THE SOUND SYSTEMS OF ZOPHEI DIALECTS AND OTHER MARAIC LANGUAGES

Samson Alexander Lotven

Submitted to the faculty of the University Graduate School
in partial fulfillment of the requirements
for the degree
Doctor of Philosophy
in the Department of Linguistics
Indiana University
December 2021

Accepted by the Graduate Faculty, Indiana University,
in partial fulfillment of the requirements for the degree of
Doctor of Philosophy.

Doctoral Committee:

_____
Kelly Berkson, Ph.D, chair

_____
Stuart Davis, Ph.D

_____
Kenneth de Jong, Ph.D

_____
Samuel Gyasi Obeng, Ph.D

_____
Kenneth Van Bik, Ph.D

July 8, 2021

Acknowledgments

It's hard to think of anyone to thank above my wife Stephanie Lotven. She's the most wonderful and talented person I know and she somehow ended up with a linguist. It was easy to keep me around when I was helping her order vegetarian food across Southeast Asia, but she still hasn't given up on me no matter how many times I've said the term *floating tone*. My kids Gytel and Valdea Lotven also deserve a lot of credit in the creation of this thesis. Even when my mind is dead stuck on how to best visually represent onset variation, they snap me out of it and take me to the park. My parents Melynda and Tony Lotven raised a curious kid and have encouraged investigation ever since. The value they've placed on doing fulfilling work is ultimately why I'm a linguist and not something else. I've really found such incredible support and encouragement from all of my family, but I want to mention especially my grandmother Gytel Lotven (my daughter's namesake) and my great aunt Regina Lotven. These sisters escaped the Holocaust to live in Springfield, Missouri where they have been family and community matriarchs. Their focus on investing in learning above all else has driven me into higher education.

I don't think I could have anticipated the support and community I've found at Indiana University since I came here in 2013. I'm not sure I could have known, though, on entering graduate school that my mentors would be so many, that I would get to discuss the puzzles I encountered in fieldwork with such a breadth of people, and that I would end up with a doctoral committee of friends, all of whom have been willing to co-author papers with me. So much of my appreciation goes to the chair of my committee. Kelly Berkson has worked with me on more academic and community projects than anyone else—every single one has benefitted from her being part of it. She challenges me to do better work and interact in ever more positive ways with the community around me. She has shaped the way I look at developing projects, structuring research, mentoring students, writing, editing, collaboration, and student engagement. When she asked me if I wanted to work with her on Hakha Lai, I never imagined that a few months later I'd be working on an undescribed language in the remote field site of central Indiana.

I'm so grateful for the rest of my committee as well, which I thank in alphabetical order. Stuart Davis was always in to discuss a good field data puzzle, and through those conversations, he showed me how to *do* phonological and morphological analysis. I had never formally studied either before I met him and I owe him my love of the subject area and my interest in syllable structure. Stuart once told me a paper I wrote wasn't very interesting. He was right, and that paper improved dramatically for the comment, as has every other one since. I'm thankful to Ken de Jong, who was willing to talk with me endlessly about the relationship between articulation and acoustics. He was also the person I most credit with instilling in me the value of well-presented data. In my first phonetics course he had the students put together the findings of their final projects in figures with no prose, then he studied the figures himself and presented the findings to the class. It has influenced every figure I've designed ever since. Samuel Obeng made me constantly think on different levels of analysis. When I start to favor a phonological or morphological account for a phenomenon, it's Sam's voice in my head that says, "But what about the syntax? What about the pragmatics? What about the phonetics?" I also credit Sam with pushing me to publish data and findings, especially on under-resourced languages, worrying about accuracy first and generalizability later. When I met Kenneth Van Bik, he immediately wanted to engage with me on my research and its intersections with his own. His groundbreaking work reconstructing Proto-Kuki-Chin has made this project possible as well as those of numerous other Kuki-Chin researchers.

Outside of my committee, I want to also thank other mentors and friends at IU who have shaped the way I approach linguistic work. Clancy Clements taught me to always place linguistics in a social context. Steve Franks (even though he encourages my kids to cause trouble) let me puzzle out syntax on countless chalkboards with him. Tom Grano engaged with me in semantic fieldwork, which taught me to pay attention to what is controlled and what is not in elicitation. Robert Botne always made me look at morphological data sets in a different light. Yoshihisa Kitagawa always pushed me to question theory that considers properties of well-studied languages to be underlying. So many of the building blocks of these projects were formed through doing research with other graduate students at IU. JC Wamsley jumped into Kuki-Chin research with me and has been a close friend and colleague of mine since well before that. His comments on some of the chapters of this thesis are also greatly appreciated. Young Hwang and Silvina Bongiovanni have talked with me so much about onset characteristics that they have helped shape both my understanding and my interest in the topic.

Outside of IU, I also credit a long list of people who have been willing to engage with me. Vicki Carstens kickstarted my love linguistics at the University of Missouri and taught me, in addition to syntactic analysis, the value in investigating questions in linguistic theory through fieldwork. Flore Zephir at the University of Missouri was the first person to introduce me to research on language contact through her work on Haitian Creole. David Peterson has been consistently available to discuss Kuki-Chin morphology and the diachronic relationships between Maraic languages. He has also given be copious comments on the tone chapter of this thesis, which I very much appreciate. Everyone that sat around discussing tone with me at the Annual Conference on African linguistics also deserves some credit—Chris Green and Laura McPherson most of all, who have continued to talk tone with me through the pandemic. It is also worth mentioning people who shaped my understanding of tone through discussion including, in alphabetical order Virginia Beavon-Hamm, Lee Bickmore, Mike Cahill, Laura Downing, Michael Marlo, David Odden, and Keith Snider. Also Larry Hyman, in my first presentation as a linguist in Eugene, Oregon asked me about the initial vocalic prefixes in Gengbe and the interest of that puzzle has followed me through to Kuki-Chin research. I also very much appreciate his and David Mortensen's comments on an early version of the Tone chapter of this thesis.

This project would not have been possible without the undergraduate language assistants who offered me their time and energy for data collection. Zai Sung, the primary language assistant for this project, is one of the most patient people I've ever met. I have asked her thousands of tiny questions about her intuitions on tone and agreement and she has continued to give me her valuable time even during the pandemic when work and community demands on that time were high. Thomas Thawngza was the first person I was able to work with on Zophei and he shaped many of the research questions I'm still puzzling over. Sui Hnem Par and Kimberly Sakhong's enthusiasm about their own language and community is infectious and always makes me want to do more. I would also like to thank Chin Evangelical Baptist Church for letting me use their space for linguistic work, as well as the Burmese American Community Institute and the Indianapolis Chin community for their support and welcome.

And finally, like Elephant and Piggie, I want to thank you, the reader! The relevance of this research is ultimately in what we do with it next.

Samson Lotven

THE SOUND SYSTEMS OF ZOPHEI DIALECTS AND OTHER MARAIC LANGUAGES

This dissertation presents in-depth description and analysis the Zophei sound system within the context of the closely-related Maraic languages. Zophei (or Zyphe, ISO 639-3 ZYP), a previously undocumented member of the Maraic branch of Kuki-Chin (or South-Central Tibeto-Burman) spoken in southern Thantlang Township, Chin State, Burma/Myanmar and by thousands of speakers in Indianapolis, Indiana. Using primary data elicited during three years of fieldwork, the sound systems of Lawngtlang, Tlawngrang, and Nuitah Zophei are investigated in detail. Special attention is paid to the segmental, syllable structure, and tonal inventories. A long history of language contact in the Maraic-speaking world has brought on radical innovations in syllable structure, vowel systems, and tone that have, as of yet, seen little linguistic analysis. Outside of the present research program, no previous linguistic work on Zophei exists. As such, this thesis endeavors to describe and analyze the sound systems of Zophei varieties. It has four major goals:

(1) Description of the synchronic sound systems of two Zophei varieties, based on data from one speaker of each variety, covering the phonetics and phonology of onsets and rhymes—with particular focus on inter- and intra-speaker variation.
(2) Analysis of lexical correspondences and comparative data in the elucidation of diachronic relationships between Zophei varieties, and between Zophei and other Kuki-Chin (especially Maraic) languages. This includes primary data from a third Zophei variety (Nuitah) and data from Hnaring Lutuv (Lautu).

(3) To create a lexical database of Tlawngrang and Lawngtlang Zophei, the two varieties focused on herein, with paired audio recordings.

(4) To present a preliminary analysis of tone in Lawngtlang Zophei.

The data collected and presented in this thesis reveal evidence of phonetic onset variation, vowel shift, and robust use of tone. This study is, to the best of my knowledge, the first linguistic treatment of Zophei and the most comprehensive research available on the sound systems of Maraic languages and on tone in KC. The instruments created for this project as well as the data collected, described, and analyzed for this project lay the groundwork for continued research in Zophei, Maraic, and Kuki-Chin more broadly.

Table of Contents

List of Tables and Figures

Chapter 1. Overview and Historical Background

1.1 Introduction

The ethnic Chin people and the diverse languages they speak reflect a history of migration and shifting language contact situations in Burma/Myanmar, India, Bangladesh, and modern diaspora communities spanning the globe. Apart from the Anu-Hkongso, who speak a Mruish language (Eberhard, Simons, & Fennig, 2020), ethnic Chin peoples speak languages from the Kuki-Chin (or South Central) group of Tibeto-Burman languages. Among these is Zophei (or Zyphe, ISO 639-3 ZYP), which is a member of the Maraic group of Kuki-Chin Maraic languages have undergone radical phonological changes compared to neighboring Kuki-Chin (KC) languages and have been the subject of comparatively little linguistic research. In pursuing a better understanding of the Maraic group and its relations with other KC languages, this thesis offers description and analysis of the phonetics and phonology of Zophei with focus both on synchronic variation and diachronic change. Major contributions of this thesis include:

(1) Contextualizing the language for future researchers: This thesis discusses the history of the Zophei people and language with a particular emphasis on movements of peoples and shifting language contact situations. Descriptions of onsets, rhymes, and tone are also presented in the context of attested phenomena in other Kuki-Chin (especially Maraic) languages.

(2) Developing instruments for continued data collection: A Zophei lexical database composed of written and audio data from Tlawngrang and Lawngtlang varieties was compiled for this project. That database further enabled the creation of three other instruments included here, one for comparative phonological analysis between Maraic varieties, one to collect data on tone and verbal morphosyntax, and one to tease apart lexical from grammatical tone.

(3) Creating resources for further analysis: The written and audio data collected with the above-mentioned instruments are made available with this thesis for continued analysis.

(4) Describing inter- and intra-speaker variation: The sound systems of the Zophei varieties investigated here differ from one another, especially in the rhyme systems, offering evidence of front and back vowel shifts as well as the coalescence of diphthongs. Speakers also vary in their productions of sibilant affricates, lateral affricates, and voiceless sonorants based on phonological or social factors. The variation observed in recorded data are elucidated herein, setting up future sociolinguistic and phonetic research.

(5) Setting up research programs: Rhymes in cognate lexical items from three Zophei varieties and one Lutuv variety are compared to Van Bik's (2009) Proto-Kuki-Chin reconstructions, as well as to data from Hakha Lai, Mara, and Zotung. This effort reveals that surface similarities between Maraic varieties may not be due to shared innovations, offering evidence of contact-induced changes to Zophei rhymes.

(6) Identifying areas of theoretical interest: In addition to relevance of vowel shift phenomena to theories of language change, Lawngtlang Zophei data analyzed here reveals a complex system of grammatical tone, which is involved in marking transitivity, plurality, possession, irrealis, and negation. Preliminary tonal analysis is presented here, including an analysis of underlying lexical tone, phonological constraints on tone realization, and morphemes with floating tone.

Zophei and other Maraic languages have undergone phonological innovations not seen in other KC sub-branches. It is worth keeping in mind that diachronic phonological change may be motivated by language contact (Andersson, Sayeed, & Vaux, 2017). To contextualize this analysis of the Zophei language within the history of its people, this chapter provides

background on KC and the movements of its speakers with particular focus on speakers of Maraic languages.

The chapter proceeds as follows: Section 1.2 surveys analyses of the historical connection between KC and other Sino-Tibetan languages. Section 1.3 offers an overview of the movements and history of the Chin peoples. Section 1.4 summarizes proposed KC sub-groupings and provides a discussion of language contact between KC sub-groups. The Zophei language and ethnic group are discussed more specifically in Section 1.5. Section 1.6 presents the structure of this thesis.

1.2 Sino-Tibetan (Trans-Himalayan), Tibeto-Burman, and Kuki-Chin

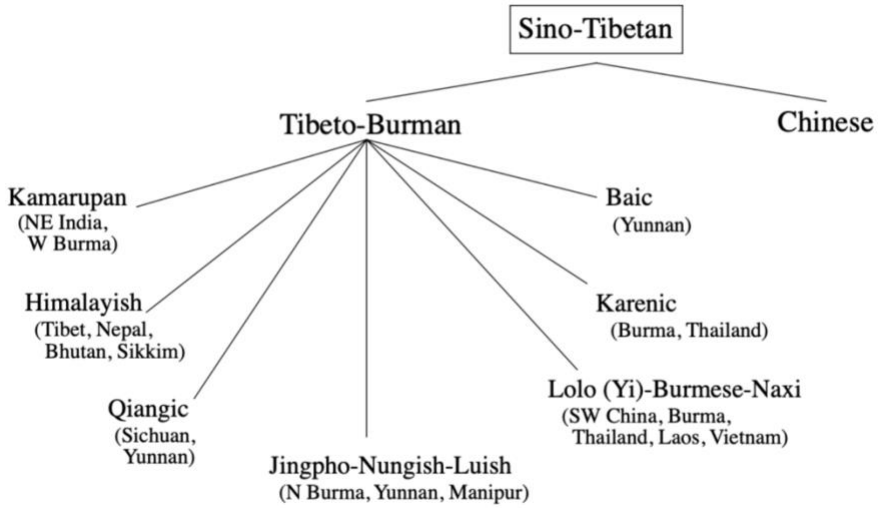
Tibeto-Burman and Sino-Tibetan (Trans-Himalayan) have been the subject of philological study and debate since the mid 1800s. Hodgson (1847) offers the first comparative work to draw historical connections between languages within the Tibeto-Burman family, although the term "Tibeto-Burman" comes from Logan (1858). Conrady (1896) is accredited with first proposing a link between Tibeto-Burman languages and Chinese languages: the Sino-Tibetan language family. The homeland of the theorized Sino-Tibetan family is argued to be located in northern India, what is now known as Sichuan, the Tibetan Plateau, or near the Yellow River. The proto-language was possibly spoken around 8,000-9,000 years ago (Sagart, Blench, & Sanchez-Mazas, 2005).

Archaeological evidence from Sichuan Mesolithic and Neolithic sites suggests that agricultural populations lived in modern-day Sichuan as early as 11,500 BCE, which was a likely starting point for several migrations including a spread northward by 6,500-5,200 BCE (to Dadiwan and Peiligang-Cshan Neolithic sites), westward by 5,550-1,700 BCE (to Yangshao,

Majiayao, and Northern Neolithic sites), and southward from 1,500 BCE to 1,000 CE during the Bronze Age (van Driem, 2002). This southward expansion of peoples from Sichuan included the ancestors of KC language speakers (Luce, 1959a, 1959b). The expansion and migration of these people led to the proliferation and development of Sino-Tibetan languages throughout the regions where they are spoken today.

Research on the internal structure of Sino-Tibetan and Tibeto-Burman has offered differing phylogenetic models. Schafer's (1955, 1974) analysis proposes 6 divisions of Sino-Tibetan: Sinitic, Burmic, Daic, Bodic, Baric, and Karenic. Benedict (1972), who assumes a more central role of the Karen languages of eastern Burma/Myanmar and western Thailand, divides Sino-Tibetan into Chinese and Tibeto-Karen, a group that he further split into the Karen languages and the Tibeto-Burman languages. According to Matisoff (1991), Sino-Tibetan can primarily be divided into Sinitic languages and Tibeto-Burman, a group which is further divided as in Figure 1.1 (from Matisoff, 2003). In this model, the KC group as well as the Naga, Bodo-Garo (Barish), Mirish (Abro-Miri-Dafla), Meithei, Mikir, Mru, and Sulong are placed in the areally classified Kamarupan group (Matisoff, 1999).

Figure 1.1 Matisoff's model of Sino-Tibetan (2003, p.5)



According to van Driem (2002, 2006), the primary division between Chinese and Tibeto-Burman is problematic for linguistic and archaeological reasons. It is possible either that Chinese represents a sub-group within Tibeto-Burman, but not one that represents a primary split, or that Chinese and Tibeto-Burman represent two language families in contact in pre-historic Sichuan. In addition, Beckwith (2002) argues that lexical correspondences between Tibeto-Burman and Chinese may be due to borrowings rather than to shared reflexes. Such research has led scholars to propose larger linguistic groups such as East Asian, which is composed of Austroasiatic, Austronesian, Hmong-Mien, Kradai (Tai-Kadai), and Tibeto-Burman (Starosta, 2005); or to redefine the larger Sino-Tibetan group as Trans-Himalayan with Chinese playing a less central role (van Driem, 2007).

Grierson & Konow (1903-1928), Schafer (1955, 1974), Benedict (1972), Matisoff (1991), and Van Bik (2009) have all offered analyses of the relationship between the KC family and other Tibeto-Burman languages. Some classification schemes have proposed a close link between KC and the Naga languages in India. Grierson & Konow (1903-1928) in their *Linguistic*

Survey of India, analyzed KC as a sub-group within the larger Naga-Kuki-Chin designation. Schafer (1955) criticizes Grierson & Konow's use of word order rather than phonology in their philological work but maintains that KC and Naga languages (except for Baric) fall within a single classification: his Kukish group. In Schafer's schema, Kukish is placed within the Burmic division of the Sino-Tibetan family. Benedict (1972) also saw Kuki-Naga as a group within Tibeto-Burman and, as mentioned above, Matisoff (1991) places KC and Naga (along with Bodo-Garo, Abor-Miri-Dafla, and others) in the Kamarupan group of Tibeto-Burman. DeLancey (2015) groups KC with Northern Naga, Nung, Meyor, and Jinghpaw together in the Central Trans-Himalayan group based on morphological evidence. The structure of the larger language family containing KC as well as the position of KC languages within that group is a problem not just for linguistics (with its inherently limited ability to look into pre-history), but also for archaeological and genetic research (van Driem, 2002, 2006).

Connection between KC and Naga languages and cultures can be especially sensitive and contentious due to the fact that, for example, speakers of the "Old Kuki" languages Lamkang and Moyon-Monshang identify ethnically as Naga (Matisoff, 1999). Furthermore, whether or not an older connection between these groups is reasonable, phonological and morphological evidence suggests the KC and Naga languages constitute separate groups (Van Bik, 2009). Those phenomena separating KC from Naga include both an innovated system of verb stem alternations still present in some KC languages and the phonological hardening of Proto-Tibeto-Burman sibilants /*s/ and /*ʃ/ to Proto-Kuki-Chin /*t^h/, a probable areal feature also present in Bodo-Garo (Burling, 1959).

Little is known about the languages of the ancestors of modern-day KC speakers before their early arrival in what is now Burma/Myanmar. However, archaeological, historic, and

linguistic research can help paint a picture of the movements of Proto-Kuki-Chin language speakers. From their shared settlement in a fertile doab to their forced migration due to flood and conflict, the history of KC language speakers provides context for the diversity of modern day KC languages, offering evidence of language dispersal and language contact.

1.3 The movements of Kuki-Chin language speakers

Kuki-Chin languages are spoken in modern day Burma/Myanmar, India, and Bangladesh and the Chin people have lived in Southeast Asia for centuries. Chin peoples likely travelled south from western China and eastern Tibet through the Hukong Valley down into the area between the Irawaddy and Chindwin rivers as part of the many southward migrations of people from the area of modern-day Sichuan province beginning in around 1,500 BCE (Luce, 1959b). Oral tradition and archaeological evidence suggest the Chin were the earliest Tibeto-Burman group to come to the Chindwin Valley, a settlement process starting as early as the 4th century. Mid 8th century historical accounts from the Pagan Empire (Burman) describe contemporaneous contact with Chin people (Sakhong, 2003; Luce, 1959b). Luce also notes linguistic evidence of contact with the previous occupants of the region: Austronesian language speakers. For example, the Hakha Lai word *ui-tsau* <uico> 'dog' contains the Tibeto-Burman *ui* and the Austronesian *tsau*. Although little is known about this contact between early Chin language speakers and Austronesian as well as other Tibeto-Burman speakers, it begins a longer story of language contact in the region.

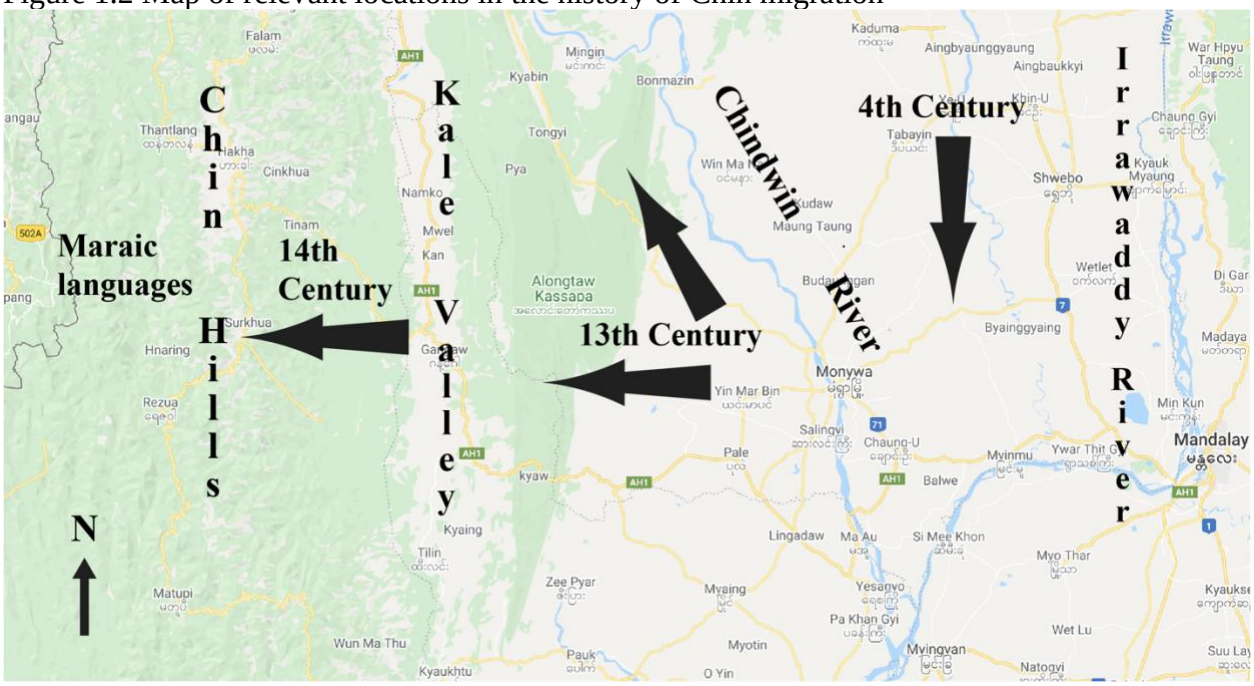
A second migration from the eastern bank of the Chindwin river across the waters to the west bank, the Kale Valley, and the Upper Chindwin occurred in the late 13th and early 14th centuries. While living on the east bank of the Chindwin river, early contact with the Pagan

Empire was peaceful, despite conflict between Pagan and other groups including the Sak, Kantú, Mons, Shans, and Wa-Palaungs (Luce, 1959a). Oral history offers a motivation for the exodus from the east bank in the form of a devastating flood that drove the Chin people north to the Upper Chindwin and west across the Chindwin river to the Kale Valley. The Shans, having toppled the Pagan Empire in at the end of the 13th century, pushed the Chins out of the Kale Valley starting in the 14th Century, westward into the Chin Hills where many KC languages are spoken today (Lehman, 1963; Sakhong, 2003). In addition to contact with Burman and Shan language speakers, Chin westward migration likely also included contact with more Austronesian language speakers.

Figure 1.2 offers a map of western Burma/Myanmar from Google Maps[1] including: the earliest Chin settlement area in the valley between the Chindwin and Irrawaddy rivers in the East, the Kale Valley west of the Chindwin River where the Chin later migrated due to flood, and the Chin Hills west of the Kale Valley where the Chin migrated due to conflict with the Shan.

[1] Google. (n.d.). [Google Map of western Myanmar]. Retrieved October 12, 2020, from https://www.google.com/maps/d/u/0/viewer?ie=UTF8&oe=UTF8&msa=0&mid=17cU629PQU8fQUMkKaL_Df54gx6w&ll=22.235061912644%2C94.43158948465721&z=9

Figure 1.2 Map of relevant locations in the history of Chin migration



The most substantial catalyst for language change in the history of these migrations, however, is likely the contact between KC varieties, with each variety's neighbors shifting dynamically throughout history. The movement of people from the flatter regions of the Chindwin valley to the mountainous regions of the Chin Hills where populations were more easily geographically isolated from one another also facilitated the diversification of KC languages reflected in the modern language group.

Although we do not have direct information about the languages of early Chin peoples, some information about the history of Chin ethnicities proves informative. Links between language and ethnic identity are well established (Fishman, 1999). According to Obeng & Adegbija (1999, p.353), "Every language carries a distinct and weighty ethnic baggage." Within the Chin ethnic group, six ethnic identities developed, assembled into tribes based on geographic settlement. Sakhong (2003) describes tribes as diverse collectives:

> For the Chin, the term ‘tribal group’ is a social group comprising numerous families, clans or generations together with slaves, dependants, or adopted strangers. In other words, it is a group of the same people whose ancestors made their settlement in a certain place together, after their common original homeland in the Chindwin Valley was destroyed. The Laimi tribe, for instance, is made up of the descendants of the group who made their settlement at Lai-lung, after being forced to leave the Chindwin Valley. Thus the term ‘tribe’ as a Chin concept does not refer to common ancestors or common family ties but to a social group of the same ethnic nationality, who settled in a certain place. (p.17-18).

As shown in Figure 1.3, Sakhong (2003) further presents sub-tribe groups within the larger tribal collectives. The Laimi tribe includes names associated with modern-day Maraic languages (Mara, Zophei, Zotung, Lautu, and Senthang) as well as of Central languages, such as Bawmzo and Zahau. However, Central Chin languages are also spoken by members of the Mizo (Lushai) tribe, further illustrating that these six ethnic groups do not reflect linguistic divisions (KC sub-groups are discussed in Section 1.4).

Figure 1.3 Chin tribal ethnicities and sub-tribal groups from Sakhong (2003, p.19).

Diagram *of Chin tribal groups which can generally be divided into smaller sub-tribes or groups as shown above.*

This brief summary of pre-historic and historic Chin migration points to a story of language contact with Austronesian and Tibeto-Burman languages as well as between KC varieties—contact that has increased in the wake of the British conquest of Chinram (the Chin homeland) in 1896. According to Sakhong (2003), after occupying the Chittagong region of Bangladesh in 1760, neighboring what is now Southwestern Chin State in Burma/Myanmar, the British first encountered the Chin people. The groups they met were diverse feudal tribes

controlled by various local chiefs and stratified into three social strata: nobles, commoners, and slaves. In feudal Chin territory, local chiefs, with the support of the nobility, raided neighboring villages for goods and slaves. Raids into neighboring Chittagong continued after the British occupation of Chittagong in 1760 and as the British conquered more area neighboring Chin territory, such as Tripura to the north, they encountered more Chin raids on British occupied areas. The modern map in Figure 1.4 depicts the areas where KC languages are largely spoken: in Chin State, Burma/Myanmar (in the East and South) and in Mizoram, India (in the West and North).

Figure 1.4 Map of Chin State, Myanmar/Burma; Mizoram, India; and neighboring regions[2]

[2] Google. (n.d.). [Google Map of western Myanmar]. Retrieved October 19, 2020, from https://www.google.com/maps/@22.8667852,91.7703505,7z

Claiming provocation by Chin groups, the British invaded what is now Mizoram in 1871, which began a series of wars where Chin groups resisted occupation. These conflicts lasted until famine led to the Chin Hills Regulation in 1896, which established British control over much of Chinram and taxation of the peoples living there. After the regulation, the area around Hakha including the Maraic-speaking villages resisted, remaining unconquered until the Anglo-Chin War (1917-1919). In 1917, around 5,000 men from Hakha, Zokhua, Thantlang, Miram, and the Maraic-speaking areas of Senthang, Zophei, Lautu, and Mara joined forces against the British. During the war, the devastation of the Maraic-speaking area was particularly profound. As many Chin evacuated women and children to the jungles, the British burned down at least 40 villages in the Zophei and Senthang area, killing the livestock and torching the grain fields. In addition to the famine caused by British forces, a Spanish influenza epidemic killed as many as 10,000 Chin, hitting the Zophei and Senthang areas the hardest. One Zophei village Aibur shrank from 300 pre-war households to 75 in 1921. In the lead up to, duration of, and reconstruction after the Anglo-Chin War, the movements of people also resulted in shifting language contact situations, especially between Maraic varieties.

In recent years, persecution by the Myanmar government has caused the need for ethnic Chin people to form communities outside of their homeland, including over 20,000 Chin who have moved to Indiana (mostly on the south side of Indianapolis) in the last three decades. Currently, inhabitants of Chin state suffer from poverty, a lack of infrastructure, and constant political persecution. According to the World Food Programme Myanmar's (WPF) 2015 Chin Operational Brief, there are 470,000 inhabitants of Chin State with 79% living in rural areas. WFP considers Chin state to be the poorest in Burma/Myanmar because of its remote location and inadequate infrastructure. In 2015, Bawi noted that there were no fully paved roads in Chin

state. The primary occupation of the rural Chin population is farming through shifting cultivation of the steep hillsides. Food insecurity in the state is a "cyclical and chronic problem" (Bawi, 2015, p.1). According to the BBC (Bagnall, 2010), the Chin are "one of the most persecuted minority groups in Burma," (para. 2). Since the 1960s when the Burmese military gained political control of the country, the Chin people have been "subjected to forced labour, torture, rape, arbitrary arrest and extrajudicial killings as part of the Burmese government policy to suppress the Chin people and their ethnic identity." The government's program of oppression has centered on the persecution of non-Buddhists and the Chin, being a largely Christian group, has seen the government use forcible conversion tactics including the destruction of Chin churches as well as the arrest and execution of Chin clergy members.

The ethnic and religious persecution of various minority groups of Burma/Myanmar has resulted in a large number of refugees from Chin state fleeing to nearby India, Thailand, and Malaysia where many pursue asylum in the US (Alexander, 2009). Though Chin refugees have settled across the country, in the late 1990s the state of Indiana welcomed about 400-500 Chin refugees, who put down roots largely in and around Indianapolis (Hussein, 2017). Since then, the number of Burmese refugees settling in the US has only increased. According to the US Department of State (Refugee Processing Center, September 2020), 4,932 Burmese refugees were admitted to the US in the previous year, the second largest incoming refugee population (the first consists of refugees from the Democratic Republic of the Congo). Ethnic Chin refugees have continued to settle in Indiana where there are now about 25,000 Burmese refugees, mostly Chin, with 19,000 living in Indianapolis and more continuing to arrive (Burmese American Culture Institute, 2018). A 2017 article in the Indy Star newspaper reported there were nearly forty Chin churches, five Chin members of the Greenwood Chamber of Commerce, and dozens

of small businesses run by Chin businesspeople (Hussein, 2017). The number of refugees, churches, and businesses is increasing, which continues to reinforce the Chin community's nickname 'Chindianapolis' for the Indiana capital city.

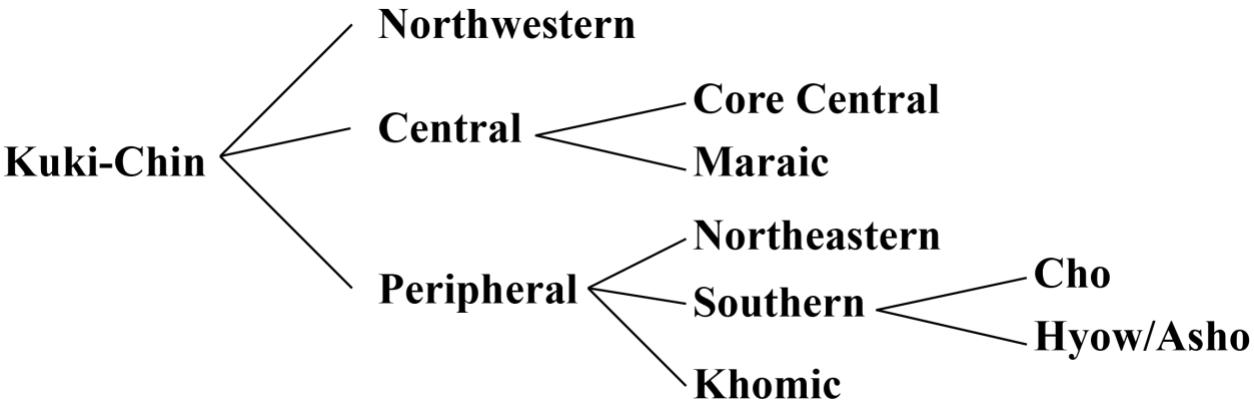
The number of Chin refugees in Indiana will continue to increase, with ongoing reports of forcible displacement. At the time of writing, the Myanmar military is engaged in a campaign of violence in Chin State that has sent thousands of people fleeing into the jungle. According to the New York Times (Wee, October 19, 2021), aid groups and neighboring countries are currently preparing for the surge of refugees from the region. The ongoing and indiscriminate killing of Chin civilians with mortar rounds and gunfire recently targeted Thantlang, capital city of Thantlang township where Zophei and other Maraic languages are spoken. Over the course of a month, 12,000 people, nearly the entire population of the city, has fled.

The large number of Chin refugees in Indiana creates both a local need for in-language materials in multiple domains (education, medicine, government, etc.) and an interest in the linguistic scholarship of these languages. Some recent research in which I am also involved at Indiana University centers around Hakha Lai, the most widely spoken of these KC languages in Indiana. According to conversations with several community members, the second most widely spoken KC language in Indiana is Zophei, which the Chin community considers to be a single language with multiple dialects, each identified by village name. Analysis of the sound systems of three Zophei varieties in this thesis, based on data collected with the help of speakers living in Indianapolis, reveals a more complicated picture with broad variation between Zophei varieties, some likely induced through contact with neighboring languages. In order to further examine the diachronic relationships between KC languages, I turn now to an overview of existing linguistic research on KC sub-groupings.

1.4 Kuki-Chin sub-groups and language contact

Previous literature has divided Kuki-Chin into sub-groups based on various non-linguistic and linguistic factors. The first such attempt was by Bareigts (1981) who suggests three subdivisions, Northern, Central, and Southern. Bareigts further divides the Central Chin languages into North Central (which includes Lai, Bawm, Mizo, and the Pankhu variety of Mara) and Kuki-Chin, which contains the Maraic languages Zophei, Zotung, Senthang, Mara, and Lautu (or Lutuv). Van Bik (2009) explains that Bareigts did not enlist linguistic methods in making his divisions, although his analyses were roughly on the right track. Bareigts' grouping of Maraic with Central Chin is corroborated by Peterson (2017b), who makes use of phonological and morphological evidence. Figure 1.5 provides Peterson's (2017b) schema for KC sub-grouping.

Figure 1.5 Kuki-Chin sub-groupings, from Peterson (2017b).



Shared phonological innovations discussed in Van Bik (2009) motivate many of these divisions. While the Peripheral group shares initial rhotic hardening from PKC /*ɹ-/ to /g-/, other sound changes separate the Northern from Southern groups. For example, the Northern group

innovated final rhotic hardening from PKC /*-ɹ/ to /-k/ while the Southern group saw gliding from /*-ɹ/ to /-j/. Members of the Central group share a number of innovations, most notably consonant cluster simplification from PKC /*pl *kl/ to /t͡l/, /*pʰl *kʰl/ to /t͡ɬ/, /*pɹ *kɹ/ to /ʈ/, and /*pʰɹ *kɹ/ to /ʈʰ/.[3] The innovated lateral affricates are also common to the Maraic branch, suggesting a close relationship between Maraic and Central Chin groups.

Maraic, however, has seen a series of shared (or parallel) innovations not found in other varieties which are discussed in detail in this Chapter 5 of this thesis. In total, these diachronic innovations offer evidence of radical simplification in syllable structure compared to surrounding languages (Lotven, Berkson, Wamsley, Danaher, Van Bik, and Davis, 2019a). Where Central Chin languages lost initial clusters, Maraic languages went on to lose all (Zotung, Mara) or most (Zophei, Lutuv, Senthang) coda consonants. This loss of codas included a reconfiguration of vowel length, with a loss of long/short vowel distinctions in closed and open syllables, followed in some languages by innovation of short vowels from syllables closed with coda oral stops. These innovations have also driven expansions in the vowel systems of Maraic languages, as well as complexification of tone.

An examination of 21 KC languages by Khoi Lam Thang (2001) revealed that lexical (lexicostatistic analysis) and phonological comparison offer evidence in support of differing sub-grouping schemata. Based on 43 phonological innovations in KC languages, Khoi Lam Thang, like Peterson (2017b), finds a primary split between Peripheral (Northern and Southern) and Central (Core Central and Maraic). However, in comparing lexical items, Khoi Lam Thang's primary split involves grouping Northern with Central Languages and Southern with Maraic

[3] The use of a retroflex symbol to indicate these sounds is not quite fitting as they appear to be more like apico-alveolar articulations rather than true sub-apical retroflexes. However, in order to avoid diacritics when referring to these Central Chin coronals, I will continue to use the retroflex symbol for this work.

languages. In this manner, Maraic languages group phonologically with their neighbors to the north and lexically with their neighbors to the south and raises several relevant questions, most notably: Does Maraic describe a distinct sub-group or a language contact situation between Central and Southern Chin languages?

It is probable that the original group that settled the Chindwin valley was linguistically diverse and migration due to natural disaster and conflict only contributed to the varied and shifting language contact situations in which these communities found themselves. After leaving the Kale Valley, the settlement of the Chin Hills provided new and different contact situations, as well as the potential for isolation in mountainous terrain. Groups of settlers moving into the Maraic-speaking area in the Chin Hills were likely linguistically diverse, as self-identification into different sub-ethnic groups suggests. They also found themselves geographically between Central and Southern Chin languages—two more distantly related KC sub-groups—with whom they share phonological innovations and lexical items. However, it is not clear whether each of these commonalities are due to phylogenetic relations or language contact.

There is also a question of whether phonological innovations (including the loss of all coda consonants in Mara and all but /ŋ/ in Zophei and Lutuv) could have occurred during more recent catastrophic changes to these communities of speakers, such as during the Anglo-Chin war (1917-1919). Linguistic documentation of Lakher (Mara) by Savidge in 1908 may shed light on the matter, suggesting recent events may have accelerated changes already underway. Unlike synchronic Mara varieties, described in Van Bik (2009) and Arden (2010) as allowing no coda consonants, Savidge (1908) describes a single coda /ŋ/, "when *ng* comes at the end of a syllable or word, the pronunciation seems to be made up of a curious combination of a nasal and guttural sound, the true pronunciation of which can only be learnt from a Lakher (Mara). The vowel *a*

usually precedes this pronunciation," (p.2). If some varieties of Mara did contain only one coda /ŋ/ and possibly only one vowel-nasal rhyme /aŋ/ prior to the Anglo-Chin war, the loss of other coda consonants must have long preceded it. In addition, since the production of the /ŋ/ coda (and /aŋ/ rhyme) merited the most prose of any sound described by Savidge (1908), who was at a loss to describe it, it is possible that it was in variation at that time in the variety he studied. Although language change was likely hastened by British occupation, syllable structure simplification phenomena further discussed in this thesis must have preceded it. Accelerated language change is likely ongoing, as conflict has not ended for the ethnic Chin population, whose multi-ethnic, multi-lingual diaspora communities span the globe.

