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Orthography development for languages of the South Central branch of Tibeto-Burman: Lessons from Lamkang

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ABSTRACT

Lamkang (ISO 639-3 code: lmk) is a Tibeto-Burman language spoken mainly in Manipur, India by a community of under 10,000 speakers. As a part of revitalization and documentation efforts, members of the Lamkang community have begun to document oral literature, personal histories, Bible translations and the like in written form using a Latin-based script. In this paper, we present findings from samples of writing collected over the course of the first author's 12 years of work with community writers. Reviewing this corpus of writing samples, we characterize variations in the orthography in linguistic terms. We then compare these variations to orthographic variations in related South Central languages. Our goal is to provide an analysis of orthographic variation focusing on phonological and morphological structure. In particular, we consider how the following are represented: vowel length, vowels in minor syllables, adjacent vowels in different syllables, and affricates. We also consider how writers group morphemes together in orthographic words and how these groupings may not correspond with morphological constituency. Existing literature on literacy shows that metalinguistic awareness can impact the processing of the written word, suggesting that this awareness, or lack thereof, could also impact orthographic choice. These linguistic factors, along with aesthetics and identity, may be used to explain and contribute to resolving orthographic variation in languages with similar structures.

KEYWORDS

Kuki-Chin, South Central, Tibeto-Burman, Trans-Himalayan, orthography, orthographic variation, language documentation, Lamkang, orthography development, language revitalization

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1 Introduction

The Lamkang language (ISO 639-3 code: lmk) is a Tibeto-Burman language of the South Central branch[1] spoken in the Chandel District of Manipur, India. The language has under 10,000 speakers. Lamkang is typologically similar to other languages in the South Central branch, though it has also been influenced by Meiteiron, which is a lingua franca for that part of Manipur State. Orthography development is underway as part of ongoing documentation and revitalization efforts. As detailed in section 2, writers adopt some common writing conventions as seen in Bible translations (Evangel Bible Translators 2014) or widely-read publications on spelling (Bepol 2002; Lamkang Language Literature Society 2017). As the community works towards a consensus on the preferred representation of the language, we notice that there are certain linguistic environments where orthographic variation can be predicted across writers. In this paper, we review these areas of variation.

Our analysis considers examples of written Lamkang by a variety of writers. We identify patterns of variation in writing conventions and the phonological or morphological environments where that variation occurs. In particular, we consider how the following are represented: vowel length, vowels in minor syllables, adjacent vowels in different syllables, affricates, and the grouping together of morphemes in orthographic words.

We also compare spelling variation in three closely related languages, Hakha Lai (ISO 639-3 code: cnh), Mizo (ISO 639-3 code: lus), and Thadou (ISO 639-3 code: tcz). The environments of variation are similar from a phonological and morphological perspective though writer choices for spelling between these languages are not always the same. The paper is organized as follows: in Section 2 we review a history of orthography development for Lamkang, highlighting the community, missionary, and linguistic factors influencing spelling conventions and character (i.e., grapheme) and

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[1] This branch has formerly been known as Kuki-Chin, but this term is considered unacceptable by many speakers of these languages. Therefore, we follow the newer naming practice with "South-Central".

script[2] choice. In Section 3 we provide examples and analysis of common environments of orthographic variation in Lamkang. This is followed by Section 4, in which we suggest that similar loci for variation can be found in the related languages Hakha Lai, Mizo, and Thadou, and discuss orthography development for other linguistically and geographically close languages. We conclude with a brief review of existing research on linguistic features which impact literacy and suggest that it is possible, based on linguistic structure, to identify areas where orthographic variation could occur.

We acknowledge the contributions of many people who have thought through the issues presented here. They are listed and their contributions described in some detail in section 2. The US National Science Foundation provided support for two orthography workshops we held in 2013 and 2016. We are also grateful to Thangi Chhangte and Kenneth Van Bik for sharing information and commenting on orthographic standards and variation in Mizo and Hakha Lai. We are especially grateful to Swamy (Ksen) Tholung, who along with Daniel Tholung, greatly guided our understanding of the facts reviewed here. We dedicate this work to Swamy Tholung who was laid to rest in August 2021.

2 History of Lamkang orthography development

In this section, we provide a brief history of orthographic development for the Lamkang where we see several familiar aspects of orthography development for other communities (Cahill and Rice 2014). This includes the influence of missionary groups who support Bible translation and literacy so that the community can read the Bible and other religious material. It also shows how community gatherings encourage writing and sharing by individuals on what conventions are appropriate, as well as how prolific individual writers create their own idiosyncratic standard by employing predictable conventions in the writing they produce. Finally, it illustrates the use of social media to encourage wider audience discussion. This story of orthography development illustrates how many individual and group preferences come into play on the road to standardization.

We begin by reviewing the influence of Christian missionaries on Lamkang orthography development. Building on the existing body of Lamkang literature created by Christian missionaries, the Lamkang choose to use the Latin script. For some communities in Northeast India, script choice is controversial (Pappuswamy 2017), but the existence of written material that has religious significance to the Lamkang community made this an easier choice. Since the 1980s, representatives from the Lamkang community have worked with Bible translators to put together an efficient and community-acceptable alphabet and spelling conventions. We share here a rather detailed history of that process based on an interview with Mr. Swamy Tholung, who worked on orthographic issues with a focus on various aspects of Bible translation (p.c. to author Chelliah, Jan. 2013). Mr. Tholung recalls translation support-staff from Bibles International starting the conversation on spelling conventions. The Reverend Renghong Khullar, Mr. Shethon Sankhil[3], and Mr. Swamy Tholung

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[2] We use the terms writing system, script, and orthography as defined by Cook and Bassetti (2005). A writing system is the general term for the symbols used to encode a language. This term is used when discussing types of writing systems such as alphabets vs. syllabaries vs. abugidas, etc. A script is the specific, physical implementation of a writing system, such as the Cyrillic or Arabic scripts. An orthography is the language-specific set of symbols and rules for symbol-use, such as the Russian orthography's specific rules for use of the Cyrillic script.

[3] The younger brother of Shekarnong Sankhil, whose contributions can be found in the Lamkang Language Resource in the CoRSAL archive at the University of North Texas.

wrote a *Lamkang Primer* as a part of this initiative. This was followed by a second primer compiled by linguists Clarissa Button from Bibles International and the then director of Bibles International, Henry Osborne. Through these efforts, the Lamkang community documented traditional stories under a literacy-enabling process called "object reading". Swamy Tholung recalled how he, Shethon Sankhil, and Renghong Khullar wrote down traditional stories using literacy in English as a guide. Button and Osborne collected these stories and counted the words to tally the most common consonants and vowels. They found <m> was the most common consonantal grapheme. Using that information, Button and Osborne asked workshop participants to make words with <m> and one vowel. The Lamkang alphabet was put together this way and a book containing a list of words and example sentences along with all the collected words with <m> was created. This was published in 1987. Regarding this, Swamy Tholung noted that the suggested alphabet was, "so new to our people, that it did not go further at that point".

The second stage of development involved additional work with a literacy workshop in 1987 in Mussoorie, Uttarakand, India. Literacy workshops in Mussoorie occurred at least two times a year for several years with the first publications produced in 1989. At the workshops, participating community members studied the Lamkang language including activities such as the classic "paper test" to check for aspiration. At these workshops it was established that long vowels were significant and needed to be shown in the orthography. The workshop conveners suggested to the writers that there were three types of vowels–very short vowels (as found in prefix syllables), short vowels, and long vowels. The workshop conveners suggested new graphemes for long vowels versus short vowels. Discussion of how to represent the very short vowels was not made at this meeting, but see section 3.2. The reaction by writers to using new graphemes for short and long vowels was mixed. For example, writers preferred representing [oː] as <ow> rather than <oo> for aesthetic reasons. This is one example of the push and pull between linguistic structure and aesthetics. The workshops also yielded a translation of the New Testament, the first version of which came out on the 18th of March 2001. The release was celebrated by numerous Lamkang groups.

