medial	final			medial	final	medial
Close	PHONEME	i		i:		ɯ		ɯ:	u		u:	
	GRAPHEME	◌᷑		◌᷑᷑		◌᷑		◌᷑	◌᷑		◌᷑	
Mid	PHONEME	e		e:		ɤ		ɤ:	o		o:	
	GRAPHEME	◌᷑	◌᷑᷑	◌᷑	◌᷑᷑	◌᷑	◌᷑	◌᷑	◌᷑	◌᷑᷑	◌᷑᷑	◌᷑
Open	PHONEME	ɛ		ɛ:		a		a:	ɔ		ɔ:	
	GRAPHEME	◌᷑	◌᷑᷑	◌᷑	◌᷑᷑	◌᷑	◌᷑᷑	◌᷑	◌᷑	◌᷑	◌᷑᷑	◌᷑
Diphth.	PHONEME	ia		i:a		ɯa		ɯ:a	ua		u:a	
	GRAPHEME	◌᷑᷑	◌᷑᷑᷑	◌᷑᷑	◌᷑᷑᷑	◌᷑᷑	◌᷑᷑	◌᷑᷑	◌᷑᷑	◌᷑᷑᷑	◌᷑᷑᷑	◌᷑᷑
Other	PHONEME		-am#				-aj#			-aw#		
	GRAPHEME		◌᷑᷑				◌᷑᷑᷑			◌᷑᷑		

Most vowel grapheme modifications are very logical and apply the features shortness and final or medial position systematically across vowels in a graphically identical manner; the grapheme for final short /-a/ is added to shorten a vowel in syllable-final position, and the grapheme for medial short /-a-/ is added to shorten a medial vowel. Nevertheless, some exceptions apply to the graphemes representing the six vowels /o ɔ ia i:a ua u:a/ which simply have to be memorized. For final vowel /u:a/, the consonant grapheme <w> cannot be mistaken as a final consonant because the sequence of short medial /o/ and final /w/ is prohibited by Lao phonotactics. Consequently, Lao vowel graphemes appropriately display all distinctive vowels. In the old orthography, reduced vowels in sesquisyllabic words were not written. Now they are over-distinguished and written with a short vowel grapheme that would carry tone but is not pronounced by native speakers (Becker 2003).

THE NOTATION OF TONE IN LAO

Table 6 shows how the spelling system indicates tone through the interaction of consonant class, syllable type, and modifying tone mark. Tone marks are written over the initial consonant grapheme, on top of any possible superscript vowel. Four tone marks are taught in school from the beginning (first grade Lao text book, Lesson 3, page 5) but two of them are rarely used. The

common tone marks, superscript *maaj eek* “first tone mark” < ^ˊ > and *maaj thoo* “second tone mark” < ^{ˊˊ} > occur with all three consonant classes. As mentioned earlier, there is no consensus on the pronunciation of Lao tone, even for the standard Vientiane variety. Accordingly, written Lao tones are transcribed differently by different scholars. The description of tone in Table 6 follows Becker’s interpretation because this is how the informant available for this study learned to pronounce them at school.

TABLE 6
Lao Tone Grapheme System*

<i>Syllable type</i>	<i>Smooth plus</i>	<i>Smooth plus</i>			
<i>Consonant class</i>	< ^ˊ >	< ^{ˊˊ} >	<i>Smooth</i>	<i>Short checked</i>	<i>Long checked</i>
High (obstruents and sonorants except /j/)		low	rising	rising (<i>high M, D, C</i>)	
Mid (unaspirated plosives and /j/)	mid		low (<i>rising M</i>)	rising (<i>high C</i>) (<i>low falling D</i>)	low
Low (obstruents, sonorants)		falling	high (<i>low falling C</i>) (<i>mid D</i>)	mid	falling

* Differing tonal interpretations are given in parentheses, with M for Mollerup’s, C for Cummings’ and D for Diller’s notation.

In summary, standard Lao tones are distributed the following way:

Smooth syllables: all five tones.
 Long checked syllables: two tones (low and falling).
 Short checked syllables: two to three tones, depending on the analysis.

Apart from this, there is no clear consensus on how to read tone on smooth and short checked syllables for the Vientiane standard variety.

IS LAO ORTHOGRAPHY READER-FRIENDLY?

Writing systems requires the reader to link the graphic information to the encoded phonological and morphological information of the language it represents (cf. Vaid & Gupta, 2002; Deacon & Kirby, 2004; Seymour, 2006; Alvarez, Carreiras, & Perea, 2007; Nag & Snowling, 2011; Conrad, Vo, Schneider, & Jacobs, 2011), influenced by the nature of the writing system and its orthography (Perfetti, 2003). Shallow orthographies with consistent phoneme-grapheme correspondences are easier to learn than deep orthographies (Goswami, 2006), which is why orthographic knowledge is particularly important for irregular spelling (Roman, Kirby, Parrila, Wade-Woolley, & Deacon, 2009).