1.5 The Zophei ethnic population in Myanmar and Indiana

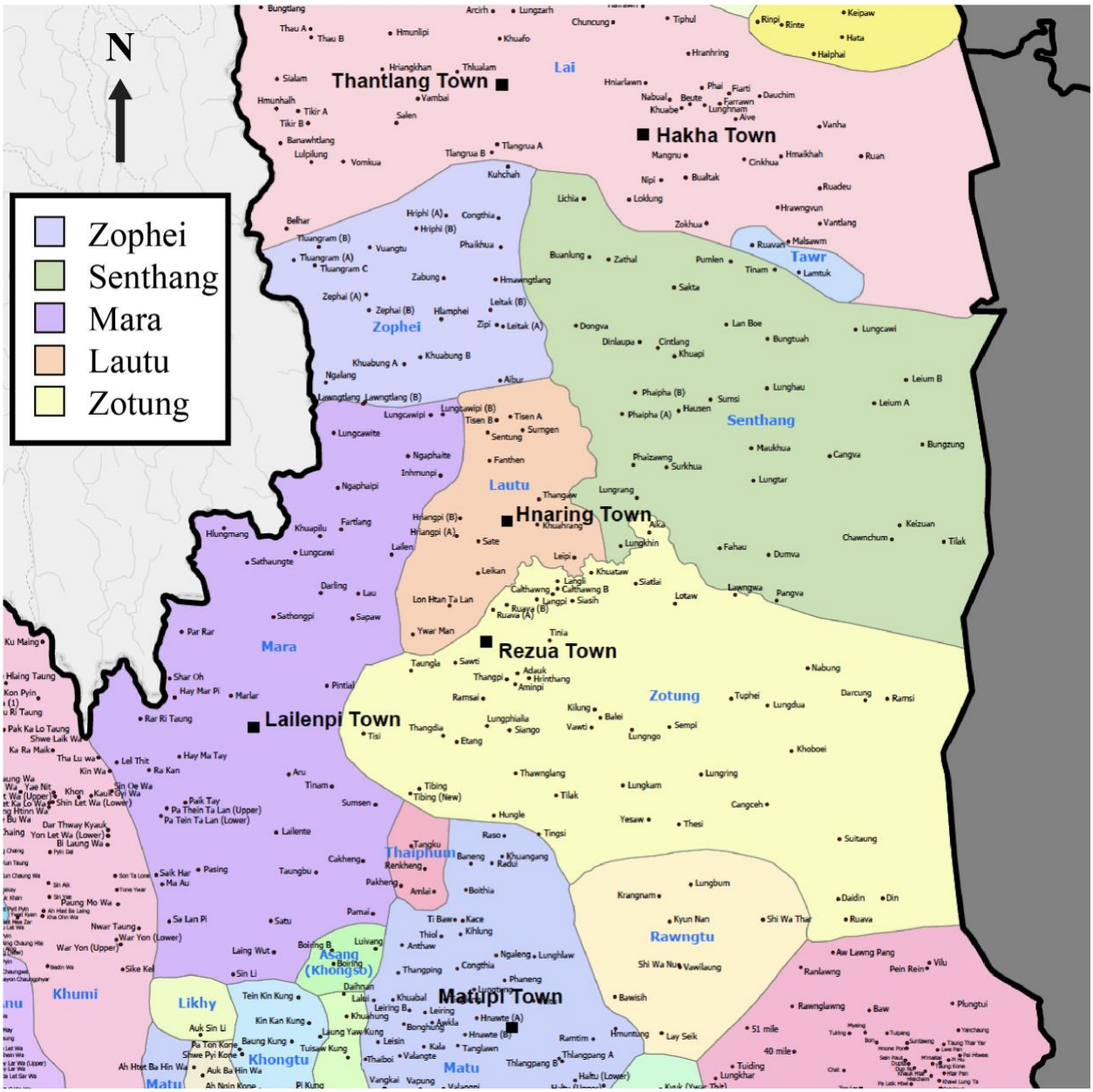
The Zophei (or Zyphe) are a Chin ethnic minority group from southern Thantlang township in western Chin state, Burma/Myanmar and Mizoram state of India. As previously mentioned, the Zophei identify ethnically as part of the Laimi tribe, a linguistically diverse group which contains speakers of many Chin languages including the Maraic languages Mara, Senthang, Lutuv (or Lautu), and Zotung. Of the leading families of the Laimi, Lian Bawi is the historical figure credited with founding the Zophei and ruling over most of the group from Mt. Bawipatlang (Sakhong, 2003). Prior to the current research at Indiana University Bloomington, the Zophei language has remained without linguistic description or analysis due to both the remote location of the Zophei villages and to the unstable political environment of Burama/Myanmar. The current work on these languages is possible due to the opportunity to work with the Indianapolis Zophei community. Ethnologue estimates there were approximately 17,000 Zophei speakers living in Burma/Myanmar and India with 20,000 speakers worldwide in

1994 (Eberhard, Simons & Fennig, 2020). Yet, there are some barriers to accepting the accuracy of this estimate, besides its being almost 30 years outdated. First, it is not clear whether this number reported includes the ethnic Zophei population or only the subset of that population that speaks the Zophei language. Second, since that time, Burmese refugee resettlement in Indiana has brought about 4,000 ethnic Zophei to the state. If Ethnologue's estimate was accurate at the time, it is likely that a substantial percentage of the ethnic Zophei community now calls Indiana home.

To illustrate this migration from the Zophei homeland, consider the worldwide numbers of people maintaining Lawngtlang village ethnic identity; Lawngtlang is the home village of Ms. Zai Sung, one the language assistants consulted for this study. The Lawngtlang community, thanks in part to H. Zo (personal communication with Z. Sung, July 19, 2019), keeps records of people who maintain Lawngtlang identity in the diaspora. Mr. Zo reports that of the 1,185 Lawngtlang individuals in their worldwide counts, only 360 people currently live in Lawngtlang village. There are another 270 in Hakha, the capital city in Chin State, and 17 in Kalaymyo. Outside of Burma/Myanmar, the diaspora community is spread broad with more Lawngtlang people in the US than in Lawngtlang village (numbers of individuals in parenthesis): Malaysia (27), Singapore (2), Australia (85), and New Zealand (5), Norway (13), Denmark (10), Canada (6), and USA (390). There are also some Lawngtlang people in other European countries and in Japan, but no counts are available. This type of large-scale migration indicates that the 1994 Ethnologue estimates for Zophei speakers are now inaccurate and the Zophei-speaking community can be understood as a global diaspora with numbers in the US (and in Indianapolis, Indiana in particular) increasing. There are 4,000 ethnic Zophei currently living in Indiana (personal communication with language assistant, B. Cung, 2019).

Figure 1.6 shows central Chin state including the Maraic-speaking area. Zophei villages (light purple) in the Northwest and Senthang villages (green) in the Northeast border the Lai-speaking area (pink). Mara (dark purple) is spoken in the southwest and Zotung (yellow) in the southeast, with Lutuv (orange) spoken in the center. The Zophei-speaking area does not border the Zotung-speaking area, but does border areas where Mara, Senthang, and Lutuv are spoken. Zophei is in contact with Senthang to the East, Lutuv (or Lautu) to the Southeast, Mara to the Southwest (and West across the border in India), and Lai to the North.

Figure 1.6 Central Chin State Map (modified from the Language and Social Development Organization, 2019)

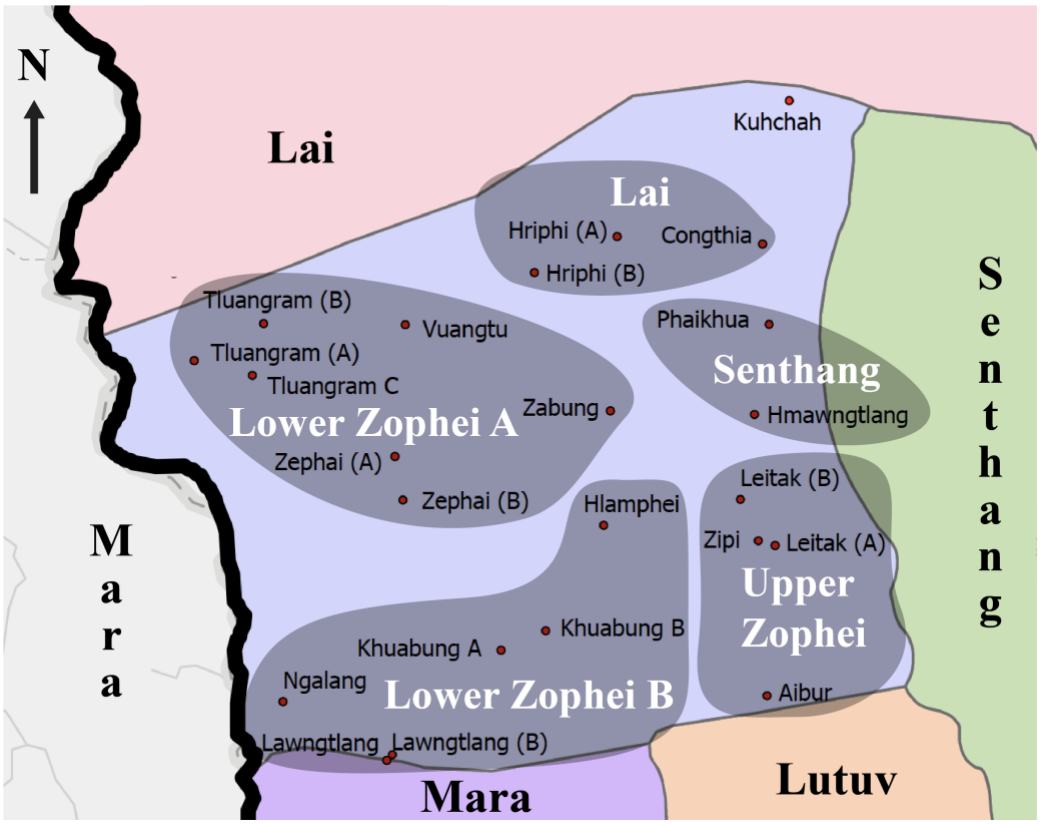


The ethnic Zophei population is linguistically diverse. According to Van Bik (2009), there are at least 15 ethnic Zophei villages in Chin state: Aibur, Congthia, Hlamphei, Hmawngtlang, Hriphi, Khuabung, Lawngtlang, Leitak (Nuitah), Ngalang, Phaikhua, Tluangram (Tlawngrang), Vuangtu, Zabung, Zephai, and Zipi. Community members report that Zophei

people in the northernmost villages of Congthia and Hriphi (near Thantlang and Hakha) mainly speak only Hakha Lai; and people in the easternmost villages of Hmawngtlang and Phaikua primarily speak the neighboring Maraic language Senthang. Of the remaining ethnic Zophei population, the eastern villages of Aibur, Leitak, and Zipi are grouped into Upper Zophei; and the western villages of Hlamphei, Khuabung, Lawngtlang, Ngalang, Vawngtu, Tlawngrang, Zabung, and Zephai are considered Lower Zophei.

Setting aside the several Upper Zophei villages that speak primarily Hakha Lai or Senthang, the division between Upper and Lower Zophei villages mirrors a dialectal divide described in this thesis. Another divide exists between Lower Zophei villages, with Lower Zophei A in the Northwest and Lower Zophei B in the Southwest. As is illustrated in this thesis, Lower Zophei A, evidenced here with data from the Tlawngrang variety, is the most phonologically conservative Zophei variety, and Lower Zophei B, evidenced here with data from the Lawngtlang variety, is the most innovative. Upper Zophei, evidenced here through data from the Nuitah variety, shares several rhyme innovations with Lower Zophei B, constituting front and back vowel shifts further discussed in Chapter 5. Figure 1.7, modified from the map of Chin state in Figure 1.6 by the Language and Social Development Organization (2019), summarizes groups of Zophei villages by language as described by Zophei community members consulted for this project.

Figure 1.7 Map of Zophei villages (modified from the Language and Social Development Organization, 2019)



Data for this dissertation were generated by working with one speaker each from these three dialect areas and provides a solid foundation from which to pursue future research on Zophei. As such, it offers description and analysis of broad topics in the phonetics and phonology of the language as well as preliminary analyses of the diachronic phonological changes that have occurred in the history of Zophei within the context of other Maraic languages. The following section offers an overview of the thesis structure and findings.

1.6 Overview of chapters

The chapters that follow provide a report on the sound system of Zophei with particular attention paid to synchronic variation as well as diachronic change between Zophei varieties and between Zophei and other Maraic varieties.

Chapter 2 presents previous research on the sound systems of Maraic languages including Zotung, Senthang, and Mara, as well as a preliminary report on Lutuv based on primary data. In order to understand Maraic within the larger KC language group, this chapter also presents Van Bik's (2009) reconstruction of the Proto-Kuki-Chin sound system and discussion of the shared phonological innovations motivating the sub-grouping. It concludes by comparing and contrasting the consonant and vowel inventories of these four Maraic varieties.

Chapter 3 describes the methods employed in this study and describes the nature of the data offered in the Appendices. Since data collection was done with the help of four individuals, their language histories are also provided in this section. The appendices described in this section include a lexical database (with available recordings) in Appendix A, examples of attested Zophei syllables in two varieties in Appendix B, corresponding lexical items across several Maraic varieties in Appendix C, verbal complex data in Appendix D, and tone pattern data in Appendix E.

Chapter 4 focuses on Tlawngrang and Lawngtlang Zophei onsets within the context of KC broadly and Maraic languages more specifically. Particular attention is paid to inter- and intra-speaker phonetic variation as exemplified through acoustic data found in the recordings of lexical items in Appendix A.

Chapter 5 discusses rhymes in Zophei, with attention paid both to synchronic and diachronic analysis. This chapter overviews issues in syllable structure in KC languages and

offers acoustic description of Zophei rhymes in the Tlawngrang and Lawngtlang varieties before turning to diachronic analysis. Using the comparative word list in Appendix C, the remainder of Chapter 5 focuses on comparative analysis of Maraic varieties with Hakha Lai and PKC reconstruction from Van Bik (2009). Comparative analysis in Chapter 5 reveals a series of vowel changes that make up a larger vowel shift in Zophei involving front and back vowels.

Chapter 6 provides background on tone research in Kuki Chin languages as well as preliminary analyses of tone phenomena in Lawngtlang Zophei. Data presented in Appendices D & E offer evidence for surface High, Mid, Low, and Falling tone as well as Rising and Concave tones in derived environments. The analysis presented here offers evidence that syllables may be underlyingly High, Low, or toneless, and that surface pitch patterns are subject to phonological, morphological, and grammatical tone processes.

Chapter 7 concludes with a summary of major findings and a look towards future avenues of research on Zophei and Maraic.

Chapter 2. The Sound Systems of Maraic languages

2.1 Introduction

The Maraic branch of Kuki-Chin (KC) has received little linguistic attention largely due to the practical inaccessibility of its speaker-communities, yet the relevance of its study of KC is wide-reaching. Geographically, Maraic languages fall between Core Central and Peripheral subgroups. The linguistic impact of this contact situation (as well as the dearth of Maraic research) obscures our understanding of the relationships between Maraic languages and between Maraic and languages other subgroups. Maraic has been defined by shared or parallel phonological innovations, reducing the complexity of Maraic syllables compared to other KC languages. These innovations are seen across Maraic from the more phonologically conservative Senthang, which retains place contrasts in nasal codas as well as a single glottalized sonorant coda /-mʔ/, to the more phonologically innovative Mara and Zotung, which lack codas altogether. Zophei finds itself between those languages in terms of diachronic change, for example, holding onto only /-ŋ/ as a coda consonant. In the interest of better understanding the relationship between Zophei and other Maraic varieties (especially relevant for the comparative analysis in Chapter 5), this chapter provides a look at the reconstructed sound system of PKC as well as at the synchronic Maraic varieties Zotung, Senthang, Mara, and Lutuv (Lautu). Section 2.2 summarizes the consonants and vowels in PKC with a closer look on the shared innovations that have been used to motivate Maraic as a subgroup in Section 2.3. The sound systems of other Maraic languages are discussed in Section 2.4 (Zotung), Section 2.5 (Senthang), Section 2.6 (Mara), and Section 2.7 (Lutuv). Section 2.8 summarizes by comparing and contrasting the consonant and vowel inventories of these four Maraic languages.

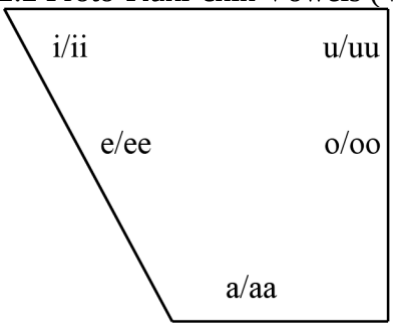
2.2 The reconstructed sound system of Proto-Kuki-Chin

Van Bik (2009) reconstructs the PKC sound system based on phonological comparison of synchronic KC varieties. Onset consonants are provided in Figure 2.1 and vowels in Figure 2.2. In addition to the simple onsets in these figures, PKC is also reconstructed with complex onsets /*pl *kl *khl *pr *phr *kr *khr/, vowel length contrasts in all 5 of its vowels, two diphthongs /*ia *ua/, a triphthong /*iaw/, and several coda consonants /*-p *-t *-k *-m *-n *-ŋ *-l *-r *-j *-w/.[4] PKC is also reconstructed with four tones whose identity was likely constrained by syllable structure, much like other KC languages discussed in Chapter 6. These tones include High, Low, Rising, and Falling (Luce, 1985; Khoi Lam Thang, 2001; Van Bik, 2009).

Figure 2.1 Proto-Kuki-Chin Onset Consonants (Van Bik, 2009)

	Bilabial	Dental	Alveolar	Palatal	Velar	Glottal
Stops	p pʰ ɓ		t tʰ ɗ		k kʰ	ʔ
Fricatives		θ	s sʰ			h
Affricates			t͡s t͡sʰ			
Lat. Affricates						
Nasals	m̥ m		n̥ n		ŋ̊ ŋ	
Laterals			l̥ l			
Rhotics			ɹ̥ ɹ			
Glides	w			j		

Figure 2.2 Proto-Kuki-chin Vowels (Van Bik, 2009)



[4] In this and other figures, the labial velar glide /w/ is listed in the 'bilabial' column for ease of viewing.

Central Chin languages have retained much of the rhyme inventory of PKC including length contrasts in closed syllables while some Southern languages retain complex onsets lost in Central languages. Due to its more conservative rhyme system, Van Bik's PKC reconstruction shares many similarities with synchronic Hakha Lai, especially in the vowel system. There are phonological reasons (such as the shared innovation of lateral affricates) to group Central and Maraic languages together. As such, Maraic is considered a phonologically innovative subgroup within the larger division of Central Chin languages (Van Bik, 2009; Peterson, 2017b), so reconstructed rhymes that are more similar to Central Chin languages than to other subgroups are particularly useful for work on diachronic change in Maraic.

2.3 The Maraic group of Kuki-Chin languages

Maraic as a subgroup is motivated through shared phonological innovations discussed below. These innovations have largely included syllable structure simplification, such as the loss of complex onsets, codas, and vowel length contrasts, which are paired with a complexification of the vowel and tone inventories. Van Bik (2009) lists five sound changes characteristic of Proto-Maraic. In each case below, the PKC reconstruction is given before the arrow and noted with an asterisk (*), while the various reflexes in Maraic languages are given after the arrow. Proto-Maraic Innovations #1-4 have to do with coda simplifications and #5 reflects an initial cluster merger.

Proto-Maraic Innovation 1. The debuccalization of coda stops:

/*-p *-t *-k/ → /-ʔ/

Proto-Maraic Innovation 2. The loss of final glottal stop

/*-ʔ/ → /∅/

Proto-Maraic Innovation 3. The loss of final liquids

/*-ɹ *-l/ → /∅/

Proto-Maraic Innovation 4. The loss of final nasals

/*-m *-n *-ŋ/ → /-m, -n, -ŋ, $V_{[+nasal]}$/

Proto-Maraic Innovation 5. Merger of initial /kɹ/ and /ts/

/*kɹ- *ts-/ → /ts-/

Proto-Maraic Innovations #1 and #2 taken together show that where other KC languages may have up to four possible coda stops (/-p -t -k -ʔ/), Proto-Maraic likely had only one /-ʔ/, since PKC final oral stops /*-p *-t *-k/ reduced to /ʔ/ and final glottal stop was deleted (although this may have proceeded differently in different Maraic languages, further discussed in Chapter 5). Proto-Maraic Innovations #3-4 taken together show a reduction of coda sonorants wherein coda liquids were deleted (with various influences on the preceding vowel) and, with the exception of Senthang, coda nasals either saw a reduction in places of articulation contrasts (to /ŋ/ in Zophei and Lutuv) or were deleted as in Zotung and Mara. Proto-Maraic Innovation #5 shows that where Central Chin languages innovated /t̨/ from /*kɹ-/, Maraic merged /*kɹ-/ and /*ts-/ to the affricate. In addition to these five innovations, Van Bik (2009) describes two other relevant processes. First, spirantization of PKC glides in Northern, Central, and Maraic languages (/*w- *y-/ to /v- z-/). And second, although PKC /*s *sʰ/ are reported to have merged in most Kuki-Chin languages, most Maraic language also merged the dental fricative in this

process (/*θ- *s- *s^{h}-/ to /s-/). These innovations make up the basis for grouping Maraic languages phonologically in previous literature.

2.4 Zotung overview

Although Zotung has long been undescribed, it was the object of research in a survey of the languages in the *Tay Cultural Area* (Shintani, 2015).[5] Shintani's (2015) data consists of a brief discussion of the sound system of Zotung followed by a word list elicited with the help of Zotung speakers in the Matupi township of Chin State, south of Thantlang township. Van Bik (2009) lists 14 villages where Zotung is spoken: Ai ka, Cal thawng, Hrin thang, Hung le, Lo taw, Luang ngo, Lung thlia lia, Na bung, Re zua, Rua va, Sia tlai, Siang ngo, Sum sen, and Ting si. Zotung villages do not neighbor Zophei villages, occupying the opposite corner of the Maraic-speaking region.

Shintani (2015) offers little description of the segmental inventory of Zotung, which is presented as a list, so for the purposes of this description, I interpret phonetic symbols according to the conventions of the International Phonetic Alphabet when not otherwise indicated. There are several notable features of the Zotung consonant system including a lack of lateral affricates and the presence of labial and coronal implosives.[6] The vowel system of Zotung is large and includes both oral and nasal vowels. The consonant and vowel systems of Zotung as described in Shintani (2015) are presented below in Figure 2.3 and Figure 2.4, respectively.

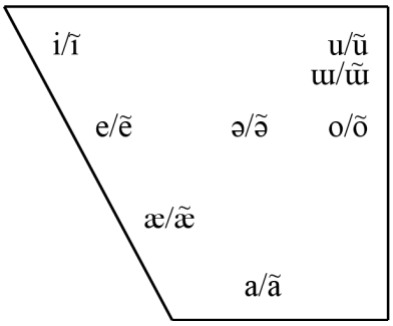
[5] The Tay Cultural Area refers to an region extending along the southern board of Yunan Province in China, south into northern Myanmar, Thailand, and Laos.

[6] It is not clear whether Zotung has sibilant affricates. Shintanti (2015) uses <c> and <c^{h}> for a contrast which may represent a pair of affricates or palatal stops. Future work on Zotung is needed for a more detailed description of the Zotung sound system.

Figure 2.3 Zotung Consonants (Shintani, 2015)

	Bilabial	(Labio-) dental	Alveolar	(Alveo-) Palatal	Velar	Glottal
Stops	p p^h ɓ		t t^h ɗ	c c^h	k k^h	ʔ
Fricatives		θ f v	s z	ɕ		h
Affricates						
Lat. Affricates						
Nasals	m		n	ɲ	ŋ	
Laterals			l			
Rhotics			ɹ			
Glides	w			j		

Figure 2.4 Zotung Vowels (Shintani, 2015)



Zotung has undergone some of the most phonological innovation in the Maraic languages and in KC as a whole. Along with the most limited syllable inventory reported in the KC languages (only CV and CVʔ), Zotung has innovated nasalized vowels from nasal codas.[7] From Shintani's (2015) word list, some other information about Zotung syllables can be gleaned. First, only the following vowels are followed by glottal stops: /iʔ eʔ æʔ aʔ oʔ uʔ ɯʔ/ (not /ə/ nor any nasalized vowel). Next, Zotung has a large inventory of diphthongs /ia ie eiʔ aɯ oe oa ouʔ ui uiʔ ue ueʔ ua ɯa/, two of which /eiʔ ouʔ/ are only transcribed with a final /ʔ/ and two of which may

[7] Though Shintani reports no minor syllables in Zotung, he does report some words with initial vowels with no inherent tone, such as *ʔa jù* 'to fly,' which look suspiciously like minor syllables.

appear with or without a final glottal stop /ui uiʔ ue ueʔ/. Also, two diphthongs are reported with a nasal contrast /ũĩ ẽĩ/, the former showing a 3-way contrast between the long diphthong, the short/glottalized diphthong, and the nasalized diphthong /ui uiʔ ũĩ/. No syllables are reported with nasality and a glottal stop, suggesting that Zotung lost glottalized sonorants (as in Senthang /-mʔ/) before losing nasal codas in favor of phonemic nasal vowels.

Zotung makes use of a two-way lexical tone contrast realized as High-Rising-Falling [454] vs. Falling [42] in open syllables and High Level [55] vs. Low-Falling [31] in syllables closed with a glottal stop.[8] Shintani (2015) notes that this contrast is only "at the end of a semantic junction" and is neutralized to a "slightly rising rhythm" elsewhere. Some grammatical particles are analyzed as having "no inherent tone" and usually surface as Mid-Level [33]. Tone inventories, neutralization of contrasts in non-final position, and toneless morphemes are further discussed in Chapter 6.

Shintani's (2015) report on Zotung consists of a word list with only a few pages of analysis, and although this represents a first step in Zotung scholarship, more research is necessary to understand the sound system, especially the syllable structure of the language. There is a Zotung community in Indianapolis with at least one Zotung Church, so future research in Indiana is well positioned is to fill these gaps.

2.5 Senthang overview

Senthang is spoken east of the Zophei-speaking region and south of the town of Hakha in Hakha township, which is east of Thantlang township. Van Bik (2009) lists the following 23 Senthang-speaking villages: Bual fiang, Buan lung, Bung tuah, Bung zung, Chawn cum, Cin

[8] Shintani (2015) uses Chao's (1930) 'tone numerals' for discussing tone where 1 is the lowest pitch and 5 is the highest. Level tones are written with the same number repeated twice (e.g 33, 55) and contour tones include a series of numbers relating to the pitch levels relevant to the contour (eg. 42, 545).

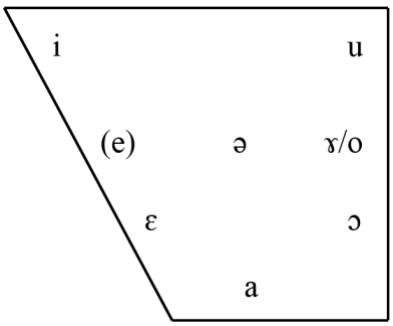
tlang, Dong va, Dum va, Hau sen, Kei zuan, Khua pi, Lang pho, Lei um, Li chia, Lung hau, Lung rang, Lung tar, Phai pha, Phai zawng, Sak ta, Sum si, Sur khua, and Za thal. The people living in the ethnic Zophei villages of Phaikhua and Hmawngtlang also speak primarily Senthang.

The Senthang consonant system shown in Figure 2.5 and vowel system in Figure 2.6 come from Ngun Tin Par (2016) and Watson (2019). The authors note this phonological description relies largely on an unpublished manuscript by Craft & Craft (2010) since their research focused on agreement and participant reference rather than phonological analysis.

Figure 2.5 Senthang consonants (Ngun Tin Par, 2016)

	Bilabial	(Labio-) dental	Alveolar	Palatal	Velar	Glottal
Stops	p pʰ b	t tʰ d			k kʰ	ʔ
Fricatives		(f) v	s z		x ɣ	h
Affricates			t͡s			
Lat. Affricates						
Nasals	m̥ m	n̥ n			ŋ	
Laterals			l̥ l			
Rhotics						
Glides	w			j		

Figure 2.6 Senthang vowels (Ngun Tin Par, 2016)



Senthang has a three-way voicing contrast in bilabial and dental stops with voiceless unaspirated, voiceless aspirated, and voiced members of the series. The velar stops show only a two-way contrast, with voiceless aspirated and unaspirated members. The fricatives include voiced and voiceless labials, alveolars, and velars. The voiceless labio-dental is reported to be a marginal phoneme borrowed from Hakha. Senthang has two sibilant affricates and no lateral affricates. For sonorants, Senthang has a voicing contrast in bilabial and dental nasals only, as well as in the lateral; there is no rhotic in Senthang. The two glides, the voiced bilabial, dental, and velar nasals, and glottal stop can appear in coda position and Ngun Tin Par (2016) notes a final glottalized bilabial nasal is possible /-w -j -m -mʔ -n -ŋ -ʔ/.

Senthang has a 7-vowel system with no length nor nasality distinction in vowels. The vowel [e] is an allophone of the phoneme /ɛ/ which is raised following /j/ or /i/. There are only two rising diphthongs /ia/ and /ua/, analyzed as Vowel-Vowel sequences because both can be followed by a coda nasal (Ngun Tin Par, 2016). Other falling diphthongs /aj, uj, oj, uaj, aw, iw/ are analyzed there as Vowel-Consonant sequences since they cannot co-occur with a coda nasal, although it is worth noting that there are further phonotactic restrictions based on preceding vowel, that may suggest analysis as six distinct diphthongs.

Tone is used lexically as well as grammatically in Senthang. The tone system has three register tones: High, Mid, and Low as evidenced by the minimal triplet *tʰə́* 'blood,' *tʰə̄* 'wind,' and *tʰə̀* 'slide.' In addition to lexical contrasts, tone marks plurality in personal pronouns, tense, mood (indicative vs. imperative), and valency (transitive vs. intransitive), further discussed in Chapter 6.

Despite the valuable steps made by Ngun Tin Par (2016) and Watson (2019) in Senthang scholarship, much work needs done in describing and analyzing the language, especially in terms

of the sound system. There is at least one Senthang Church in Indianapolis, so future research in Indiana will offer opportunities to pursue work with the local Senthang community.

2.6 Mara overview

Due largely to early Christian missionary work, Mara (also called Maraa or Lakher) is the most well-researched Maraic language. According to Van Bik (2009) Mara is spoken in Mizoram province of India and in 13 villages of Myanmar: Dar ling, Hlum mang, Lai len pi, Lung cawi pi, Lung cawi te, Nga phai pi, Nga phai te, Pin tia, Sa bawng pi, Sa bawng te, Ti chung lai len, Ti si, and Tin nam. The Mara-speaking area extends south from Thantlang township into Matupi township. Mara villages are found west and southwest of the Zophei-speaking region, west of the Zotung-speaking region, and west of the Lutuv-speaking region.

Early research on Mara was done by Savidge (1908), Parry (1932), and Lorrain (1951) who reported on lexical and grammatical features of the language. Later work has described wide variation within Mara and has worked to better understand the place of Old Mara within KC. Löffler (2002) is focused on orthographic recommendations for the Mara script as well as on Old Mara reconstruction by comparing Mara to other Kuki-Chin languages, while Löffler (2004) pursues Old Mara reconstruction through inter-dialectal comparison. Van Bik (2009) also uses comparative analysis to situate Proto-Maraic within KC. Arden (2010) describes the Mara sound system and morphosyntax based on the intuitions and recorded speech of a native speaker. These analyses span multiple dialects and over 100 years, so broad variation in these reports should be expected.

Parry (1932) lists four Mara dialects: Tlongsai (around Saiko and Siaha), Zeuhnang (around Savang and Laki), Sabeu (around Sabeu), and Hawthai (the language of the Hawthai people). Löffler's (2002) data is from the Tlóusài (Parry's Tlongsai) dialect, while Löffler's

(2004) data adds a comparison with the Fàbàu (Parry's Sabeu) dialect as well as the Zàwhnái (Parry's Zeuhnang) dialect; and Arden's (2010) analysis focuses on the Sabeu dialect based on data from a speaker from Ngephepi (Ngaphaipi in Figure 2.3).[9]

Mara (along with Zotung) offers among the most limited syllable structure in KC. Mara lacks coda consonants other than /ʔ/, which Arden (2010) describes as part of the sound system but Löffler (2002) claims is not phonemic and is indicative only of impolite speech. Arden (2010) does report that Mara also has CV minor syllables, which are not reported for Zotung. Also unlike Zotung, Mara does not have nasal vowels, however Löffler (2004) reconstructs nasal vowels for "Old Mara," no longer present in modern Mara varieties. Arden (2010) (though not Löffler, 2002 nor Van Bik, 2009) describes vowel contrasts in terms of lowering /i i̤ ɑ ɑ̤ u ṳ/, as well as 3 tone levels: High, Mid, and Low. Löffler (2002) also speaks to the central importance of indicating 3 tone levels in the orthography, noting that written Mara is too ambiguous to be functional without tone marks.

A description of the Mara segmental inventory is presented below, consonants in Figure 2.7 and vowels in Figure 2.8. The consonants in Figure 2.7 are modified from Arden (2010), who treats lateral affricates as stop-lateral clusters, however I have added them to the consonant chart as affricates for ease of comparison with the other Maraic languages described in this thesis. Figure 2.8a is Arden's (2010) analysis of the Sabeu Mara vowel system and Figure 2.8b includes monophthong and diphthong diagrams of Mara vowels from Van Bik (2009). Van Bik's (2009) data is primarily from Luce (1959a) and is augmented by primary data from a speaker from Surkua village.

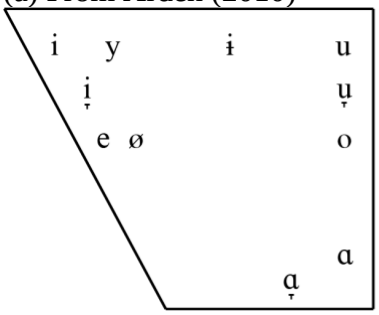
[9] Löffler's (2002, 2004) data is from Savidge (1908), Parry (1932), and Lorrain (1951).

Figure 2.7 Mara consonants

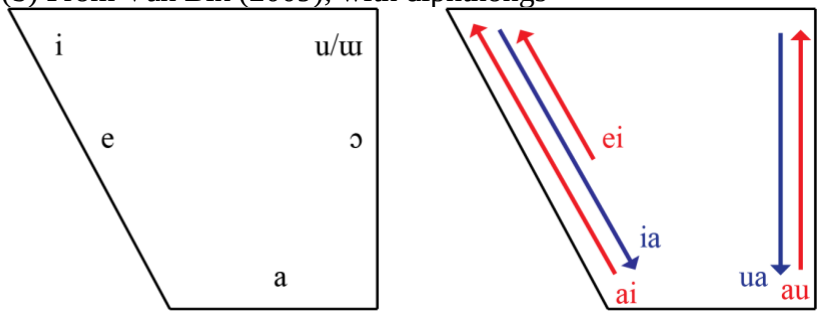
	Bilabial	(Labio-) dental	Alveolar	Alveo-Palatal	Velar	Glottal
Stops	p p^h b	t t^h d			k k^h	ʔ
Fricatives		f v	s z			h
Affricates				t͡ɕ t͡ɕʰ		
Lat. Affricates			t͡l t͡ɬ			
Nasals	m̥ m	n̥ n			ŋ	
Laterals			l̥ l			
Trill			r̥ r			
Glides						

Figure 2.8 Mara vowels

(a) From Arden (2010)



(b) From Van Bik (2009), with diphthongs



Arden (2010), describing the sound system of the Sabeu (West Maraland) dialect, also mentions some contextual and free variation in the realization of Mara consonants and vowels:

(1) Dentalization of coronal stops (/tʰ/ to [t̪ t̪ʰ]) generally before high vowels, but occasionally elsewhere.

(2) Uvularization of velar stops (/kʰ/ to [q qʰ]) in some word-medial environments.

(3) Palatalization of alveolar fricatives (/s z/ to [ɕ ʑ]) before high front vowels.

(4) Free variation in the voicing of the unaspirated sibilant affricate (/tɕ/ to [dʑ]), especially before high front vowels.

(5) Variable production of voiceless nasals whereby initial /m̥/ and /n̥/ are realized with pre-aspiration [ʰm] in word-initial position and post-aspiration [mʰ] in word-medial position.

(6) /j w/ glide formation in some word-internal environments.

(7) Dialectal variation between [f] and [ʃ].

(8) Free variation between [o ɔ ʊ̈] and between [i eɪ ɑɪ].

(9) Regressive vowel height harmony conditioning the realization of [ʌ ɑ].

(10) Diphthongization of /ø/ to [øɪ] and /i/ to [eɪ ɑɪ] and raising of /ɑ/ to [ø] in running speech.

Arden's (2010) Mara word list also reveals possible limitations in Vʔ rhymes with only examples of /eʔ ɑʔ ɑ̣ʔ ɑʊʔ oʔ/ appearing in the list. Since the word list contains instances of low vowels contrasting in lowering and VV vs. Vʔ syllable shapes, the proposed /ɑ ɑʔ ɑ̣ ɑ̣ʔ/ contrast merits further phonetic and phonological investigation. Arden reports that in addition to spectral differences, /ɑ̣/ is generally 50% shorter than /ɑ/. While Arden's work offers phonetic exemplification missing in other studies of Mara, the lack of phonological and comparative

analysis makes for difficulties in comparison between the Sabeu dialect and other Mara varieties and Maraic languages.

Löffler's (2004) dialect comparison and reconstruction of Old Mara vowels shows that there is broad variation within Mara. Table 2.9 reconstructed Old Mara rhymes on the left and data from three modern Mara dialects in the three columns on the right. Löffler (2004) reconstructs nasal vowels in Old Mara based on evidence from modern dialects (e.g., splits between /i/ from /*i/ and /ai əi ay/ from /*ĩ/).

Table 2.9 Comparison of Mara dialects Old Mara (from Löffler, 2004)

Old Mara	Zàwhnái	Fàbàu	Tlóusài
*i	i	i	i
*ĩ	ai	əi [ei]	ay [o]
*e	ia	ie	ie
*ẽ	e	ai	ai
*əi	əi [ei]	ie	əi [ei]
*ai	e	e	ia
*ə, *a	a	ə [æ]	ə [a]
*ã	e	a	a [aa]
*au	[eu]	o [aw]	[aw]
*əu	əu	əu [au]	[əu] [yu]
*o	ua	au [ao]	au [ao]
*õ	o [aw]	əu [au]	y
*u	u	u	u
*ũ	ou [o]	ou [o]	ou [ɔ, ɯ, ʉ]
*ir (>y)	-	y	ua
*ar	a	o [aw]	o [aw]

Although more materials currently exist on Mara than on any other Maraic language, as with Zotung and Senthang, Mara remains largely under-researched. Löffler's (2002, 2004) analysis, though useful in furthering our understanding of Mara, is based largely on Parry (1932), whose data is nearly a century old, lacking in acoustic evidence or modern phonetic description techniques—and without tone marks. Arden (2010) includes phonetic description and acoustic

exemplification, but only reports on a single speaker's recordings. For the purposes of comparison with Zophei and other Maraic varieties, this research makes use of the Mara reported in Van Bik (2009) on which he primarily bases his assertions about Maraic. By making use of those data, this research is also able to directly contribute to the phylogenetic work done on PKC by Van Bik. There are at least two Mara Churches in Indianapolis, so there is great research potential in Indiana for work to fill gaps in our understanding of Mara and Mara dialects.

2.7 Lutuv overview

Lutuv (or Lautu) is centrally located among Maraic language villages in southern Thantlang Township and Northern Matupi Township.[10] It is south of the Zophei-speaking region in Thantlang Township, west of the Senthang-speaking region in Hakha Township, east across the Thango River from where Mara is spoken, and north of the Zotung-speaking population in Matupi Township. Van Bik (2009) lists the following villages where it is spoken: Fa te, Fan tthen, Hna ring, Hriang pi, Khua hrang, Lei kang, Lei pi, Sa te, Sen tung, Sur Ngen, Thang aw, Ti sen, and Zua mang. Ethnologue reports 15,000 total Lutuv speakers in a 2005 estimate (Eberhard, Simons, & Fennig, 2020), and a 2019 community estimate provided by Ms. Sui Hnem Par, the language assistant consulted for this project, reports over 18,000 ethnic Lutuv worldwide, including about 2,000 in the US, 600 of whom live in Indianapolis.

Outside of the current work at Indiana University (Lotven, Par, Wamsley, & Berkson, 2019b; Lotven, 2020a; Matthews & Wamsley, 2020; Haza & Wagner, 2020), Lutuv is currently

[10] As this community is currently in the process of orthography development and popularization, two spellings <Lautu> and <Lutuv> are both currently in use. The former follows orthographic conventions for, and reflects pronunciation in Hakha Lai. The latter reflects Lutuv orthographic conventions which follow Hnaring dialect pronunciation. As Ms. Par, the language assistant consulted for this project, prefers the latter, it is adopted for this work.

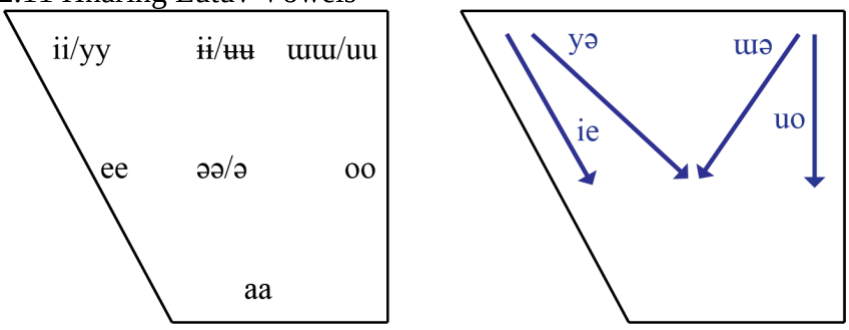
undescribed, so analysis of the Lutuv sound system is based on primary data. An orthography has been developed for Lutuv based on the Hnaring variety (Ms. Hnem Par's dialect), but it is not yet widely used.[11]

Ethnologue (Eberhard, Simons, & Fennig, 2020) reports that there is some variation in Lutuv dialects between the Northern Sur Ngen variety and the Southern varieties; Ms. Par reports too that Sur Ngen Lutuv is the most different from her own. Figure 2.10 presents Lutuv consonants and Figure 2.11 includes Lutuv vowels.

Figure 2.10 Hnaring Lutuv Consonants

	Bilabial	(Labio-) dental	Alveolar	Palatal	Velar	Glottal
Stops	p pʰ b		t tʰ d		k kʰ	ʔ
Fricatives		v	s z			h
Affricates			t͡s t͡sʰ d͡ʒ			
Lat. Affricates			t͡l t͡ɬ			
Nasals	m̥ m		n̥ n		ŋ	
Laterals			l̥ l			
Rhotics			ɹ̥ ɹ (r)			
Glides						

Figure 2.11 Hnaring Lutuv Vowels



[11] According to Ms. Par, apart from a translation of the New Testament, few documents are yet available that make use of the Lutuv orthography. I had the pleasure of mentoring Ms. Hnem Par in her translation of the first four Lutuv picture books and the distribution of 500 copies at a national Lutuv community event in Indianapolis (Par, Berkson, & Lotven, 2019).