A notable turning point for literacy work occurred with the translation of three United Nations documents in 2004-2005: the United Nations Declaration on Rights of Indigenous Peoples (UNDRIP), the United Nations Universal Declaration of Human Rights (UDHR), and the Convention on the Elimination of Discrimination Against Women (CEDAW). Sample translations can be found in the Lamkang Language Resource in the CoRSAL archive at the University of North Texas. When working on these translations, Sumshot Khular found interesting orthographic decisions that needed to be made and she consulted with Swamy Tholung Ksen to make those decisions and finalize the translations. He is added as translator to acknowledge his input. Sumshot Khular's UN experience influenced orthography development for the Lamkang in another important way. She attended an event about the importance of mother tongue literacy and while there learned about the Summer Institute of Linguistics (now SIL International) work in this area. Khular remained in touch with SIL and asked for their assistance in orthography standardization. SIL representatives in 2005 hosted a workshop in Guwahati which Sumshot Khular and sister Toni Khullar attended. The output of that workshop is children's stories, such as *Knao Bu Then*, and the storybook *Naoluwng Paomi*, excerpts of which can be found in the CoRSAL archive at the University of North Texas. At Khular's building a convincing case for the need for further literacy work, SIL accepted her invitation to visit the Lamkang people in their villages. Sumshot and Toni hosted many a meeting at their home so that orthography discussions could take place outdoors in their front

yard. The sisters also ran a school for 5 years to introduce preschoolers to writing and reading in Lamkang as well as English and Manipuri.

From the late 90s on there has been additional orthography development coordinated by various members of the community. For example, Michael Bepol, a former chairman of the Lamkang Literature Society, published *Lamkaang Jiikbul* 'Learning the Lamkang Alphabet' in 1999 (republished as Bepol 2002). This publication included some of his observations on spelling variation and provided some useful minimal pairs. SIL International has also been involved with workshops in Chandel and Guwahati, during which researchers, educators, and elders worked to reexamine the characters used in the Lamkang alphabet. The result was similar to the original 1987 proposals. SIL continues to work with the Lamkang community, with recent efforts involving rapid word collection, writer workshops, and other interactive ways to collect writing samples and arrive at an orthographic standard. The Lamkang Language Education Committee (LLEC) and the Lamkang Literature Society also continue to provide crucial support for language-related work in the community. Lufson (~Lovesen) Silsii, along with others on the committees, has shown leadership in this area. Working with SIL, the LLEC has published a children's story book and a dictionary (LLEC 2017). They have also published an alphabet poster, calendar, and a hymn book with 600 songs. In 2015, along with SIL, a workshop was held to collect words from different semantic domains for a dictionary using FLEx[4]. Word collection remains an ongoing effort.

Two US National Science Foundation-funded orthography workshops run by the first author in 2013 and 2016 in Assam provided information on morphological structure, specifically the structure of the inflected Lamkang verb. This structural information provided clues as to where and why writers represented morphology as bound or free. Contributors to these workshops were linguists David Peterson and Thangi Chhangte (experts on South-Central languages), Harimohon Thounaojam (expert on Meiteiron), Prafulla Basumatary (expert on Boro), and Lamkang community writers/translators/linguists Swamy Tholung, Donnu Sankhil, Sumshot Khular, Daniel Tholung, Kumar Sankhil, and Rex Rengpu Khullar. Motivated by the standardization needed for interlinear glossing and based on both discussions and patterns observed in published materials, the first author's UNT team developed a practical orthography which the team uses currently for transcription and morpho-syntactic analysis. That system is revised as our understanding of the structure of the language grows and we better understand, for example, how morphemes group together as morphological, prosodic, or orthographic units. Tyler P. Utt worked for several years on our growing body of interlinear glossed texts and, for that work, studied many writers' conventions both in published and unpublished works. Many of his discoveries were used in honing our working orthography.

We also point to individuals in the community who promote literacy through their own writing. The Lamkang elder Mr. Beshot Khullar, motivated by a desire to pass down the culture of the community to the next generation, has self-published anthologies of Lamkang folksongs, stories, and proverbs (Khullar 2006; Khullar 2013). Another example of a self-funded documentation effort from the community is the work of Reverend Daniel Tholung. Reverend Tholung created videos and photographs of traditional dances and stories. He instituted a competition at his church to record traditional narratives from elders, to encourage writing, and to get younger speakers involved in language documentation. For example, he instituted a competition for the best writing sample

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[4] FLEx (FieldWorks Language Explorer) is a software tool to manage linguistic and cultural data. More information can be found at https://software.sil.org/fieldworks/.

submitted by a young congregant of a traditional story told by an elder. Reverend Tholung also continues to create new translations of the books of the Bible (e.g., Evangel Bible Translators 2013) and to document aspects of the Lamkang culture such as house architecture. Some differences between Daniel Tholung's and Beshot Khullar's writing may reflect that Daniel speaks the Eastern dialect and Beshot the Western. Today, the Lamkang community uses the Lamkang language in social media. Facebook hosts a particularly popular online community where Lamkang members can share photographs and stories. There is also a WhatsApp Group that focuses on language and orthography.

Thus, Lamkang orthography has developed both organically (as individuals adopt conventions they find useful) and systematically (through the work of literacy experts, linguists, and Lamkang Bible translators). Orthographic variation in current day Lamkang writing is an outcome of the combination of these influences. Also, there appear to be certain phonetic and/or morphosyntactic environments which have a greater propensity for variation. These are exemplified and discussed in the following sections.

3 Orthographic variation in Lamkang

The following section outlines some of the commonly seen variations in Lamkang orthography. The main variations discussed include the choice of graphemes to represent long vowels, reduced syllables, adjacent vowels in adjacent syllables, and affricates.[5] Also common to South Central languages and discussed here are the representation of morpheme and word divisions. Examples and, where appropriate, recommendations, are provided and discussed.

3.1 *Grapheme-level variation*

The graphemes used for writing Lamkang are listed in Table 1 along with the International Phonetic Alphabet equivalents and an example.

Grapheme	Phone/Use	Representation using proposed orthography
a	[a], occasionally [ə]	\<arhang kal ma\> 'don't climb up'
aa	[aː]	\<prkhaa\> 'almond'
ai	[aj]	\<phaivang\> 'ant'
aai	[aːj]	\<psaai\> 'elephant'
ao or au	[aːw]	\<pkhao\> 'reptiles'; \<auva\> 'that one'
b	[b]	\<baak rek\> 'bats'
ch	[tʃ], occasionally [ts]	\<chen\> 'to run'
d	[d]	\<dii\> 'water'
e	[e]	\<chet lam da\> 'they went'
ee	[eː]	\<mkheel thung bi ngu\> 'when they asked'
ei	[ej]	\<nei\> 'I'
h	[h]	\<heem\> 'to hit'

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[5] Since tone does not factor into spelling variation we have not indicated tone in the examples.