Lao is an isolating language without inflection or agglutination and only a few derivational morphemes, and the syllabic organization of Lao script reflects the language’s monosyllabic morpheme structure. The revision of Lao orthography resulted in a reader-friendly shallow

orthography. Keeping irregular etymological spelling down to four symbols (if used at all) increased the frequency of orthographic neighbours, the orthographic counterpart of phonological minimal pairs, which positively impacts visual word recognition and reading (Perea & Rosa, 2000). The 1:2 mapping on the segmental phonological level for some consonant graphemes is used to indicate tone, resulting in a 1:1 mapping for this distinctive suprasegmental feature. The 1:2 mapping for distinctive vowel quality accommodates a 1:1 mapping for medial and final vowel position, a syllabic feature which helps to identify whether the following consonant grapheme is a coda or the next word's onset. The strong correspondences of phonological and morphosyllabic characteristics between Lao orthography and the spoken language most likely support the process of reading development, enhanced by regular spelling which furthers orthographic knowledge.

From the linguistic point of view, the identification of word boundaries can be problematic (Dixon & Aikhenvald 2002); in English, for example, there is no motivation for spelling 'pillowcase' as one and 'pillow cover' as two words. The introduction of word breaks for the Lao-based Kmhmu' orthography requested by the community (Miller, 2013) resulted in writing many polysyllabic words as individual syllables⁵, avoiding the identification of word boundaries. Furthermore, inter-word spacing appears to facilitate reading only if it is found in the readers' first language writing system (Bassetti 2009). Therefore the missing word breaks in Lao orthography should not make reading harder and circumvent the problem of identifying word boundaries.

Alphasyllabary acquisition is considered to be slower than alphabet acquisition which, next to teaching practice, might not only be due to the type of script and orthographic depth but also to whether an orthography is extensive or contained (Nag, 2007). Traditional etymological spelling with old graphemes which over time caused a one:many phoneme-grapheme correspondence is not used in Lao orthography anymore and should make its acquisition easier. It still is a moderately extensive orthography with its 70 graphemes, though, using tone-bearing consonant grapheme alternants, position-dependent vowel grapheme alternants, and representing vowel length through individual symbols. On the other hand, in a comparison of two contained Roman-based alphabets for a Nilo-Saharan and a Cushitic language with two extensive Semitic abugidas, the alphabets turned out to be harder to learn (Asfaha, Kurvers, & Kroon, 2009). The syllable-based teaching of one of the alphabets also provided better results in letter knowledge, word reading, and spelling tasks than the letter-based teaching in the other alphabet. This indicates that the crucial role of phonology in reading has segmental, phonotactic, suprasegmental and syllabic implementations (Halderman, Ashby, & Perfetti, 2012) which should be made transparent in teaching. The Lao writing system appears to directly reflect such multi-layer representations but, to the author's knowledge, no literacy acquisition studies on alphasyllabaries for tone languages have been conducted yet. Only a direct literacy acquisition comparison of an extensive alphasyllabary and a contained alphabet representing one single language, e.g. Kmhmu' or Hmong which use both Roman and Lao script (Enfield, 2006b), would reveal how reader-friendly the revised simplified Lao orthography really is.

⁵ personal communication November 2012

APPLICATION OF LAO SCRIPT TO OTHER LANGUAGES

Areal phonological features in Mainland Southeast Asia are tone, voice quality (often called register), vowel split, and mono- and sesquisyllabic word structure (Enfield, 2005). Lao word structure, with syllables being equivalent to morphemes, compounds, and reduced syllables, has much in common with other even unrelated languages in the area and is represented through orthographic syllables. Lao encoding of tone can be applied to other tone languages, either by use of consonant classes with a particular inherent tone, by overt tone marks, or by combining both methods like in Lao orthography. The directly encoded vowel length distinctions can be transferred to voice quality distinctions in languages that make use of phonatory suprasegmental features. For split-vowel systems, the loss of tone or voice quality has resulted in additional vowel distinctions, often realized as diphthongs; this can also be indicated through length if this feature is not contrastive. Regarding reduced syllables, it is possible to consider the option of not writing the non-distinctive vowel, as practiced in Thai. This would prevent beginning readers from adding contrastive tone and reflects the phonology more directly.

The following examples from three minority language orthographies illustrate the applicability of Lao script to other languages.