It is notable that the Lutuv vowel system is symmetrical with six high vowels, four mid vowels and a low vowel. The four rising diphthongs consist of high rounded vowels favoring movement towards the back of the vowel space /yə uo/ and high unrounded vowels favoring movement towards the front of the vowel space /ie ɯə/. Only the mid central vowel /ə/ shows a length contrast where the short vowel appears in minor syllables and the long vowel /əə/ appears elsewhere. CVʔ syllables are not found in Lutuv. It is also likely that coarticulation effects the realization of /ə/ when following rounded vowels in diphthongs /yə ɯə/.

Variation is noted in the pronunciation of voiced rhotics between a rhotic [ɹ] and a trill [r]. Preceding /i̵/, the trill rather than the rhotic surfaces and the vowel assimilates to the onset, as in /ri̵i̵/ [rrr] ‘to be heavy’; likewise, the voiceless rhotic, though not observed as a trill, exhibits similar assimilation, as in /ɻi̵i̵/ [ɻɻɹ] ‘louse.’ Lutuv has only one coda consonant /ŋ/ which occurs following only the vowels /ə i u/. The rhyme /uŋ/ is often realized with a diphthongal vowel and a labial velar coda [ou͡ŋm]. Lutuv is tonal, but since tonal analysis is forthcoming, no tone marks are included here.

With no previous literature on Lutuv outside of preliminary work at Indiana University, I again point out that there is much documentation and analysis to be done. With at least one Lutuv Church in Indianapolis, ongoing research in Indiana will work to add to our understanding of Lutuv

.

2.8 Summary and comparison of Zotung, Senthang, Mara, and Lutuv

Previous literature has analyzed the Zotung, Senthang, Mara, Lutuv, and Zophei as members of the Maraic branch of KC. The Maraic languages are characterized by syllable structure simplification from PKC including the loss of onsets clusters in favor of affricates and the loss of most coda consonants in favor of tone or vocalic features such as length (or V vs Vʔ),

nasality, and quality differences. Setting aside offglides and /-ʔ/, which have been variably analyzed as vocalic features (or tonal features in the case of the latter), Senthang boasts the most coda consonants with /-w -j -m -mʔ -n -ŋ/, Lautu has only /-ŋ/ (as is the case in Zophei), and there are no codas in Mara or Zotung. In order to further discuss the sound systems of these four Maraic languages in relation to one another, Section 2.8.1 compares Maraic onsets while Section 2.8.2 compares Maraic rhymes.

2.8.1 Comparison of Zotung, Senthang, Mara, and Lutuv onsets

Onset consonants show some variability across Maraic. Maraic stops follow the general Kuki-Chin pattern of a three-way contrast in bilabial and alveolar stops and a two-way contrast in velar stops /pʰ b t tʰ d k kʰ ʔ/ (whether or no /ʔ/ is analyzed as phonemic, here it represents the onset of a vowel-initial syllable). Zotung shows the most deviation from other Maraic languages, retaining PKC implosives /ɓ ɗ/ in place of the voiced series and adding a palatal /c cʰ/ in place of the sibilant affricates common to other Maraic languages (though these may be orthographic representations of sibilant affricates). Maraic languages vary greatly in the number of fricatives. Zotung has the most with 7 /θ f v s z ɕ h/ and Lutuv has the least with 4 /v s z h/; only /s z/ are common to all members of the group.

Although affrication of PKC onset clusters is included as a shared Maraic innovation by Van Bik (2009), more recent data from Maraic varieties reveals broader variation. While Mara and Lutuv have 2-way contrasts in sibilant affricates (with a voiced sibilant affricate in Lutuv possibly adding a 3rd contrast), Zotung lacks sibilant affricates altogether, and only one is reported in Senthang /ts/. In addition, Zotung and Senthang both lack the lateral affricate series found in Mara and Lutuv (and Zophei), derived diachronically from stop-liquid onsets /*pl *kl *kʰl/. As discussed in Lotven et al. (2019a), cluster simplification in Central Chin languages has

favored affrication while Southern languages have made use of other processes such as deletion. Maraic offers mixed strategies for simplification, even within the same variety (see Section 4.4), likely reflecting contact between Central KC languages to the north and Peripheral KC languages to the south.

While PKC is reconstructed with voicing contrasts in labial, coronal, and dorsal nasals /*m *m̥ *n *n̥ *ŋ *ŋ̊/, it is not entirely retained in any Maraic language. Senthang, Mara, and Lutuv have merged the voiced and voiceless velar nasals resulting in a series of 5 /m m̥ n n̥ ŋ/, and while Zotung has lost the voicing distinction in nasals, it has also innovated a palatal nasal resulting in a series of 4 /m n ɲ ŋ/. A voicing distinction in liquids is also reconstructed for PKC /l l̥ ɹ ɹ̥/, which is maintained in Mara and Lutuv (and Zophei), but not Zotung, which lost voiceless liquids (leaving only /l ɹ/), or Senthang, which lost rhotics (leaving only /l l̥/). Glides are reported in Senthang and Zotung only and are not reported for Mara or attested in our work with Lutuv (or Zophei). To facilitate comparison, Figures 2.12-2.15 repeat Figures, 2.3, 2.5, 2.7, and 2.10.

Figure 2.12 Zotung consonant inventory (copied from Figure 2.3)

	Bilabial	(Labio-) dental	Alveolar	(Alveo-) Palatal	Velar	Glottal
Stops	p pʰ ɓ		t tʰ ɗ	c cʰ	k kʰ	ʔ
Fricatives		θ f v	s z	ɕ		h
Affricates						
Lat. Affricates						
Nasals	m		n	ɲ	ŋ	
Laterals			l			
Rhotics			ɹ			
Glides	w			j		

Figure 2.13 Senthang consonant inventory (copied from Figure 2.5)

	Bilabial	(Labio-) dental	Alveolar	Palatal	Velar	Glottal
Stops	p pʰ b	t tʰ d			k kʰ	ʔ
Fricatives		(f) v	s z		x ɣ	h
Affricates			t͡s			
Lat. Affricates						
Nasals	m̥ m	n̥ n			ŋ	
Laterals			l̥ l			
Rhotics						
Glides	w			j		

Figure 2.14 Mara consonant inventory (copied from Figure 2.7)

	Bilabial	(Labio-) dental	Alveolar	Alveo-Palatal	Velar	Glottal
Stops	p pʰ b	t tʰ d			k kʰ	ʔ
Fricatives		f v	s z			h
Affricates				t͡ɕ t͡ɕʰ		
Lat. Affricates			t͡l t͡ɬ			
Nasals	m̥ m	n̥ n			ŋ	
Laterals			l̥ l			
Trill			r̥ r			
Glides						

Figure 2.15 Lutuv consonant inventory (copied from Figure 2.10)

	Bilabial	(Labio-) dental	Alveolar	Palatal	Velar	Glottal
Stops	p pʰ b		t tʰ d		k kʰ	ʔ
Fricatives		v	s z			h
Affricates			t͡s t͡sʰ d͡ʒ			
Lat. Affricates			t͡ɬ t͡ɬʰ			
Nasals	m̥ m		n̥ n		ŋ	
Laterals			l̥ l			
Rhotics			ɹ̥ ɹ (r)			
Glides						

Figure 2.16 combines the onset consonant charts for Zotung, Senthang, Mara, and Lutuv described in Figures (2.12-2.15) above. The consonants shared by all 4 Mariac varieties are in black, those shared by only 2-3 Maraic varieties are in red.

Figure 2.16 Shared consonants between Zotung, Senthang, Mara, and Lutuv

	Bilabial	(Labio-) dental	Alveolar	Palatal	Velar	Glottal
Stops	p pʰ b		t tʰ d		k kʰ	ʔ
Fricatives		f v	s z			h
Affricates			t͡s t͡sʰ			
Lat. Affricates			t͡ɬ t͡ɬʰ			
Nasals	m̥ m		n̥ n		ŋ	
Laterals			l̥ l			
Rhotics			ɹ̥ ɹ			
Glides	w			j		

Van Bik (2009) suggests that Mara, Zophei, and Lutuv are more closely related to each other than any of them are to Senthang or Zotung. This closeness, either through phylogenetic relation or language contact, is reflected in their onset systems. Lutuv and Mara (as well as

Zophei) maintain 2-way contrasts in laterals, rhotics, sibilant affricates, and lateral affricates not found in other Maraic varieties. Such similarities are also noted in the rhyme systems of these languages and are further discussed in relation to Zophei in Chapter 4.

2.8.2 Comparison of Zotung, Senthang, Mara, and Lutuv rhymes

Previous literature indicates that Maraic languages display wide variation in their rhyme systems. Both a lack of acoustic evidence and differences in phonological analyses complicate comparative analysis of the vowel systems in Kuki-Chin in general and Maraic in specific. The only acoustic studies of Maraic have been from Arden's (2010) work on Mara and from preliminary Zophei findings published at Indiana University (Lotven & Berkson, 2019a); the former is based on data of a Mara speaker from Ngephepi and the latter is based on pilot work with the two primary Zophei language assistants for this study.

Maraic languages have undergone radical syllable structure simplification, trading a rich system of coda consonants for vocalic and tonal distinctions. While PKC had a large inventory of coda consonants /*-p *-t *-k *-m *-n *-ŋ *-l *-r *-j *-w/, as well as length distinctions in closed syllables, little retention of these codas is left in Maraic. Senthang has /-w -j -m -mʔ -n -ŋ/, Lutuv has /-ŋ/ (as does Zophei), and there are no codas in Mara or Zotung.

Previous analyses vary in the treatment of the contrast between syllables with shorter vowels ending in a glottal stop and those with longer vowels and no glottal stop, describing it in terms of syllable shape (V vs. Vʔ) or alternatively in terms of vowel length (V vs. VV). Senthang, Zotung, and Mara are reported to have a syllable shape contrast, and limited sets of Vʔ rhymes are suggested by Arden's (2010) Mara word list, which contains only /eʔ ɑʔ ạʔ ɑʊʔ oʔ/, and by Shintani's (2015) Zotung word list which notably has no syllables with nasal vowels

ending in glottal stops /iʔ eʔ eiʔ æʔ aʔ oʔ ouʔ uʔ uiʔ ueʔ ɯʔ/. Our preliminary work on Lutuv reveals no such contrast and makes use of a short /ə/ <a> in minor syllables only.

There are two additional contrasts worth noting, nasalization in Zotung and lowering in Mara. Neither Mara nor Zotung has nasal codas, only Zotung retained vowel nasalization, affecting all long vowels, while Mara likely innovated and then lost contrastive vowel nasalization (Löffler, 2004). According to Arden (2010), Mara's additions to the Maraic vowel canon innovated contrastive lowering in three vowels /i̤ ɑ̤ ṳ/. In addition, /ɑ̤/ is described as 50% shorter than /ɑ/, suggesting the necessity of future research comparing vowel length and quality differences in the reported /ɑ ɑʔ ɑ̤ ɑʔ/ contrast.

Disregarding nasalization and lowering, the most vowel contrasts in long vowels belongs to Lutuv with 10 /ii yy ee aa əə oo uu ɯɯ ~~ɨɨ ʉʉ~~/, while the other Maraic languages have only 8. To facilitate comparison, Figures 2.17-2.20 repeat Figures 2.4, 2.6, 2.8, and 2.11.

Figure 2.17 Zotung vowel inventory (copied from Figure 2.4)

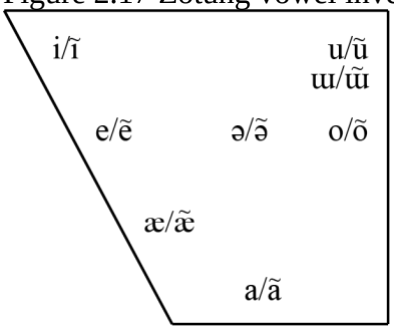


Figure 2.18 Senthang vowel inventory (copied from Figure 2.6)

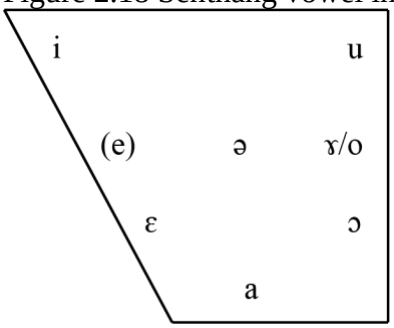
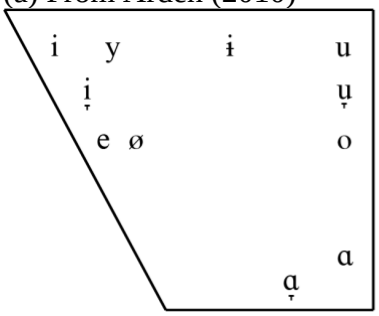


Figure 2.19 Mara vowel inventory (copied from Figure 2.8)

(a) From Arden (2010)



(b) From Van Bik (2009) with diphthongs

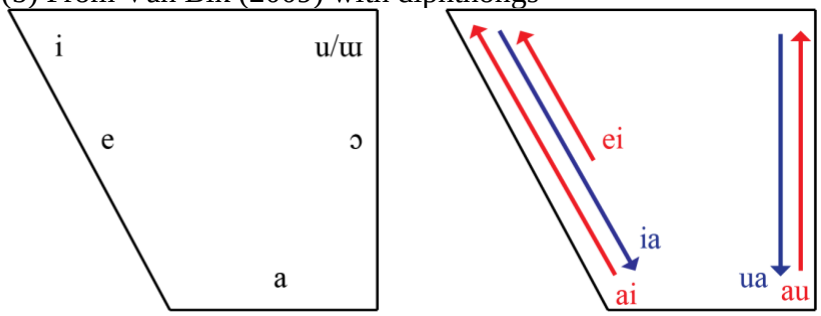


Figure 2.20 Lutuv vowel inventory (copied from Figure 2.11)

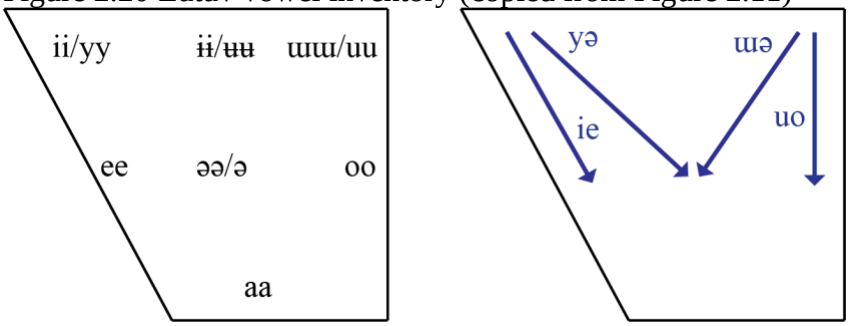
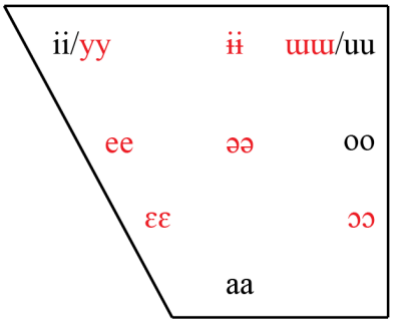


Figure 2.21 combines the long vowel charts for Zotung, Senthang, Mara, and Lutuv repeated in Figures 2.19-2.22 above. Vowels shared by all 4 Mariac varieties are in black; those shared by only 2-3 Maraic varieties are in red.

Figure 2.21 Shared long vowels between Zotung, Senthang, Mara, and Lutuv



There is much variation in the diphthong inventories of Maraic languages as well; the most are found in Zotung and the least in Mara. Zotung boasts 15 diphthongs including the two closed in glottal stops and the two nasalized diphthongs /ia ie eiʔ ẽĩ aɯ oe oa ouʔ ui uiʔ ũĩ ue ueʔ ua ɯa/. Senthang has eight, two that can be followed by a nasal coda /ia ua/ and 6 that cannot /aj uj oj uaj aw iw/ (Ngun Tin Par, 2016, analyzes the former as VV and the latter as VC). Lutuv has four diphthongs /ie yə ɯə uo/, while Mara has no phonemic diphthongs, rather diphthongs appear in free variation with certain monophthongs.[12] The similarities and differences in the rhyme systems of Maraic languages are further discussed in relation to Zophei in Chapter 5, which includes comparative analysis of lexical items to further investigate the relationships between Maraic languages. Before turning to the phonetic and phonological analyses of Zophei

[12] Löffler (2004) notes variation and several phonemic diphthongs in Mara dialects but offers only four reconstructed diphthongs for Old Mara /*ai *əi *au *əu/. The realization, variation, and phonemic status of Mara diphthongs are promising fields for future research.

presented in the Chapters 4-6, Chapter 3 presents the methodologies for data collection employed here.

Chapter 3. Methodology

3.1 Introduction

The descriptions and analyses of Zophei presented here are based on fieldwork performed at Indiana University and in Indianapolis, Indiana from Spring 2018 to Spring 2021. The primary data collected for this study includes a multi-modal database of Zophei lexical items with written transcriptions of words and paired audio recordings. Those recordings were subject to acoustic analysis reported on here. Further data, especially concerning tone and the Zophei verbal complex, has also been collected and is presented here as well. This chapter details the methodologies employed in conducting this study with particular emphasis on the interpretation of data found in Appendix A-E and the list of orthographic conventions in Appendix F.

Section 3.2 introduces the backgrounds of the language assistants who made this study possible. Section 3.3 describes the lexical data collection process and the organization of the lexical database in Appendix A, as well as the examples of attested syllables in Appendix B. Section 3.4 offers information about the acoustic data collection and analysis techniques employed here. Section 3.5 describes the methods of comparative phonological analysis used in Chapter 5 and the comparative word list in Appendix C. The following sections provide additional description of the tone data collected and analyzed in Chapter 6 with particular attention paid to the interpretation of data in Appendix D in Section 3.6 and Appendix E in Section 3.7. Section 3.8 addresses orthographic conventions used in this thesis. Section 3.9 summarizes the chapter.

3.2 Language assistant backgrounds

Data collected and analyzed in this study were obtained with the help of three Zophei-speaking language assistants and one Lutuv-speaking language assistant. The primary Zophei language assistant involved in this study is Ms. Zai Sung from Lawngtlang village, with whom I worked from Spring 2018 to Spring 2021. Due to the Covid-19 pandemic, our last in-person meeting was in the Spring of 2020. Thereafter Ms. Sung was kind enough to offer me some of her valuable time in collecting verbal complex and tone data over Zoom, although further audio data collection proved too difficult to manage remotely. Her lexical data (transcribed and recorded) is included in this study's lexical database and in the comparative analysis in Chapter 5; her tone data are presented in Chapter 6. The secondary language assistant involved in this study is Mr. Thomas Thawngza from Tlawngrang, with whom I worked from Spring 2018 through Spring 2019. His lexical data (transcribed and recorded) are included in this study. Ms. Sung and Mr. Thawngza were recruited as language assistants for a Field Methods class on Hakha Lai taught by Dr. Kelly Berkson, with whom I was working as a research assistant at the time. Upon finding out that they were both native speakers of Zophei as well, I began collection of Zophei word list data. It was immediately clear that they two varieties were different, so elicitation proceeded in parallel to illuminate differences between varieties.

Two other language assistants speaking Nuitah Zophei and Hnaring Lutuv were also consulted to aid with comparative analysis. A third Zophei-speaking language assistant Ms. Kimberly Sakhong from Nuitah was also consulted for this study. Elicitation with Ms. Sakhong occurred in Spring 2020, so her data are limited to those collected using the comparative analysis instrument described in Section 3.5. A Lutuv language assistant Ms. Sui Hnem Par from Hnaring, with whom I worked from Spring 2019 to Spring 2020 was also consulted for the

sketch of the Lutuv sound system in Chapter 2 and the comparative analysis in Chapter 5. It is with deep appreciation for these individuals and the languages they have shared with me that I present their linguistic and family backgrounds in the following subsections: Ms. Sung in Section 3.2.1, Mr. Thawngza in Section 3.2.2, Ms. Sakhong in Section 3.2.3, and Ms. Hnem Par in Section 3.2.4.

3.2.1 Ms. Zai Sung, Lawngtlang Zophei language assistant

Ms. Zai Sung is from Lawngtlang village, where she was born in 1997; her language is referred to in this thesis as Lawngtlang Zophei (LTZ), part of the Lower Zophei B dialect region. Ms. Sung also speaks Lai[13] (familiarity with both Thantlang and Hakha varieties), English, and some Burmese she learned at school in Lawngtlang. Burmese was the stated language of instruction in that school, but in some cases Zophei had to be used since there were no native Burmese-speaking students in the school.

Both of Ms. Sung's parents are also from Lawngtlang, speaking LTZ, Lai (familiarity with both Hakha and Thantlang dialects, having spent time in both places), Burmese, and English. She has three younger brothers and a younger sister. Two of her younger brothers (born 1999 and 2001) and her younger sister (born 2004) were also born in Lawngtlang and speak LTZ, Lai (her oldest brother, like Ms. Sung, is familiar with both Hakha and Thantlang varieties), and English. Her youngest brother was born in Indianapolis and speaks only LTZ and English.

Ms. Sung's family left Chin state for Malaysia in 2006 and lived there for 9 months before moving to Indianapolis in 2007. Ms. Sung notes that she speaks to her parents in LTZ,

[13] Lai or Laiholh is the vehicular language in much of central Chin State and in Indianapolis. There are several languages that make us of these terms, including Hakha Lai (or Hakha Chin), Thantlang Lai, and Falam. Hakha and Thantlang Lai are considered dialects of the same language and are named after cities in central Chin state.

Hakha Lai, and English (in order of frequency). Her mother often requests they speak English with her to help her improve her language skills and with her youngest brother in LTZ to practice Zophei since he has never lived in Lawngtlang. She speaks with her siblings in LTZ and English (noting frequent code-mixing between the two languages), with her friends in Hakha Lai, Zophei, or English, and with the rest of the community (including members of her church) in Hakha Lai.

3.2.2 Mr. Thomas Thawngza, Tlawngrang Zophei language assistant

Mr. Thomas Thawngza was born in 1998 in Muko, a city in Kayin State of Myanmar (south of Chin state) where his father was working for a brief period as a pastor. Mr. Thawngza self-identifies as from Tlawngrang, his father's village, so his language is referred to as Tlawngrang Zophei (TRZ), part of the Lower Zophei A dialect region. Mr. Thawngza also speaks Lai (Thantlang variety) and English. He lived in Tlawngrang and Thantlang before moving with his family to a Chin community near Kuala Lumpur, Malaysia in 2007 where they lived until 2010 when they moved to Indianapolis. His father was from Tlawngrang and spoke TRZ, Mizo, Lai, Burmese, and English. He worked as an English interpreter for some time as well. Mr. Thawngza's mother is from Zephai and speaks Zephai Zophei (also part of the Lower Zophei A dialect region), both Thantlang and Hakha dialects of Lai (she lived in both places), and Burmese. Mr. Thawngza has three siblings, an older sister, a younger sister, and a younger brother. His older sister was born in 1996 in Tlawngrang, speaks TRZ, Thantlang Lai, English, and Burmese; his younger sister was born in 2001 in Tlawngrang, speaks TRZ, Thantlang Lai, and English; and his younger brother was born in 2009 near Kuala Lumpur and speaks TRZ (likely heavily influenced by the Zephai of his mother, though both are part of the same dialect region) and English. Mr. Thawngza notes that with other Zophei speakers in the community, he

speaks either Zophei or Lai, while at home he and his sisters generally speak in Lai only even though his mother speaks to them in Zophei. His younger brother uses either Zophei or English at home, although his mother does not speak English.

3.2.3 Ms. Kimberly Sakhong, Nuitah Zophei language assistant

Ms. Kimberly Sakhong was born in 1999 in Nuitah (Leitak); her language is referred to in this thesis as NTZ and is part of the Upper Zophei dialect region. Ms. Sakhong left Nuitah when she was 7 months old and lived in Hakha until she was 8 when her family moved to Kuala Lumpur, Malaysia. She moved to Indianapolis when she was 10. In addition to NTZ, she speaks Hakha Lai, English, and Senthang (she had many Senthang-speaking neighbors in Hakha). Her mother and father both speak NTZ and Hakha Lai, and speak or understand Lutuv, Senthang, Mara, and Zotung. Her father additionally speaks Burmese, and Mizo. Ms. Sakhong has three brothers. Her older brother speaks NTZ, Hakha Lai, Senthang, English, and Falam (having spent time with Falam-speaking children in Hakha). Her younger two brothers speak NTZ, Hakha Lai and English, although she notes her youngest brother is more familiar with English than Lai. Ms. Sakhong speaks with her parents and older brother in NTZ, with community elders and church members in Hakha Lai, with younger community members in a mix of Hakha Lai and English, and to some of her Zophei friends (such as Ms. Sung) in Zophei.

3.2.4 Ms. Sui Hnem Par, Hnaring Lutuv language assistant

Ms. Hnem Par was born near Mandalay, Burma/Myanmar in 1998 to parents who were both born in Hnaring. Her family moved back to Hnaring when she was 7 and lived there for 3.5 years before moving to Malaysia in 2009, to Atlanta, GA in 2010, and to Indianapolis, IN in 2012 at age 14. She grew up speaking Burmese primarily in Mandalay (with Lutuv in the home),

and Lutuv primarily in Hnaring. She started learning English at age 12 in Atlanta and Hakha Lai at age 14 in Indianapolis, where it functions as a lingua franca for the Chin community. She also has studied Spanish in school, Korean informally, can understand some Malay from her time in Malaysia, and understands some Zophei from spending time with her Zophei-speaking roommate (Ms. Sung) as well as other Zophei-speaking friends. Her mother and father both speak Lutuv, Lai (Thantlang variety), Falam, and Burmese; additionally, her father speaks Mara.

She has two younger brothers and a younger sister. Her sister was born in Malaysia, and her brothers were born in Atlanta and Indianapolis. Her siblings speak Lutuv and English—her youngest brother uses English primarily and some Lutuv. At home, she speaks Lutuv and Burmese with her parents, and Lutuv and English with her siblings. She attends a Lutuv church which she describes as using Lutuv only for sermons (unless there is a visitor who requires accommodation), but informally Burmese and Lai are also spoken at the church. At other Lutuv community events she speaks Lutuv. She also notes that with friends of diverse linguistic backgrounds, she switches between languages including Hakha Lai, English, Zophei, Lutuv, and Burmese as appropriate.

3.3 Lexical database (Appendix A & Appendix B)

The majority of the data used in the description and analysis of the sounds systems of Lawngtlang (LTZ) and Tlawngrang (TRZ) Zophei can be found in the lexical database in Appendix A and paired recordings. Those data were collected through elicitation at Indiana University and at Chin Evangelical Baptist Church with Ms. Sung and Mr. Thawngza. The 1355 reconstructed Proto-Kuki-Chin etyma and their correspondences in various Kuki-Chin languages from Van Bik (2009) were employed as prompts for lexical item collection. The language assistants were offered access to that text during elicitation, although since both were fluent in

Hakha Lai, prompts in that language proved the most useful. Often the meanings of cognates in various KC languages would also aid in elicitation. When non-cognate words and phrases were offered by the language assistant, these were also collected. Words elicited from one Zophei language assistant were also used to help prompt cognates from the other language assistant.

When working to elicit all possible syllable structures in the languages (see Appendix B for the results of that project), direct elicitation of surface forms ("Can you think of any words like [phyy]") was used to fill in some gaps. Entries in the lexical database were elicited, checked with the intuitions of the speakers, and checked with the assistance of the recordings described in Section 3.4 by myself. As such, any errors in transcription are my own. A sample entry from Appendix A is provided in Table 3.1 for reference and each column is addressed in turn.

Table 3.1 Appendix A example entries

LTZ word	Tone	Gloss	POS	Index#	TRZ	Gloss	POS	Index#	Ref#
a hlyo	OO	saw	N	3795	a hlua	saw	N	1720	a188
a hmii	OH	food	N	2887	a hmei	food	N	838	760
a huu	OH	who	WH	3801					a194
a khyy	HO	bee	N	2487	khui	bee	N	463	423a

Appendix A is organized alphabetically by the first letter of the LTZ entry, with LTZ data reported before TRZ data. In the first column of the LTZ data is a phonemic representation of the **LTZ word** using the practical orthography in Figure 3.2. Syllables are written with space between them for clarity of syllable boundaries in all data presented in this thesis. For example, in Table 3.1, each LTZ word has two syllables, but are likely monomorphemic. However, derivational morphology is not systematically addressed in this thesis, as such it is important for the discussion of phonology in this text to be able to differentiate <a hlyo> from <ah lyo>, for which I employ spaces. Future work on word boundaries in the verbal complex will be needed to

develop diagnostics and conventions for free/bound morphemes and clitics. Although further discussed in Chapters 4 and 5, orthographic conventions are offered here as well in Figure 3.2. A comparison of orthographic conventions between languages and varieties is provided in Appendix F and described in Section 3.8.

All cells in Figure 3.2a are presented in the order: voiceless, aspirated, voiced (although the three-way distinction is only relevant with bilabial and alveolar stops). An <h> is used to mark aspiration in obstruents and voicelessness in sonorants. For stops, fricatives, and sibilant affricates, the <h> is placed on the right of the di-/trigraph. For lateral affricates and sonorants, the <h> is placed on the left of the sonorant consonant letter (to the left of the bolded letter in <h**m**> or <th**l**>).

An orthographic <h> is also used at the end of a syllable to mark a short vowel in a major syllable (a syllable that can show up word-finally CVV, CVN, CVh). This convention is commonly used in other KC language orthographies such as that of Hakha Lai to mark final glottal stops. This analysis finds no evidence for nor against final phonemic glottal stops, as discussed in Chapter 5, still the contrast between long and short vowels is relevant for the analyses here, especially in Chapter 6 regarding tone. In Chapter 6, lengthened short syllables are written with an orthographic <h> as well to indicate they are underlyingly short (CVVh). It is for this reason that the convention of using final <h> to mark glottal stops has been adopted here to mark vowel length in major syllables. Syllables marked with the rhyme <a> are minor syllables (short non-final syllables with a reduced [ə] vowel).

For the purposes of an LTZ orthography, it is not necessary to distinguish between [uo] and [yo], the two allophones of /uo/. Here though, in order to make clear the allophonic relationship, both are represented in the practical orthography. Likewise in NTZ data in

Appendix C, there are some instances of allomorphy wherein final nasals assimilate to the place of articulation of a following rhotic and are realized as [n]. This does not occur in the other varieties more extensively investigated here, so it is noted orthographically and merits further research.

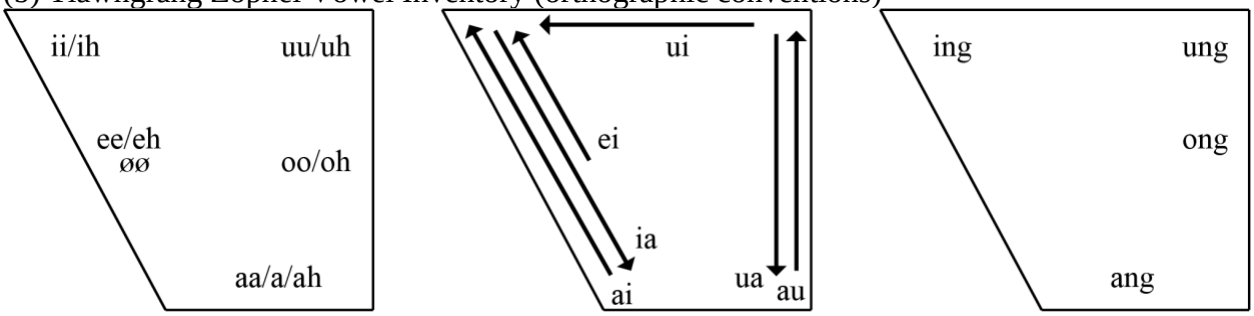
Due to differences in the rhyme inventories of the three Zophei varieties discussed here, orthographic conventions are presented for Tlawngrang Zophei in 3.2b, Nuitah Zophei in 3.2c, and Lawngtlang Zophei in 3.2d.

Figure 3.2 Zophei orthographic conventions

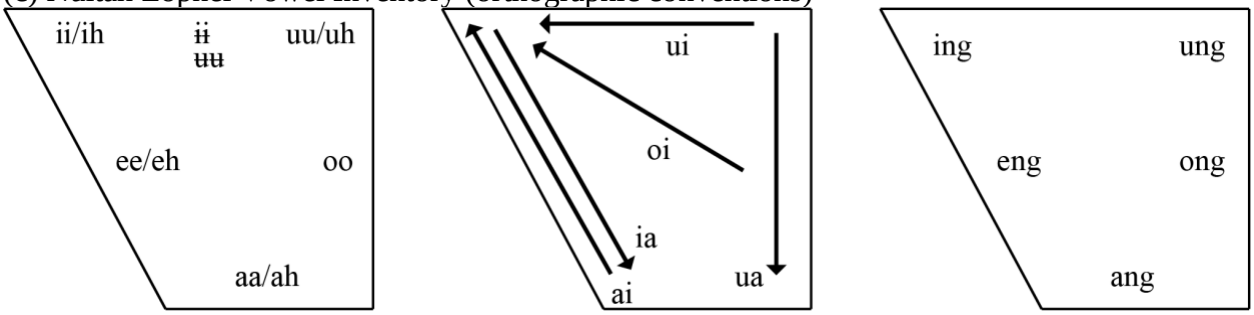
(a) Zophei onset inventory (orthographic conventions)

	Bilabial	Labio-dental	Alveolar	Velar	Glottal
Stops	p ph b		t th d	k kh	
Fricatives		f v	s z		h
Sib. Affricates			ts tsh		
Lat. Affricates			tl thl		
Nasals	hm m		hn n	ng	
Laterals			hl l		
Rhotics			hr r		

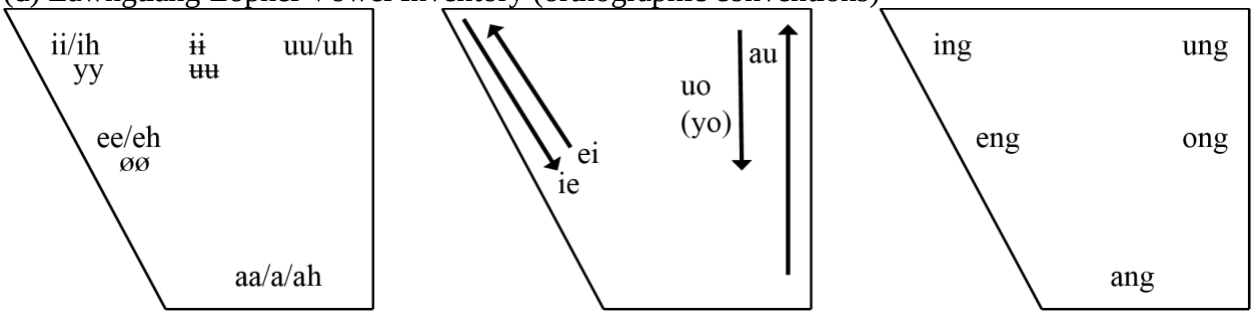
(b) Tlawngrang Zophei Vowel Inventory (orthographic conventions)



(c) Nuitah Zophei Vowel Inventory (orthographic conventions)



(d) Lawngtlang Zophei Vowel Inventory (orthographic conventions)



The LTZ word is followed by the lexical item's **Tone** H(igh), L(ow), or O (Toneless). Tone for multisyllabic words is represented as a series of tones corresponding to the sequence of syllables. For example <OO> in Table 3.1 indicates that both syllables of the word <a hlyo> are toneless. Likewise, OH indicates High tone on the second syllable of <a hmíí> and HO indicates High tone on the first syllable of <á khyy>. Underlying tone for these words has been determined based on the analyses presented in Chapter 6 and are intended to represent underlying lexical contrasts rather than surface tone patterns. Verbs are classified based on their behavior in representative contexts in Appendix E, further discussed in Section 3.7. There are additionally five words that were not recorded and tone data was not collected, those entries where tone data is absent are marked with a tilde <~>.

In the next column is a **Gloss** provided by the speaker. These often are in line with one or more of the attested cognates in Van Bik (2009), since such information was used as a prompt. However, language assistants were encouraged to give their own translations, which are included here as well.

Next, is an indication of **Part of Speech (POS)** with conventions given in Table 3.3.

Table 3.3 Part of Speech marking conventions in Appendix A

ADV	adverb	PHR	phrase
CONJ	conjunction	PP	postposition
INT	interjection	PRO	pronoun
IV	intransitive verb	Q	quantifier
N	noun	TV	transitive verb
NC	noun counter	VC	verb collocation[14]
NUM	number	VIMP	verbs recorded in imperative contexts[15]
PART	grammatical particle[16]	WH	wh-question words

[14] These are phrases consisting of a verb and another word that appears separated from the verb before any agreement marking. These are noted for LTZ, but were not thoroughly investigated in TRZ and are not noted in those data.

[15] In some cases, different forms were given for imperatives. Though later investigated in terms of stem alternation, these forms were recorded and added to the list.

[16] The use of PART is paired with the translation or function of the grammatical particle in the third column.

The next column offers an **Index Number (#)** for reference to the recorded materials described in Section 3.4. These numbers originate from the order in which lexical items were elicited, and as such they roughly follow the order of the KVB Reference Numbers addressed below. When additional words or phrases were elicited, a decimal place was used for organizational purposes but is longer significant. For the purposes of Appendix A, these numbers are arbitrary and are intended only as a reference number to link the text entries in Appendix A with recorded materials. Examples without audio recordings are marked with a tilde <~>.

LTZ data is followed by TRZ data in the same format, except for the lack of tone data, which was not investigated sufficiently to present here.

The final column **KVB Reference Number** offers a possible correspondence with etyma numbers in Van Bik (2009). When multiple words or phrases were elicited from the same prompted word in Van Bik (2009), a letter was added after the KVB Reference Number, for example (70a, 70b, 70c) and in Table 3.1 this convention is found in the entry for <á khyy> numbered '423a.' Where no correspondence in Van Bik (2009) is found, a new numbering system was added beginning with 'a001' and progressing sequentially, for example "a001, a002, a003…" In Table 3.1 this shows up in entries for <a hlyo> and <a húú>, numbered 'a188' and 'a194' respectively. It is worth noting that some lexical items appear multiple times in Appendix A as prompted by different KVB Reference Numbers. These duplicates were not deleted so that the accompanying sound files would be preserved. Although some correspondences are reported more clearly in Appendix C, determining which KVB reference number is accurately linked to the Zophei correspondence in Appendix A is beyond the scope of this project.

Chapter 5 includes description and discussion of all attested syllables in both LTZ and TRZ data. The data in Appendix B, culled from Appendix A and summarized in Tables 5.9 and

5.10 in Chapter 5, contains the examples used in those analyses. It is organized into two parts: Part I includes attested syllables in TRZ and is summarized in Table 5.9, Part II includes attested syllables in LTZ and is summarized in Table 5.10. These data are organized into smaller tables by onset type, then into three columns divided by long monophthongs on the left, short monophthongs and diphthongs in the middle, and vowel-nasal rhymes on the right. Where the onset is attested in a minor syllables (short non-final syllables written here with the rhyme <a>), examples are given below each table.

3.4 Acoustic data collection and analysis methods

Along with the lexical database described in Section 3.3, audio recordings (available on the Computational Resource for South Asian Languages, CoRSAL) were also collected for acoustic exemplification and analysis. Recordings were made in a single-walled Whisper Room sound booth in the Indiana University Department of Linguistics, with some recordings also made in quiet rooms in Indianapolis, IN (at Chin Evangelical Baptist Church and language assistant residences). The recordings were made with the use of a head-mounted Shure SM10A microphone using primarily a Marantz PMD661 MKII solid-state recording device, though on some occasions a Zoom H4N solid state recording device was used instead. All recordings were made with 44.1kHz/16bit sampling frequency.

Each lexical item was recorded four to six times, twice in isolation and twice with a proclitic 3rd person agreement or possessive prefix *a*/*aa* (e.g., *túá* ‘do,’ *a túá* ‘he/she did it,’ *pʰéé* ‘leg,’ *a pʰéé* ‘his/her leg,’ *tsùh* ‘to be good,’ *aa tsùh* ‘it’s good,’). For recordings that include 6 repetitions, usually the extra recordings are of the target word preceded by a 3rd person plural possessive prefix (e.g., *aa pʰéé* ‘their legs’). Some extra repetitions were also collected with post-verbal marking, usually the plural marker *héé*. For lexical items where such prefixation was not

possible (i.e. adverbs, numbers, etc.), the word was recorded in isolation twice and, in most examples, with another preceding word twice.

Sound files have paired textgrid files that have rough boundaries placed around all repetitions of the same entry. They are annotated following the scheme with four sections separated by underscores: **Index#_word_tone_speakerID**. Consider, for example, the first entry in Table 3.1 which is annotated as **3795_a-hlyo_OO_Z**. The Index# (3795) corresponds to a text entry in Appendix A from the column of the same name. The word (a-hlyo) is represented with the orthographic conventions in Figure 3.2 with one modification. In the thesis text, a space represents a syllable boundary; but in order to keep a continuous string of characters for file names, a hyphen <-> is used in annotation instead. This hyphen is not indicative of a morpheme boundary or any other analysis. The tone of the two syllables is provided next (OO), representing both are toneless. Preliminary tone transcription is included in TRZ coding for consistency, although it is not found in Appendix A and is likely more accurate for nouns than verbs given the contextual neutralization of verbal tone contrasts discussed in Chapter 6. Finally, this data comes from Ms. Zai Sung, so the speakerID is 'Z.' Data from Mr. Thomas Thawngza has the speakerID 'T.'

To avoid Unicode characters, some digraphs are used. Table 3.4 offers orthographic conventions in these audio files where they differ from the conventions in Table 3.1.

Table 3.4 Audio file conventions where different from practical orthography

Word list convention	Audio file convention
ɨɨ	eu
ʉʉ	vv
øø	eo

The presentation of these data involves exemplification of acoustic phenomena that make use of acoustic data visualization in Praat (Boersma & Weenink, 2020). Additional acoustic measurements and analysis techniques used in Chapters 4-6 are presented and described where relevant.