i	[i]	<in> 'house'
ii	[iː]	<kmiing> 'my name'
iiu	[iːw]	<tkhiiu> 'seven'
k	[k]	<keel> 'goat'
kh	[kʰ]	<khuung> 'drum'
l	[l]	<loon> 'hill'
m	[m]	<mei> 'fire'
n	[n]	<nii> 'day'
ng	[ŋ]	<ngaa> 'fish'
o	[ɔ]	<non> 'snout'
oo	[oː]	<oon> 'to call'
p	[p]	<puu> 'grandfather, uncle'
ph	[pʰ]	<phul> 'water pot'
r	[r]	<raal> 'war'
s	[s], occasionally [ç]	<som> 'ten'
t	[t]	<talu> 'what'
th	[tʰ]	<thung> 'inside'
thl or ṭl	[t͡ɬ]	<thlaa> 'moon, month'
tl	[t͡ɬ]	<tloo> 'do'
tx or ṭ	[ʈʂ]	<txim> 'half'
txh or ṭh	[ʈʂʰ]	<txhi> 'to lead'
u	[u]	<thuk> 'come out'
uu	[uː]	<nuu> 'mother'
uui	[uːj]	<uui> 'dog'
v	[ʋ]	<vak> 'pig'
y	[j]	<yaan> 'night'

Table 1. Lamkang graphemes and corresponding phonemes

Some grapheme standardization may be due to frequency of use. For example, some writers learned to use the grapheme <j> for a voiced palatal glide [j] instead of <y>. Compare, for example, <pyil> 'cucumber' which is also written as <pjil> (Bepol 2002: 8). However, the use of <y> is more common and may therefore become the standard. Speakers sometimes note that this variation is due to influence of spelling practices of Roman Catholic missionaries versus Baptist missionaries as seen by comparing the writing of Catholic Lamkang Michael Bepol and Baptist Lamkang Daniel Tholung. Throughout section 3, we discuss additional sounds and environments where there continues to be variation between writers.

3.1.1 *Vowel length*

Vowel length is phonemic in Lamkang. Long unrounded vowels are represented more or less consistently as a double grapheme sequence–<aa>, <ii>, <ee>–as in <leen> [leːn] 'on top of/above'. However, long rounded vowels are written variably, with the variation centering around use of the grapheme <w>. Some speakers prefer the consistency of doubling the grapheme, resulting in <uu>

and <oo>. Others, however, find that the use of <w> is more aesthetically pleasing, as in <uw> and <ow>. A common example of this is the two forms of /kᵊruːŋ/ 'god', which may be written as <kuruwng> or <kruung>. One may also note the variation of the <u> appearing between <k> and <r> in the first form. This type of additional vowel will be addressed in section 3.2.

3.1.2 *Voiceless retroflex affricates*

Lamkang has unaspirated and aspirated voiceless retroflex affricates [ʈʂ] and [ʈʂʰ], usually written as <ṭ> and <ṭh>, respectively. In some texts the underdot is represented as a dash or underline to make the diacritic more legible, i.e., <ṯ>. There are three issues with the use of the underdot symbol. The dot is often hard to read in smaller fonts and on certain computer screens. Additionally, the underdot can require an additional step on a standard keyboard, so the underdot is often omitted or represented as <tr>. Note that [tr] contrasts phonemically with [ṭ] (e.g., <tren> [tren] 'buy' versus <ṭen> [ʈʂen] 'pull apart') so the use of <tr> is not an ideal solution, though speakers may revert to this solution because it is easier to type. Since context clarifies which word is meant, this does not hamper comprehension. Still, most writers continue to use the underdot for this sound and it is the representation selected by the Lamkang Literature Education Committee. For our practical orthography, we proposed <tx> because it is easy to type, easy to read, and clearly set apart from [tr]. The use of <tx> when writing the retroflex affricate is new and has only been adopted by a handful of writers and especially on social media.

3.1.3 *Aesthetics of digraphs and individual variation*

As was shown in Table 1, digraphs are used for long vowels, the velar nasal, some affricates, and aspiration. Aspiration is represented consistently with <h>, e.g. <ph>, <th>, <ṭh>, and <kh>. The laterally released affricates [t͡ɬ] and [t͡l] have been represented consistently in the majority of published works as <tl> and <thl>, respectively. A list of minimal pairs from Tholung (2018) is given in Table 2 to illustrate:

With voiceless l [ɬ]	With voiced l [l]
<nthlun> [nt͡ɬun] 'we piled up'	<ntlun> [nt͡lun] 'our arrival'
<pthlung> [pt͡ɬuŋ] 'center beam of a roof'	<ptlung> [pt͡luŋ] 'to host'

Table 2. Examples of minimal pairs contrasting voicing/aspiration of laterally released affricates

Aesthetics is at the center of a controversy on how to represent [t͡ɬ]. The LLEC has suggested writing [t͡ɬ] with an underdot, i.e. <ṭl> to avoid the three-consonant sequence of <thl> which they consider awkward.

3.1.4 *The Apostrophe*

The apostrophe <'> has a wide array of uses in the Lamkang orthography. One use is to indicate that a sequence of graphemes is not a digraph but represents two separate sounds. For

example, <p'haap da> 'inhaling it' is pronounced [pˀ.haːp dɐ] not *[pʰaːp dɐ]. In Table 3, we provide additional illustrations of why the apostrophe is necessary for representing some lexemes. Compare the column on the left, which shows a sequence of graphemes pronounced as a single sound, and the right-hand column, where it is pronounced as two different sounds.

Single morpheme	Prefix + Root
<dii tlaang> [diː t͡laːŋ] 'spring'	<t'laang veek dah> [tˀlaːŋ veːk da] 'he used his full strength'
<tloo> [t͡loː] 'to do'	<t'loo> [tˀloː] 'to take'
<khimkhei> [kʰimkʰej] 'all'	<k'hii yah> [kˀ.hiːja] 'I am bleeding!'

Table 3. Comparisons of single morphemes vs. prefix+root combinations

In the same way, the apostrophe is used with sequences of the same consonant which are not geminate consonants but rather are a sequence of a minor syllable composed of a prefix C and an excrescent super short vowel prefixed to the root. The apostrophe indicates that super short vowel. Not all writers follow this convention–some writers are more accepting of the CC sequences in this linguistic environment.

(1) a. <t'thlip> or <tthlip>   [tˀtʰlip]   'ambush'
     b. <m'ma> or <mma>   [mˀma#]   'he'
     c. <k'kal rah> or <kkal rah> [kˀkal ra#]   's/he will find'
     d. <n'neen> or <nneen>   [nˀneːn]   'us (incl.)'
     e. <p'phaak> or <pphaak>   [pˀpʰaːk]   'cause to reach'

Section 3.2 includes further examples and discussion.

Between vowels of non-minor syllables, the apostrophe represents a glottal stop as in the following examples where the vowel-initial stem is separated from the prefix. Here, there is consensus on the need to show that these VV sequences are not long vowels.

(2) a. <na'al>   [naʔal]   'our saltedness'
     b. <tu'uum>   [tuʔuːm]   'to ripen'
     c. <a'oon>   [aʔoːn]   'your shouting'

Image 1. Swamy Tholung Singh explaining the use of apostrophes at the 2016 Lamkang Orthography
Workshop. Photograph by Prafulla Basumatary.

3.1.5 *Syllable-final <h>*

A final <h> is used variably. The main purpose seems to be to provide more orthographic
bulk to monosyllabic open syllable morphemes, e.g., <kkangra>, <kkang rah> 'it will dry' where *k-* is
the third person participant marker, and *rah* is the 3rd future auxiliary. When written with the stem
for 'dry' the auxiliary is written without a final <h>; when written as a separate word, it is written with
the <h>. Consider also <beng leen nih>, for /beŋ-leːn=i/ (wall-on-affirmative) 'is on the wall'. Table 4
shows the most common morphemes that may be written with final <h>.