Tai Dam, a Tai-Kadai language related to Lao, has six tones which do not pattern like Lao tones (Fippinger & Fippinger, 1970). Since this language has only one, not three aspirated stops, the present orthography (Fippinger, 2012) uses only the non-aspirated mid class consonant symbols and modifies them with tone marks as appropriate. The use of tone marks does not deviate from Lao orthography. Only the tone of the aspirated stop /^ht/ is indicated through Lao high and low class graphemes. The other high and low class graphemes representing Lao aspirated stops are transferred to the fricatives found in Tai Dam.

Austroasiatic Kmhmu' has 17 initial consonant phonemes that are not represented in Lao script (Miller, 2013). Two new consonant symbols have been created, a merged form of existing graphemes and a curl augment found in an old consonant symbol. Since this language does not utilize tone, preglottalization of nasals and approximants is indicated through the first tone mark. Voiceless sonorants are represented through digraphs using the high class consonant <h> which in Lao orthography also serves to indicate tone. High class consonant graphemes represent the equivalent Kmhmu' phonemes. Other consonants that are not represented in Lao script are symbolized with the remaining low class consonant graphemes with similar places or manners of articulation. The only vowel not found in Lao, near-open central vowel /ɐ/, is written with the graphemes for <i> and <ɛ>, analogous to the mid central vowel written with <i> and <e>.

Tibeto-Burman Louma has three tones and distinguishes two phonation types. The current orthography draft (Lew, 2012) is based on the Louma dialect Uishui. Unmarked low class consonant graphemes carry high tone, with the two common tone marks indicating mid and low tone. High class consonant graphemes represent consonants that are absent in the Lao language. Voicing and aspiration for sounds that are alien to Lao phonology are marked through the vowel-onset consonant base and the high-class <h>, respectively. Long and short vowel graphemes are utilized to represent Louma voice quality by assigning long vowel graphemes to breathy vowels, and short vowel graphemes to creaky, often glottal-final vowels. This convention follows current practice for the related Thai-based Akha languages (Boonyasaranai, 2010) because short open

syllables in Thai and in Lao are pronounced with final glottal stops. The graphemes for <iw, ew> are used to represent the Louma rounded front vowels /y/ and /ø/. Syllabic nasals are interpreted as vowels in Akha (Hansson, 2003). The consonant base representing vowel onsets automatically gives the Louma syllabic nasal a vowel status, and contrastive creaky voice is indicated with the vowel shortening grapheme like for vowels.

These examples show that the rich inventory of consonant and vowel graphemes, the consonant-inherent tone, tone marks, and the systematic marking of vowel length constitute a rich base of orthographic features that new orthographies can draw from. Testing to evaluate the learnability of these orthographies remains to be done.

SUMMARY AND CONCLUSIONS

The Lao orthography discussed in this paper follows the modern simplified system that dates from 1975. Reduced syllables came to be overdifferentiated by writing the phonologically empty toneless vowel; since consonant graphemes carry tone, this inherent tone now applies to the written vowel of the reduced syllable and might be pronounced by beginning readers. Other than that, Lao phonemes are adequately represented through Lao orthography. Word breaks are not indicated by spaces between words, but syllables which are equivalent to morphemes are marked through spelling rules, enhanced by the awareness of Lao phonotactics. Only clauses are separated through spaces. Even though Lao dialects differ in amount and quality of their tones, the orthography has unambiguous tone rules, allowing different but consistent pronunciations for each dialect.

Lao script is not an abugida because it has no inherent vowels and must be labelled as an alphasyllabary which does not distinguish this feature. Its similarities to the Thai abugida and Hangul alphabet suggests to assign all three scripts to one category that may be called syllabet, defined by the use of orthographic syllables with separate consonant and vowel symbols whose placement deviates from the temporal order of the phonemes they represent. Lao script encodes all consonant and vowel segments, represents the suprasegmental features tone and vowel length, and acknowledges syllable structure through vowel grapheme alternants which indicate whether the represented vowel phoneme constitutes the rime or whether it is followed by a final consonant.

The rich but systematic grapheme inventory consistently maps both overt segmental as well as overt and inherent suprasegmental features. The representation of tone and vowel length can be applied to other tone languages as well as languages with voice quality distinction or vowel splits. This dual focus on segmental as well as suprasegmental features poses an advantage over Roman script where suprasegmental features cannot be represented without augmentation or extensive use of multigraphs.

Whereas processing of alphabets has been studied in depth for many decades, more reading research is needed for alphasyllabaries to ensure that creation or revision of Lao script-based orthographies for other languages is adequate to the needs of their users.

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