3.5 Comparative phonological analysis methods (Appendix C)

Comparative phonological analysis presented in Chapter 5 is facilitated by the data in Appendix C, previously published as Lotven (2020b). The sources of data included in that list are varied, Proto-Kuki-Chin reconstructions, Hakha Lai, and Mara are all from Van Bik (2009); Tlawngrang, Lawngtlang, and Nuitah Zophei, as well as Hnaring Lutuv data are all primary, and Zotung data are from (Shintani, 2015).

This list is designed as an elicitation program for future research on Maraic varieties of Kuki-Chin, and as such Appendix C includes both data used to create the elicitation instrument and data collected using it. The priority in this list is to maximize the possibility of eliciting different rhyme types for comparative analysis. Herein I describe the data in Appendix C.

The original elicitation instrument used in constructing Appendix C was created by comparing Tlawngrang and Lawngtlang Zophei field data from Appendix A with data from Van Bik (2009). There were several principles used in creating the list:

1) **Include at least one of each Proto-Kuki-Chin rhyme type.** This principle prioritizes identifying diachronic rhyme change through comparison of reconstructed PKC rhymes with any other data sets added to the list. Since diverse PKC rhymes are reconstructed based on diverse cognate forms in other KC languages, this approach also benefits from using words with synchronically varied rhymes.

2) **For each Proto-Kuki-Chin rhyme type, give priority to lexical items found in both varieties of Zophei.** This principle prioritizes lexical items likely shared between Zophei varieties.
3) **For each Proto-Kuki-Chin rhyme type, include all different Zophei rhymes**. This principle prioritizes inclusion of lexical items where further elicitation will likely encounter variation.
4) **For lexical items found in both varieties of Zophei, give priority to those with a correspondence in Mara**. Mara is the most closely related language to Zophei included in Van Bik (2009), so prioritizing correspondences with those data allows comparison with Van Bik's research. It also promotes inclusion of lexical items likely to be found in Mara varieties for future data collection projects.

To the Proto-Kuki-Chin reconstruction and Mara data from Van Bik (2009), and the TRZ and LTZ data sets, four additional data sets were added to this list: Hakha Lai data from Van Bik (2009), Zotung data from Shintani (2015), and field data from Hnaring Lutuv and Nuitah Zophei collected using this instrument.

A sample from Appendix C is given in Table 3.5. Data are organized according to the correspondence between TRZ and LTZ rhymes given in the first two columns (labeled "**TRZ /x/**" and "**LTZ /x/**"). The correspondence between phonemic rhymes (for the examples in Table 3.5, between TRZ /ii/ and LTZ /i̵i̵/) can also be seen in the TRZ and LTZ columns of the table (in Table 3.5 between TRZ "thlìì" and LTZ "thli̵i̵"). These leftmost columns are included to mark the beginning of each correspondence set for ease of use. To further aid use of this data set, the following column "**PKC /x/**" offers phonemic rhymes found in the PKC reconstruction column

"**PKC**."[17] In the columns that follow, data from various languages is provided. Descriptions and justifications of all resulting data sets are given in Figure 3.6. Although variations between the semantic meanings of these correspondences exist (and are noted in source texts, as well as in Appendix A for Zophei), the rightmost column includes a rough gloss for reference.

Table 3.5 Sample entries from Appendix C

TRZ /x/	**LTZ /x/**	**PKC /x/**	**PKC**	**H. Lai**	**TRZ**	**NTZ**	**LTZ**	**H. Lutuv**	**Mara**	**Zotung**	**Gloss**
/ii/	/i̵i̵/	/*ii/	*khlii	thlîi	thlìì	thlì̵ì̵	thlì̵ì̵	thlì̵i̵	thlì	khì væ̀ khì sà̱	wind
		/*iʔ/	*kriʔ	triʔ	tsíí	tsí̵í̵	tsí̵í̵	tsi̵i̵	chí	rí	to fear
		/*iat/ or /*iak/	*phiat or *phiak	phiak-I phiaʔ-II	phíí	phíá	phí̵í̵	phi̵i̵ [pʰsi̵i̵]	phí	phí	to sweep

[17] The following PKC rhymes are not included in this table due to a lack of data:
/*-iim *-een *-on *-oon *uuŋ *eer *iar *iil *ol/
No PKC words have been reconstructed with /*iil/ in Van Bik (2009).

Figure 3.6 Sources and justification for Appendix C data

Proto-Kuki-Chin reconstruction. This list is culled from Van Bik's (2009) reconstructions. Using the widest variety of reconstructed rhymes offers linguists the best chances of finding different paths of diachronic rhyme development and of quickly determining what rhymes are in a language. It also facilitates comparison with KC languages more broadly. Reconstructions are marked with an asterisk (*).

Lawngtlang Zophei. These data were elicited as part of the larger word list described in Section 3.3 and presented in Appendix A. Elicitation of that data set is described in Section 3.2.1. Inclusion of Lawngtlang Zophei facilitates comparison between Appendix A and Van Bik (2009).

Tlawngrang Zophei. These data were elicited as part of the larger word list described in Section 3.3 and presented in Appendix A. In addition, preliminary tone transcriptions are added for TRZ data (likely more accurate for nouns than verbs given complexities described in Chapter 6 for LTZ). Elicitation of that data set is described in Section 3.2.2. Inclusion of Tlawngrang Zophei facilitates comparison between Appendix A and Van Bik (2009). Preliminary tone transcriptions are added to this list.

Mara. These data are from Van Bik (2009), the only Maraic language included there. In order to facilitate direct comparison with that text, Mara data were prioritized. Though Van Bik (2009) relies on Mara orthography, he also notes where pronunciations do not mirror orthographic conventions. For Mara lexical items, I have included phonetic transcriptions described in Van Bik (2009) rather than orthographic forms.

Hakha Lai. Much of Van Bik's (2009) Proto-Kuki-Chin rhyme inventory can be found in Hakha Lai, so inclusion of Hakha Lai allows for synchronic comparison. Also, many Maraic language speakers also speak Hakha Lai, making it a useful stimulus list in elicitation. The orthography used in Appendix C is from the source text.

Zotung. Shintani's (2015) word list is the only available information on Zotung and its inclusion offers the first diachronic comparison between Zotung and other Kuki-Chin languages. The orthography is modified from the source text to indicate tone and nasality as diacritics the source text uses numbers to mark tone and <n> to mark nasality.

Nuitah Zophei. These data were elicited using this instrument with the help of Ms. Kimberly Sakhong, introduced in Section 3.2.3.

Hnaring Lutuv. These data were elicited using this instrument with the help of Ms. Sui Hnem Par, introduced in Section 3.2.4. Tone is not included in Lutuv transcriptions since little is yet known about the Lutuv tone system.

3.6 Verbal complex tone data (Appendix D)

Additional data used for the tonal analyses in Chapter 6 are from targeted elicitation experiments focusing on the verbal complex and tone in LTZ presented in Appendix D and Appendix E, the former is discussed in this section and the latter in Section 3.7. Such targeted elicitation constitutes a linguistic experiment wherein the native speaker is presented with controlled variables and asked to report their intuitions (Hyman, 2007). The tone data collected for this study forms two such experiments, the first instrument feeding the creation of the second. Regrettably, audio files for the data in Appendix D and Appendix E were not obtained due to pandemic-related difficulties in data collection during 2020, although the results of these studies set up a straightforward path for acoustic data collection that can be employed in future research.

Appendix D offers the results of verbal complex elicitation experiment targeting different syntactic contexts and different verb shapes. Syntactic contexts include all possible combinations of person and number agreement (subject, agent, patient), mood (declarative, interrogative, imperative), and polarity (affirmative, negative). Although the original elicitation included two verbs known to have a tonal opposition (*báá* 'to feed' and *ming* 'to watch'), in light of data in Appendix E, verbs with CVʔ structure and contrasting tone were also added to Appendix D. In the end, although several verbs were checked in these contexts, some exemplar words are provided: *tshuh* 'leave' and *sah* 'build' (toneless stems with short vowels), *túh* 'hit' (a High tone stem with a short vowel) *ming* 'watch,' (a toneless stem with a long vowel, here with a nasal coda) *báá* 'feed' (a High tone stem with a long vowel).

Tone is marked on all moras, so for clarity in this section any CVN syllable is written as CVVN (e.g. *miing* 'to watch') so that tone can be marked on the two moras independently. (H)igh tone is marked with an acute accent (x́), (L)ow tone with a grave accent (x̀), and Mid tone

with no accent (x). As discussed in Chapter 6, onset characteristics seem to have little or no effect on surface pitch contours (and no effect on any phonological or morphophonological process yet identified). Also, no meaningful differences in the treatment of CVV and CVN syllables has been noted. So, the reader should take these verbs to be typical of monomoraic and bimoraic stems regardless of segmental differences.

The transcriptions in Appendix D are not intended to indicate underlying tone, but rather to capture meaningful differences in the surface pitch of syllables. Some contrasts that appear to be phonetically motivated and do not offer meaningful differences between forms, are neutralized in this orthographic representation. The two most relevant examples are between HM and ML falls and between different realizations of H tone.

There does not appear to be any reason to posit two different falling tones in LTZ although the starting pitch for a fall may vary, where a HM fall follows H and a ML fall follows M, further discussed in Chapter 6. Falling tone is unattested in these data following L. Thus for consistency, all syllables with a falling tone are indicated as a HM fall orthographically (x́x).

The other collapse in surface pitch contours for the purposes of this orthography include different surface realizations of H tone. When preceded by a minor syllable with M or L tone, H tone often appears with a brief rising pitch contour. Following a H tone syllable, H is realized with level H pitch. Since this was also not found to be contrastive, Appendix D neutralizes distinctions between these two surface forms, marking both as H.

This collapse in H tone is also useful since Rising tone can occur in the language marking a meaningful difference between singular and plural imperatives (further discussed in Chapter 6). Vowels with these rises are noticeably longer, and may also involve phonological mora augmentation. They are marked as (xx́), or (x́xx́) for the concave pitch contour.

The last and most consequential assumption used in the creation of this data set is that initial prefixal elements (such as *a-* and *aa-* with various meanings) are marked as M tone (with no marking) despite surface pitch differences found in the recordings paired with Appendix A. This method has the advantage of aiding with cross-token comparison and in marking a following mora with similar pitch as M, higher pitch as H, and lower pitch as L. This method was used as well in determining the tone of words in Appendix A, where words in isolation vary in their starting f0. Thus, tone was never determined by words in isolation, only under prefixation with further concerns for verbs discussed in Section 3.7.

Variability in initial f0 is likely due to three factors: environmental factors, intonational factors, and contextual factors. First, since all items in the word list were not recorded in the same session, environmental factors such as recording place and time of day affected the pitch range employed by the speakers. Second, since a prosodic frame (that would be employed, for example, in a more targeted phonetic study) was judged too cumbersome for this large word list, no prosodic frame was used in these recordings, opening the possibility of influence from list intonation or other uncontrolled prosodic factors. Third, since the contexts employed are limited, it is possible that other preceding elements could influence the tone of these morphemes. When an additional Nuitah Zophei speaker was consulted on constructions consisting of H tone syllables (from NP objects) preceding these agreement markers, it appeared H tone could spread from the preceding element onto these markers. This process was not observed with LTZ, but merits further attention and points to potential contextual influence on agreement marker tone.

This assumption of initial M tone has the potential to cause certain problems for analysis that were only partially resolved in this project and merit further attention. This is illustrated most clearly with a sequence of a syllable with lower pitch followed by a syllable with higher

pitch at the beginning of the utterance. In this system, it is marked as M+H, however without the assumption of initial M, it could reasonably be analyzed as L+M or L+H, since both sequences are attested elsewhere in the data. Likewise, what is marked as M+L could reasonably be analyzed as H+M (H+L is not a licit sequence, as discussed in Chapter 6); and sequences of all M tones could be analyzed as sequences of all H tones (sequences of L are avoided).

In order to mitigate these problems, two additional methods were employed. First, consultation with the language assistant put the transcriptions in Appendix D in line with her intuitions. Second, comparison between items in Appendix D identified potentially similar forms that were transcribed differently. These were then checked again with the language assistant to better ensure that like forms were transcribed consistently. Despite these efforts, it is important to continue to probe these analyses in addressing potential problems. Future work, especially investigating and controlling for the previously mentioned factors of variability, will work to address these shortcomings.

As one last note on free translations, since gender is not indicated in Zophei agreement, all 3rd person singular subjects are translated as ‘she’ while all 3rd person singular objects as ‘him.’ The language assistant did not make dual vs. plural distinctions, so ‘dual’ is not marked in the data in Appendix D.

3.7 Verb tone in context (Appendix E)

Appendix E presents the results of an experiment with the goal of identifying contexts that would help distinguish the underlying tone of verbs by their tonal behavior. First, nine contexts were identified from Appendix D where stems showed up in varied phrase positions, with varied morphology, and with varied surface pitch. Contexts are provided below with some notes on the syntactic context (in parenthesis) followed by the phonological context.

Figure 3.7 Contexts for Appendix E

CONTEXT A: (transitive affirmative declarative) minor syllable proclitic subject, phrase final (found in recordings of transitive verbs in Appendix A)

a Ø _____
3SS 3SO STEM
'She _____ him.'

CONTEXT B: (transitive affirmative interrogative) subject and object proclitics, following question marker with variable tone

aa tsa ____ máá/máa
3PS 2SO STEM Q
'Did they _____ you?'

CONTEXT C: (intransitive negative interrogative) minor syllable prefix, following negative marker with variable tone

a _____ ba/bà tsih máa
PFX STEM NEG 2SS Q
'Didn't you _____ (or _____ yourself?)

CONTEXT D: (intransitive affirmative declarative) proclitic major syllable, phrase final (found in recordings of intransitive verbs in Appendix A)

aa _____
3SS STEM
'She _____ (or _____ herself)'

CONTEXT E: (transitive affirmative interrogative) proclitic major syllable, following H tone plural marker

aa Ø _____ héé máá
3PS 3PO STEM PL Q
'Did they _____ them?'

CONTEXT F: (intransitive negative interrogative) minor syllable prefix, following negative marker with variable tone

a _____ ba/bà héé Ø máá
PFX STEM NEG PL 3PS Q
'Didn't they _____ (or _____ themselves/each other)?'

CONTEXT G: (intransitive affirmative imperative) minor syllable prefix, phrase final

A _____
PFX STEM
'_____! (or _____ yourself!)'

CONTEXT H: (intransitive negative imperative) minor syllable prefix, following prohibitive marker (kheh is H after H tone, only seen with some bi-syllabic verbs and in transitive contexts)

A _____ kheh/khéh
PFX STEM PROHIB
'Don't _____! (or Don't _____ yourself!)'

CONTEXT I: (transitive affirmative declarative) minor syllable proclitic marker, following plural marker with M tone due to irrealis L tone.

a _____ hee
3SS STEM PL.IRR
'She'll _____ them.'

The results of this experiment are presented in Appendix E. The column in that table are arranged as follows. The number of (**Ar**)guments is listed first to indicate that the verb is intransitive (1) or transitive (2). Transitive verbs can usually get intransitive interpretation as reflexives or reciprocals, but intransitive verbs cannot be interpreted in transitive contexts. This column is followed by the LTZ **Verb** in the practical orthography described in Table 3.1 and Figure 3.2, the underlying **Tone** analyzed in this study (further discussed below and in Chapter 6), and a **Gloss**. The following column is marked **PFX**. In the contexts above with a minor syllable prefix (glossed as PFX)—that is intransitive negative and imperative contexts C, F, G, and H—some verbs fail to take the prefix. It is not clear what the function of this prefix is or why some verbs do not take it. Verbs that take this prefix are marked 'Y' in this column and those that do not are marked 'N.' The following nine columns correspond to contexts **A-I** above.

In each individual cell in the columns marked for contexts A-I, the elicited pitch for each syllable is given: (L)ow, (M)id, (H)igh, or Falling (HM). For multisyllabic roots where contours could cause ambiguity, a hyphen '-' is added to indicate a syllable boundary. For verbs with stem alternation, alternants are also given for each context. Empty cells (marked in gray) represent contexts where the language assistant felt the form was too unnatural to report. As such, these gaps may be accidental (e.g., a random gap in the paradigm or a form that is too odd semantically) or systematic (e.g., intransitive verbs cannot show up in transitive contexts). In contexts with variable tone found on other morphemes within the verbal complex, variation was found to be tied to the weight (monomoraic vs. bimoraic) and pitch (H vs. M) of the last syllable of the verb stem as is shown in Appendix D, so it is not marked on the spreadsheet in Appendix E.

Elicitation of the verbs in Appendix E in each of these 9 contexts facilitated their organization into several categories, reflected in the order of groups of verbs in the list. These categories, based on further elicitation using representative contexts for major categories, were used to determine the underlying tone for verbs, reported in Appendix A. For monosyllabic verbs, this includes (H)igh and toneless (O) categories. For bisyllabic verbs this includes two major categories, High (considered H-O here) and toneless (considered O-O here), with many other examples in Appendix A. Other bisyllabic items are divided into possible minor categories and given tentative tone category titles: O-H, L-O, O-L, L-H. Trisyllabic verbs are also included with tentative underlying tone analysis. Multi-syllabic verbs are diverse, some potentially monomorphemic, others potential compounds or stems with derivational morphemes such as the directional *va-* or causative *pa-* or *-sah*. These differences are not analyzed here, but may be responsible for some of the minor categories.

In checking the underlying tone of verbs in Appendix A, Context D (especially due to its inclusion in much of the recorded data of intransitive verbs) was used as the primary diagnostic. In this context, mono-syllabic stems and some bisyllabic words with surface contrasts. These correspondences between surface forms in Context D and preliminary analyses of underlying forms found in Appendix A are described in Table 3.8. Verbs in the other minor categories /O-L/ and /L-O/, as well as trisyllabic verbs were investigated in all Contexts (A-I), with data provided in Appendix E.

Table 3.8 Correspondences between Context D surface forms and underlying representations

Surface form in Context D	Underlying form as found in Appendix A
[HM]	/H/
[L]	/O/
[M-L]	/O-O/
[M-HM]	/H-O/
[M-H]	/O-H/
[L-H]	/L-H/

Although these analyses are preliminary, they offer a jumping-off point for further analysis of tone in the LTZ verbal complex.

3.8 Orthographic conventions (Appendix F)

Data in this text make use of different orthographic conventions depending on data source and language. In some cases, source orthographies have been altered to bring them closer in line with the practical orthographies used to represent primary data from Zophei and Lutuv. Appendix F is included as a quick reference for orthographic conventions used in the most commonly mentioned languages here.

Three tables are included in Appendix F. Part I includes consonants; Part II includes long and short monophthongs; and Part III includes diphthongs. For each table, cells in the first column contain International Phonetic Alphabet (IPA) symbols. The following columns contain corresponding symbols used to represent Proto-Kuki-Chin reconstructions (PKC), and data from Hakha Lai (H.Lai), Mara, Zotung, Lutuv, Tlawngrang Zophei (TRZ), Nuitah Zophei, and Lawngtlang Zophei (LTZ). Shaded boxes indicate that the language is not reported to have that sound or its not represented orthographically. In Zophei varieties, initial glottal stops are unmarked and treated as vowel-initial words, while underlying short syllables (often ending in a phonetic glottal stop) are indicated with a final <-h>, even when lengthened morphologically.

For Zophei, the palatal glide <j> only appears in one loanword /kun jaa/ ‘betel nut.’ Likewise, the retroflex coronal stop <tt> is only attested in the loanword /ttui ttui tah/ ‘pair.’ They are included in this list for completeness.

3.9 Summary

This chapter included information relevant for the interpretation of the data in Appendix A-E and the summary of orthographic conventions in Appendix F. It also offered information as to the analysis techniques involved in decisions relevant to the creation of those resources. Data for this study were collected with the help of four languages assistants, three Zophei speakers and one Lutuv speaker. The data for this study include a word list in Appendix A, attested syllables with examples in Appendix B, comparative lexical data in Appendix C, verbal complex data in Appendix D, and verb tone data in Appendix E. In addition, Appendix F is meant as a reference for the orthographic conventions used for Zophei, Lutuv, Mara, Lai, and Proto-Kuki-Chin. The techniques employed in this thesis have resulted in data collection that is intended to cast a wide net across the sound systems of these languages. With the sources of the data presented here in mind, the following three chapters turn to onsets (Chapter 4), rhymes (Chapter 5), and tone (Chapter 6) in Zophei.

Chapter 4. Onsets

This chapter examines the phonemic consonant contrasts in Lawngtlang (LTZ) and Tlawngrang (TRZ) Zophei and compares them to Proto-Kuki-Chin (PKC) reconstructions, as well as to other synchronic Kuki-Chin (KC), especially Maraic, languages. TRZ and LTZ (as well as Nuitah) have the same inventory of phonemic onset consonants, with some phonetic variation. The primary goals of this section are:

(1) to synchronically and diachronically contextualize Zophei onsets within Kuki-Chin,

(2) to describe the acoustic characteristics of Zophei onsets, and

(3) to identify inter- and intra-speaker variation in the phonetic realization of Zophei phonemic onsets for future work with the language.

The rest of the chapter is organized as follows. Section 4.1 provides an overview of Zophei onset consonants using IPA and the practical orthography used in this study. Stops are discussed in Section 4.2; fricatives in Section 4.3; affricates in Section 4.4; nasals in Section 4.5; and liquids in Section 4.6. Section 4.7 briefly considers minor syllable onsets and Section 4.8 summarizes the chapter.

4.1 Overview of Zophei onsets

Zophei allows only single onsets: stops, fricatives, affricates, nasals, and liquids. Unlike some Southern Chin languages like Hyow (Zakaria, 2017; Baclawski, 2012), Asho, and M. Cho (Van Bik, 2009), Maraic languages have not retained any PKC onset clusters, diachronically employing epenthesis, deletion, and affrication to simplify clusters. Although all three processes have occurred in Zophei, the most commonly observed process is affrication, so cluster simplification is discussed alongside synchronic affricates in Section 4.4. In addition, glides have been lost in Zophei in favor of fricatives, so they are discussed in Section 4.3.

Zophei has a smaller set of possible onsets than Central Chin languages like Lai and an inventory similar to other Maraic languages overviewed in Chapter 2. The phonemic inventory for Zophei onsets is presented in Figure 4.1 in IPA and in the practical orthography in Figure 4.2. For comparison, Figure 4.3 is copied from Figure 2.16 and offers a comparison between Zotung, Senthang, Mara, and Lutuv—consonants shared by these 4 Mariac varieties are in black, those shared by only 2-3 of them are in red. In Zophei, the palatal glide /j/ and retroflex coronal stop /ʈ/ are only attested in a pair of Burmese loanwords *kun jaa* 'betel nut' and *ʈui ʈui tah* 'couple' so they are not added to this inventory. The inventories presented in Figures 4.1, 4.2, and 4.3 are further explicated in the remainder of this chapter.

Figure 4.1 Zophei onset consonants (IPA)

	Bilabial	Labio-dental	Alveolar	Velar	Glottal
Stops	p pʰ b		t tʰ d	k kʰ	ʔ
Fricatives		f v	s z		h
Sib. Affricates			t͡s t͡sʰ		
Lat. Affricates			t͡l t͡ɬ		
Nasals	m̥ m		n̥ n	ŋ(ŋʲ)	
Laterals			l̥ l		
Rhotics			ɹ̥ ɹ		

Figure 4.2 Zophei onset consonants (orthographic conventions)

	Bilabial	Labio-dental	Alveolar	Velar	Glottal
Stops	p ph b		t th d	k kh	
Fricatives		f v	s z		h
Sib. Affricates			ts tsh		
Lat. Affricates			tl thl		
Nasals	hm m		hn n	ng	
Laterals			hl l		
Rhotics			hr r		

Figure 4.3 Shared consonants between Zotung, Senthang, Mara, and Lutuv (from Figure 2.16)

	Bilabial	(Labio-) dental	Alveolar	Palatal	Velar	Glottal
Stops	p pʰ b		t tʰ d		k kʰ	ʔ
Fricatives		f v	s z			h
Affricates			t͡s t͡sʰ			
Lat. Affricates			t͡l t͡ɬ			
Nasals	m̥ m		n̥ n		ŋ	
Laterals			l̥ l			
Rhotics			ɹ̥ ɹ			
Glides	w			j		

4.2 Oral stops and glottal stop

The Zophei system of onset oral stops mirrors those of other Maraic languages presented in Chapter 2. Mara, Senthang, Lutuv, and both TRZ and LTZ all have a three-way contrast in labial /p pʰ b/ and coronal stops /t tʰ d/, as well as a two-way contrast in velar stops /k kʰ/. In addition to these oral stops, Melnik (1997) analyzes Hakha Lai's apparent vowel-initial syllables as beginning in a glottal stop /ʔ/ based on impressionistic acoustic evidence—particularly high amplitude initial glottal bursts, also seen in some Zophei examples, such as in Figure 4.30a below. Melnik's analysis has also been adopted in Van Bik (2009) for his analysis of PKC. Since /ʔ/-initial syllables are not reported to contrast with onset-less syllables in any Kuki-Chin language, such an analysis suggests that all syllables must have an onset in Hakha Lai, as may have been the case in PKC, and as may be the case in other Kuki-Chin languages. This study finds no strong evidence for or against initial phonemic glottal stops in Zophei, so in order to facilitate comparison with Van Bik (2009) and to discuss acoustic characteristics of such syllable onsets in this section, /ʔ/ is included in this discussion and inventory of onset stops. However, future research on this topic is necessary to understand the phonetics and phonology of apparent vowel-initial syllables in Zophei and other Kuki-Chin languages. The remainder of this section offers historical background on stops in Kuki-Chin, recapitulates previous literature on stops in other Maraic languages, describes Zophei phonemic onset stop contrasts, and offers some acoustic exemplification of the phonetic realization of Zophei stop contrasts.

Van Bik (2009) reconstructs six voiceless stops in PKC /*p *pʰ *t *tʰ *k *kʰ/, as well as two implosives /*ɓ,*ɗ/.The voiceless labial and dental stops /*p *pʰ *t *tʰ/ have stayed relatively stable in synchronic Kuki-Chin languages, for example in Hakha Lai (Lalremzami, 2011) and in the Northern Languages Thado, Zo, Tedim, and Sizang (Button, 2011), although the velar series

/*k *kʰ/ has been less stable. In the Northern Chin varieties Thado, Zo, and Tedim, only /*k/ remains from the PKC velar inventory; /*kʰ/ lenited to /x/ and /*r/ hardened to /g/, leaving a two-way voicing contrast /k g/ in place of the older aspiration contrast /*k *kʰ/ (Button, 2011). The Southern Chin language Hyow has borrowed /g/ in loanwords, resulting in a marginal 3-way contrast /k kʰ g/. The implosive series has been lost in favor of voiced labial and coronal stops in all but some Southern Chin languages (So-Hartmann, 1988) and the Maraic language Zotung (Shintani, 2015).[18] The Zophei stop inventory contains the PKC voiceless series and voiced labial and coronal stops innovated from PKC implosives. No evidence of implosives was found in Zophei data collected for this study.

To exemplify the stops in TRZ and LTZ, Table 4.4 presents examples of labial (4.4a-c), dental (4.4d-f), velar (4.4g-h), and glottal stops (4.4i). The three-way laryngeal contrast in labial and dental places of articulation involves voiceless unaspirated (4.4a, d), voiceless aspirated (4.4b,e), and voiced (4.4c, f) stops. The velar series is lacking the voiced member but contains voiceless unaspirated (4.4g) and voiceless aspirated (4.4h) stops.

Table 4.4 Onset stops in Zophei

	Onset	**TRZ**	**LTZ**	**Gloss**
a)	/p/	pee	pee	wrestle
b)	/pʰ/	phee	phéé	leg
c)	/b/	bei	bii	pot
d)	/t/	tee	téé	waist
e)	/tʰ/	thee	théé	scratch
f)	/d/	dee	déé	be quiet
g)	/k/	kee	kee	ascend
h)	/kʰ/	khee	khéé	chew
i)	/ʔ/	ʔee	ʔee	eat

[18] It is possible that these implosives are the innovated forms (Mortensen, 2021), but since Zophei data presented here sheds no light on the issue, it is not taken up in this discussion.

It is worth noting that some Central Chin languages also developed an additional coronal contrast not attested in any Maraic language (Van Bik, 2009). One of these Central languages is Hakha Lai, which has 5 coronal stops, differentiating dental stops (voiced, voiceless aspirated, and voiceless unaspirated) from alveolar stops (voiceless aspirated, voiceless unaspirated), transcribed here as retroflex to avoid diacritics /ʈ ʈʰ/. This Hakha Lai coronal contrast has been described as plain vs. retroflex contrast (Button, 2011) or as an apico-alveolar vs. lamino-dental contrast (Maddieson & Van Bik, 2004; Smith, Flego, & Berkson, 2018). The series is derived diachronically from initial stop-rhotic clusters in Proto-Kuki-Chin (i.e., /*pr *kr/ → /ʈ/; /*pʰr *kʰr/ → /ʈʰ/). Zophei does not have consonant clusters, nor does it feature a place contrast in coronal stops; however, since Zophei speakers often also speak Hakha Lai and study Burmese in school (which features a similar coronal series to Lai), the speech community is familiar with the contrast and both LTZ and TRZ language assistants report widespread use of the loanword *ʈúí ʈúí tah* 'pair, couple' borrowed into Zophei, which they suggest is from Burmese. Setting aside this marginal occurrence of /ʈ/, we now turn to further explication of the acoustic properties of Zophei stops.

To offer acoustic exemplification of Zophei stops, this description now turns to comparison of sample waveforms and spectrograms from LTZ and TRZ recorded data. Labial stops are shown for comparison, though coronal and velar stops exhibit similar properties (aside from the lack of a voiced velar stop). In describing this distinction, I make use of the concept of Voice Onset Time (VOT), as coined by Lisker & Abramson (1964), which compares differences in timing between the release of an oral closure (as indicated by a burst of energy in the waveform and spectrogram) and the onset of voicing (as indicated by periodicity in the waveform). Voiceless stops have a 'lag' between the burst release and the onset of voicing—

short for unaspirated and long for aspirated stops. Voiced stops where glottal vibration precedes the burst release are described as having a 'lead' time. A 3-way distinction in VOT (short lag vs. long lag vs. lead), as found in Zophei, is typologically commonplace and has been described in Lisker & Abramson (1964) for Eastern Armenian and Thai (which also lacks /g/), as well as for the Kuki-Chin language Paite (Ngaihmuan, Holliday, and Berkson, 2020).

The diagrams that follow (Figures 4.5-4.8) provide sample waveforms of initial and intervocalic labial stops from TRZ and LTZ language assistants. Figures 4.5 and 4.6 show TRZ and LTZ initial labial stops, respectively. In both cases, the voiceless unaspirated (4.5a, 4.6a) contrasts with the voiceless aspirated (4.5b, 4.6b) in terms of a short vs. long lag VOT. The voiced series shows contrast through a lead time VOT (4.5c, 4.6c). This pre-voicing does not persist through the full pre-voicing period, but rather undergoes passive devoicing (where pressure build-up in the oral cavity behind the consonant constriction slows the airflow across the glottis needed to maintain vocal fold vibration throughout), as indicated by a drop in amplitude before the burst release. Neither speaker utilizes other voice-maintaining gestures such as oral leakage (frication, gliding) or nasal leakage (pre-nasalization) available in other languages such as French and Spanish to avoid passive devoicing. For a recent description and cross-linguistic comparison of voicing maintenance gestures, see Solé (2018).[19]

[19] The images from Praat (Boersma & Weenink, 2020) of waveforms and spectrograms in this Chapter all follow the same standard unless otherwise noted. This includes default settings with two crucial standards: (1) Spectrograms have a range from 0-10,000 Hz; and (2) images make use of the same timescale. The latter is achieve through several controlled steps. First, images are build from screenshots of a 400 ms Praat window. The Praat application window was maximized on the same computer for these screenshots and although they may appear at different sizes due to margin considerations, no modification to the aspect ratio was made.

Figure 4.5 Initial bilabial stops, waveform (TRZ)

(a) /pee/ ‘wrestle’ (b) /phee/ ‘leg’ (c) /bei/ ‘pot’

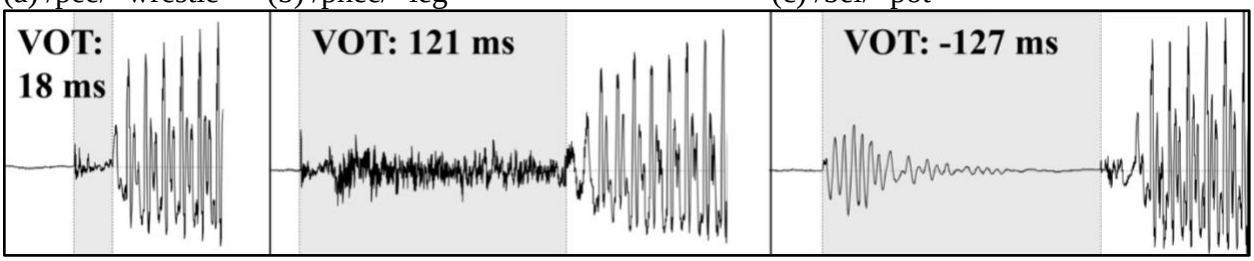
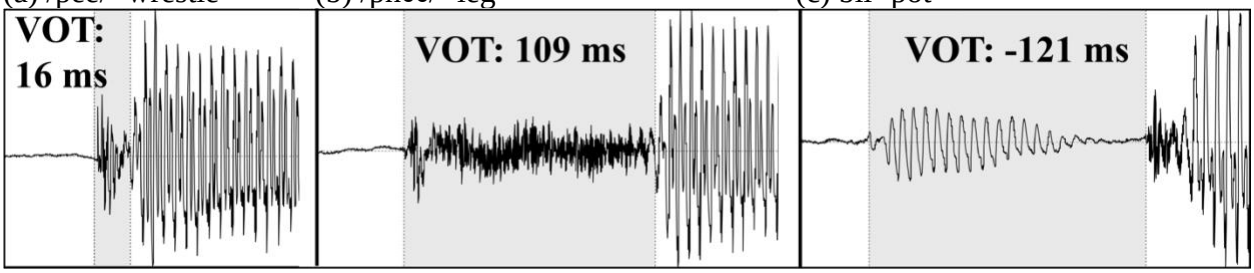


Figure 4.6 Initial bilabial stops, waveform (LTZ)

(a) /pee/ ‘wrestle’ (b) /phéé/ ‘leg’ (c) bii ‘pot’



Intervocalic stops in Figures 4.7 and 4.8 (TRZ and LTZ, respectively) show a similar pattern whereby initial voiceless unaspirated stops (4.7a, 4.8a) have a shorter aspiration interval than the voiceless aspirated stops (4.7b, 4.8b). The voiced series (4.7c, 4.8c) involves closure voicing, with some variation in the occurrence of intervocalic passive devoicing noted, as seen in (4.8c).

Figure 4.7 Intervocalic bilabial stops, waveform (TRZ)

(a) /aa pee/ ‘They wrestled.’ (b) /a phee/ ‘his leg’ (c) /a bei/ ‘his pot’

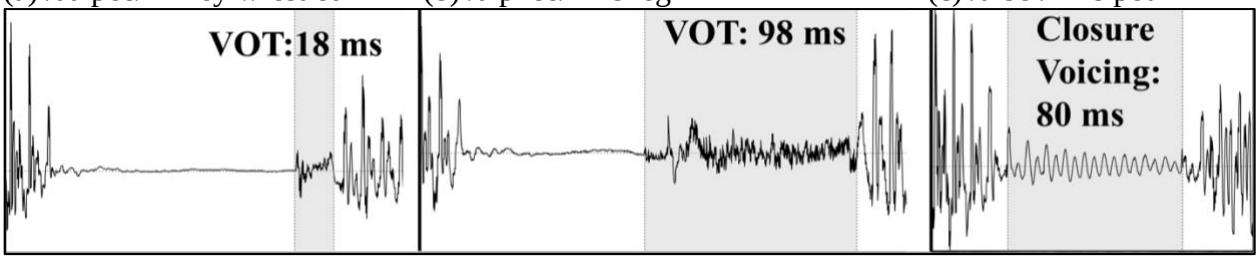
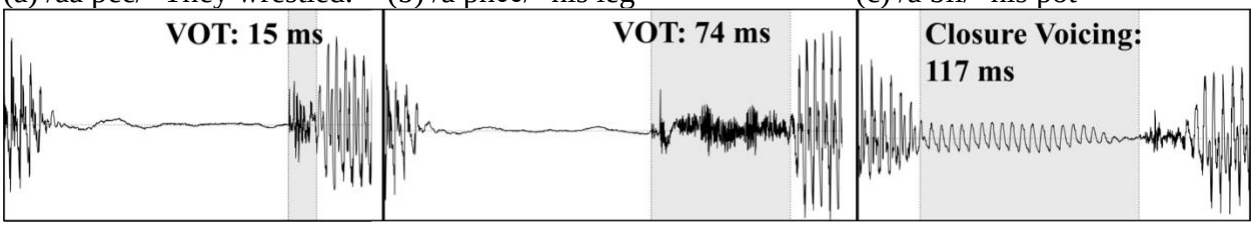


Figure 4.8 Intervocalic bilabial stops, waveform (LTZ)

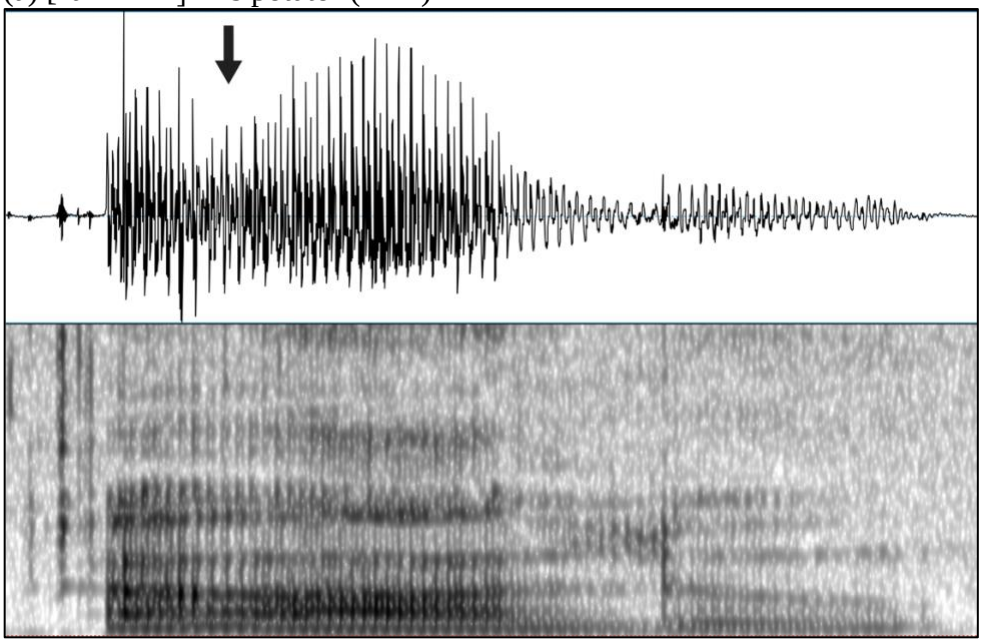
(a) /aa pee/ ‘They wrestled.’ (b) /a phéé/ ‘his leg’ (c) /a bii/ ‘his pot’



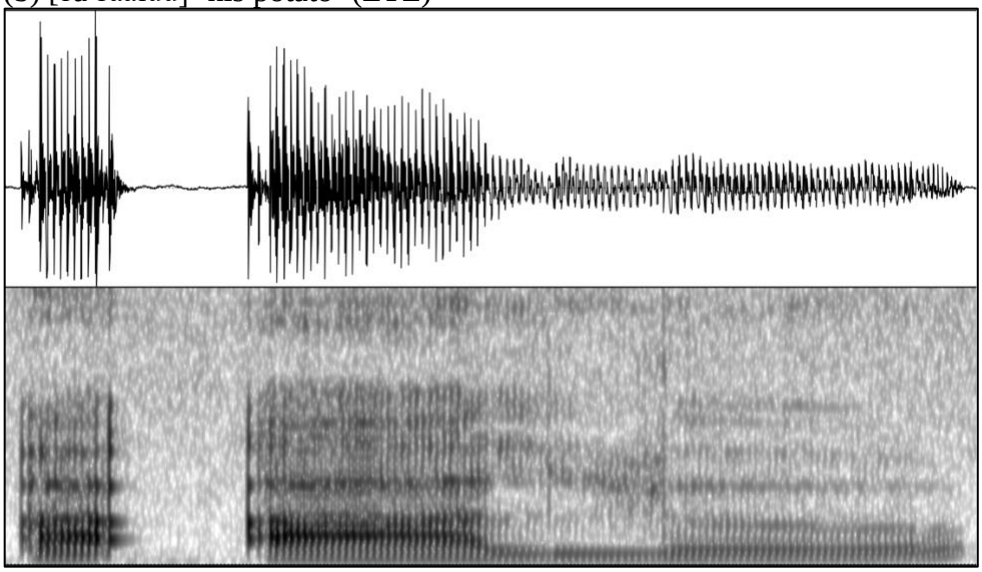
The initial and intervocalic glottal stop are illustrated for TRZ in (4.9a) and LTZ in (4.9b). In (4.9a), the TRZ example shows a glottal burst at the onset of the first syllable but no full glottal closure between syllables (some glottalization at the syllable boundary is noted and marked with an arrow). In (4.9b) our LTZ language assistant has a clear glottal burst beginning each syllable and a pause between syllables. This image is presented only to note variation, the factors involved in this variation (phonological, sociolinguistic, etc.) are beyond the scope of this dissertation.