Spelling and pronunciation	Gloss
<avah> [ava#]	'those'
<leh> [le#]	'and'
<mah> [ma#]	NEG
<ptih> [pti#]	copula
<rah> [ra#]	3A.FUT
<thah> [tʰa#]	LOC
<thuh> [tʰu#]	'inside'
<vah> [va#]	DIST

Table 4. Occurrences of <h>

Additionally, in keeping with short vowels being represented as Vh in some South Central
languages, in Lamkang the <h> is used with short central vowels in phrase or clause final position.

In some languages, <h> is repurposed to indicate glottal stop. See Lotven et al. (2019) on glottal stops in related languages. However, in Lamkang the glottal stop and /h/ do not contrast in this position; therefore, the <h> can be used in this way without confusion. The repurposing of <h> is not unique to Lamkang – Falam Chin's (ISO 639-3 code: cfm) orthography has five different uses for <h> which are all predictable based on the environment of the grapheme (Bibles International 2008: 9).

3.1.6 *Tone*

As is the case with related languages (e.g., Hakha Lai, Mizo, and Thadou), native speakers feel no need to represent tone in the orthography. Tone is phonemic in Lamkang and native speakers can list minimal pairs without much difficulty: e.g., [bu55] 'rice' with high level tone, versus [bu21] 'nest' with low falling tone (Chelliah and Utt 2017). There are also complex tone sandhi rules which are yet to be described. However, context is usually sufficient to differentiate lexical items, so indicating the tone in spelling is not seen as necessary. The tone rules are automatically applied by speakers when reading and so speakers do not see it necessary to mark tone from that perspective either. While tone is not represented in the orthography, the Lamkang language documentation team at UNT is including a phonetic representation of lexemes with tone in Lamkang word lists and other descriptive products. This information is necessary for language revitalization purposes as well as for historical and descriptive study.

In certain other orthographies created for Tibeto-Burman languages, all contrastive tone is marked. See, for example, the case of Kurtöp (ISO 639-3: xkz), which is spoken in Bhutan. The Bhutanese government and the community wished to adopt a Latin-based orthography as well as an orthography based on the Tibetan script Ucen abugida. The community opted to represent all contrastive features such as vowel length and tone (Hyslop 2017). (See also Morey 2021).

3.2 *Representing reduced syllables*

There are three sources for syllable onset consonant clusters in Lamkang. The first we refer to as lexical prefixes, i.e., nonproductive, historically segmentable but now frozen elements (see Matisoff 2003; Mortensen 2013; VanBik 2009). The second is nominalizer-stem combinations, as in [kᵊtʰra] 'good' (Burke et al. 2019: 203). The third is nominal possessive prefixes as in [nej kᵊp.plap] 'my friend' (Burke et al. 2019: 201), or participant marking, as in [mᵊkᵊtᵊpal ra] 'he will collide with me' (Burke et al. 2019: 199). In pronunciation, these clusters are produced with an excrescent vowel, which is shorter than a phonemic short vowel and has just enough sonority to provide a nucleus (Burke et al. 2019).

Syllabification of these complex consonant clusters using excrescent vowels has been observed, as shown in Table 5, which illustrates verbs with the affixes *m-* '1st.patient', *t-* 'inverse', *p-* 'causative', *k-* '3rd.agent', *-lam* '3rd.pl. participant', *-rah* '3rd future auxiliary'.

Orthographic representation using proposed practical orthography	Gloss	Prefixes	Verb Root	Resulting Syllable Structure
\<mtptxooi lam\>	'They are obeying me.'	m.t.	ptxooi	[mˀt.tˀp.pʈʂoːi.lam]
\<mtpk'ong\>	'S/he is causing me to sit.'	m.t.p.	k'ong	[mˀt.tˀp.kɔŋ]
\<mkpchor rah\>	'S/he will soak me.'	m.k	pchor	[mˀk.kˀp.ptʃɔr.ra]
\<mktpmen lam rah\>	'They will trap me.'	m.k.t.	pmen	[mˀk.tˀp.pmen.lam.ra]

Table 5. Verbs illustrating prefix sequence syllabification in Lamkang

The feeling that too many sequences of consonants "doesn't look right" may be the reason why in earlier writings, such as the hymnals produced in the 1950s (Lamkang (Ksen) Naga Christian Literature Society 2009), onset clusters are often represented with a vowel, usually \<a\> when the stem vowel is low and \<i\> or \<u\> when the stem vowel is high. Variation is introduced as writers insert or do not insert the excrescent vowel, e.g., \<**kr**uung\> vs. \<**kur**uwng\> 'god' and \<**kc**hiir\> 'holy' vs. \<**ki**chiir\>.

As our own understanding of Lamkang morphology progressed, we first selected an apostrophe \<'\> to represent this excrescent vowel in these environments. As we show in section 3.1.4, the apostrophe is used to show that adjacent graphemes are not digraphs, so we felt we were extending existing functions of this already useful grapheme. We originally felt that we could use the apostrophe to set off the possessive prefix or participant marking from the stem and thus offer some consistency in the spelling of words with these productive prefixes. We were using our own metalinguistic awareness of Lamkang morphology to determine our spelling rules. Thus, 'my father' with the first person possessive prefix *k-* and the root \<paa\> 'father' would be represented as \<k'paa\> and not \<kpaa\> or \<kapaa\>. However, our suggested use of the apostrophe did not gain traction with users because the rule proliferated apostrophes and made Lamkang look very strange on the page. It appears that most writers prefer to not represent the excrescent vowels. However, one exception that seems to fall along Western and Eastern dialect lines is the case of prefixes that involve syllabic consonants, e.g., the causative prefix *p(r)-* in [p̩r̩t͡lɛw] 'it woke up' which may be written as \<partleu\> or \<prtleu\> with the Western variety preferring the onset with the vowel.

Reduced syllables are also observed when open syllables concatenate with syllables with vowel onsets. This again leads to some variation as writers may or may not write these morphemes separated by spaces. In the word [iip ma-an-tinu] 'y'all did not sleep' (composed of sleep NEG-NON.SG-2A.PST) the negative auxiliary [ma] and plural inflection [an] could be written as either \<maan\> or \<ma an\>.

3.3   *Representing morphological boundaries*

The following section includes discussion of the representation of morpheme and word boundaries. There are difficulties with such representation when dealing with morphologically complex words. These difficulties are discussed and, in some cases, specific recommendations on how to handle these difficulties are provided.

3.3.1 Enclitic morphophonemics

Another area which results in significant variation in spelling practices is how enclitics are written. When an enclitic is concatenated to a root, the result is often a doubled consonant. Usually referred to as gemination in Indian writing on Tibeto-Burman linguistics, these sequences of homorganic consonants represent ambisyllabicity or total assimilation of an onset or coda consonant. Additionally, glide and glottal insertion are observed. Some examples of enclitics with observed morphophonemics are in Table 6.