Figure 4.9 Initial and intervocalic glottal stops, waveform and spectrogram[20]

(a) [ʔa ʔaaluu] ‘his potato’ (TRZ)



(b) [ʔa ʔaal~~uu~~] ‘his potato’ (LTZ)



The Zophei stop system overviewed in this section is conservative when compared to PKC reconstructions, the only apparent innovation is the loss of reconstructed implosives in

[20] The images in Figure 4.9 have both been taken from 800 ms windows rather than 400 ms windows to capture the whole word. Other standards are maintained with images in this chapter; see footnote 2.

favor of voiced stops. This study finds no strong evidence for the phonemic status of glottal stops in Zophei, but variation in their realization and theoretical considerations concerning the obligatoriness of onsets merit further research.

4.3 Onset fricatives

As described in Chapter 2, Maraic languages show some variation in their fricative inventories as well as innovation from PKC, which Van Bik (2009) reconstructs with 4 fricatives /*θ *s *sʰ *h/. Zotung is reported to have the most fricatives in Maraic with 7 /θ f v s z ɐ h/, Senthang has 6 /v s z x ɣ h/ (also marginally /f/, borrowed from Hakha), Mara has 5 /f v s z h/, and Lutuv has 4 /v s z h/. Zophei varieties reported on here show the same fricative inventory as Lutuv /v s z h/, with examples provided in Table 4.10. Both TRZ and LTZ have a voiced labio-dental (4.10a), voiceless (4.10b-d) as well as voiced (4.10e) alveolar, and voiceless glottal (4.10f) fricatives.

Table 4.10 Onset fricatives in TRZ and LTZ

	Zophei Onset	**PKC**	**TRZ**	**LTZ**	**Gloss**
a.	/v/	*waa	pa voo	pá váú	bird
b.	/s/	*θaa	soo tei	sáú tíí	child
c.	/s/	*saa/*sak	sah	sah	build
d.	/s/	*sʰaa	soo	sáú	meat
e.	/z/	*juu	zuu	~~zuu~~	alcohol
f.	/h/	*hal	hei	hei	ask

Apart from /h/ retained from PKC (4.10f), the Zophei fricative system has undergone several relevant innovations, including the merger of all coronal fricatives /*θ *s *sʰ/ to /s/ (4.10b-d) and the innovation of /z v/ from the glides /*j *w/ (4.10a, e). Fricative innovations are common in KC, especially for these two processes, each addressed in turn.

Coronal Merger. The PKC voiceless dental fricative /*θ/ is retained in the Southern Chin language Mindat Cho (Jordan, 1969). However, it has merged with /s/ in other Southern languages Daai and Asho, as well as in Mara; affricated to /ts/ or /tsʰ/ in Northern Chin languages like Tedim and Sizang, as well as in the Southern language Khumi; and labialized to /f/ in the Central Chin languages, like Hakha Lai and Mizo. Apart from Daai Chin, which retains /*sʰ/, and Mindat Cho, which merged /*sʰ/ with the voiceless liquid /*hl/, other Kuki-Chin languages have generally merged /s/ and /sʰ/. Since the three-way merger is only noted for Maraic languages, the occurrence of /f/ in Maraic languages is likely due to language contact with Hakha Lai whereby /f/ is borrowed (as noted for Senthang). And although Zophei (LTZ and TRZ) has *sing* 'wise' and *pa sing* 'clear' from PKC **θiŋ-I *θin-II* 'wise' or **θiaŋ-I *θian-II* 'clear' evincing merger of /θ s/, our TRZ and LTZ language assistants also note widespread Zophei use of the word *fiang* 'clear, understandable' with the labial fricative and somewhat different semantics, likely borrowed from Hakha Lai.

Questions of language contact and fricative borrowing may be particularly valuable in analysis of the large fricative inventory of Zotung, which has both /θ/ and /f/ (Shintani, 2015). The voiceless dental fricative /θ/ in Zotung is likely either retained from PKC, offering possible evidence of a more distant relationship between Zotung and other Maraic languages, or it is borrowed from neighboring Southern Chin languages such as Cho, which retains the dental fricative (Jordan, 1969).

Glide spirantization. As in Zophei, onset glides are missing in Mara and Lutuv as well as in Central and Northern Chin languages but are reported for Zotung and Senthang. Van Bik, (2009) accounts for the lack of /j/ and /w/ in Northern Chin, Central Chin, and Mara through correspondences that indicate diachronic spirantization of /*j *w/ to /z v/. The palatal glide /j/,

for example as reconstructed in PKC as **jooŋ* 'monkey,' is retained in the Southern Chin languages of Cho *yawng*, Asho *yón*, and Daai *jɔːŋ* (with <y> used in some orthographies to mark the glide); however, /*j/ spirantized to /z/ in the Northern language Tedim *zo:ng*, in the Central Chin language Hakha Lai *zôoŋ*, and in Mara *zỳ*. Zophei patterns with Mara in having /z/ in *á zòng* (TRZ and LTZ), but Zotung retains /j/ in *jùà pò*. It is unclear why Zotung patterns with Southern Chin languages in retaining /j/, but such a deviation is suggestive of either a closer phylogenetic connection or more recent language contact between Zotung and Southern Chin varieties that merits further investigation.

The labio-velar glide /*w/ has also been lost in many KC languages, with Northern, Central, Maraic, and even several Southern Chin languages spirantizing /*w/ to /v/. For example, PKC /*w/ in **waa* 'bird' is retained in the Southern Chin language Asho *waw̌-k'ó* 'dove,' but has spirantized elsewhere, as in (Central) Hakha Chin *vàa*, (Southern) Mindat Cho *va*, Mara *pā-váw*, Zotung *pà vò*, LTZ *pá váú*, and TRZ *pa voo*.

In summary, Zophei, Lutuv, and Mara all have the retained glottal fricative /h/ from PKC, the voiceless coronal fricative /s/ merged from PKC coronals /*θ *s *sʰ/, and the two voiced fricatives /v z/ spirantized from PKC /*w *j/, as well as marginal use of /f/, likely borrowed from Hakha Lai. It is worth noting that Zotung patterns with Southern languages in retaining /j θ/ and innovating the voiceless alveo-palatal fricative /ɕ/. The latter development is similar to Hyow, which has innovated the voiceless palatal fricative /ç/ (as in the language name, indicated orthographically as <hy>) (Zakaria, 2017). These similarities further suggest a close connection (either phylogenetic, through language contact, or both) between Zotung and Southern Languages. Zophei, on the other hand, shows similarities to Mara and Lutuv in their fricative system.

4.4 Onset affricates

Zophei has two series of affricates: sibilant affricates /ts tsh/ and lateral affricates /tl thl/. Sibilant but not lateral affricates are reconstructed for PKC, though both types have also been innovated, resulting from the diachronic onset cluster simplification of PKC /*pl *kl *khl *pr *kr *phr *khr/. The most common process for cluster simplification in Zophei is affrication, as in much of Maraic, yet sporadic examples of deletion and epenthesis are also attested cluster simplification strategies in the Zophei. Table 4.11 offers examples of each PKC cluster type and all attested simplification strategies for each type. PKC stop-liquid clusters have been simplified through affrication in (4.11a-b, d-e) and epenthesis in (4.11c); affrication of stop-lateral clusters has resulted in innovated lateral affricates /tl/ in (4.11a-b, d) and /thl/ in (4.11e). In (4.11b-c), divergent strategies (affrication and epenthesis) have split the PKC etymon into two separate lexical items in Zophei. PKC stop-rhotic clusters have been simplified through affrication in (4.11f-g, k-l), stop deletion in (4.11h), and rhotic deletion in (4.11i-j) with additional aspiration in the (4.11j).[21] Examples of retained PKC (or Proto-Central Chin) sibilant affricates are given in (4.11m-p), examples of variation in aspiration between PKC and Zophei sibilant affricates are given in (4.11o-p).

[21] Mara onset clusters have also undergone similar simplification, but not always in the same lexical item. For example, in (4.11i) Mara affricates the /*kr/ cluster resulting in Mara *chài* 'to bite, to tear,' while Zophei shows deletion to form *khéé* 'to chew' (LTZ). As an additional example, in (4.11k) Zophei affricated the PKC /*phr/ cluster to form *tsháh* 'to be good' (LTZ) while Mara deleted the rhotic to form *phā* 'to be good.'

Table 4.11 Consonant cluster simplification and affricate retention in Zophei

	PKC onset	PKC word	PKC gloss	TRZ	LTZ	Zophei gloss
a.	*pl	*plok	boil	tloh	tlah	boil
b.	*pl	*plooŋ/ *ploon	visit, move	tlong	tlong	visit
c.	*pl	*plooŋ/ *ploon	visit, move	pa long	pá long	transfer
d.	*kl	*klaw	durable	tløø	tløø	durable
e.	*khl	*khlii	air	thlii	thlii	wind, air
f.	*pr	*(p)raŋ	uncle	tsang poo	tsang páú	uncle
g.	*kr	*kriʔ	fear, afraid	tsii	tsíí	fear
h.	*kr	*(k)(r)aaŋ/ *(k)(r)aan	white-I/II	rang	rang	white
i.	*kr	*kray	bite, chew	khee	khéé	chew
j.	*phr	*s^{h}a-phruu	pangolin	sa phuu	-	pangolin
k.	*phr	*phraa/ *phrat	good	tshah	tsháh	good
l.	*khr	*khraŋ/ *khran	grow-I/II	tshang	tshang	grow
m.	*ts	*tsa(a)m	stay	tsang	tsang	stay
n.	*tsh	*tshuŋ	interior	tshung	tshung	interior
o.	*ts	*tsuʔ	claim	tshuu	tshúú	claim
p.	*tsh	*tshaay	slingshot	tsii see	tsii see	slingshot

Affricate contrasts in Zophei are variably produced, so two measures are provided for the examples below, a temporal measure that I will refer to as VOT (though, in fact, it is a slight adaptation of VOT, described more thoroughly below) and Center of Gravity (COG). Regarding the temporal measure, what is reported here is the interval that stretches from closure release to the onset of periodic voicing in a subsequent vowel (highlighted). This measure does not differentiate frication produced due to oral occlusion from that produced due to glottal occlusion (i.e. aspiration). COG is provided to illustrate differences in the spectral properties of the noise intervals of these affricates, indicative of different occlusions (Forrest, Weismer, Milenkovic, & Dougall, 1988; Zsiga, 1993; Jongman, Wayland, & Wong, 2000; Gordon, Barthmaier, & Sands, 2002). COG is a commonly-used acoustic tool for differentiating frication noise and is described

in Gordon, Barthmaier, & Sands (2002) as, “calculated by multiplying each frequency value in the numerical spectrum by its corresponding intensity value and then dividing the sum of these products by the sum of all the frequency values of the spectrum” (p.143). In other words, it reduces the various amplitudes of different frequencies within the spectrum to a single “spectral mean,” which helps to identify where the highest concentration of energy is within the spectrum. In examples where there is aspiration, a vertical line separates the oral frication interval from the glottal frication interval and COG is indicated separately for each. The remainder of this section focuses on affricates in Zophei, lateral affricates in Section 4.4.1 and sibilant affricates in Section 4.4.2.

4.4.1 Onset lateral Affricates

Zophei lateral affricates /tl/ and /thl/ follow diachronically from Proto-Kuki-Chin stop-lateral clusters /*pl *kl/ and /*khl/, respectively, as is the case in Central Chin languages and some Maraic languages. Mara and Lutuv have lateral affricates, but Senthang and Zotung do not, though cluster simplification has occurred differently in the two languages. Senthang appears to have innovated lateral affricates, then merged lateral affricates with coronal stops. Take for example the PKC **khlii* ‘air, wind’ in (4.11e) where Senthang has *tʰɘ̄* ‘wind,’ homophonous with *tʰɘ̄* ‘die’ from PKC **thii/*thiʔ* ‘die-I/II.’ Zotung, on the other hand, has opted for liquid deletion, as in *khì væ̀* ‘wind.’ However, due to the lack of data from these languages, observations about diachronic simplification of clusters in Senthang and Zotung are only preliminary. Examples of Zophei lateral affricates are given in Table 4.12, the unaspirated in (4.12a) and the aspirated in (4.12b).

Table 4.12 Onset lateral affricates in Zophei

	Onset	TRZ	LTZ	Gloss
a.	/tl/	tlang	tláng	redeem, save
b.	/thl/	thlang	thláng	loosen, untie

The realization of this contrast is variable across KC. Hakha Lai is reported to have a contrast in duration of oral frication /tl t͡ɬ/ (Van Bik, 2009; Peterson, 2017a) while closely related Falam is reported to have a contrast in aspiration /t͡ɬ t͡ɬʰ/ (Thuan, 2008). For both TRZ and LTZ speakers, the contrast in Zophei makes use of aspiration, which increases the overall duration of frication and can be measured similarly to VOT for stops.[22]

To illustrate the contrast between /tl/ and /thl/, Figures 4.13-4.16 present example waveforms and spectrograms of the contrast in TRZ and LTZ. For each of these figures, (a) offers an image of /tl/ and (b) of /thl/. Initial lateral affricates are shown in Figure 4.13 (TRZ) and Figure 4.14 (LTZ); intervocalic lateral affricates are shown in Figure 4.15 (TRZ) and Figure 4.16 (LTZ). For each of these examples, /thl/ has a longer VOT than /tl/; for initial affricates, the difference is approximately 40ms, but for intervocalic affricates the difference is greater (about 70ms for the TRZ example and about 90ms for the LTZ example). In addition, the TRZ /tl/ in (4.13a) shows that oral frication persists into the vowel, which has a noisy onset. VOT and COG measurements are taken from the highlighted section. Where frication (i) is divided from aspiration (ii) with a vertical line, VOT is figured for the highlighted portion, while COG is given separately for oral frication and aspiration intervals.

[22] The section of the waveform that is being measured is more accurately described as the interval of frication preceding the vowel onset (regardless of the source of the noise), but the term VOT is used here for consistency of terminology in the diagrams and prose for this chapter.

Figure 4.13 Initial lateral affricates, waveform and spectrogram (TRZ)

(a) /**tl**ee/ ‘late’ (b) /**thl**ee/ ‘hang down’

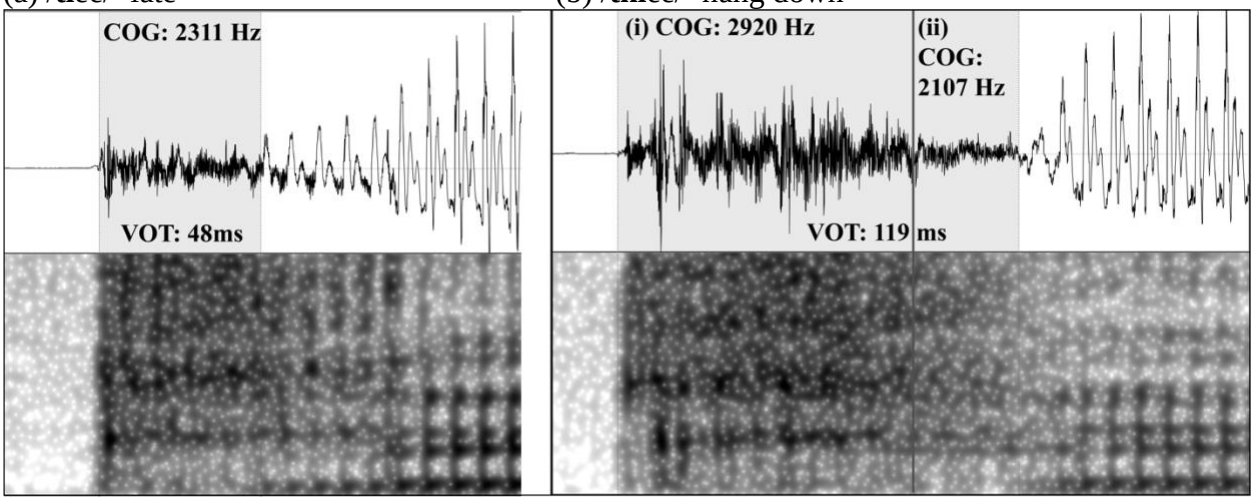


Figure 4.14 Initial lateral affricates, waveform and spectrogram (LTZ)

(a) /**tl**ee/ ‘late’ (b) /**thl**ee/ ‘hang down

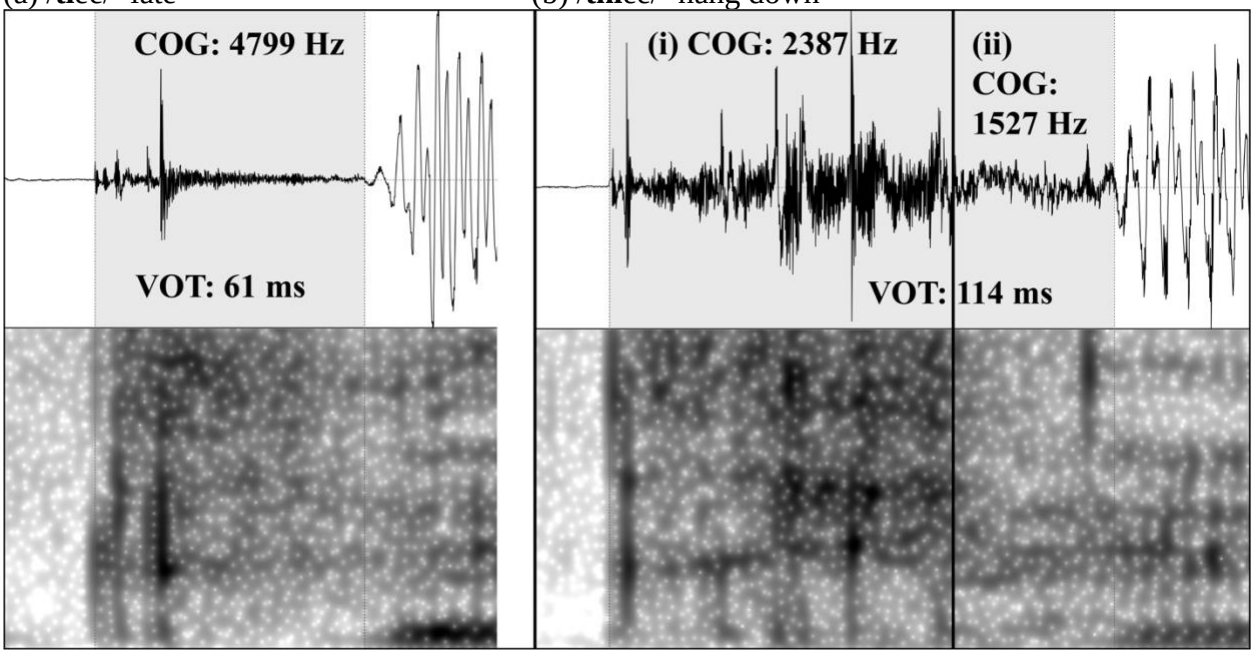


Figure 4.15 Intervocalic lateral affricates, waveform and spectrogram (TRZ)

(a) /aa **tl**ee/ ‘He’s late.’ (b) /aa **thl**ee/ ‘It hangs down.’

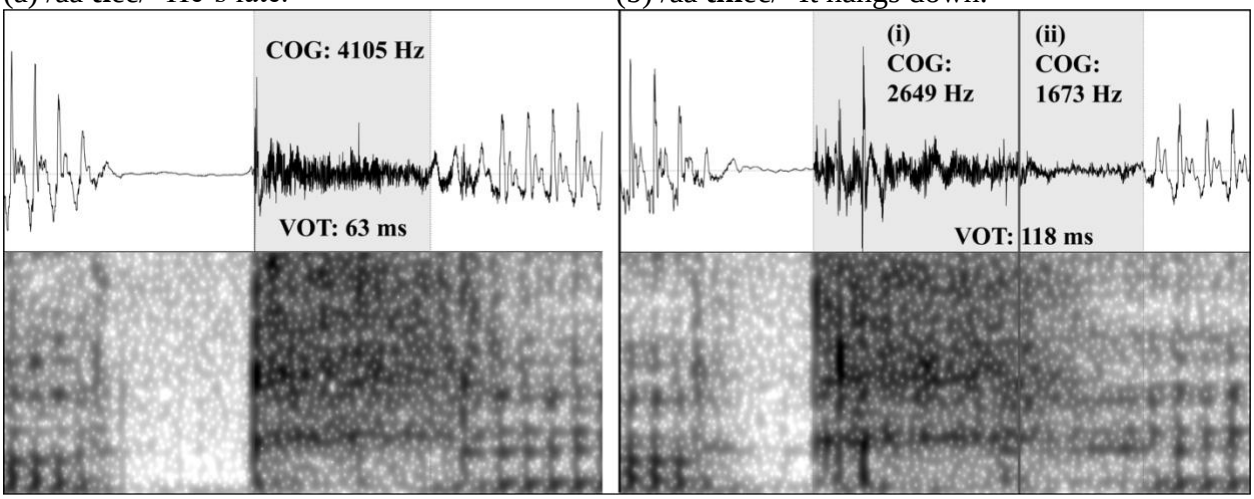
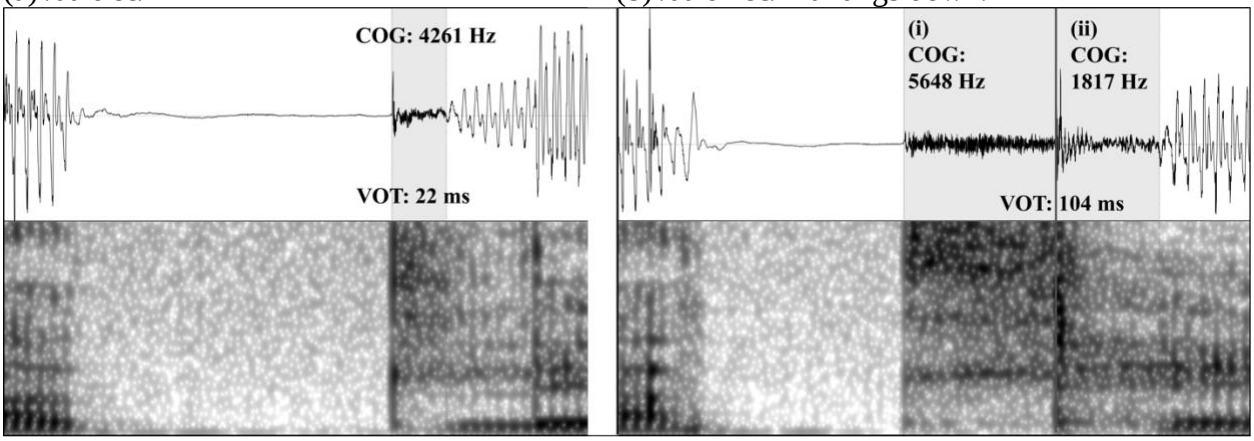


Figure 4.16 Intervocalic lateral affricates, waveform and spectrogram (LTZ)

(a) /aa **tl**ee/ ‘He’s late.’ (b) /aa **thl**ee/ ‘It hangs down.’



The examples in Figures 4.13-4.16 illustrate the contrast between /tl/ and /thl/ in Zophei, presenting several relevant questions for future research. In future investigations of Zophei lateral affricates, attention should be paid to VOT, aspiration, and whether oral frication noise persists into the vowel onset.

4.4.2 Onset sibilant affricates

According to Van Bik (2009), sibilant affricates in Maraic derive diachronically from the merger of Proto-Kuki-Chin /*ts *kr/ to Proto-Maraic /*ts/ and Proto-Kuki-Chin /*tsʰ *kʰr/ to Proto-Mariac /tsʰ/. As noted previously in Table 4.11, this generalization is not without exception. First, /*kr/ has also been simplified through deletion of the stop or rhotic, and such rhotic elision has involved aspiration (see 4.11h-i). Second, although /*phr/ has undergone rhotic deletion in some lexical items (see 4.11j), labial stop-rhotic clusters /*pr *phr/ have also been simplified through affrication to /ts tsh/, respectively (see 4.11f, k).

Maraic languages differ in their inventories of sibilant affricates. Lutuv, based on preliminary analyses, has three /ts tsʰ dʒ/[23]; Senthang /ts tsʰ/ and Mara /tɕ tɕʰ/ are both reported to have two; and Zotung has no sibilant affricates. Zophei, as will be shown in this section, has two, with the realization of that contrast varying by dialect and vowel context. Contrary to the organization of the rest of this chapter, in this (and the following) subsection, examples of the less context-dependent LTZ contrast are presented first, followed by those of the more context-dependent TRZ contrast.

For our LTZ language assistant, this contrast can consistently be described in terms of aspiration [t͡s t͡sʰ], with the aspirated member sometimes leading into a breathy vowel onset. Our TRZ language assistant, on the other hand, does not consistently use aspiration in forming the contrast. Rather, the realization of this contrast varies by vowel context and word-position, using place of articulation [t͡s t͡ʃ] and a spread of oral frication into the vowel onset in addition to, or instead of, aspiration.

[23] The voiced sibilant affricate [d͡ʒ] in Lutuv has been reported in only one word *bvv dʒoo* ‘ashes,’ likely cognate with the Hakha Chin *vut tsâam* ‘ashes.’ It may be an allophone of /ts/, possibly conditioned by the preceding fricative vowel /vv/, and merits further investigation.

The purpose of the examples presented in this section are to identify phonetic variation for future research. Table 4.17 presents examples of this contrast in LTZ which are further used in Figures 4.18-4.20.

Table 4.17 Onset sibilant affricates in LTZ

	Onset	**LTZ**	**Gloss**
a.	/ts/	tsang	stay
b.	/tsh/	tsháng	be gone
c.	/ts/	tseng	be worn out
d.	/tsh	tshéng	generation, era
e.	/ts/	tsong	be few
f.	/tsh	tshóng	be strong
g.	/ts/	tsing	plant
h.	/tsh	tshíng	teach
i.	/ts/	tsúng	top
j.	/tsh/	tshung	interior

Figures 4.18-4.19 present the waveforms of /ts tsh/ followed by /a e o i u/ in initial and intervocalic position, respectively, with VOT and COG measures for the highlighted sections provided. In each context, /tsh/ is realized with longer VOT and lower COG than /ts/, both resulting from aspiration, as illustrated in 4.20. It is also worth noting that the glottal frication in /tsh/ continues into the vowel, resulting in a breathy (noisy) vowel onset in (4.19d, e).[24]

[24] The images in Figures 4.18-4.19, 4.22-4.23, the timescale is standardized between waveforms but differently from the other images in this chapter. These images were all taken from 25 ms windows (rather than 40 ms).

Figure 4.18 Initial sibilant affricate vowel context comparison (LTZ)

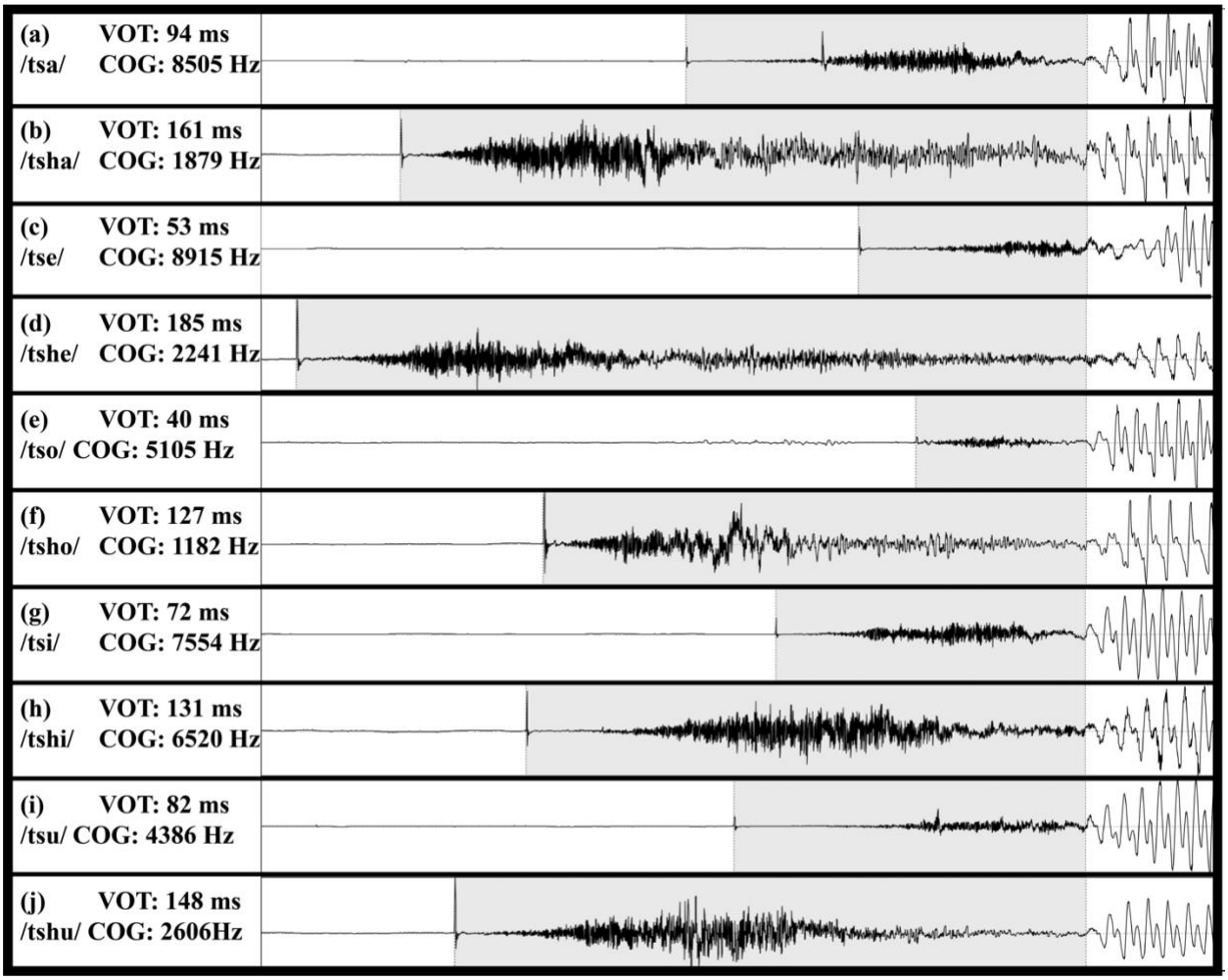
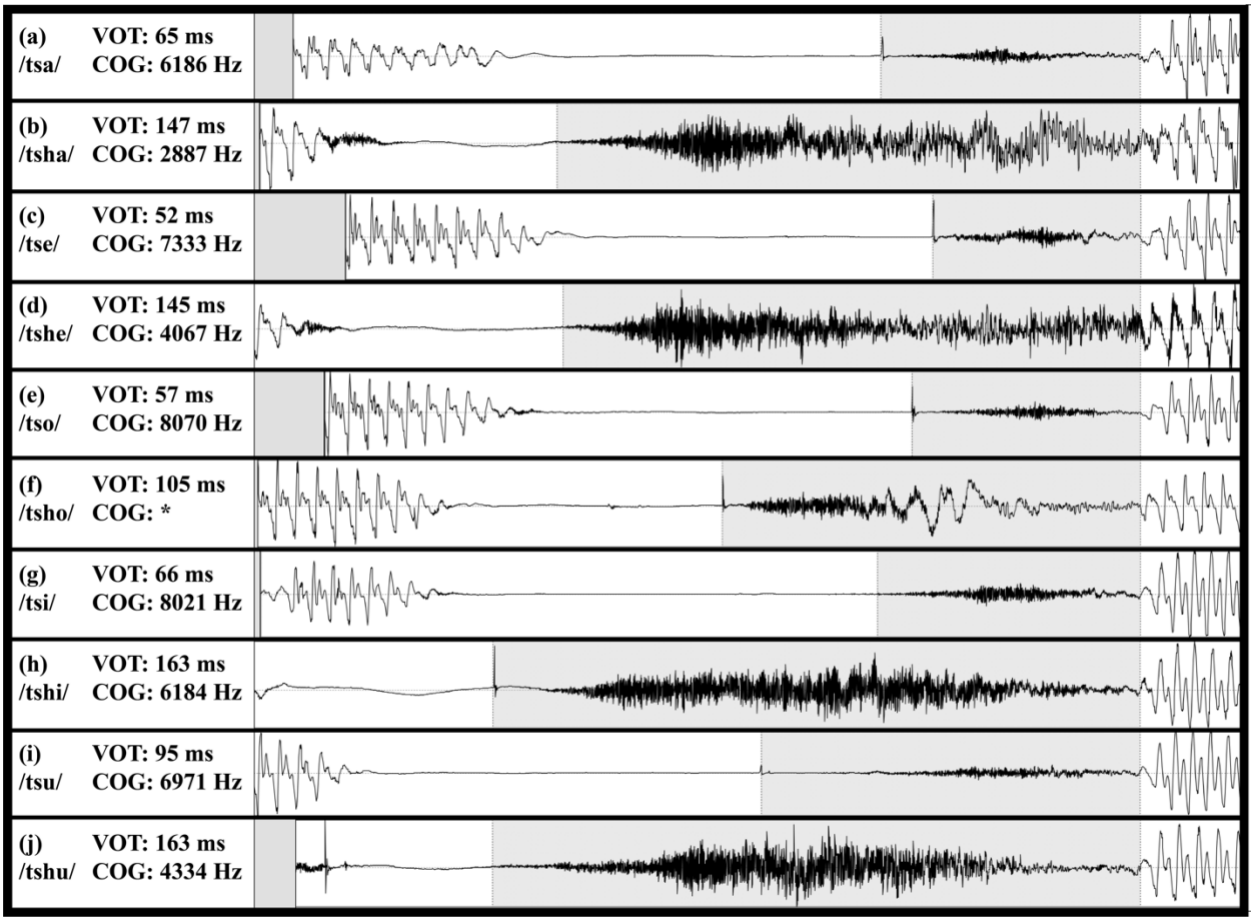


Figure 4.19 Intervocalic sibilant affricate vowel context comparison (LTZ)

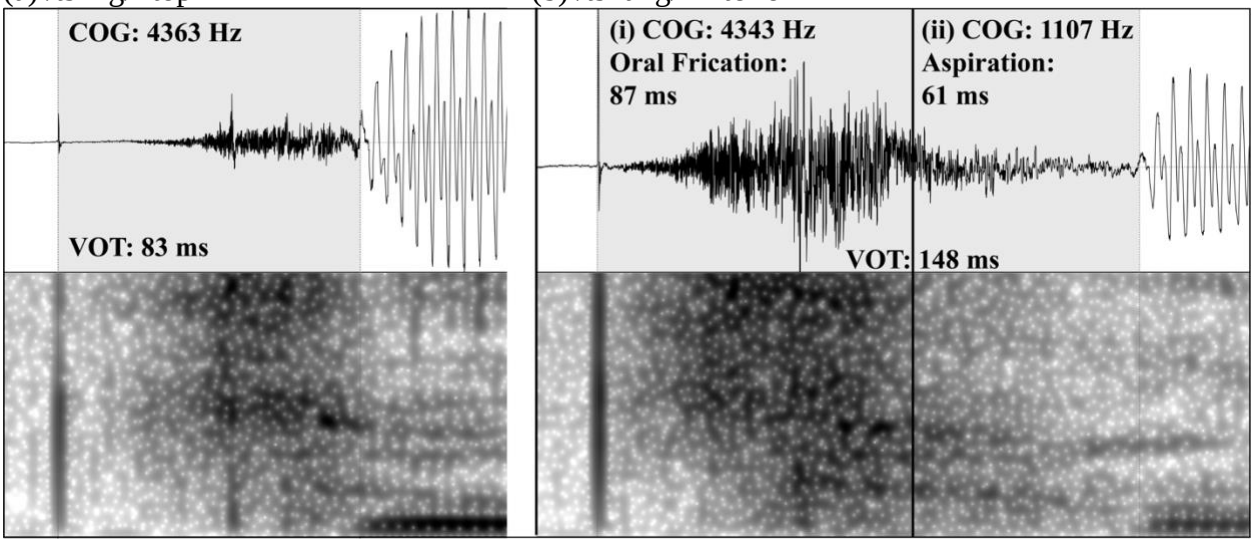


The recording of (4.19f) includes an artifact from a burst of oral airflow accompanying this articulation, as well as other repetitions. The COG for that context is not included because the artifact rendered that measurement meaningless. These and other observations suggests that aerodynamic research would be useful in future investigations into Zophei sibilant affricates.

Figure 4.20 offers example waveforms and spectrograms of /ts tsh/ with VOT and COG measures included for the highlighted interval. In (4.20b), the highlighted portion of /tsh/ is divided with a vertical line into (i) the oral frication interval on the left and (ii) the aspiration interval on the right. Note that the COG and VOT of /ts/ is similar to the COG and oral frication duration of /tsh/, indicating that the longer VOT and lower COG for /tsh/ is due to aspiration.

Figure 4.20 Initial sibilant affricates, waveform and spectrogram (LTZ)

(a) /tsúng/ ‘top’ (b) /tshung/ ‘interior’



While our LTZ language assistant consistently uses aspiration to differentiate sibilant affricates, our TRZ language assistant’s contrast is variably realized, dependent on vowel context and word position. Table 4.21 presents those examples of this contrast in TRZ which are further used in Figures 4.22-4.24.

Table 4.21 Onset sibilant affricates in TRZ

	Onset	**TRZ**	**Gloss**
a.	/tsa/	tsang	stay
b.	/tsha/	tshang	become
c.	/ts/	tsee	join an argument
d.	/tsh	tshee	dig a hole
e.	/ts/	tsoo	one’s share
f.	/tsh	tshoo	cut, chop
g.	/ts/	tsii	saliva
h.	/tsh	tshii zau	cat
i.	/ts/	tsung	top
j.	/tsh/	tshung	interior

The TRZ contrast in initial position relies variably on VOT, COG (both due to place of articulation and aspiration), and the presence/absence of oral frication noise perseverating into

the vowel onset. In the /a i/ contexts in (4.22a-b, i-j), some minor VOT differences are observed, but lower COG for /tsha/ and /tshu/ reflects post-alveolar production (audible [t͡ʃ]) and aspiration. For the mid vowels /e o/ in (4.22c-f), VOT differences are greater, with some COG differences also observed. For the high front vowel /i/ in (4.22g-h), minor VOT and COG differences are observed, yet for /tsi/ in (4.22g) oral frication noise persists into the vowel onset, which is not the case for /tshi/ in (4.22h). In intervocalic position, as shown in Figure 4.23, both VOT and COG are relevant in each context, with some possible relevance of noisy vowel onsets.

Figure 4.22 Initial sibilant affricate vowel context comparison (TRZ)

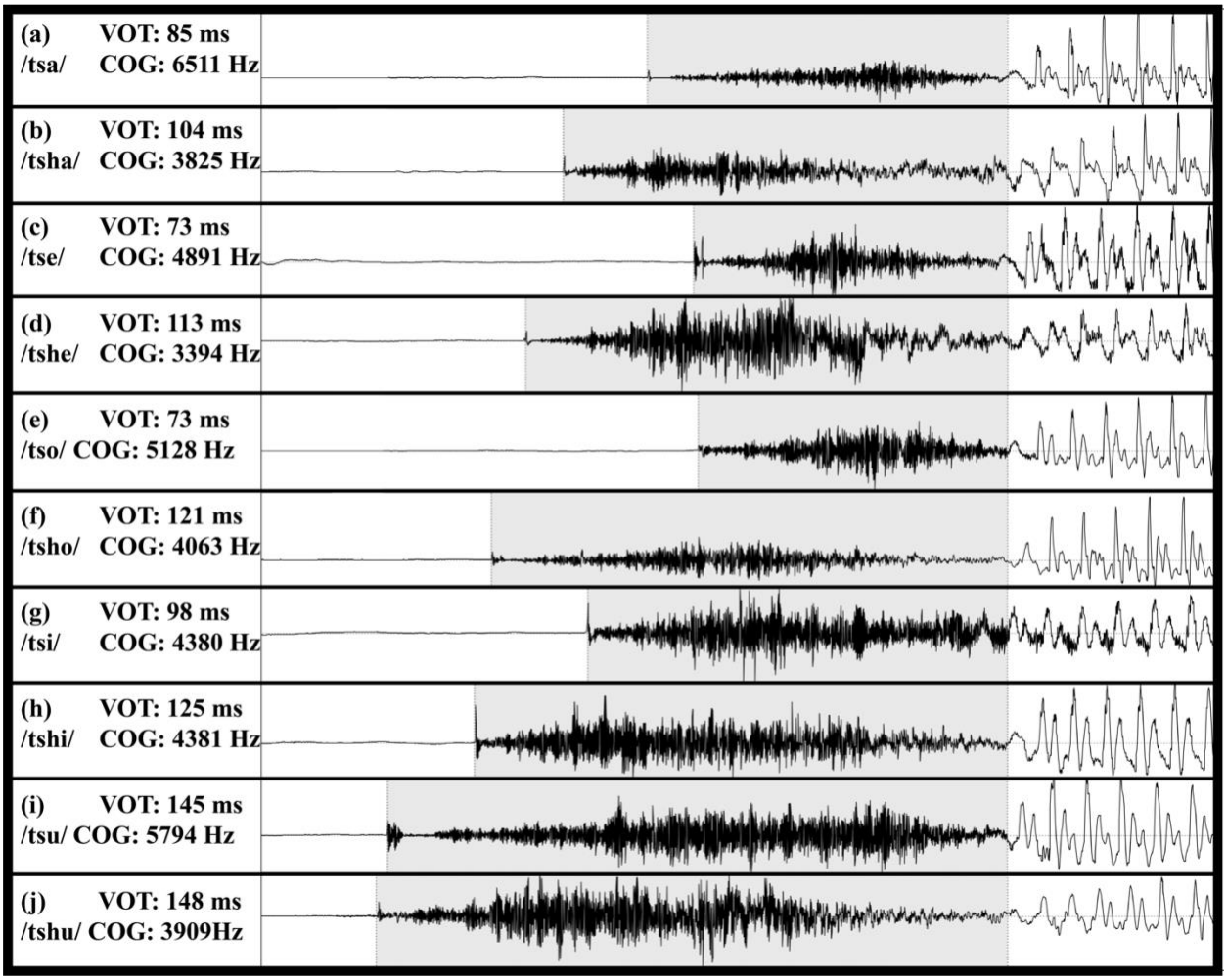
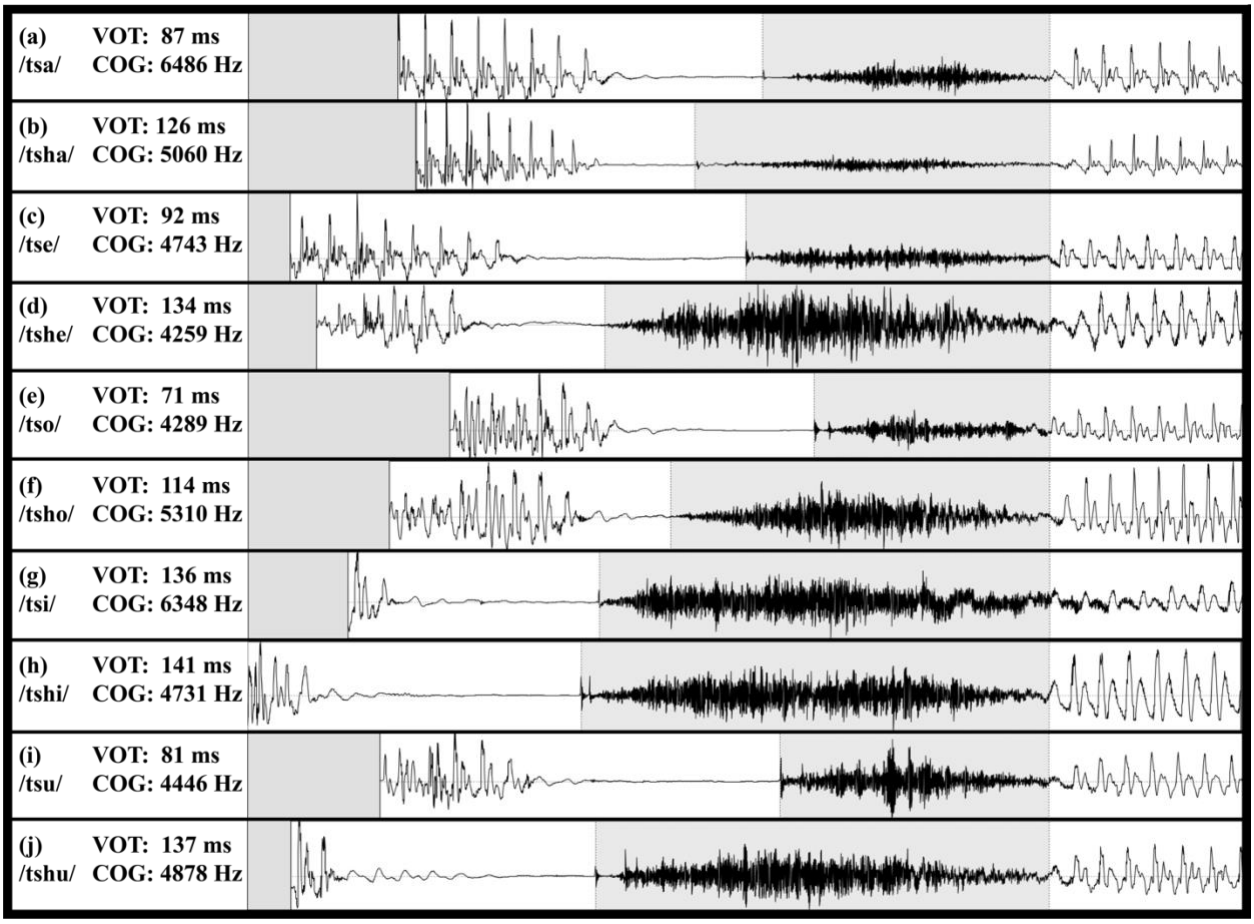


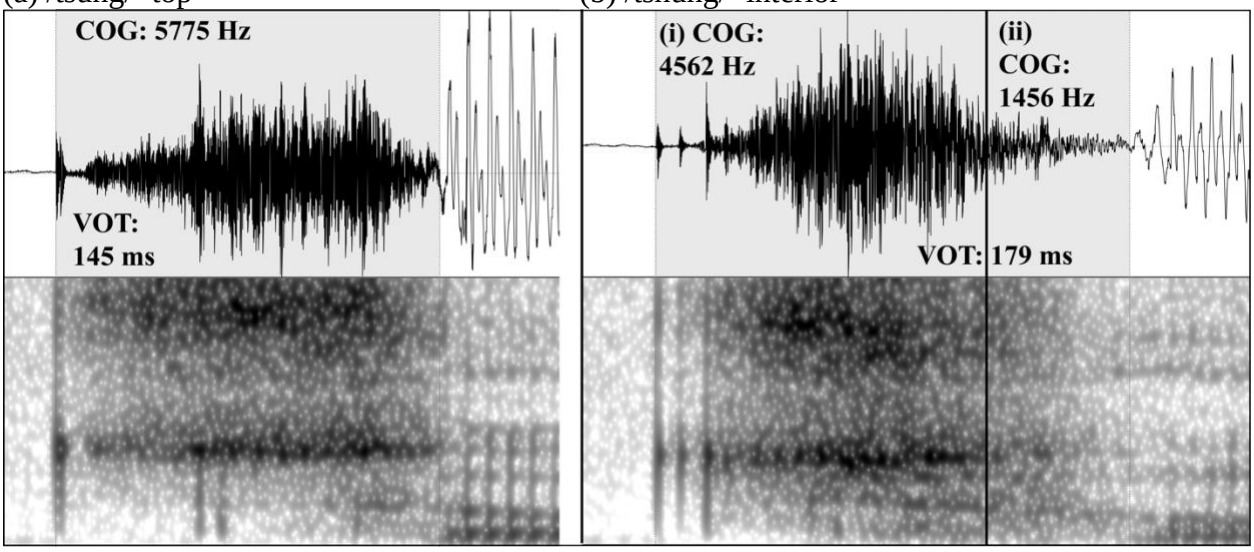
Figure 4.23 Intervocalic sibilant affricate vowel context comparison (TRZ)



In order to further illustrate that differences in COG are due both to differences in oral frication noise (according to place of articulation differences) and aspiration, Figure 4.24 presents the waveform and spectrogram for initial /tsu/ and /tshu/. With only 34ms VOT difference, COG is additionally useful in differentiating /tsu/ from /tshu/. The COG for /ts/ in (4.24a) is higher than the (i) oral frication interval and (ii) aspiration interval for /tsh/ in (4.24b), reflecting a contrast both in place of articulation and aspiration [t͡s] vs. [t͡ʃʰ].

Figure 4.24 Initial sibilant affricates, waveform and spectrogram (TRZ)

(a) /tsung/ ‘top’ (b) /tshung/ ‘interior’



Zophei lateral and sibilant affricates derive diachronically from diverse sources and show diverse phonetic realizations based on dialect and phonological context, especially the following vowel. For our TRZ language assistant, the sibilant affricate contrast is realized variably based on vowel context and word position, with distinctions in VOT, COG (due to both oral frication noise differences and aspiration), and the persistence of oral frication noise into the vowel onset all observed. Zophei affricates are a particularly rich area for the study of variation and future work is needed to investigate the phonological and social factors involved.

4.5 Onset nasals

Lexical items with all six nasals reconstructed for PKC /*m *hm *n *hn *ŋ *hŋ/ are attested in Zophei (/m hm n hn ng hng/), although the voiceless velar nasal /hng/ is only marginally reported. This section overviews diachronic changes to voiceless nasal inventories in Kuki-Chin and Zophei with special focus on the loss of the voiceless velar nasal, then offers acoustic exemplification of Zophei onset nasals.

Voiceless nasals are rare in the world's languages, but well attested in Tibeto-Burman in general and Kuki-Chin in particular. Ohala & Ohala (1993) describe voiceless nasals as fricatives with noise produced in the nasal cavity and nostrils; and they suggest that their typological rarity may stem from two difficulties to production and perception. (1) Since speakers have little control over the amount of constriction in the nasal cavity or nostrils, air leaving the nose is not usually very high amplitude. (2) Regardless of the oral constriction location, the noise-producing obstructions of a voiceless nasal are in the nasal cavity. So, without voicing prior to the oral constriction release, speakers/listeners have little more than formant transitions in the vowel (in part obscured by the nasal) to differentiate places of articulation. In languages with place contrasts in voiceless nasals, voiceless nasals are often produced with some degree of voicing, as in Burmese or the Central Chin language Mizo where a voiced interval follows the voiceless interval before the vowel onset (Bhaskararao & Ladafoged, 1991), although fully voiceless nasals have been reported in the Southern Chin language Matu (Hoffman, 2018).

A comparison of KC languages offers further evidence of the diachronic instability of voiceless nasals. Some lexical items with voiceless nasal onsets were likely in free variation with their voiced counterparts in PKC (Van Bik, 2009) and some members of each Kuki-Chin subgroup have lost the contrast altogether. All six nasals are retained in the Central languages Hakha Lai and Falam (Van Bik, 2009; Button, 2011), the Northern language Zahau (Button, 2011), and the Southern languages Hyow (Baclawski, 2012) and Mindat Cho (Van Bik, 2009), indicating that (in addition to PKC) Proto-Northern, Proto-Central, Proto-Southern, and Proto-Maraic languages all featured voiceless nasals. However, no voiceless nasals are reported in the Central Chin language Bawm (Reichle, 1981), the Northern languages Thado, Zo, Tedim, and Sizang (Button, 2011), the Southern languages Asho (Houghton, 1892), Khumi, and Daai (Van Bik, 2009), or the Maraic

language Zotung (Shintani, 2015). Some languages have lost the voiceless velar nasal only, as in Matu (Hoffman, 2018) and the "Old Kuki" language Monsang, where reflexes of PKC /*hŋ/ vary with /h/ or /n/ onsets (Konnerth, 2018). In addition, the Maraic languages Senthang (Ngun Tin Par, 2016) and Lutuv both lack voiceless velar nasals.

Table 4.25 offers examples of Zophei nasals, with labial nasals in (4.25a-c), coronal nasals in (4.25d-g), and velar nasals in (4.25h-j); voiced nasal are exemplified in (4.25a, d, h-i), voiceless nasals in (4.25b, e, j), and variation in voicing between TRZ and LTZ varieties in (4.25c, f-g). It is worth noting that the voiced velar nasal picks up secondary palatalization preceding /ee/ in both TRZ and LTZ, as in (4.25i).

Table 4.25 Voiceless Nasal Onsets in Zophei

	Onset	**TRZ**	**LTZ**	**Gloss**
a.	/m/	mee	méé	fire
b.	/hm/	hmee	hméé	face
c.	/hm/	hmui (or mui)	hmýý	look
d.	/n/	noo	náú	plead, beg
e.	/hn/	hnoo	hnáú	mucus
f.	/hn/, /n/	hnoo tsa kau	nau	ear
g.	/n/, /hn/	nua	hnaa	sulk, be upset
h.	/ng/	ngoo	ngáú	fish
i.	/ng/ [ŋʲ]	ngee [ŋʲee]	ngee [ŋʲee]	listen
j.	/hng/	tsa hngia	tsá hngíé	wild dog

Of note is the voiceless velar nasal in (4.25j), which is the only lexical item where it appears in LTZ and one of only two in TRZ (the other is *sa hngia* 'wild cat'), suggesting that it is a later borrowing, likely from Hakha Lai. Other lexical items showing PKC /*hŋ/ occur with a variety of onsets including /ng hn hr r h/, as illustrated in Table 4.26. Additionally. where /*ŋ *hŋ/ variation is reconstructed for PKC in (4.26a-b), Zophei varieties show only the voiced

variant. In (4.26c), the voiceless nasal is retained, but the velar place is lost in favor of a coronal articulation, as is reported for Lutuv *tsa hnie* 'wild dog' (compare to 4.25j above). In (4.26d), our TRZ language assistant reports variation between the voiced and voiceless rhotic /hr r/, and our LTZ language assistant only reports the voiced variant. In (4.26e), the voiceless nasal was lost in favor of the voiceless glottal fricative /h/.

Table 4.26 Zophei correspondences with PKC voiceless velar nasals

	PKC	**TRZ**	**LTZ**	**Gloss**
a.	*ŋal/*hŋal	ngei	-	wild boar
b.	*ŋaa/*hŋal	ngoo	ngáú	fish
c.	*hŋilʔ[25]	ii hning	ìh hníng	fall asleep
d.	*hŋooŋ	hrong (or rong)	róng	neck
e.	*hŋaak-I / hŋaʔ-II	hoo	háú	wait

Regarding diachronic changes, Van Bik (2009) reports only the loss of voiceless nasals in favor of their voiced counterparts, and it is unclear without more extensive research on Maraic languages how much of the variation in our Zophei data is internal to Zophei (i.e., differences in phonological context) and how much is external to Zophei (i.e., phonological differences in donor languages for borrowed terms). Since no Maraic language is reported to have voiceless velar nasals, it is possible that such onsets were not a feature of Proto-Maraic. Future research on variation within Zophei and in other Maraic languages will help to reveal the sources of these observed variations.

Variation in the phonetic realization of laryngeal contrasts in nasals has been described for a number of languages, especially Indic and Tibeto-Burman languages. Some laryngeal contrasts have been reported in terms of breathiness, which begins in the consonant and

[25] According to Van Bik (2009), this word is reconstructed to mean 'to forget' in PKC, but its meaning has also changed to 'to fall asleep' in Hakha Lai *hŋilʔ*.

continues into the vowel, as in Marathi (Berkson, 2019). Bhaskararao & Ladafoged (1991) describe two other types of laryngeal contrasts in Tibeto-Burman nasals. The first is observed in Burmese (also described in Ladefoged, 1971; Dantsuji, 1987) and the Central Chin language Mizo wherein the oral occlusion is released after voicing begins, resulting in a voiceless nasal interval followed by a voiced nasal interval (i.e., [m̥m])—these are voiceless unaspirated nasals. The second type is observed in the Naga language Angami wherein the oral occlusion is released before voicing begins, resulting in aspiration—these are voiceless aspirated nasals (i.e., [m̥^{h}]).

In KC research, Hoffman (2018) describes contextual and inter-speaker variation in the realization of Matu and Hakha Lai voiceless nasals. In word-initial position, Matu voiceless nasals most often conform to the breathy nasal description of Marathi above, with breathiness starting part-way through the consonant in these productions. Hoffman's (2018) Matu data also includes voiceless aspirated productions, as in Angami, as well as fully voiceless nasals with some breathiness spreading into the vowel. Hakha Lai voiceless nasals conform more to the Burmese and Mizo-style voiceless unaspirated nasals with some tokens fully voiceless.

Voiced aspirated nasals, as reported in Bantu languages such as Sukuma (Maddieson, 1991) have also been reported for KC. Such nasals contain an initial voiced interval followed by a voiceless interval, including some aspiration, before the vowel (i.e., [mm̥^{h}]). In intervocalic position, voiceless nasals in both Matu and Hakha Lai show nasal airflow begins following the preceding vowel, resulting in a phonetically voiced nasal closing the preceding syllable, as in the Hakha Chin /a.ho.m̥anʔ/ [a.hom.hanʔ] 'whosoever.' The laryngeal contrast in nasals varies in its phonetic realization between and within languages, as is seen in Zophei as well

Zophei data collected for this study shows variation with similarities to several of the patterns described above. As with sibilant affricate data in Section 4.4, our LTZ language

assistant shows less variation in voiceless nasal production than our TRZ language assistant, so LTZ data are presented here first. Observed phenomena are exemplified with waveforms and spectrograms below, initial nasals in Figures 4.27-4.30 and intervocalic nasals in Figures 4.31-4.32. Although the present study does not include methodologies to collect or analyze aerodynamic data, some qualitative description of the acoustic characteristics of voiceless nasal examples is provided below. For comparison, Figure 4.27 illustrates voiced nasal production in both LTZ and TRZ (with the nasal interval highlighted).

Figure 4.27 Initial voiced nasals, waveform and spectrogram

(a) /méé/ ‘fire’ (LTZ) (b) /mee/ ‘fire’ (TRZ)

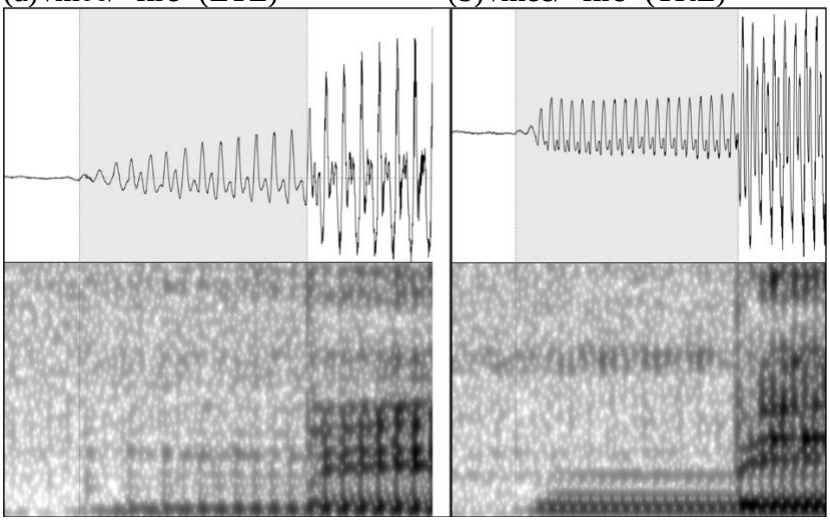


Figure 4.28 shows LTZ voiceless nasals, the labial in (4.28a) and the coronal in (4.28b). In both productions, low amplitude noise produced in the nasal cavity (i) is followed by higher amplitude aspiration (ii), sometimes with a burst at the oral closure release, as in (4.28a). Some amount of breathiness perseverates into the vowel in (4.28b) as well, a phenomenon that merits further investigation in the production of these sounds.

Figure 4.28 Initial voiceless nasals, waveform and spectrogram (LTZ)

(a) /hmýý/ ‘look’ (b) /hnaa/ ‘sulk’

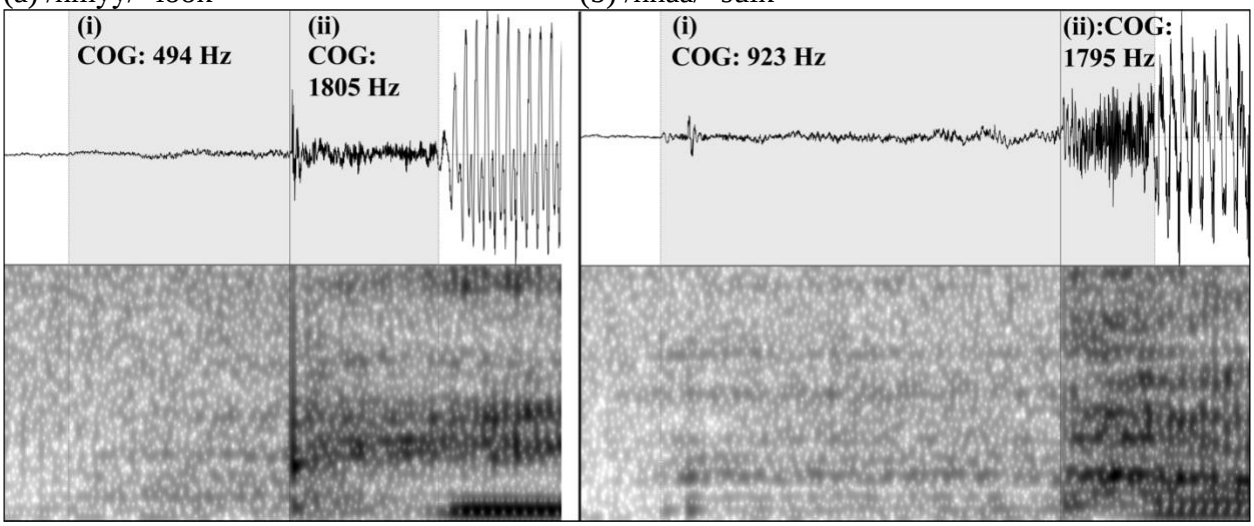
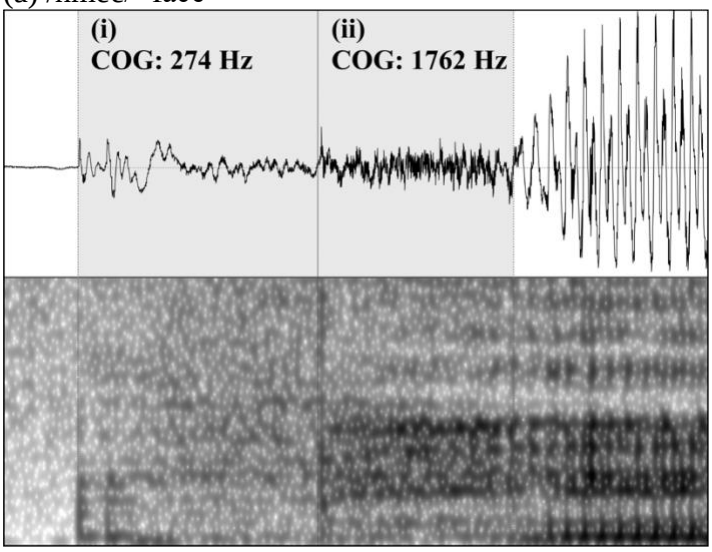


Figure 4.29 shows variation found in TRZ voiceless nasal onset data. A production similar to the LTZ voiceless nasals is found in (4.29a), where lower frequency (likely nasally produced) noise (i) is followed by higher frequency aspiration (ii), although there is not much amplitude difference between the two noise types. In (4.29b), only the lower frequency nasally produced noise precedes the vowel. In (4.29c), a voiced interval (i) precedes a voiceless interval before the vowel (ii).[26] Note that (4.29b-c) are both repetitions of the same word. For both TRZ examples, the vowel onset following a voiceless nasal has some breathiness, also seen in LTZ.

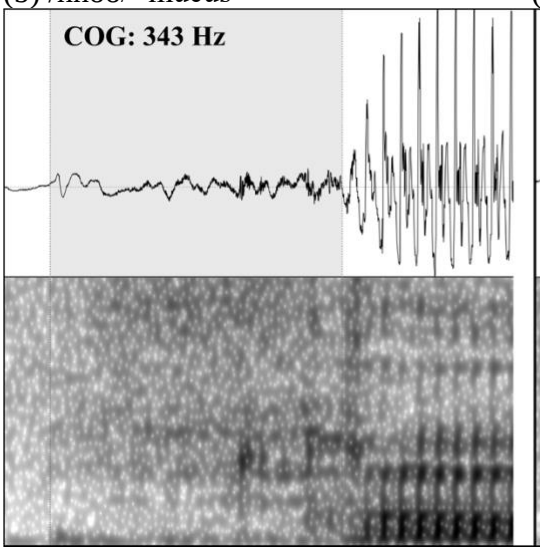
[26] Without aerodynamic data, it is not possible to confirm in these examples the sources of the airflow as oral or nasal, however this research identifies observed variations in production for such future research.

Figure 4.29 Initial voiceless nasals, waveform and spectrogram (TRZ)

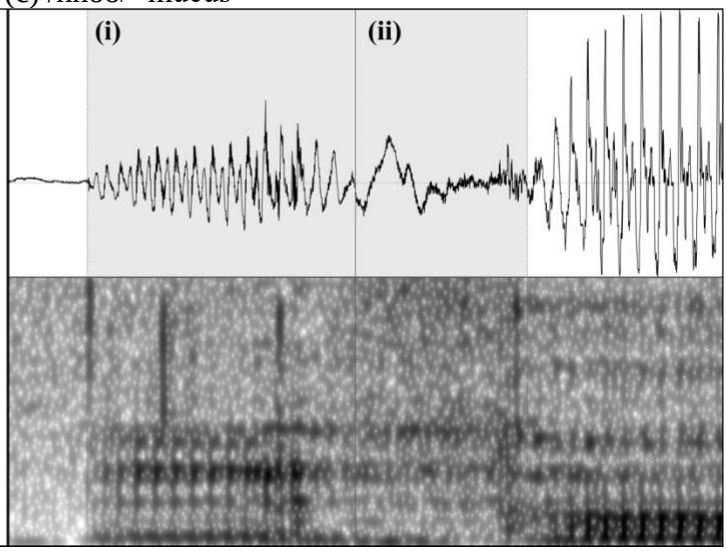
(a) /hmee/ ‘face’



(b) /hnoo/ ‘mucus’



(c) /hnoo/ ‘mucus’



Fully voiceless nasals similar to (4.29b) are described for Matu (Hoffman, 2018) and voiceless aspirated nasals similar to (4.29a) are described for Angami (Bhaskararao & Ladafoged, 1991). Without a voiced interval, as in intervocalic position or with a production similar to (4.29c), voiceless nasals are predicted to cause difficulties for production and perception (Ohala & Ohala, 1993); namely, they leave little other than the breathy formant

transitions in the vowel onset to differentiate places of articulation. If such productions are shown to be typical in Maraic languages, they may be responsible for the reduction in place contrasts (i.e., the loss of /hng/). The voiceless nasal in (4.29c) is phonetically voiced yet transitions to a voiceless interval before the vowel onset, similar to Maddieson's (1991) description of Sukuma, although without aerodynamic study, it is unclear in such Zophei productions whether the voiceless interval includes nasal or glottal frication noise, or both.

Waveforms and spectrograms of intervocalic LTZ and TRZ nasal productions are presented below, voiced nasals in Figure 4.30 and voiceless nasals in Figure 4.31. While intervocalic voiced nasals have consistent voicing throughout the closure duration (4.30a-b), voiceless nasals in (4.31a-b) can be divided into (i) a voiced period following the preceding vowel, (ii) a voiceless period with low amplitude (likely nasally-produced) noise, and (iii) higher amplitude aspiration. Such productions are similar to Hoffman's (2018) description of Matu intervocalic nasals in having a voiced period followed by a voiceless period but different from Matu in having an aspirated interval.

Figure 4.30 Intervocalic voiced nasals, waveform and spectrogram

(a) /a méé/ ‘his fire’ (LTZ) (b) /a mee/ ‘his fire’ (TRZ)

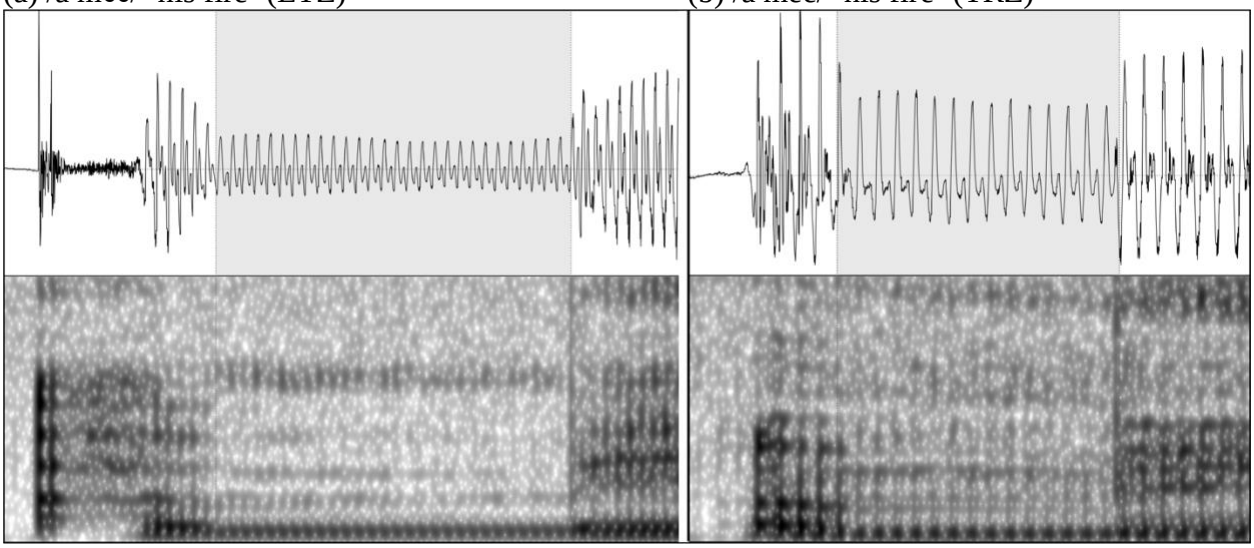
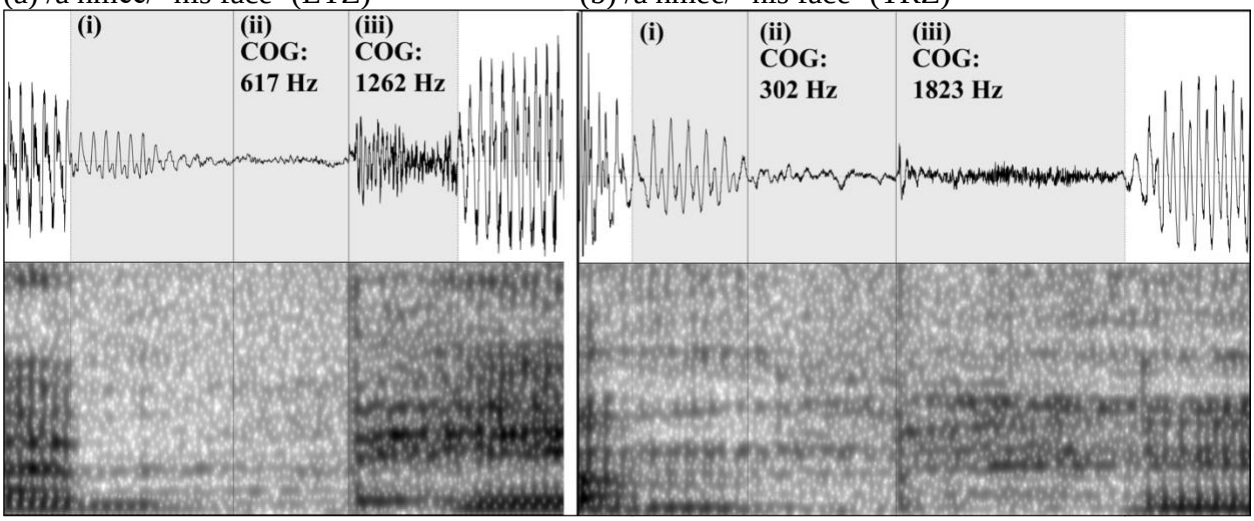


Figure 4.31 Intervocalic voiceless nasals, waveform and spectrogram

(a) /a hméé/ ‘his face’ (LTZ) (b) /a hmee/ ‘his face’ (TRZ)



Zophei offers rich opportunities for the synchronic and diachronic study of voiceless nasals. Like other Maraic languages, Zophei has a two-way place contrast in voiceless nasals, having variably lost voiceless velar nasals in favor of voiced velar nasals, voiceless coronal nasals, voiced and voiceless rhotics, and glottal fricatives. Examples of /hng/ in Zophei are likely

borrowings from Hakha and are unattested in word-initial position. For our LTZ language assistant, voiceless nasals can be described as aspirated, though our TRZ language assistant shows variation between voiceless aspirated, voiceless unaspirated, and voiced aspirated (or [mm̥]) productions. Intervocalic voiceless nasals involve three intervals: voicing, voicelessness, and aspiration. This variation reflects the variation reported in the world's language and merits further research, especially using methodologies that allow for aerodynamic measurements.

4.6 Onset liquids

Zophei, like PKC, contrasts four liquid onsets: a voiced and voiceless lateral and a voiced and voiceless rhotic /l hl r hr/. Though all four liquids /*l *hl *r *hr/ are reconstructed for PKC, they have been unstable diachronically in the Chin languages. The laterals have been more stable than the rhotics, though most Southern languages as well as the Northern languages Tedim and Sizang have lost /hl/ (Van Bik, 2009), and the Northern language Thado has also re-innovated /hl/ from /*kl *khl/ (Button, 2011). The Peripheral Chin subgroup (consisting of Northern and Southern Chin languages) is defined, in part, by the loss of /r/, though with differing results. In the Northern languages Tedim, Zo, and Thado (Button, 2011) and the Southern language Mindat Cho (Van Bik, 2009), /r/ hardened to /g/; while in (Southern) Daai Chin (So-Hartmann, 1988, 2009) it corresponds with /ɣ/. In (Northern) Sizang /r/ nasalized, merging with /ŋ/ (Button, 2011); and in (Southern) Asho, /r/ lenited to /j/ (Van Bik, 2009). Where the voiceless rhotic /hr/ is lost in Peripheral languages, it has merged with /h/ in (Northern) Tedim and Sizang, and (Southern) Asho; and it has become /x/ in Daai (Van Bik, 2009). These diachronic changes are summarized in Table 4.32.

Table 4.32 Onset rhotic loss in Kuki-Chin languages

PKC Phoneme	Modern Phoneme	Language
/*r/	/g/	Tedim, Zo, Thado, Mindat Cho
	/ɣ/	Daai Chin
	/ŋ/	Sizang
	/j/	Asho
/*hr/	/h/	Tedim, Sizang, Asho
	/x/	Daai Chin

Some of this variation also plays out in Maraic. The full set of four liquids /l hl r hr/ is retained in Mara, Lutuv, and Zophei but there are no rhotics in Senthang (Ngun Tin Par, 2016) and no liquids at all in Zotung (Shintani, 2015). Although PKC liquids have been generally stable in Zophei, we observe /hl/ is lost in favor of /h/ in the (TRZ and LTZ) lexical item *hing* ‘to cheat, to lie’ from PKC **hleŋ*. Zophei rhotics have been innovated in some lexical items from the PKC clusters /*khr *kr/, as in TRZ/LTZ *hrah* from PKC **khraŋ-I, *khraŋʔ-II* ‘awake’ and TRZ *ai hrang*, LTZ *éng hráng* ‘cabbage’ from PKC **ʔan-kram*. The Zophei liquid examples used for phonetic illustrations in the remainder of this subsection are presented in Table 4.33, liquids in (4.33a-b) and rhotics in (4.33c-l). Example (4.33l) shows that phonemic /hr r/ variation between Zophei varieties is also observed.

Table 4.33 Onset liquid examples

	Onset	**TRZ**	**LTZ**	**Gloss**
a.	/l/	løø	lóó	farm
b.	/hl/	hloo	hláú	song
c.	/r/	roo	ráú	scold
d.	/r/	røø	róó	take a long time
e.	/r/	ria	rie	hail
f.	/r/	rang	rang	country
g.	/r/	ring	ring	smell, odor
h.	/hr/	hrang	hrang	be wild, angry
i.	/hr/	hrong	hrong	follow (a path)
j.	/hr/	hrang	hrang	base, root
k.	/hr/	hrau	hrúú	wear
l.	/hr/, /r/	hrau	rúú	break

The images in Figures 4.34-4.37 exemplify voiced (4.34-4.35) and voiceless (4.36-4.37) liquids in initial (4.34, 4.36) and intervocalic (4.35, 3.37) position. Based on impressionistic observation, voiced laterals in both varieties are produced with a coronal constriction and no apparent secondary velarization. In other words, they are ‘light’ rather than ‘dark’ in both initial and intervocalic position.

Figure 4.34 Initial voiced lateral, waveform and spectrogram

(a) /løø/ ‘farm’ (TRZ) (b) /lǿǿ/ ‘farm’ (LTZ)

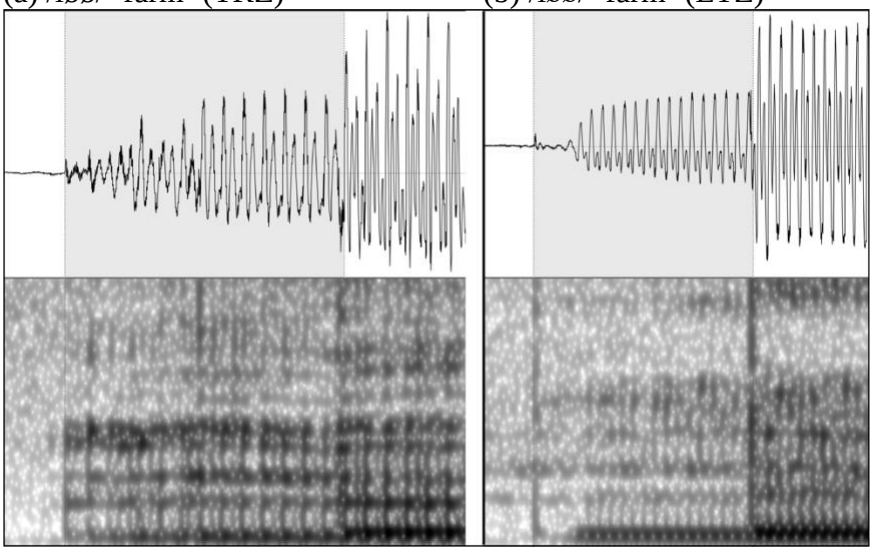
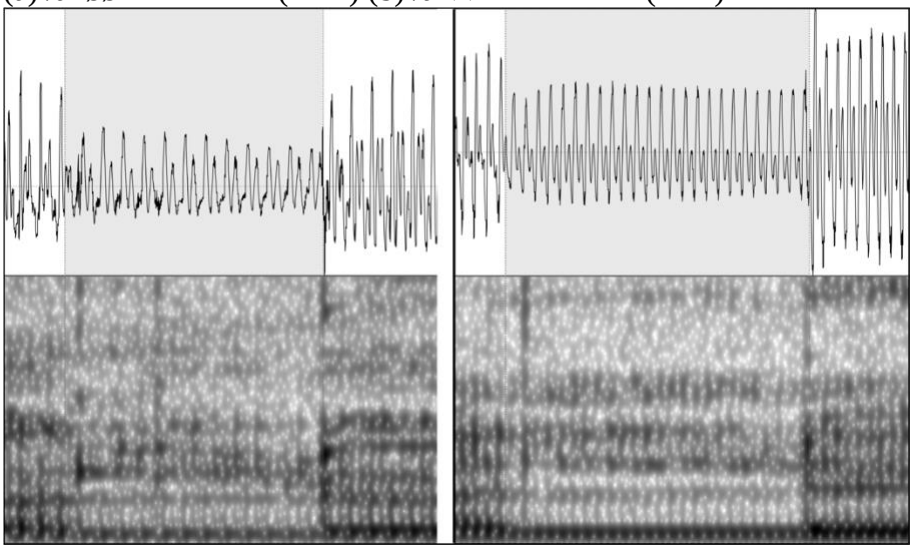


Figure 4.35 Intervocalic voiced lateral, waveform and spectrogram

(a) /a løø / ‘his farm’ (TRZ) (b) /a lǿǿ / ‘his farm’ (LTZ)



Voiceless laterals show several similarities with voiceless nasals (rather than voiceless rhotics presented later in this subsection). In Figure 4.36, much like Figures 4.28 and 4.29b, there is a decrease in amplitude and COG before the onset of the vowel, indicating that the oral closure

is released prior to voicing, resulting in some aspiration. In Figure 4.36, (i) indicates likely oral frication and (ii) indicates likely glottal frication.