Enclitic and meaning	Environment	Underlying form	Surface form	Gloss
/ŋu/ 'when V'	V__	tʰung+bi+ŋu	[tʰung.biŋ.ŋu]	'when it still was'
	C__	k+r+tʰuk+en+ŋu	[kɹ.tʰuk.en.nu]	'when they became'
/u/ 'quotative'	V__	the:+da+u	[the:daw]	's/he said, it is said'
	C__	no:l+u	[no:l.lu]	'as (you) said again'
/u/ 'imperative'	V__	atʰe:+u	[a.tʰe:.ju]	'say it!'
	C__	m+hej+tʰe:+pik+u	[m.hej.tʰe:.pik.ku]	'tell (it) to me!'
/a/ 'topic'	V__	au+tʰuŋ+ki+a	[aw.tʰuŋ.ki.ya]	'from there'
	C__	huŋ+ktʰuk+a	[huŋ.ktʰuk.ka]	'(the one who) had emerged'
/o/ 'vocative'	V__	n+pa:+o	[npa:.ʔɔ]	'our father'
	C__	m+dit+o	[mdit.ʔɔ]	'it is said'
/ŋi/ 'source/location'	V__	da:t+pi+ŋi	[da:t.piŋ.ŋi]	'(I) was (there)'
	C__	m+hin+ŋi	[m.hin.ni]	'to (him/her/them)'
/i/ 'shared information'	V__	pi+i	[pi.ʔi]	'it is'

Table 6. Examples of enclitics and underlying vs. surface forms when concatenated with roots

Enclitics are one of the primary sources of variation in spelling. An example is: [paʃaj kana **thuṇṇi**] 'inside the elephant's ear' which is written as <pashai kana **thungi**>, <pashai kana **thung ngi**>, or <pashai kana **thung i**>. Similarly, some speakers will write [beŋ le:ṇṇi] 'on the wall' as <beng lee**ni**> while others prefer <beng leen **nih**>, or <beng leen **ni**>. This source of spelling variation is not unique to Lamkang. We see exactly the same features causing variation in spelling in Thadou as described in Haokip (n.d.) for the agentive/instrumental marker *-in* as in <belin> versus <bellin> 'with pot'.

Another similarity between Thadou and Lamkang is spelling at the juncture between enclitic and vowel-final stem. While a stop in the juncture between enclitic and stem is copied, a glide is inserted when there is no stop. This is seen in the Lamkang word <atheyu> 'you tell me'. The same glide insertion is seen in Thadou, for example, [kei+a] <keiya> 'mine'; [kui+a] <kuiya> 'your'; [mei+a] <meiya> 'with fire'.

We attempted to introduce spelling conventions that maintained the morpheme shape in the orthography to encourage consistency. For example, as seen in Table 6, the imperative morpheme /u/ has many allomorphs. We suggested that instead of writing <nu>, <ku>, <tu>, and <ju> or <yu>, all enclitics should be written as just <'u>, as shown in examples (3a)-(3d) below.

(3) a. <arhan don in'u>   [arhan dɔn in nu]   'Bring (it)!'
     b. <mhei thee pik'u>   [mhej tʰeː pik ku]   'Tell (those things) to me!'
     c. <achet'u>   [a tʃet tu]   'Go!'
     d. <athee'u>   [a tʰeː ju]   'Say it!'

Speakers we consulted were not supportive of this more abstract solution; they preferred instead to represent the allomorphs as they are pronounced. With respect to the consistent representation of the enclitic as a separate morpheme with a copied onset, as in <thung ngi>, we predict that this would be more likely if writers have an awareness of the semantic and morphophonological profile for each enclitic. However, the impact of such metalinguistic information on writing is yet to be systematically researched.

In our attempts at supporting orthography development for the Lamkang, we used knowledge of phonetics, phonology, and morphophonemic rules to provide suggestions on how predictable allomorphy could be represented by underlying forms. We suggested that representing underlying forms would make the spelling more consistent. While knowledge of the relationship between underlying and surface forms may ultimately be useful in spelling instruction, it was clear that for comprehension and aesthetics, writers preferred using surface forms.

3.3.2   Representing the verbal complex

Spacing and what should be considered an orthographic word is one of the biggest issues, not only in Lamkang but for other Tibeto-Burman languages of the South Central branch. The issue arises from the mismatches between grammatical words (which occur in a fixed order and have conventionalized meaning) and phonological words (which are determined on the basis of prosody, allomorphy, and segmental features) (Dixon and Aikhenvald 2003: 13-19). The need for a principled way to decide where orthographic word boundaries should be marked is not unique to South Central (Cahill and Rice 2014). In fact, this matter has also been discussed in literacy studies for world languages. Lojenga (2014: 92-99) suggests a series of tests, which are akin to tests for free vs. bound morphemes, to motivate where orthographic boundaries are to be represented. These include testing for mobility, substitutability, separability, and referential independence. She also recommends tests to see if a constituent can be pronounced in isolation–if it can be, this may support writing the constituent as a separate orthographic word. If a constituent shows phonological unity with another constituent, for example, if there is vowel harmony, then this could motivate grouping the harmonizing constituents into one orthographic word.

The tension between morphological and phonological unity creates a challenge of how to orthographically represent the morphological units of the verbal complex in Lamkang where the verb template has 8 slots, not including the possible auxiliaries and enclitics which may follow.

1	2	3	4	5	6	VERB	7	8	
Patient	Venitive	Preverbal Directional	Agent	Valence	Inverse	ROOT	Derivational Suffixes	Inflectional Suffixes	Auxiliaries/ Enclitics

Table 7. The Lamkang verb template

Although all 8 positions are rarely filled, most verbs in connected speech carry two or three prefixes and at least one derivational suffix along with required inflection. The preverbal directionals carry stress and prosodically chunk as if they are independent constituents. Similarly, derivational morphemes in slot 7 can be phonetically bulky such as the common reduplicated manner adverbial in the following example from Chelliah et al. (2021: 176):

(4) <a-ktxek-sek–sek   rah>
     2A-tear-IDEO–IDEO   3A.FUT
     'You will slice it into small pieces.'

The question is whether the morphemes in the verbal complex should be written as a single orthographic word or whether some other principle, such as stress and prosodic chunking, should determine where breaks are made. To determine this, it would be good to take some usability factors into consideration, factors such as how: (1) word divisions support reading fluency and comprehension, (2) different ways of writing may increase speed of processing, and (3) different representations of the verb best support accurate spelling. However, systematic literacy studies on complex morphologies are not commonly conducted in conjunction with revitalization efforts. What we do have for Lamkang are analyses of existing practices which show the following variability in which of these morphemes are orthographically grouped. There are two patterns we have observed.

Pattern 1 includes representation of the excrescent vowel with prefixes. This provides orthographic bulk to the prefix. Once the vowel is represented, speakers also tend to write the morpheme as a separate orthographic word. An example is provided in Burke et al. (2019: 206).

(5) <mak pɜrdel rah> (rather than <**mk**prdel rah>)
     m-   k-   pr-del   rah
     1P-   3A-   CAUSE-wake.up.V1   3A.FUT
     'She or he will wake me up.'

Note how the inclusion of the reduced vowels in <mak pɜrdel rah> also allows for a new CVC syllable <mak>.

In a second pattern, morphemes of the shape CVC or CCVC within the complex are variably written with the rest of the verb or separately depending on the length of the verb. As of yet, we have not identified particular criteria for the length of the verb; however, there are particular morphemes

where this variability is seen. For example, the derivational suffix -daat which indicates a state or current activity can either be written with the main verb or separately depending on the length of the verbal complex.

(6)   a. Written separately
<an kcham lu **tchaak-chaak in daat rang mda** ne>

an	k-cham	lu	t-chaak-chaak-in-daat-rang	m-da	ne
food	NOM-simple	like	CLUS-eat:V2-eat:V2-NON.SG-STA-PROSP	NEG-3A.PAST	TAG

'We eat mostly boiled vegetables, isn't it?'

b. Written together
<boorkaang **hordaatda**>

boor-kaang	hor-daat-da
basket-men's.basket	carry-STA-3A.PAST

'..Carrying a men's basket…'

Another predictable variation in spelling is with enclitics and auxiliaries which may be written separately or together with the verb. See discussion earlier in this section.

Image 2. Daniel Tholung showing spelling of verb forms at the 2016 orthography workshop.
Photograph by Prafulla Basumatary.