Figure 4.36 Initial voiceless lateral, waveform and spectrogram

(a) /hloo/ ‘song’ (TRZ) (b) /hláú/ ‘song’ (LTZ)

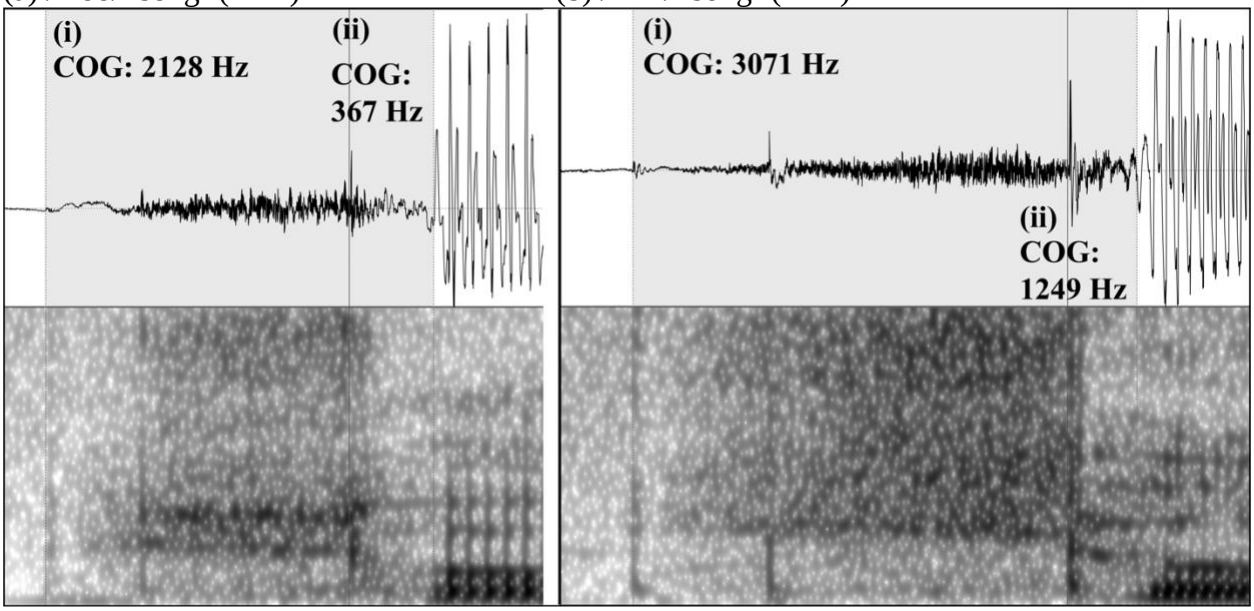
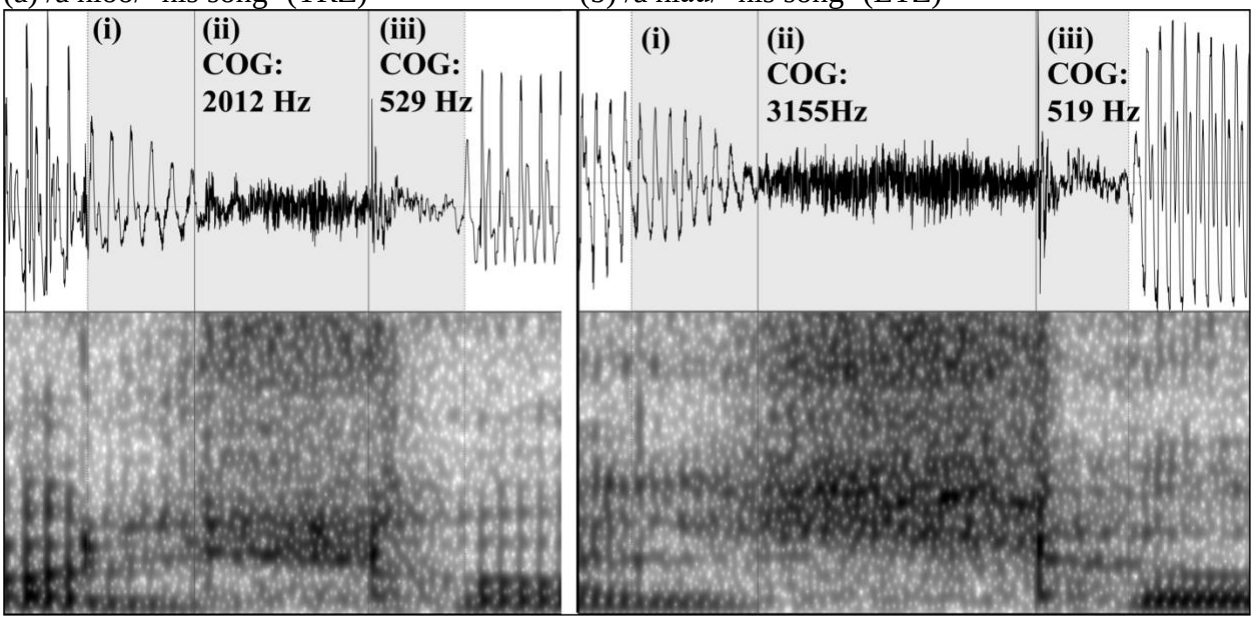


Figure 4.37 shows further similarities between intervocalic laterals and nasals (compare to Figure 4.31): (i) a voiced lateral interval follows the preceding syllable vowel, then (ii) voicing ceases and there is an oral frication interval, and (iii) aspiration before the vowel onset.

Figure 4.37 Intervocalic voiceless lateral, waveform and spectrogram

(a) /a hloo/ ‘his song’ (TRZ) (b) /a hláú/ ‘his song’ (LTZ)



Inter- and intra-speaker phonetic variation in rhotic realization has been noted impressionistically in our work with Hakha Lai, with /r/ varying between the rhotic [ɹ], trill [r], voiced retroflex fricative [ʐ], and post-alveolar fricative [ʒ]; and /hr/ varying between the pre-aspirated rhotic [ʰɹ] or trill [ʰr], retroflex fricative [ʂ], and post-alveolar fricative [ʃ]. In the Zophei data collected for this study, our TRZ language assistant is more consistent in his rhotic production than our LTZ language assistant. His productions of the voiced and voiceless rhotic are best described as retroflex fricatives [ʐ] and [ʂ], although articulatory studies are needed to further investigate the nature of the retroflex gesture. Figures 4.38-4.39 compare TRZ /r/ to /z/, both showing concurrent voicing and oral frication, however F3 rises during the transition to the following vowel for /r/ in (4.38a, 4.39a), which is not the case for /z/ in (4.38b, 4.39b).

Figure 4.38 Initial voiced /r/ and /z/, waveform and spectrogram (TRZ)

(a) /roo/ ‘scold’ (b) /zoo/ ‘be enough’

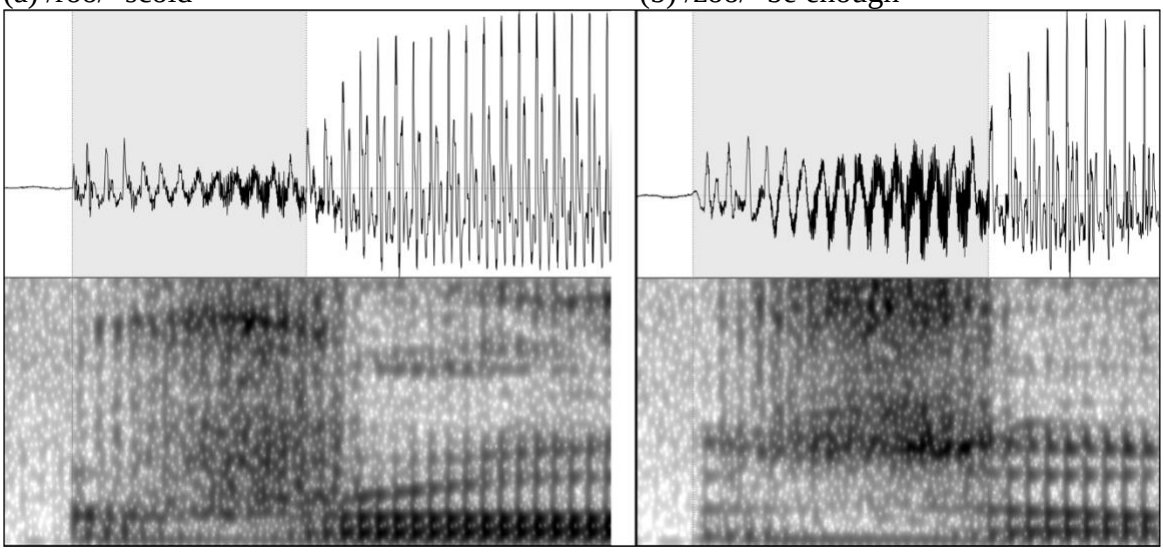
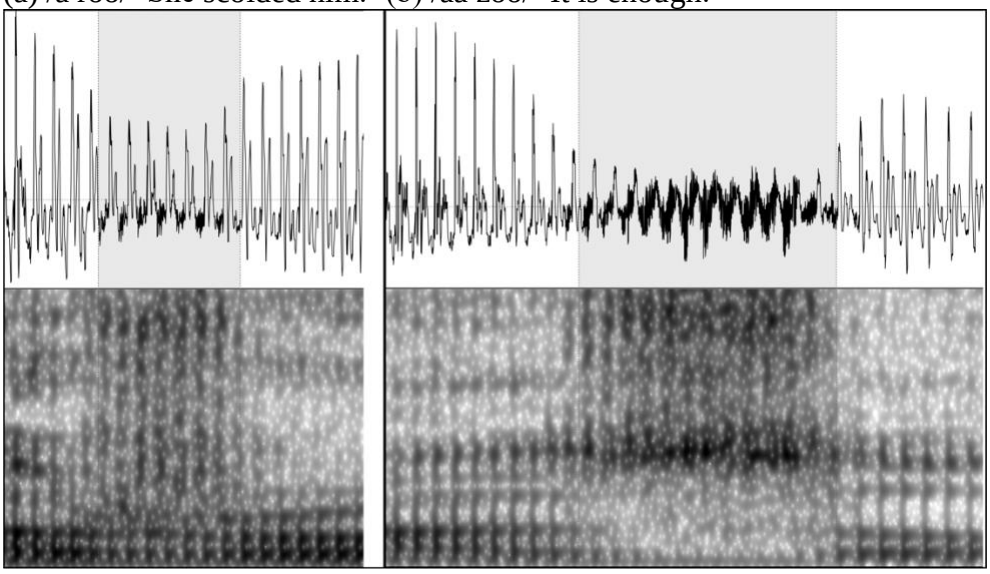


Figure 4.39 Intervocalic voiced /r/ and /z/, waveform and spectrogram (TRZ)

(a) /a roo/ ‘She scolded him.’ (b) /aa zoo/ ‘It is enough.’

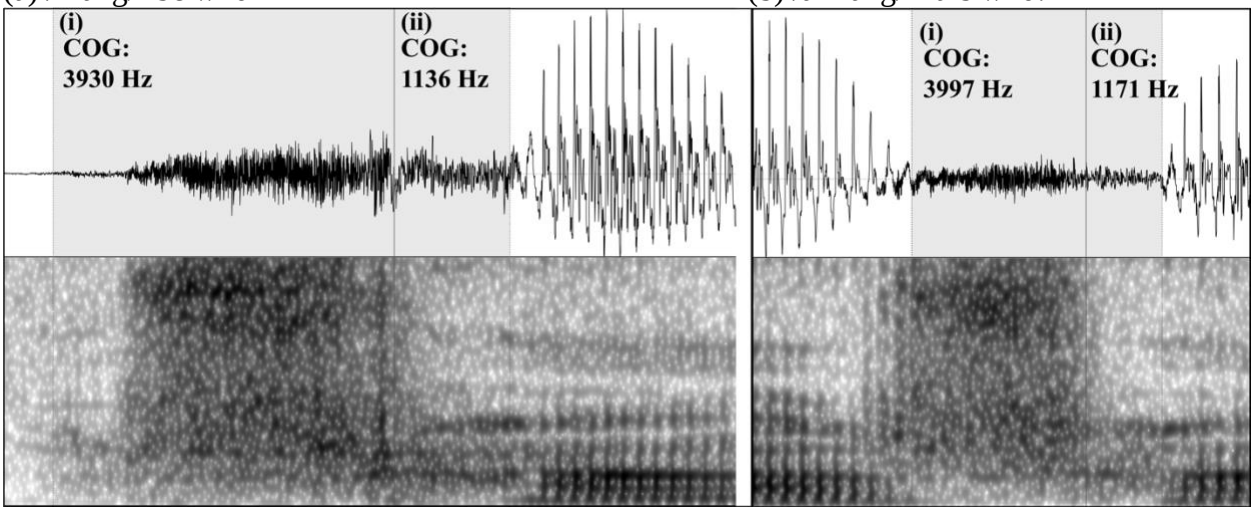


TRZ voiceless rhotics are exemplified in Figure 4.40 in initial position in (4.40a) and in intervocalic position in (4.40b). In both examples, as is typical of our TRZ language assistant’s productions, there is an audible rhotic element to /hr/ and little to no clear F3 depression in the

vowel after the aspirated interval. In both cases, there are two intervals of noise with the higher frequency oral noise in (i) followed by the lower frequency aspiration in (ii).

Figure 4.40 Initial and intervocalic voiceless rhotics, waveform and spectrogram (TRZ)

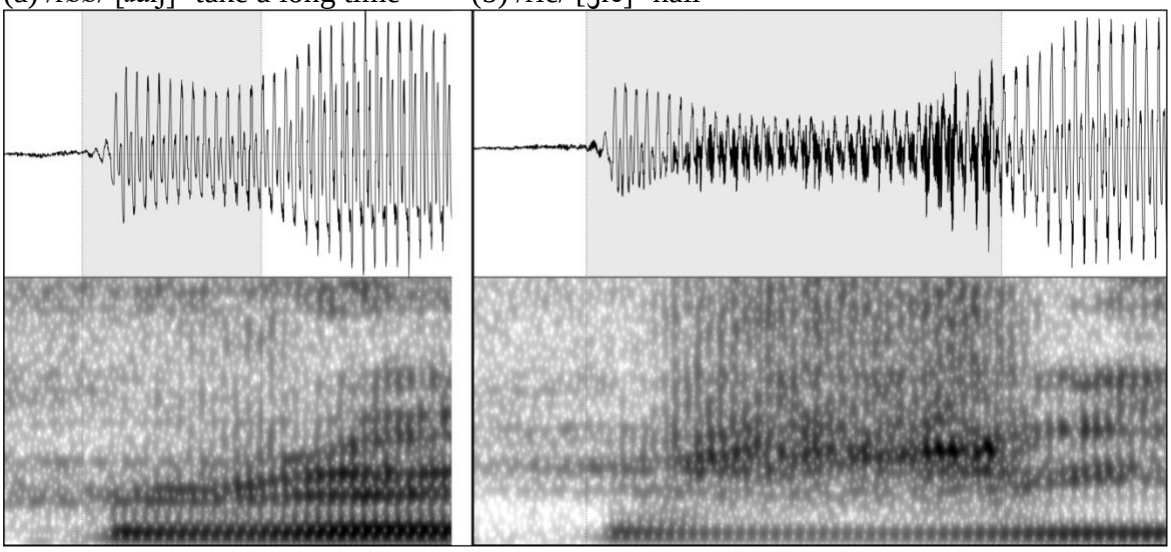
(a) /hrang/ ‘be wild’ (b) /a hrang/ ‘It is wild.’



Rhotic examples from the LTZ-speaking language assistant are less consistent than those from the TRZ-speaking language assistant. Figures 4.41-4.42 illustrate this variation in initial rhotics: (4.41a) shows a rhotic [ɹ] without frication and with lowered F3 during the consonant closure, (4.41b) shows a voiced post-alveolar fricative [ʒ] with little or no F3 lowering (partially obscured by the oral frication noise), and (4.41c) shows a devoiced post-alveolar fricative [ʃ]. In the latter two, some frication persists into the vowel onset.

Figure 4.41 Initial voiced rhotic /r/, waveform and spectrogram (LTZ)

(a) /rǿǿ/ [ɹaŋ] ‘take a long time’ (b) /rie/ [ʒie] ‘hail’



(c) /rang/ [ʃaŋ] ‘country’

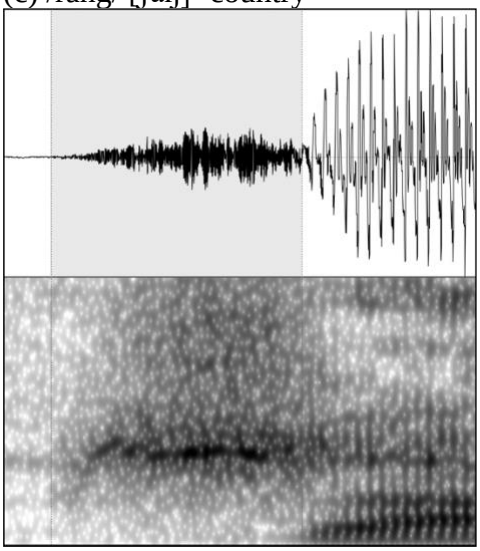
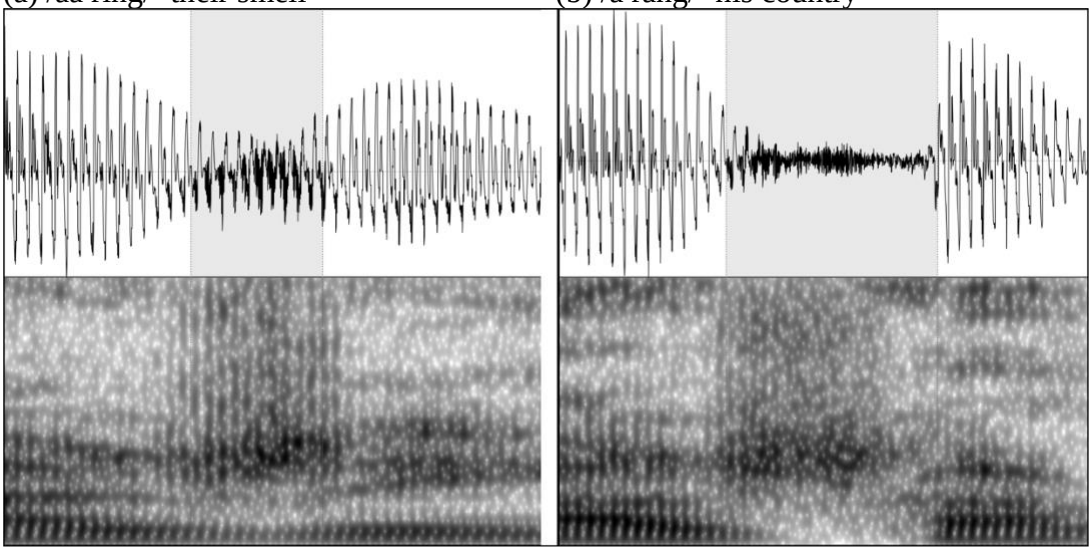


Figure 4.42 exemplifies variation observed in intervocalic position with voicing and frication in (4.42a), devoicing in (4.42b), and voicing with a whistle in (4.42c). Shadle (1983) describes the acoustic characteristics of whistles as involving narrow high amplitude spectral peaks. So, in (4.2c, 4.43b, 4.44b), whistles can be identified both by a sudden rise in amplitude

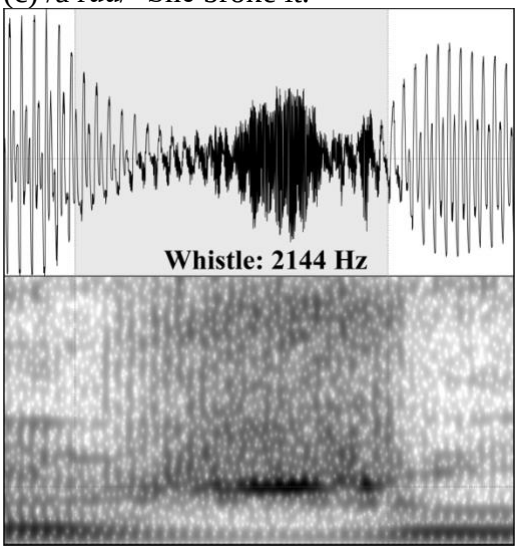
during the frication noise in the waveform and a narrow dark horizontal bar (at approximately 2100-2500 Hz) in the spectrogram, marked with a horizontal line.

Figure 4.42 Intervocalic voiced /r/, waveform and spectrogram (LTZ)

(a) /aa ring/ ‘their smell’ (b) /a rang/ ‘his country’



(c) /a rúú/ ‘She broke it.’

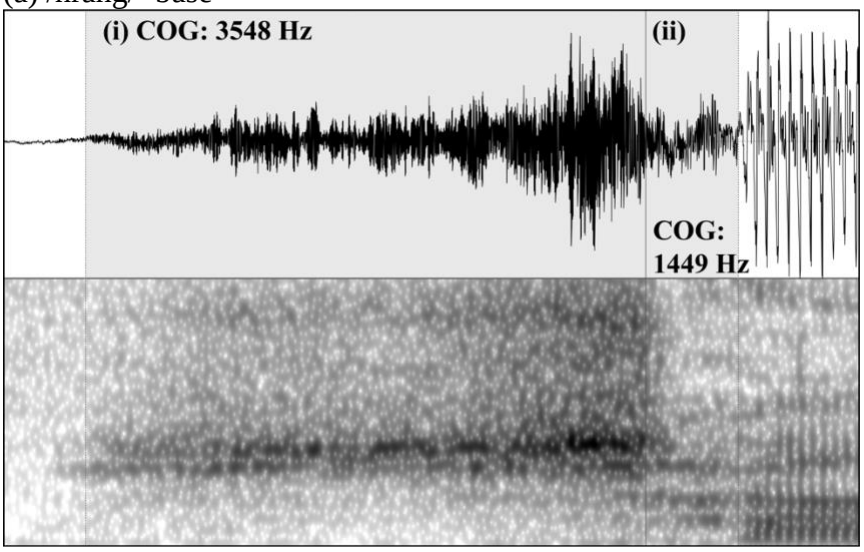


LTZ Initial and intervocalic voiceless rhotics are exemplified in Figures 4.43 and 4.44, respectively, with (4.43a, 4.44a) showing that oral frication noise (i) is followed by a short interval of lower frequency, lower amplitude aspiration (ii) before the vowel onset. Examples

(4.43b, 4.44b) show that a whistle is common even in initial position for our LTZ language assistant, especially preceding rounded vowels.

Figure 4.43 Initial voiceless /r/, waveform and spectrogram (LTZ)

(a) /hrang/ ‘base’



(b) /hrong/ ‘follow’

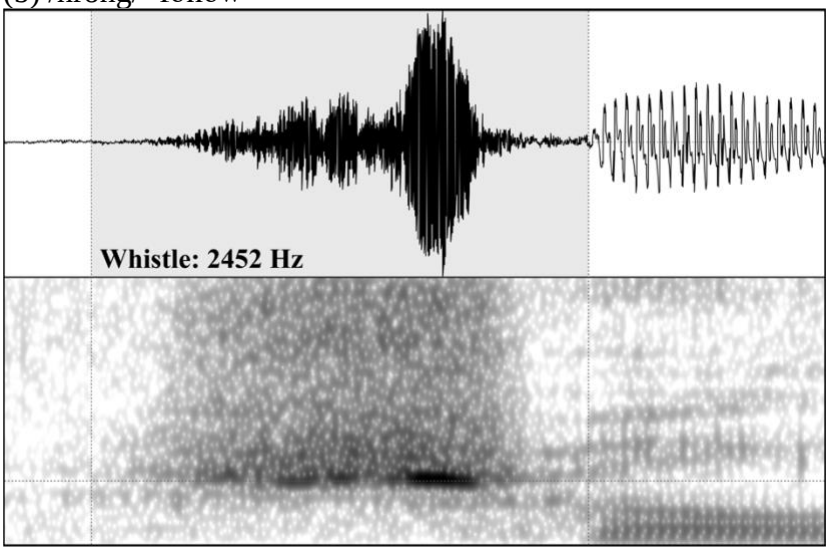
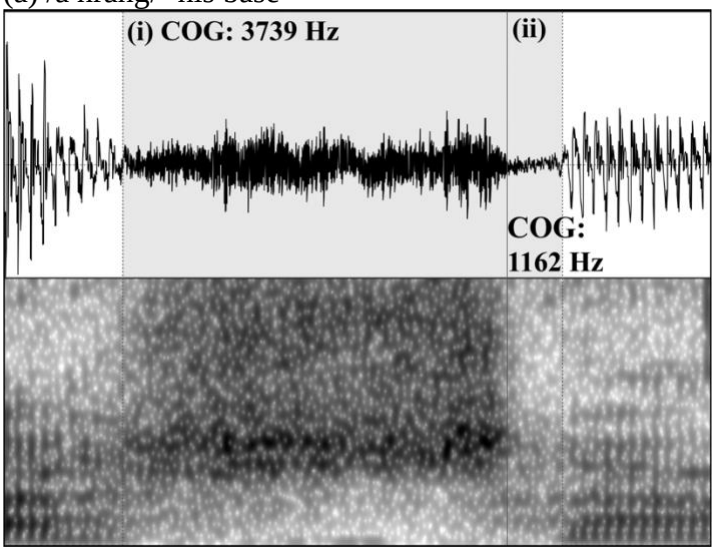
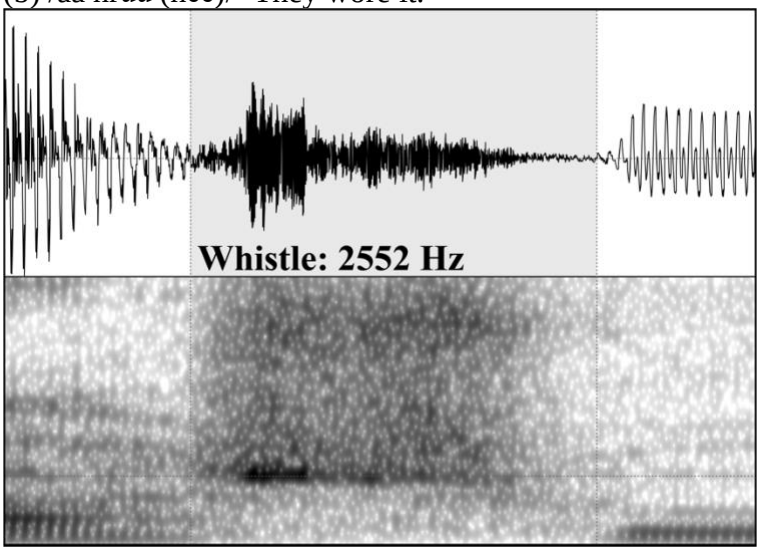


Figure 4.44 Intervocalic voiceless /r/, waveform and spectrogram (LTZ)

(a) /a hrang/ ‘his base’



(b) /aa hrúú (héé)/ ‘They wore it.’



The relationship between retroflex gestures and whistling is described in Bantu languages such as Shona, Chananga, and Xitsonga where whistled sibilants are phonemic. Carter (1986) describes whistled sibilants in Shona as involving retroflexion, with “the tip of the tongue curled upward and backward touching the roof of the mouth” (p.2). As previously noted, we see lip rounding commonly associated with these whistles, but Shosted (2011) concludes labialization

alone is not responsible for the whistle in Chananga whistled sibilants and a modern Chananga dictionary transcribes such sounds as retroflex (Sitoe, 1996). Furthermore, Lee-Kim, Kawahara, & Lee (2014) provide ultrasound evidence of retroflexion in Xitsonga whistled fricatives. The relationship between retroflex sibilants and whistles in Kuki-Chin merits further investigation using articulatory as well as acoustic methodologies.

While Zophei laterals show little deviation, inter- and intra-speaker variation in rhotics merits further investigation. Examples of intervocalic laterals indicate a similar time course to nasals in having a voiced interval followed by a voiceless interval. Rhotics do not follow this pattern. The acoustic and articulatory properties of these typologically uncommon sounds offer multiple avenues for future phonetic study (especially in examining links between retroflexion, vowel co-articulation, and whistles) and phonological study (especially in examining the featural similarities between rhotics and fricatives).

4.7 Minor syllable onsets

Where the subsections above focus only on major syllable onsets, it is worth discussing the phonemic onset contrasts found in Zophei minor syllables. Minor syllables, as described for Cambodian by Henderson (1952), are those non-word-final syllables that show reduced consonantal, vocalic, and/or tonal contrasts compared to major syllables. The phonology of minor syllables is further discussed in Chapters 5 and 6 (especially Section 5.2.6), but the reduction in consonantal contrasts merits attention in the discussion of onsets, especially in the emergence of complex onsets.

A reduction in onset inventories for minor syllables is exemplified by Southern Chin languages. So-Hartmann (1988) reports the only minor syllable onsets available to Khomi are /p t k/; /t k m/ are attested in Wakung, /p n ŋ/ in Matu, /ʔ m ŋ/ in Nghmoye and Ngmüün, and /m/ in

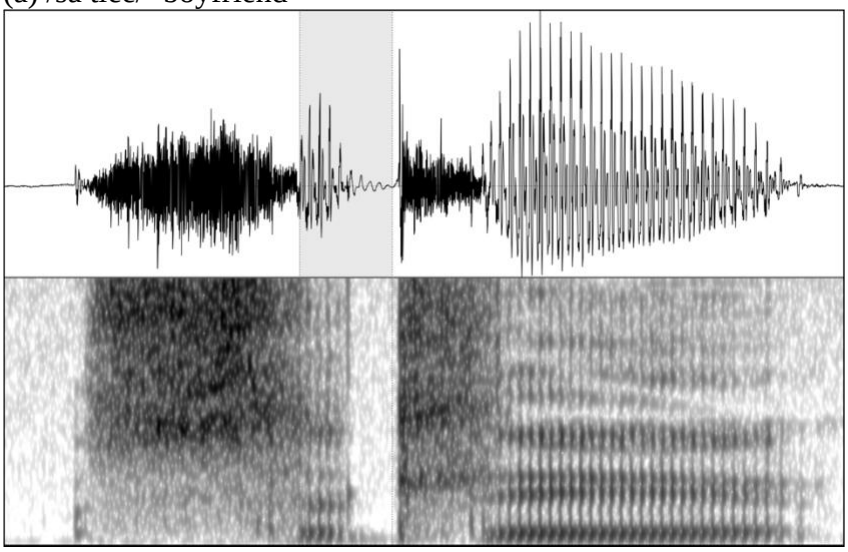
Chinpon. Most onsets are available to all syllable shapes in Zophei, yet there are some gaps. In Zophei minor syllable onsets—the data collected for this study lacks /ph d ng hl/ in both TRZ and LTZ minor syllables. Additionally, no lexical items have been found with minor syllables containing /hr/ in TRZ or /h/ in LTZ (see Appendix C for examples of other minor syllable onsets). Since most onsets are attested in minor syllables, these gaps appear accidental, though /ng/ is only attested in syllables with long vowels (as discussed in Chapter 5), so its avoidance in minor syllables may be systematic.

In some prosodic positions, minor syllable vowels are devoiced or deleted, resulting in an apparent complex onset. Take for example the word *sa tlee (poo)* (TRZ), *sa tléé (páú)* (LTZ) 'boyfriend, bachelor.' Figure 4.45 shows example TRZ recordings of *sa tlee* in (4.45a) and of *sa tlee poo* in (4.45b), with the minor syllable vowel highlighted.[27] In the former, the vowel is voiced and in the latter it is devoiced, resulting in an apparent onset cluster. An investigation of the segmental and prosodic environments for devoicing is beyond the scope of this study; however, prosodification is discussed in Chapter 6 and the inherent loss of pitch information during devoicing is relevant to research on tone and onset complexification.

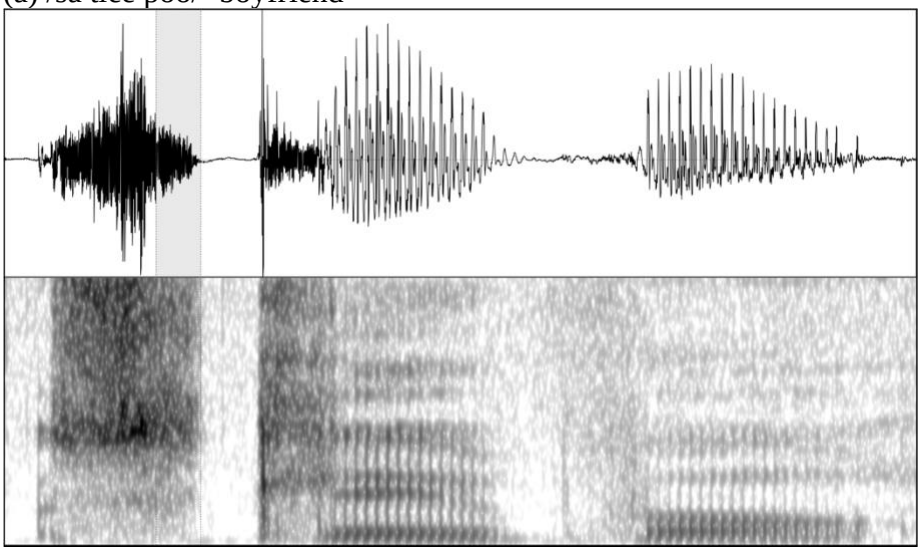
[27] *poo* is an optional masculine suffix.

Figure 4.45 Vowel devoicing and apparent onset clusters[28] (TRZ)

(a) /sa tlee/ ‘boyfriend’



(a) /sa tlee poo/ ‘boyfriend’



Since Maraic languages have reduced their coda consonant inventories, some losing codas altogether, complexification of onsets is not expected. Languages with complex onsets and no codas such as some West African languages (Gbe for instance) cause some problems for analysis (Kaye & Lowenstamm, 1981; Kaye, 1985; Baertsch, 2002; Baertsch & Davis, 2009), so

[28] The timescale in Figure 4.45 differs from those in the rest of this section in that it is taken from a 750 ms window to facilitate word comparison.

further investigation of vowel devoicing and onset complexification in Maraic languages will work to inform the discussion of onset-coda relationships in Kuki-Chin and elsewhere.

4.8 Summary

This chapter presented the onset consonant contrasts available to Zophei. There are no differences between varieties in terms of the phonological onset inventory, but particular attention was paid in this chapter to variation in phonetic realization. Unlike PKC but like other Central and Maraic languages, Zophei allows only single onsets, and diachronic cluster simplification has involved deletion, epenthesis, and affrication. Zophei contrasts 8 stops /p ph b t th d k kh/, 4 fricatives /v s z h/, 4 affricates /ts tsh tl thl/, 5 nasals /m hm n hn ng/ (with /hng/ marginally reported), and 4 liquids /l hl r hr/. Additionally, /j t̩/ are reported in loanwords from Burmese. The language has a relatively conservative onset system within Maraic, retaining lateral affricates from Proto-Maraic (lost in Zotung and Senthang), voiceless sonorants from PKC (lost in Zotung), and rhotics (lost in Senthang). Particularly ripe areas for future investigation of inter- and intra-speaker variation are found in Zophei affricates, voiceless nasals, and rhotics.

The affricate inventory of Zophei includes both sibilant /ts tsh/ and lateral /tl thl/ affricates, the realization of which varies based on speaker and phonological context. Our LTZ-speaking language assistant contrasts /ts tl/ and /tsh thl/ with aspiration in the latter set, which results in a longer voiceless interval preceding the vowel (what I call VOT in the chapter), which sometimes has a noisy onset. The TRZ-speaking language assistant variably produces a contrast in terms of VOT, breathy/noisy vowel onsets for former set, and place of articulation differences between /ts/ [t͡s] and /tsh/ [t͡ʃ].

Zophei has five nasal onsets including three voiced /m n ng/ and two voiceless /hm hn/ phonemes. The voiceless velar nasal /hng/ has been lost diachronically in favor of other voiced and voiceless nasals and liquids, although it appears in a few loanwords. In initial position, speakers vary in their production of voiceless nasals between voiceless aspirated, voiceless unaspirated, and voiced aspirated variants. Intervocalic nasals are often produced with a voiced nasal interval closing the first syllable which is followed by a voiceless nasal interval, then an aspirated interval leading into the second syllable vowel.

There are also voiced and voiceless laterals and rhotics /l hl r hr/ in both varieties of Zophei. Voiced laterals can be described as 'light' and voiceless laterals, like many voiceless nasals also discussed in this chapter, consist of an interval of orally-produced noise and an interval of aspiration. In intervocalic position, an additional voiced lateral interval closes the preceding syllable before the voiceless interval.

Rhotics have more varied production. In TRZ, /r/ and /hr/ are retroflex fricatives [ʐ] and [ʂ]; the latter is produced with some aspiration. More variation is found LTZ, where the voiced rhotic is optionally produced as a post-alveolar fricative [ʒ], which may be devoiced [ʃ], may involve retroflexion, and may include a whistle. Voiceless rhotics in LTZ are similar to those in TRZ and are also sometimes produced with a whistle like their underlying voiced counterparts when partially devoiced.

While all onsets are available to major syllables, /ph d ng hl/ are unattested in the onsets of Zophei minor syllables, with TRZ additionally lacking /hr/ and LTZ lacking /h/. When multiple minor syllables show up in a row, in some examples there is vowel devoicing that results in apparent onset consonant clusters. The analysis of these derived clusters merits future research, along with the treatment of hiatus and the status of the glottal stop as a phoneme.

Where variation is reported in this chapter, socio-phonetic and phonological studies are needed to further understand the linguistic and social factors involved for further analysis.

Chapter 5. Rhymes

5.1 Introduction

As discussed in Chapter 2, the Maraic languages have the most innovative rhyme inventories of any branch of Kuki-Chin (KC). In order to investigate rhyme phenomena in Zophei within the context of Maraic, this section presents synchronic and diachronic analyses of the rhyme data collected for this study. Section 5.2 describes rhymes in KC languages with particular focus on Maraic languages. Section 5.3 describes Zophei rhymes, providing acoustic exemplification of Zophei vowels. Sections 5.4-5.6 discuss diachronic changes in Maraic rhyme systems comparing PKC lexical items to reflexes in Mara (Section 5.4), Lutuv (Section 5.5), and Zotung (Section 5.6). Sections 5.7-5.9 do the same for Zophei varieties, Tlawngrang Zophei in Section 5.7, Nuitah Zophei in Section 5.8, and Lawngtlang Zophei in Section 5.9. Sections 5.10-5.12 focus on diachronic vowel changes between Zophei varieties, the back vowel shift in Section 5.10, the front vowel shift in Section 5.11, and the coalescence of diphthongs in Section 5.12. Section 5.13 summarizes the chapter.

5.2 Overview of rhymes in Kuki-Chin with emphasis on Maraic

Central KC languages like Hakha Lai have the most conservative rhyme systems, analyzed as retaining all Proto-Kuki-Chin (PKC) rhyme types and, along with Zahau (Falam) (Button, 2011), retaining all PKC coda consonants. Northern languages have lost some PKC codas, with more reduced coda inventories found in Southern languages. In comparison, Maraic languages feature the most rhyme innovation. Maraic syllable structure simplification has reduced the inventory of rhyme types from PKC's six (VV, VVC, VC, Vʔ, VCʔ, and V in minor syllables) to five in Senthang (VV, VC, Vʔ, VCʔ, and V in minor syllables), four in Zophei and

Lutuv (VV, V?, VC, V in minor syllables), three in Mara (VV, V?, V in minor syllables), and two in Zotung (VV, V?, no minor syllables) (Van Bik, 2009; Ngun Tin Par, 2016; Arden, 2010; Shintani, 2015). The remainder of this subsection overviews innovations in various Kuki-Chin languages with an emphasis on Maraic. Long monophthongs are addressed in Section 5.2.1, diphthongs in Section 5.2.2, coda consonants in Section 5.2.3, nasal rhymes in Section 5.2.4, final glottal stops and vowel length in Section 5.2.5, and minor syllables in Section 5.2.6. Section 5.2.7 offers an interim summary.

5.2.1 Long monophthongs

Proto-Kuki-Chin is reconstructed with a 5-vowel system /*i *e *a *o *u/, which is retained in the Central Chin languages of Mizo (Chhangte, 1986), Hakha Lai (Melnik, 1997), and Hmar (Dutta Baruah & Bapui, 1996), though the latter lists /ɔ/ rather than /o/. Other subgroups have made use of a range of innovations. Northern languages have innovated additional vowels, such as /ə/ in Paite (Singh, 2006). Southern Chin languages have added further vowel distinctions, /ɛ ə ɯ/ in Daai (So-Hartmann, 2009) and /æ ʉ ɘ ɔ/ in Hyow (Zakaria, 2017). Maraic languages show evidence of vowel innovation as well: Senthang adds /ɔ ɤ ə/ (Ngun Tin Par, 2016), Zotung adds /æ ɯ ə/ (Shintani, 2015), Mara adds /y ø ɨ/ (Arden, 2010), and Lutuv adds /y ɔ ɨ ʉ ə/ with audible lip frication in the production of /ʉ/, represented in their recently-developed orthographically as <uv>, as in <Lutuv>. Zophei varieties have made several monophthong innovations including /y ø ɨ ʉ/, with only Lawngtlang Zophei making use of all four innovated vowels. Of particular interest to this study are innovated front rounded vowels /y ø/ as well as vowel raising and centralization in front and back vowels, further discussed in Sections 5.10-5.12.

5.2.2 Diphthongs

Diphthongs in PKC are reconstructed with a limited inventory, allowing only /*ia *ua/, although Van Bik (2009) also includes glide-final rhymes for the proto-language. Senthang is also described has having /ia ua/ only, which can both be followed by coda nasals. Ngun Tin Par (2016) analyzes other apparent Senthang diphthongs as VC sequences /aw iw aj uj oj uaj/ since they cannot be followed by nasal codas. This diagnostic does not help to distinguish diphthongs from VC sequences in other Maraic varieties since VN is not an available rhyme type for Mara or Zotung—and Lutuv and Zophei do not permit any diphthongs followed by coda nasals. The largest diphthong inventory in Maraic is reported for Zotung /ia ie eiʔ aɯ oe oa ouʔ ui uiʔ ue ueʔ ua uɑ/, as discussed in Section 2.3. There are two diphthongs that only appear with a final glottal stop /eiʔ ouʔ/ (i.e., no /ei/ nor /ou/), and two that show a contrast with glottal stop-final rhymes /ui ue uiʔ ueʔ/. There are an additional two nasalized diphthongs /ũĩ ẽĩ/, resulting in a three-way contrast in the high height harmonic diphthongs /ui uiʔ ũĩ/.

As presented in Section 2.5, Arden (2010) largely describes Sabeu Mara as having allophonic variation between monophthongs and diphthongs, although Löffler (2004) describes a number of diphthongs in other Mara varieties. Diachronic changes from reconstructed Old Mara show diphthongization (e.g. /*ẽ/ to /ai/ in Fàbàu and Tlóusài Mara) and monophthongization (e.g. /*ai/ to /e/ in Zàwhnái and Fàbàu Mara), similar processes are observed between Zophei varieties and are further discussed in Section 5.2.4 (on VN rhymes) and Section 5.7 (on TRZ). The trade-off between monophthongs and diphthongs is evident in comparing Zophei and Lutuv. In Zophei, TRZ has 6 monophthongs and 6 diphthongs /ia ei ai au ui ua/, while LTZ has 8 monophthongs and 4 diphthongs /ie uo(yo) ei au/. In Lutuv, the large inventory of 10

monophthongs is accompanied by 4 diphthongs /ie yə ɯə uo/. Monophthongization and diphthongization are further discussed in Sections 5.10-5.12.

5.2.3 Coda consonants

The coda consonant inventories of languages in the four Kuki-Chin subgroups show Central languages are the most conservative, followed by Northern, then Southern, then Maraic languages, which are the most innovative, some lacking codas altogether. Proto-Kuki-Chin is reconstructed with coda glides, liquids, nasals, (as well as glottalized liquids and nasals) and stops /*w *j *l *lʔ *r *rʔ *m *mʔ *n *nʔ *ŋ *ŋʔ *p *t *k/, retained mostly in Central KC languages such as Hakha Lai (Van Bik, 2009) and Zahau (Falam) (Button, 2011). Northern languages show further inventory reductions, with a loss of final rhotics in Tedim, Sizang, Thado, and Zo and an additional loss of final /k/ in the latter two languages (Button, 2011).