3.3.3 Compounds

There are no standardized rules for writing compounds in Lamkang. Some compounds are written as open compounds: e.g., <skhii ktaang> 'deer trap' composed of [skhiː] 'deer' + [ktaːŋ] 'trap'. Others are written as closed compounds with no space between the stems as in <milaai> 'human being' composed of [miː] 'man' + [laːj] 'spirit'. It is not clear what factors speakers use to decide if a compound is closed or open and there is a high degree of variation in how the same compounds are represented by different writers.

3.3.4 Reduplication

Reduplicated constituents in Lamkang are predictably used to denote repetition, duration, intensity/degree of an action, or extent/amount of an entity (Chelliah et al. 2021). The second element may be partially reduplicated or an exact copy of the first. There is currently no convention for writing reduplicated forms but we have found it convenient to use a hyphen between reduplicated constituents.

(7)   <dii   kchiir   dang-dang nga>
             [diː   ktʃiːr   daŋ-daŋ=ŋa]
             water   NOM-clear   visible-visible=TOP
             'This water is clear (as opposed to other muddy water).'

Speakers treat the elements in a form like <dang-dang> as if they were separate units. They are, for example, written often in short form as <dang2>.

3.3.5 Summary on community writing trends

We offer the following observation about community writing trends. There appear to be five zones in the verb (as listed in Table 8). We suggest that treating these zones as orthographic units could provide guidance for spellers.

Zone 1	predirectional prefixes + **directional**
Zone 2	valency affecting prefixes+**root**
Zone 3	**adverbials**, other derivational morphology including **reduplicated adverbials**+inflection
Zone 4	**auxiliary**+inflection
Zone 5	enclitics

Table 8. Postulated "zones" in the Lamkang verb

It appears that writers organize chunking of morphemes around these zones. The morphologically bound morphemes will seek out the closest component (a prosodic anchor). This docking is rightward for prefixes and leftward for suffixes and enclitics. So when a directional is not present, the predirectional prefixes will dock on the root. Compare (a) and (b). When an auxiliary is not present, inflection will dock on an adverbial. If an adverbial is not present, inflection will dock on the root as long as there is no auxiliary. Compare (c) and (d).

(8) a. Zone 1+2   Zone 3   Zone 3   Zone 4
      <**mprcham**   meek   slii   ah>
      [m-pɻcham-me:k-sli:=a]
      3A-recite.V1-STILL-CONT=TOP
      'He is reading it.'

    b. Zone 1   Zone 2   Zone 3
      <**mhei**   prcham   pik>
      [m-hei-pɻcham-pik]
      1P-HORIZ-recite.V1-BENF
      'Read it to me.'

The (8a) there is no directional prefix, so the person prefix *m-*, which is a Zone 1 prefix, docks on the verb root *prcham*. In (8b) there is a directional, *hei*, so the person prefix docks on the directional, resulting in the writing as <*mhei*>. As already mentioned, there is a tendency to avoid longer words. This extends to other types of constituents such as sequences of derivational morphemes. Thus *meek* and *sli* are both Zone 3 but written separately.

    c. Zone 2   Zone 3+4
      < pii   lamda>
        [pi:-lam-da]
        give.V1-3P.PL-3A.PAST
        '(He/she) gave (it).'

    d. Zone 2   Zone 3   Zone 4
      < pii   lam   mda>
        [pi:-lam m-da]
        give.V1-3P.PL NEG-3A.PAST
        '(He/she) did not give (it).'

In (8c), the third person past *-da* attaches to *-lam.* Both are in Zone 3. Contrast this with (8d) where the third person past *-da* attaches to the auxiliary which is Zone 4. This comparison illustrates the docking to prosodic anchors that we see as a tendency in Lamkang spelling. We are yet to carry out an extensive analysis of existing writing to catalog and analyze patterns of chunking.

4 Orthographic variation in other languages of the South Central branch

These observed variations do not appear to be random or unique to Lamkang. Similar patterns of variation in similar linguistic environments can be seen in other, related languages as we learned from discussion with Thangi Chhangte and Kenneth Van Bik on Mizo and Hakha Lai, respectively. We also use observations on Thadou from Pauthang Haokip (Haokip, n.d.).

The Hakha Lai orthography is based on community discussion and conventions followed in Bible translations. The Mizo community has a standardized orthography taught through school

textbooks, so writers are often familiar with conventions but variation still exists in practice. In this section, we point to some of these similar areas of variation in orthography.

4.1 Grapheme selection

The Hakha Lai and Mizo orthographies both use <t̪>. In Hakha Lai, <t̪> represents a voiceless apical alveolar stop (hypothesized by Maddieson and Van Bik (2004) to be derived from plosives followed by /r/ in Proto-Kuki-Chin) and in Mizo it represents an alveolar flap. While the <t̪> is the orthographic standard for both languages and fairly well established, <tt> may be used by Hakha Lai writers and <tr> or just <t> may be used by Mizo writers for ease of writing.

It is also interesting to compare the use of the grapheme <h> in Hakha Lai as opposed to Lamkang. In Hakha Lai the word final <h> represents a glottal stop. Additionally, in Hakha Lai initial <h> before a vowel is [h] but initial <h> before a consonant represents voicelessness, e.g., <hl> would represent voiceless [l]. Recall that final <h> in Lamkang is used with phrase- or clause-final open syllables to provide orthographic bulk.

4.2 Vowel length

Choice of representing vowel length currently ranges from writing two vowels for long vowels (Lamkang), using diacritics (Mizo), writing long vowels only when ambiguity is possible (Hakha Lai), and not indicating vowel length (Thadou).

In Hakha Lai, vowel length is represented in the orthography based on possible ambiguity. If there is a known minimal pair which may result in ambiguity, then the long vowel will be written with double graphemes, as in Lamkang (e.g., <aa> for [aː]). However, if there is no minimal pair then both long and short vowels are written with a single vowel grapheme as seen in the following examples (p.c. Ken Van Bik), for example, [vaːn] 'heaven' vs. *[van] is written as <van>.

(9)   a. <far> [far] 'sister'   b. <faar> [faːr] 'pine tree'

(10)   a. <kang> [kaŋ] 'fry'   b. <kaang> [kaːŋ] 'burn'

(11)   a. <din> [din] 'stand'   b. <diin> [diːn] 'resting'

(12)   a. ------------------   b. <van> [vaːn] 'heaven'

Additionally, for rounded vowels in Hakha Lai, there appears to be orthographic variation as in Lamkang. A short [o] is represented as <o> but the long [oː] is represented as <aw>. A minimal pair example is [koŋ] <kong> 'story' and [kɔːŋ] <kawng> 'barren'/'bald '. In Hakha Lai it would be incorrect to write *<koong> for either of these word forms. Mizo has a similar orthographic convention, where <aw> represents an open-o [ɔ], similar to the <aw> in English <law> or <yawn>.

Though Mizo does not always represent long vs. short vowels in the orthography, occasionally a circumflex diacritic will be used to indicate long vowels, such as <â>. A long open-o, then, is written as <âw> as in <khâwm> 'gather together, do collectively' and <lâwmna> 'happiness'. However, Chhangte notes that, "people soon get tired of writing or typing that special mark and eventually

leave it out altogether." She notes that while long vowels were written with diacritics, â, ê, î, ô, û, in print, the circumflex mark is mostly omitted. Additionally, just as in the case of Lamkang, the Mizo [t] and [t] are sometimes both written as <t> because, "no one bothers to backspace and dot the ṭ. So, there is only one t in modern printed Mizo." (Chhangte n.d.)

For Thadou, Haokip notes that differences in vowel length are not always indicated. He provides the following Thadou examples: *kap* [kəp] 'cry' versus *kap* [kaːp] 'shoot'; *lit* [lit] 'be big' versus *lit* [liːt] 'leech'; *bong* [bong] 'break' versus *bong* [boːng] 'cow'; and *sun* [sun] 'pour' versus *sun* [suːn] 'day'.

Use of digraphs is also the standard for vowel length and tone in another related language, Falam (Bibles International 2008: 96-97). In Mizo, the lack of distinct vowel length representation and other features result in many homographs, which is now causing the community to consider revising the orthography for this feature.

4.3   *Phonetic mergers and insertions*

Whether or not to write excrescent vowels is specific to Lamkang since the other languages we considered do not have the possibility of stacking more than two stop prefixes. In Mizo and Hakha Lai, prefixes do not stack. There may be one prefix per word and those prefixes are always written with a vowel. Compare Lamkang <kpaa> 'my father' with the same word in Hakha Lai, Mizo and Falam, all written as <ka pa>.

However, there are similar considerations for dealing with V.V sequences, i.e., sequences of adjacent identical vowels rather than long vowels. In Thadou, as seen in section 3 for Lamkang, V.V sequences are resyllabified to VV. The resulting sequence is spelled with just V: [chi 'go' + in 'IMP'] pronounced [chiːn] but spelled <chin>. This can be contrasted with <chin> 'wet surrounding'. Additional examples are: <ne 'eat' + in 'IMP'> written as <nen> instead of <neen>, thus creating a homograph with <nen> 'dirty, shabby' and <ve 'see' + in 'IMP' > is written as <ven> instead of <veen> creating a homograph with <ven> 'to guard, protect someone/something'. In Mizo, the root-affix sequence is written separately reflecting that there is no resyllabification of the VV sequence, as in this example from Chhangte (1989: 123).

(13)   nau-pang   le?   **ui**   **in**
        child   and   dog   ERG

4.4   *Allomorphy and orthographic wordhood*

It appears that for all four languages it is preferred to write out the surface allomorphs (shallow orthography) rather than the underlying morpheme (deep orthography). However, writers may not always have sufficient clues to identify allomorphs.

Hakha Lai, Lamkang, and Thadou exhibit variability in how enclitics are written with the host constituent. Haokip (n.d.) provides the example of <kana> or <ka na> 'grief, sorrow' as an example from Thadou for a verb+nominalizing suffix sequence which is written variably. Additionally, all three languages have consonant copying, assimilation, or glide insertion at the juncture between enclitic and host, as discussed for Lamkang in section 3.3.1. A similar example in Thadou is [kan i lɔm] 'we are happy'/'we thank you' may be written as <kan ni lawm> or <kan i lawm>, though the latter is considered the standard.

In Hakha Lai, spacing between morphemes depends on whether the morpheme is productive or a part of a lexicalized unit. For example, the locative <ah> is written as a distinct orthographic word when used as a post-position as in <Hakha ah> [hakʰa aʔ] 'at Hakha'. However, when appearing in a common collocation or lexicalized form, the orthographic word includes the postposition: e.g., <tikah> 'when', which is <tik> 'time' and <ah>. One exception is when the adverbial <zong> 'also' is used, as in <ka kal tik zong ah> 'when I also go'. In Mizo, most morphemes are written as separate orthographic units, e.g., Mizo <a no lo va> 'it is not the case'.

To further compare the similarities between Lamkang and other languages from the South Central branch, we provide a comparison of lines from the Bible, specifically Chapter 15, verses 11-32 from the Prodigal Son, the Book of Luke. We selected this passage because it occurs as the sample text in most sketches found in the Linguistic Survey of India (Grierson 1903-1922). Notice that orthographic words are longer, always at least two graphemes in length in Lamkang, as compared to Falam, Hakha Lai and Mizo. For these languages, free and bound morphemes are more likely represented as separate orthographic words. That being said, the actual word counts across all four languages are fairly close for these passages, despite the shorter orthographic words in Falam, Hakha Lai and Mizo.

English translation of Luke 15:15-16 (King James Bible)
<15 And he went and joined himself to a citizen of that country; and he sent him into his fields to feed swine. 16 And he would fain have filled his belly with the husks that the swine did eat: and no man gave unto him.>

Lamkang translation of Luke 15:15-16 (Lamkang Ren Pauriina Bible)
<15 Ava leiji mma ngi chetda khuwpaam ava thungki miilai khat hinni am chda; mma ava bil thung ngi vak kapmaal siida. 16 Ungta vak rek do chaak vak then ava kdung ngi chaa chnuwm da; ungu mma ava ku mii khat lee ngi do khat lee pii chme.>

Falam translation of Luke 15:15-16 (Myanmar Bible Society 2006)
<15 Curuangah cuih ramih mi pakhat hnenah a hna ṭuansak dingah a feh ih cupa cun vok kilkhawi dingin a lo ah a fehter. 16 Vok ih an eimi be-hawng kha puar zetin ei sehla a duh zet nain zohman in ei ding zianghman an pe fawn lo.>

Hakha Lai translation of Luke 15:15-16 (Hakha Lai Hakha Common Language Bible)
<15 Cucaah cuka ram mipa pakhat sinah khan kuli va ṭuan awkah a kal i cu pa nih cun vok cawngh awkah a lo ah a rak kalter. 16 Vok nih an eimi bekawng hmanh kha ṭam lenning ti a duh, asinain ahohmanh nih ei awk zeihmanh an pe lo.>

Mizo translation of Luke 15:15-16 (Mizo Tawng Common Language Bible)
<15 Tichuan, chumi rama chêng mi pakhat a bêl ta a, ani chuan a lo lamah vawk rual enkawl tûrin a tîr a. 16 Tin, vawk chawte chu ei tak a nâp a, tu man ei tûr an pe si lo.>

4.5 Discussion

The similar concerns across these languages implies that orthography design would be best served if a linguistic analysis of connected text is first attempted. In addition to determining graphemes needed for individual words, it becomes immediately apparent that there must be standardization around orthographic wordhood. What seems to be of use in making these decisions is an understanding of the language's morphophonology, morpho-syntax, and morpheme semantics. When conferring with tribal literature or orthography societies, it would be useful to look specifically at the juncture between enclitics and their hosts and prefixes and their hosts. These seem to be the main causes of variability.

Typically, communities request help with orthography creation before linguists have a full understanding of the phonology and morphology of a language. So, while tests for orthographic wordhood are useful, they will most likely need to be applied iteratively with modifications to the spelling rules made as linguistic understanding grows (Willis-Oko 2018 and Lojenga 2014). We have yet to try these tests for Lamkang but will be doing so in future research into orthography usability.

One aspect of usability is readability and this has been discussed within the Lamkang community in terms of the difficulty of reading orthographically longer words. For the Lamkang, it is reported that early Bible translations are difficult to read because the words are long and divided in ways that do not correspond to natural intonational phrasing. This is likely true for other South Central communities as well. The Lamkang are aware of these challenges in reading the Bible. In fact, they host a competition called "Surprise Bible Readings" during annual Christian celebrations where pastors are challenged, without any prior warning, to read a random passage from the Bible. To our knowledge, very little work has been done on the intersection of readability and orthography development for South Central languages.

Another challenge to readability may be the amount of phonetic detail provided in the writing. The main purpose of an orthography is to encode spoken language into a written format and to facilitate access to written content as readers decode visual stimuli into linguistic-concepts (Perfetti and Liu 2005). Most research on these types of usability factors is for high-resource languages such as English (Koda 1998, 2007; Meschyan and Hernandez 2004). There is substantial literature indicating that phonological awareness is an indicator of literacy in English L1 readers (Carlisle 2004; Meschyan and Hernandez 2004; Torgesen 1999; Windsor 2000). In literacy studies, phonological awareness refers to being able to identify and manipulate various phonological constituents such as onsets and codas. This awareness is not necessarily conscious but when encoding in spelling makes those structures transparent, such manipulation becomes easier (Carlisle 2004). This is central to one of the arguments for ensuring a developed orthography has, as much as possible, a one-to-one grapheme-to-phoneme correspondence. We recall the use of extra graphemes for orthographic bulk, such as the final <h> in Lamkang. The irregularity of use may correspond to the fact that this grapheme does not correspond to any single phonological unit or feature.

Finally, individuals' morphemic awareness may also support fluency in reading and writing (Nunes et al. 2006; Apel et al. 2013). This metalinguistic knowledge allows readers to process more complex words at the sublexical level (Carlisle 2004). A reader essentially recalls the semantics of a morpheme and associates that with the spelling so that even if the spelling is not phonetically representative, the reader still can quickly decode what is intended. An example provided by Carlisle (2004) is *<dogz> vs. <cats>. The plural of *dog* is not spelled in a phonetically transparent way, yet

reading and decoding is not difficult because we associate the <-s> with the plural morpheme. Recall that in section 3.3.1, Table 6, we proposed spelling conventions for a series of Lamkang enclitics that maintained the underlying representation. This would provide a one-to-one match between the morpheme spelling and semantics. In practice, however, the Lamkang choose to write the surface forms of all allomorphs. In this case, it is important that readers see sufficient examples of allomorphs and develop metalinguistic awareness of the semantics of those allomorphs as related to those morphemes.

A related point is awareness of morphophonemics. In studies of literacy in major languages, it has been found that young readers have less trouble with productive inflectional morphology compared to derivational morphology (Bryant and Nunes 2006). Inflectional morphology is frequent and the morphophonology is predictable and regular. The general consensus seems to be that if speakers are sensitive to morphophonological changes then phonetic details should be represented in the orthography and if the speakers are unaware then the underlying form is preferred (Lojenga 2014; Snider 2014). Take, for example, the Latin-based negative prefix [in-] in English. This prefix has the following allomorphs [il-], [im-], [ir-] due to regressive assimilation with the following syllable's onset. In the English orthography, the surface forms are represented rather than the underlying morpheme, as in <irrelevant> rather than *<inrelevant> (Snider 2014). The representation of the allomorphy does not confuse readers of English. In the case of Lamkang as well, even though they cannot explain the morphophonological change, speakers are aware that the allomorphs of the enclitics are related.

5 Dialects, community, and individuals

Community perceptions associated with different writing systems and scripts, combined with political views towards the lingua franca, can have impacts on community preferences for orthography (Chelliah 2005; Cahill 2014). Additionally, it should not be forgotten that many indigenous communities have had their languages transcribed previously by missionaries and priests for the purposes of Bible translations and hymns (Gray and Fiering 2000). This can result in prior exposure to certain spelling conventions and scripts, which may lead to additional preferences by the community. Even in cases where there is not an orthography developed by missionaries for Bible translations, writing and religion are intimately connected in the context of the Trans-Himalayan region (Willis Oko 2018: 36), with certain writing systems and scripts being strongly associated with religious texts and, as a result, considered sacred (Hyslop 2017; Willis Oko 2018).

Finally, we note that selecting what to represent in writing also depends on which variety is being represented. Working with the Darma people to develop a standard orthography, Willis Oko (2018) noted that there were many different dialects that are closely tied to tribal identity and determining a standard has implications for all of these dialects. The other point noted by Willis Oko is true for many South Central communities as well–individuals in the community develop their own writing conventions, which may result in several individual standards. As Willis Oko states, orthography development cannot be a single linguist's endeavor. It has to be a collaborative, community-driven process. The linguist, however, can inform the process with linguistic details necessary for decision-making.

While communities consider many factors in selecting aspects of a writing system, for under-resourced languages we recognize that there may be very few speakers who are fluent in the spoken

language. In such an instance, we may want to represent all phonetic details. Willis Oko (2018) describes it as follows: if the target audience for orthography development is future generations, then a deeper orthography would be ideal to properly capture underlying forms. If older generations are the target audience then a more shallow orthography may be ideal. While fluent speakers, rather than semi-speakers (Chelliah and de Reuse 2011), may need only "sight vocabulary", or words that can be easily recognized without phonetic decoding (Seifart 2009: 282), readers who aren't fluent in the language will need phonetic details. Some general factors on language planning for lower-resourced languages can be found in McCarty (2018) with discussion of orthography development in additional papers in Hinton et al. (2018).

6 Conclusions and future research

This paper discusses the Lamkang orthography and the attested variation observed throughout the ongoing process of orthography development. We see that the very places where we find variation in Lamkang are the same places we find variation in related languages, such as Hakha Lai and Mizo. These are decisions of whether or not to represent allomorphy and determining orthographic word boundaries. We have shown that it is necessary to have an understanding of morphophonology to provide at least the analysis if not the choice of how to write. Readability as a factor for orthographic conventions could be further investigated.

Our goal in this paper is to identify areas of potential variation, illustrate how this variation is handled in different languages, and provide some background from linguistics and literacy research to better inform decisions. It is our hope that these efforts can aid other community members and linguists working on orthography development by highlighting probable environments of variation and giving ideas for how to tackle said variation. This paper is not meant to act as a set of rules to follow, but rather as a rough guide to help others navigate the complexities of developing an orthography.

This paper focuses on Lamkang and three closely related languages, Hakha Lai, Mizo, and Thadou, so it remains unclear whether the environments we have identified as having a greater propensity for variation will also exist in other languages from different language families. Further research will be needed to see if these areas of variation are common across multiple language families or are unique to Tibeto-Burman languages. Additionally, more research is necessary to fully assess the role of linguistic awareness on orthographic preference and adoption. Most literacy research is focused on pre-existing orthographies and focuses on features that facilitate vs. hinder literacy acquisition. Orthography development is a slightly different scenario, one which necessitates decisions about representation rather than mere observations. Much literacy research is purely observational and descriptive and makes no attempt to provide guidelines for orthographic standards. The potential linguistic factors that need to be considered when developing an orthography for an indigenous, endangered language is a topic that remains under-researched. Nevertheless, it is our hope that this paper will prove helpful to fellow linguists and indigenous language communities as they develop their own orthographic standards. For further reading on orthography development and considerations, the authors recommend the papers collected in Hinton et al. (2018), Cahill and Rice (2014), as well as Seifart (2009).

ABBREVIATIONS

2	second person	*a-*
1P	first person patient (with stem variant 1)	*m-*
3A	third person agent	*k-*
3A	third person agent (with stem variant 2)	*m-*
3A.FUT	third person agent, future	*rah*
3A.PAST	third person past tense verb marker	*-da*
3P.PL	plural	*-lam*
BENF	benefactive	*-pik*
CLUS	inclusive/exclusive agent	*t-*
CONT	continual	*-slii*
DIST	distal	*vah*
ERG	ergative	*-in (Mizo)*
HORIZ	horizontal permanent	*hei-*
INCL	inclusive	
LOC	locative	*=thah*
NEG	negative auxiliary	*ma/mah (when freestanding word)*
NOM	nominalizer	*k-*
NON.SG		*-in*
PROSP	prospective	*-rang*
STA	stative	*-daat*
STILL	ongoing	*-meek*
TAG	tag question	*-ne*
TOP	topic	*=a/=ah (when freestanding word)*
V1	indicates first variant of the verb stem	
V2	indicates second variant of the verb stem	

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