According to So-Hartmann (1988), Southern languages vary broadly, with Matu listed as the only Southern Chin language with a final liquid /l/ (though it lacks coda /p/). Without liquids as well, Nghmoye, Ngmüün, and Mkaang still retain the full set of PKC stops and nasals /p t k m n ŋ/; Khomi has lost the place contrast in final stops /k m n ŋ/ (So-Hartmann, 1988); and Kemi (Stilson, 1866) retains only two coda nasals /n ŋ/. Maraic languages that permit coda consonants allow nasals only, with /m mʔ n ŋ/ in Senthang (Ngun Tin Par, 2016) and /ŋ/ in Zophei and Lutuv. Mara and Zotung ban codas apart from /ʔ/ (Arden, 2010; Shintani, 2015). Senthang is the only Maraic language reported to retain a glottalized nasal /mʔ/. These glottalized codas and coda glottal stops can also be analyzed as a phonetic consequence of a phonological length distinction, as discussed further in Section 5.2.5.

5.2.4 Vowel-nasal rhymes

It is worth also discussing the loss of Vowel-Nasal (VN) rhymes, a process that has played out differently in the various Maraic languages. Setting aside Senthang, which maintains a coda place distinction in final nasals, the loss of VN rhymes has proceeded differently in Zotung and Mara than it has in Zophei and Lutuv. Zotung's loss of VN rhymes came at the hands of another innovation: phonemic vowel nasality is contrastive in every vowel within its system /i ĩ e ẽ æ ǽ a ã o õ ɯ ɯ̃ u ũ ə ə̃/ (Shintani, 2015). As discussed in Section 2, Proto-Mara is also analyzed as having innovated phonemic vowel nasality in 5 vowels /i ĩ e ẽ a ã o õ u ũ/, but nasality was then lost in favor of vowel quality distinctions in synchronic varieties (Löffler, 2004).

Lutuv and Zophei have not shown the same trade-off between VN and Ṽ. Lawngtlang and Nuitah Zophei have the most conservative Zophei systems with five VN rhymes /iŋ eŋ aŋ oŋ uŋ/. Tlawngrang Zophei has lost /eŋ/ in favor of /ai/, leaving only four VN rhymes /iŋ aŋ oŋ uŋ/. This /eŋ/ to /ai/ change may have been influenced by Mara; diachronic change from (PKC) /*eN/ to (Proto-Mara) /*ẽ/ to (Mara) /ai/ is noted by Löffler (2004) for the Fàbàu and Tlóusài dialects. Hnaring Lutuv has further reduced the inventory of VN rhymes to 3 /iŋ əŋ uŋ/. For some Lutuv lexical items, Zophei /oŋ/ corresponds with Lutuv /ɔɔ/, as in Zophei *toŋ* and Lutuv *tɔɔ* 'meet.' The /*õ/ to /ɔ/ innovation is also noted by Löffler (2004) for Zàwhnái Mara, so this may also have been conditioned through contact with Mara.

This piecemeal loss of VN rhymes in Lutuv and Zophei has not resulted in the development of phonemic vowel nasality, unlike in Zotung and Proto-Mara. It is possible that these differences offer evidence of contact-induced changes. One possibility is that where Mara innovated a number of diphthongs and monophthongs through the denasalization process (VN to

Ṽ to V), Tlawngrang Zophei and Lutuv borrowed in some of the opaque results of this process, facilitating piecemeal VN to V innovations. Similarities between specific VN rhyme loss in Zophei and Lutuv and innovations in certain synchronic varieties of Mara raise questions as to the process of VN rhyme loss in other Mara varieties as well. Systematic documentation of Maraic languages and dialects as well as comparison with Zophei and Lutuv in future research will further elucidate the process of VN rhyme loss in Maraic, though such inquiry is beyond the scope of the present project.

5.2.5 Vowel-glottal stop rhymes and vowel length

All Kuki-Chin languages (apart from Lutuv) are reported to have a surface contrast between vowels: (1) those containing vowels of longer duration and more peripheral articulation, and (2) those containing vowels of shorter duration, more centralized articulation, and often ending in a phonetic glottal stop. Phonological analyses of these contrasts vary. The observation that no Kuki-Chin language permits *CVVʔ, even Hakha Lai where CVVC is a possible syllable shape, suggests that /ʔ/ does not pattern as a consonant. And since -Vʔ rhymes tend to have shorter vowel duration, more centralized vowel quality, and a reduction in tonal contrasts, this contrast is variably described in terms of vowel length (e.g., in Hakha Lai, Lehman, 1973), vowel quality (e.g. in Mara, Arden, 2010), tone (e.g. in Mizo, Chhangte, 1986), or a glottal prosody applied to the syllable and realized through various phonetic cues (Mortensen, 2021)

Glottal stops in some KC languages have a morphological importance, adding more intrigue to the question of their phonological representation across Kuki-Chin. PKC, as well as many synchronic Kuki-Chin varieties such as Hakha Chin (Hyman & Van Bik, 2002b) and Senthang (Ngun Tin Par, 2016) report the use of glottal stop in verb stem alternations (further discussed in Chapter 6), where glottal stop may be treated as a segmental morpheme. Zakaria

(2017) also argues that the Southern Chin language Hyow has two types of glottal stops, a non-phonemic type that can be deleted during resyllabification and a phonemic-type that holds grammatical information and cannot be deleted during resyllabification. When followed by /ə̂ng/ (marking inessive locative case), the noun /phámphéʔy/ 'broom' and the affix resyllabify as [phámphé-yə̂ng], not *[phámphéʔ-yə̂ng]. The second type is seen in the verb meaning 'to pick up,' which has two possible stems (/kól/ and /kóʔl/). When stem II /kóʔl/ is combined with the departive marker /-âl/, the glottal stop is retained in the resyllabified surface form as [kòʔ-lâl]. These morphological examples suggest either an analysis of this contrast in terms of a suffixal glottal stop /-ʔ/ or other tonal, moraic, or prosodic processes.

Maraic languages are characterized in part by the loss of PKC coda glottal stop (/*Vʔ/ → /V/) as well as the innovation of coda glottal stop from coda oral stops (/*Vp *Vt *Vk/ → /Vʔ/), which preserves this VV vs. Vʔ contrast, though in different lexical items. Vʔ rhymes are reported in all Maraic languages apart from Lutuv and are often represented orthographically as <-h>, a convention adopted here. Coda /-ʔ/ is limited in its distribution in TRZ to /iʔ eʔ aʔ oʔ uʔ/ (not following /ø/ or any diphthongs, similarly to coda /ŋ/), but in LTZ the inventory is more limited, only including /iʔ aʔ uʔ/ (and /eʔ/ limited to the negative marker *bèh*, but not following /y e ø ɨ ʉ/ or any diphthongs).

Unlike Senthang, this study has revealed no reason (such as morphological glottal stop augmentation) to posit an underlying final glottal stop for Zophei. So, for the purposes of the vowel studies presented below, I consider vowels followed by glottal stops separately from those without, and in tonal analyses presented in Chapter 6, I consider [Vʔ]/<Vh> syllables to be short, monomoraic vowels. The glottal stop is thus considered here to be part of the phonetic

realization of a short vowel although further investigation into Zophei varieties and Kuki-Chin in general will help to further elucidate the underlying phonological representation of this contrast.

5.2.6 Minor syllables

Minor syllables (or semi-, reduced, or pre-syllables) are similar to the Vʔ rhymes discussed above in that they are shorter and often offer fewer contrasts than major syllables. Such syllables do not occur on the final edge of a word and may be derived through shortening of syllables in weak prosodic positions; in these iambic languages that is the initial edge of a prosodic foot.[29] Matisoff (1989) calls this syllable-and-a-half structure (CVCVX) the 'bulging monosyllable' or the 'sesquisyllable,' referring to the CV syllable as a 'minor syllable.' As discussed in Section 4.7, Henderson (1952) coined the term 'minor syllables' to describe syllables in Cambodian lacking the full set of segmental and suprasegmental contrasts that could be found in 'major syllables.' Thomas (1992) further described a range of such non-final syllables: C-only, Cə (with no other vowel available), CV (with a reduced vowel inventory), and unstressed CVC.[30] Thomas considers the former two to compose a category of 'pre-syllables' and the latter two to compose a category of 'minor syllables.'

Reductions in segmental and tonal inventories for minor syllables are widely reported for KC languages. For example, the C-only type pre-syllables are common in Southern Chin languages such as Daai, Nghmoye, Ngmüün, Chinpon, Matu, Khomi, and Wakung where only some consonants are available to such syllables, /m/ in Chinpon, /ʔ m ŋ/ in Ngmüün, /p n ŋ/ in Matu, /t k m/ in Wakung, and /p t k/ in Khomi (So-Hartmann, 1988). Such pre-syllable

[29] In Kuki-Thaadow, this type of derivation is exemplified in compounding, where the first morpheme in a compound may be reduced to a minor syllable, as in vâa 'bird' + bùu 'nest' = vâ-bùù 'bird's nest' (Haokip, 2014).
[30] Minor syllables may also have vowel realization dependent on following vowels, with harmony processes described for the KC languages: Hyow (Zakaria, 2017) and Lamkang (Thounaojam & Chelliah, 2007).

consonants may lead to (surface) syllable structure complexification, for example, Van Bik (2009) reconstructs *sʰaa pʰruu ‘pangolin’ in Proto-Kuki-Chin (*sa-phuu* in Mara and Hakha), but in Khumi (a Southern language that retained the /pʰr/ cluster) the CCCVV syllable *sphruu* is reported.

Though Zophei allows for a wide range of minor syllable onsets, only one vowel /a/ [ə] is permitted and vowel devoicing may lead to surface onset clusters, as noted in Section 4.7. Though I make use of the more general term ‘minor syllable’ from Henderson (1952), it is worth noting that the Zophei phenomenon falls within the Thomas (1992) category of ‘pre-syllable.’ Suprasegmental restrictions are also reported in Hakha Lai by Hyman & Van Bik (2002a) who show that minor syllables do not participate in tonal phonology by conditioning or being conditioned by any phonological process. As further discussed in Chapter 6, minor syllables also show tonal contrasts in Zophei.

5.2.7 Summary

Rhymes in Maraic have seen a reduction in syllable structure complexity but an expansion in vowel contrasts. Maraic languages usually show larger inventories of monophthongs and/or diphthongs than other Kuki-Chin languages as well as vowel nasality in Zotung and Old Mara. All Maraic languages apart from Lutuv are described as having Vʔ rhymes and all Maraic languages apart from Zotung are described as having CV minor syllables. With these generalizations in mind, the following sections present a more detailed look at Zophei rhymes before turning to diachronic changes to rhymes in Maraic in Section 5.4.

5.3 Zophei rhymes

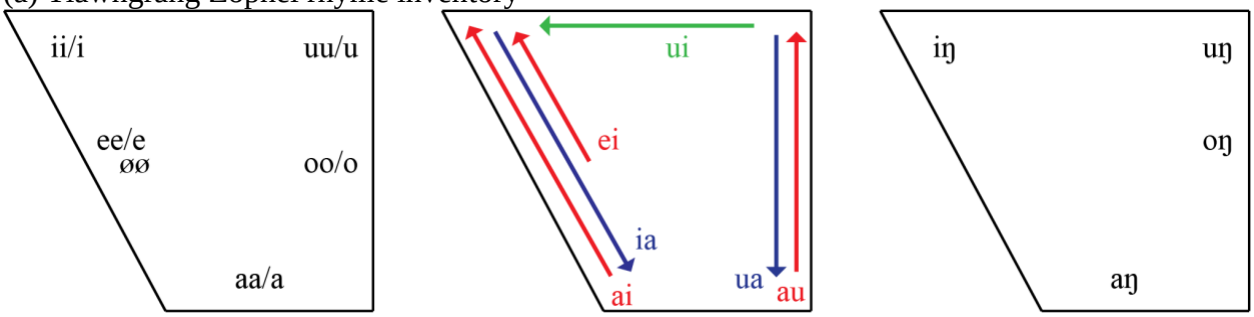
The vowel inventories of our Tlawngrang (TRZ), Nuitah (NTZ), and Lawngtlang (LTZ) Zophei-speaking language assistants show similarities and differences discussed in this section. All three varieties have /ii i ee aa a uu u/, though often not in the same lexical items. Innovations from TRZ, the most conservative variety, to LTZ, the most innovative variety, include an increase in the number of long monophthongs and a reduction in the number of short vowels and diphthongs. Where TRZ has 6 long monophthongs, NTZ has 7, and LTZ has 8; where TRZ has 5 short vowels, NRZ and LTZ have 4; and where TRZ has 6 diphthongs, NTZ has 5, and LTZ has 4. In addition, NTZ and LTZ have 5 VN rhymes, while TRZ has only 4.

The phonemic vowel inventories of Tlawngrang, Nuitah, and Lawngtlang Zophei are schematized in Figure 5.1. For each variety, monophthongs are presented on the left, diphthongs are presented in the center, and VN rhymes on the right. The short vowels in these diagrams are those occurring in monomoraic major syllable rhymes (*-ah*, *-ih*, *-uh*, *-eh*, *-oh*), and in minor syllable rhymes (*-a)*.

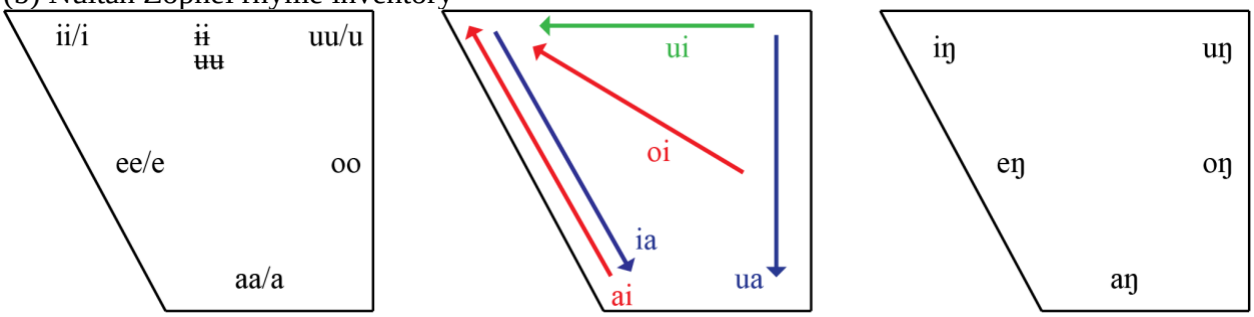
The analysis of vowel-vowel sequences as diphthongs in Zophei is based on two observations. First, the combinations of vowels are limited in each language, suggesting they are a closed set of diphthongs rather than the result of combining two adjacent segments. Second, these diphthongs pattern with long monophthongs and VN rhymes in their tonal behavior, further discussed in Chapter 6. In Figure 5.1, falling sonority diphthongs are given in red, rising sonority diphthongs in blue, and height harmonic diphthongs in green.

Figure 5.1 Zophei rhyme inventories in three varieties

(a) Tlawngrang Zophei rhyme inventory[31]



(b) Nuitah Zophei rhyme inventory



(c) Lawngtlang Zophei rhyme inventory[32]

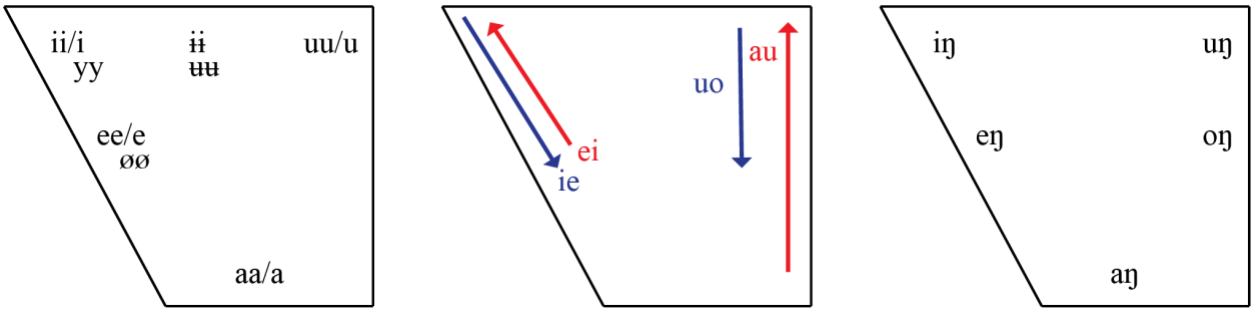


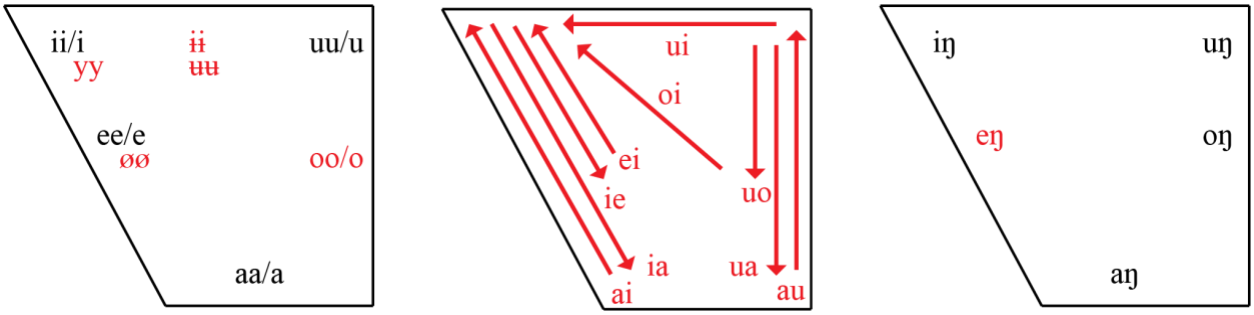
Figure 5.2 summarizes rhymes shared between Zophei varieties. As in 5.1, long and short vowels are shown on the left, diphthongs in the center and VN rhymes on the right. Rhymes

[31] In TRZ and NTZ, there is marginal use of the rhyme /io/ in *ha thio* 'to sneeze'.

[32] As further discussed in Section 5.9 and 5.11, the /eh/ rhyme has been lost in LTZ in favor of /ih/, but verbal complex data in Appendix D has revealed marginal retention of the /eh/ rhyme in a few words including the negative marker *bèh* and the prohibitive marker *kheh*.

occurring in all three Zophei varieties are given in black while those occurring in one or two varieties are given in red, revealing few rhymes shared between all three systems.

Figure 5.2 Rhymes shared between Zophei varieties (in black)



Acoustic analysis of vowel data from the Tlawngrang and Lawngtlang varieties is also presented here. Figures 5.3-5.8 offer acoustic exemplification updated from Lotven & Berkson (2019a), which offers a preliminary acoustic analysis of Zophei vowel spaces. In the images revised from that paper, F1 and F2 measurements (presented in Bark to facilitate interspeaker comparison) were taken at 20% and 80% of each vowel using the Praat script Semi-Auto Formant Extractor (McCloy & McGrath, 2012) and plotted using the phonR package (McCloy, 2016) for the statistical software R (R Core Team, 2013). For monophthongs, an ellipse was added using phonR, representing a confidence level according to Hotelling's T^2 distribution.

Figures 5.3-5.4 show example formant values of long monophthongs, Figures 5.5-5.6 show length contrasts, and Figures 5.7-5.8 show diphthongs, in each case TRZ examples are presented before LTZ examples. In these images, colors are arbitrary and used only to facilitate ease of interpretation. Note that Figure 5.8 includes [yo] which is an allophonic variant of /uo/ occurring after anterior consonants /t th d s z ts tsh n hl/ (see Table 5.10 and discussion below). Note that /a/ is phonetically [ə].

Figure 5.3 Acoustic exemplification of vowel formant values in TRZ long monophthongs

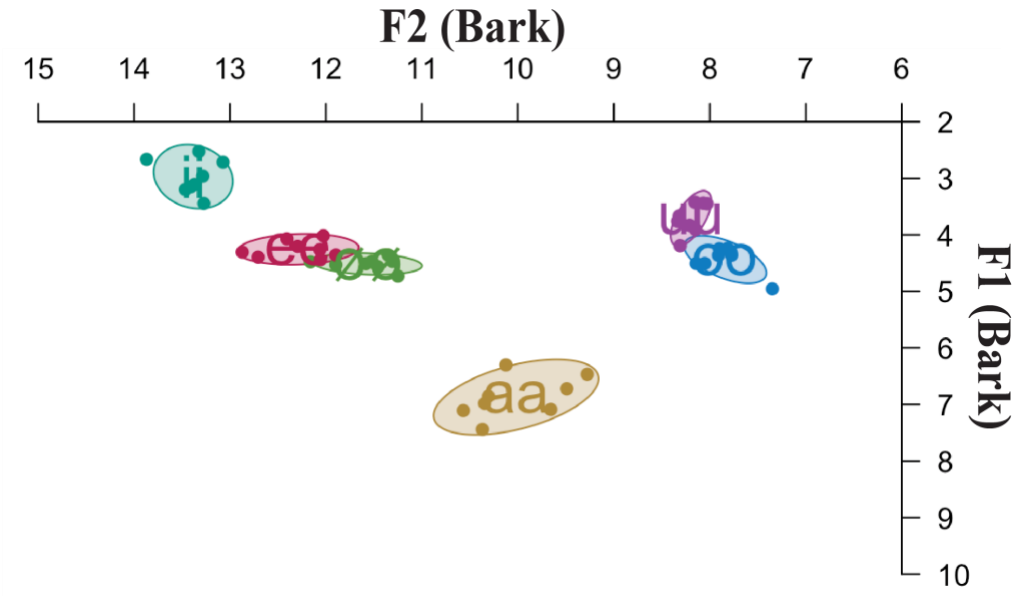


Figure 5.4 Acoustic exemplification of vowel formant values in LTZ long monophthongs

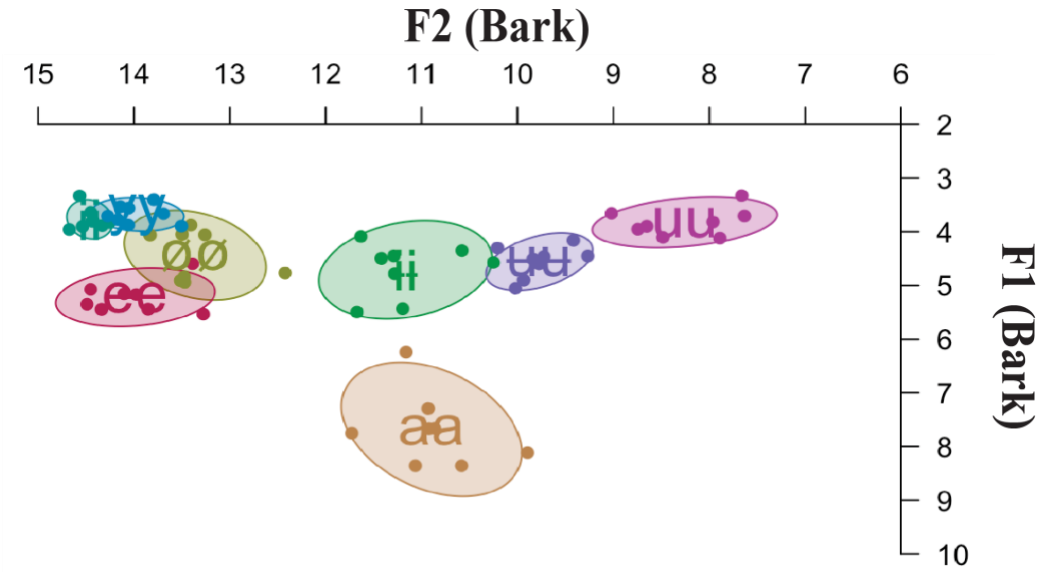


Figure 5.5 Acoustic exemplification of vowel formant values in TRZ length contrasts

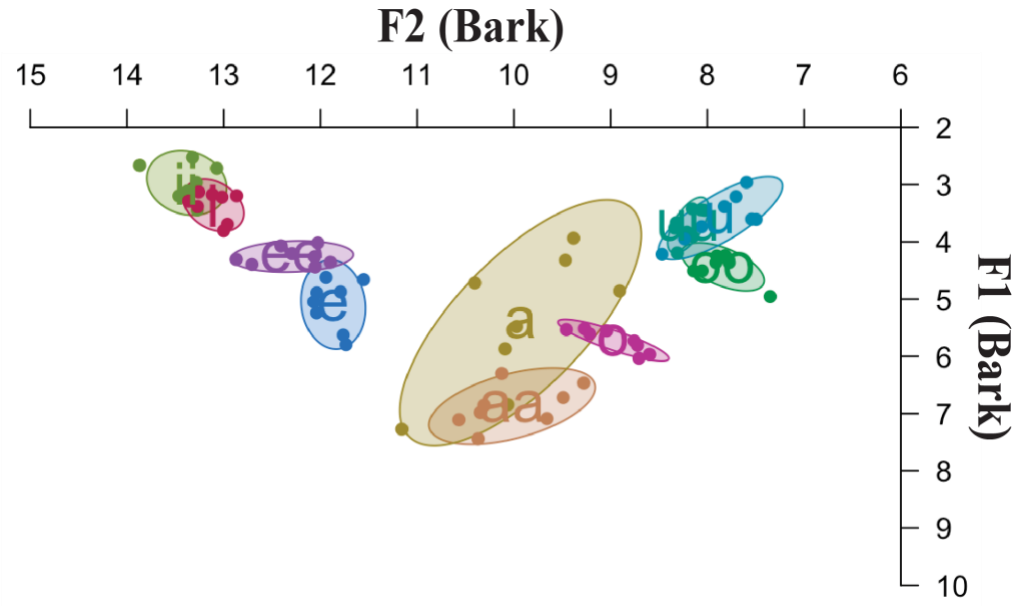


Figure 5.6 Acoustic exemplification of vowel formant values in LTZ length contrasts

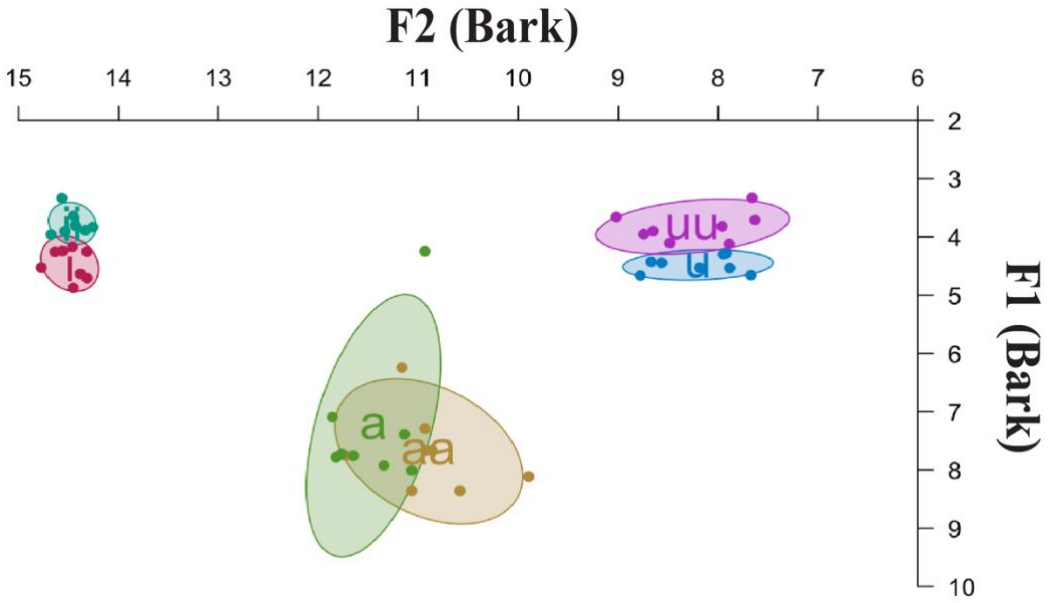


Figure 5.7 Acoustic exemplification of vowel formant values in TRZ diphthongs

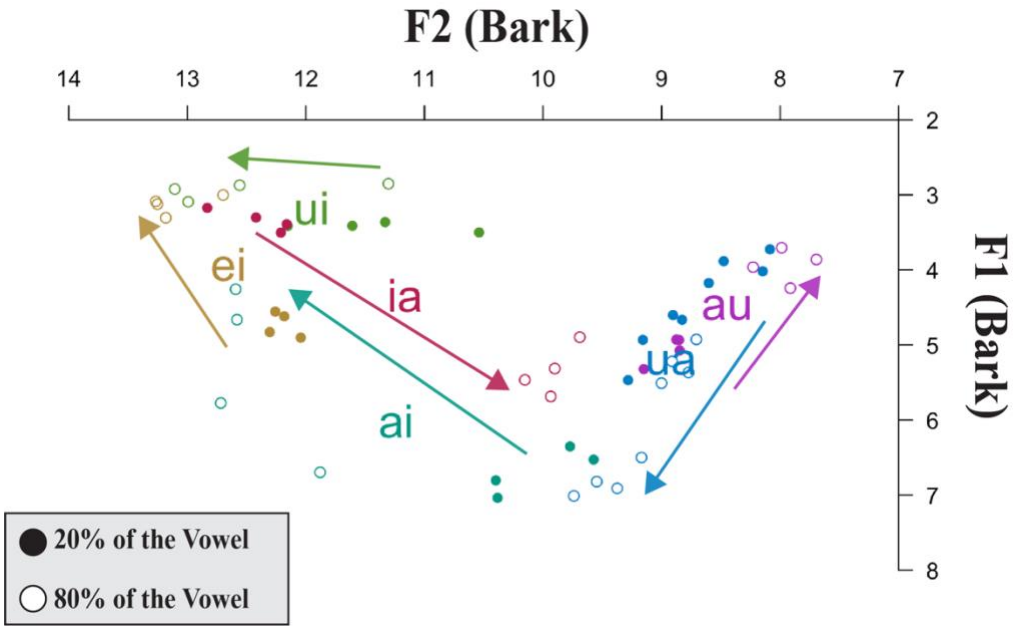
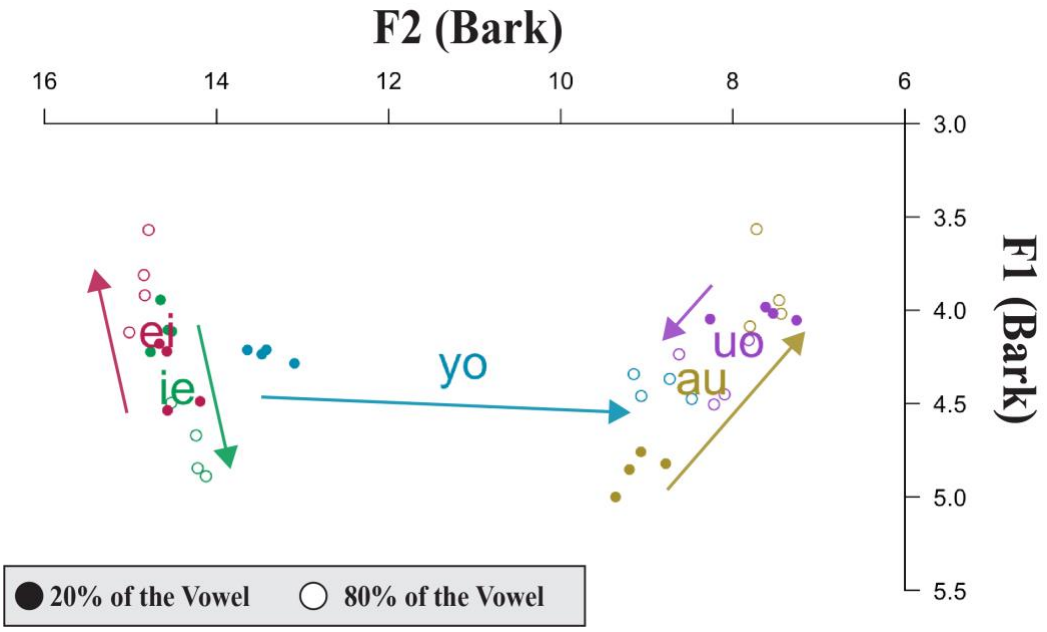


Figure 5.8 Acoustic exemplification of vowel formant values in LTZ diphthongs



Not all rhyme types are attested with all onsets, so in order to facilitate future phonetic and phonological work on Zophei, Tables 5.9 and 5.10 present the attested syllables in TRZ and

LTZ, respectively. Example words with these shapes can be found in Appendix B. Syllables with the same onset are given in the rows of the table, while syllables with the same rhyme are indicated in the columns, first long monophthongs, then short monophthongs, then diphthongs, VN rhymes, and minor syllables. Attested syllables are shaded in black and unattested syllables are in white. In Table 5.10, red shading indicates where the [yo] allophone surfaces.

Table 5.9 Attested TRZ syllables

	ii	ee	øø	aa	oo	uu	ih	eh	ah	oh	uh	ia	ei	ai	au	ui	ua	iŋ	aŋ	oŋ	uŋ	Ca
p	■	■	■	■	■	■		■	■		■	■	■	■	■	■		■	■	■	■	■
ph	■	■	■	■	■	■	■	■	■			■	■		■		■	■	■		■	
b	■	■	■	■	■	■		■	■	■		■	■	■	■	■	■	■	■	■	■	■
t	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
th	■	■	■	■	■	■	■		■	■	■	■		■	■	■		■	■	■	■	■
d	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	
k	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
kh	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
ʔ	■	■	■	■	■	■		■	■	■	■		■	■	■	■		■	■	■	■	■
v	■	■		■	■	■				■	■	■	■	■		■		■	■	■		■
s	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
z	■	■	■		■	■		■	■		■	■	■	■	■	■	■	■	■	■	■	■
h		■	■		■	■		■		■		■	■	■	■	■	■	■	■	■		■
ts	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■
tsh	■	■	■		■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■
tl		■	■	■	■	■		■	■	■	■	■	■	■		■			■	■	■	■
thl	■	■	■		■			■	■		■	■		■	■			■	■		■	■
hm		■			■	■		■	■		■		■	■	■	■		■	■			■
m		■	■	■	■		■	■	■			■	■	■		■		■	■	■		■
hn	■	■		■	■			■	■	■		■		■	■	■		■	■	■		■
n	■	■	■	■	■	■	■	■	■	■	■		■	■	■		■	■	■	■		■
ng		■	■		■							■	■	■						■		■
hl	■		■		■	■		■	■	■				■	■	■	■	■	■	■	■	
l	■	■	■		■	■		■	■	■		■	■	■	■	■	■	■	■	■	■	■
hr	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■		■	■	■		
r	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■

Table 5.10 Attested LTZ syllables

	ii	yy	ee	øø	aa	oo [au]	uu	~~ii~~	~~uu~~	ih	ah	uh	ie	uo [yo]	ei	iŋ	eŋ	aŋ	oŋ	uŋ	Ca
p																					
ph																					
b																					
t																					
tʰ																					
d																					
k																					
kh																					
ʔ																					
v																					
s																					
z																					
h																					
ts																					
tsh																					
tl																					
thl																					
hm																					
m																					
hn																					
n																					
ng																					
hl																					
l																					
hr																					
r																					

Whether gaps are accidental or systematic is beyond the scope of this dissertation, however it is worth discussing the complementary distribution of [uo] and [yo] in LTZ, which corresponds to TRZ /ua/. The allophone [uo] shows up after /k kh r/ and the allophone [yo] shows up after /t th d s z ts tsh n hl/, other onsets are unattested in this context. One possible analysis is that the distinction has to do with anteriority, a phonological feature differentiating anterior ([+anterior]) constrictions produced before the alveolar ridge with posterior ([-anterior]) constrictions behind the alveolar ridge (Hayes, 2009). This differential treatment offers evidence that /r/ (and possibly /hr/ by extension) differs from other coronals and is treated as phonologically retroflex, or at least ([-anterior]). As discussed in Section 4.6, rhotics are produced often as retroflex or post-alveolar fricatives and this phonological alternation further suggests that those phonetic realizations are indicative of underlying [+/-anterior] phonological features. Since these derive diachronically from /ua/ diphthongs and no other synchronic phonological process has been identified that needs make reference to anteriority, for the purposes of this analysis, I consider the underlying form to be /uo/.

With the synchronic rhyme systems of Zophei varieties in mind, the rest of this section turns to a broader look at developments to Maraic rhymes. Section 5.4-5.6 discuss rhyme developments in Mara, Lutuv, and Zotung, respectively. Sections. 5.7-5.9 discuss Tlawngrang, Nuitah, and Lawngtlang Zophei before turning to some specific treatment of rhyme changes within Zophei in Sections 5.10-5.12.

5.4 Diachronic changes from PKC to Mara

Our understanding of the changes from PKC to Maraic comes from Van Bik (2009) who, for lack of data on other varieties, relies on Mara for his analysis of the Maraic branch of Kuki-Chin. With the primary Zophei and Lutuv data collected for this project as well as Shintani's

(2015) Zotung word list, the current research is able to expand our understanding of the relationships between Maraic languages and between PKC and Maraic.

There are several diachronic processes worth discussing across Maraic languages, some of which are considered in Van Bik's (2009) analysis of Maraic and are evidenced in his data:

(1) the loss of final glottal stops

(2) the loss of coda obstruents in favor of glottal stops

(3) the raising of /e/ to /i/

(4) the substitution of one high vowel for another between /i u/

(5) the back vowel chain shift: /a/ → /ɔ/ → /u/ → /ɯ/

Van Bik (2009) analyzes the chain shift in (5) as a drag chain, wherein first /*u/ unrounds to /ɯ/, then /*ɔ/ raises to /u/, then /*a/ raises to /ɔ/.

Table 5.11 offers the correspondences compiled from data in Van Bik (2009) between PKC rhymes and their Mara reflexes. Unlike correspondences for Zophei, Lutuv, and Zotung presented in Appendix C, Mara rhyme correspondences in this section use data and analyses in Van Bik (2009). For the tables in this subsection, each synchronic Mara rhyme is found on the left and each row represents the PKC rhymes associated with reconstructed words corresponding to rhymes in Mara lexical items. Rhymes in these tables are marked with an asterisk (*) to show they represent reconstructed forms.

Tables 5.12-5-15 further divide this table into Mara reflexes of PKC open syllables (5.12), obstruent-final rhymes (5.13), nasal-final rhymes (5.14), and liquid/glide-final rhymes in (5.15). In Table 5.15, red highlighting is used for /*-r/ and green highlighting is used for /*-l/ to

aid visual comprehension, with italics for long vowels and diphthongs (added to facilitate comparison).

Table 5.11 Mara reflexes of PKC rhymes

	PKC				
Mara	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/i/	*ii *il *iak *iʔ *ia *iar *ik *iat *iaw	*ee *eʔ	*ar *ay[33]	-	*ul *ua *uul *uak *uuy
/ia/	-	-	*al *aal *aay	-	-
/e/	-	*eer	-	*om *oom *on *oon *oŋ *ooŋ	-
/ei/	*ial	*em *el *en *eel *eŋ	*ay	*ooy	*ual *uay
/a/	-	-	*aa *aat *aŋ *aʔ *aak *aam *at *am *aaŋ *ak *an *aar *aap	-	-
/ai/	*iam *ian *iaŋ	*eem *een *eeŋ	*an *ay	-	-
/au/	*iit *iŋ *im *iiŋ *in	-	*aw	-	*um *uum *uam *un *uun *uan *uŋ *uuŋ *uaŋ
/ɔ/	-	-	*aa *aaw *aar	*ot	-
/u/	*it *ir		*aw	*oo *oop *ool *oʔ *oot *or *ok *ook *oor	*uur *uap *ur *uat *uaʔ
/ua/	*iir	-	-	-	*uar
/ui/	-	-	-	-	*uy
/ɯ/	-	-	-	-	*uʔ *uup *up *uut *ut *uuk *uk

[33] Van Bik (2009) suggests PKC *ay and *ey were in free variation.

Correspondences between PKC open syllable rhymes and their Maraic reflexes in Table 5.12 reflect several of the above-listed diachronic processes, the raising of /*ee/ to /i/, high vowel substitution /*ii *ia *ua/ to /i/, and evidence of a back vowel chain shift /*oo/ to /u/ and /*uu/ to /ɯ/. Van Bik's (2009) hypotheses on the loss of final glottal stops and the debuccalization of coda stops in Maraic are not based on Mara but rather on limited data collected from Senthang and Zotung speakers. However, it is possible that both processes have occurred in Mara. First, despite the lack of final glottal stops in Van Bik's (2009) Mara data, Arden (2010) includes CVʔ syllables in her description of Sabeu Mara, so evidence of stop debuccalization may exist in at least some Mara varieties. Second, the loss of glottal stops is also visible in some Mara correspondences, for example in the merger of /*ii *iʔ *ee *eʔ/ to /e/, /*aa *aʔ/ to /a/, /*oo *oʔ/ to /u/, and /*uu *uʔ/ to /ɯ/. For the diphthong /uaʔ/, which patterns with obstruent-final syllables /*uap *uat/ in merging to /u/, a merger of oral and glottal stop-final rhymes appears similar to Lutuv data presented in Section 5.5.

Table 5.12 Mara reflexes of PKC open syllable rhymes

	PKC				
Mara (KVB)	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/i/	*ii *iʔ *ia	*ee *eʔ	-	-	*ua
/a/	-	-	*aa *aʔ	-	-
/ɔ/	-	-	*aa	-	*uu
/u/	-	-	-	*oo *oʔ	*uaʔ
/ɯ/	-	-	-	-	*uu *uʔ

Correspondences between Mara and PKC rhymes closed in an obstruent are separated out in Table 5.13. Final obstruent loss appears to have had little effect on monophthong identity regardless of PKC vowel length, which is reflected in diachronic changes, for example, from /*ik/ to /i/ and /*at *ak *aap *aat *aak/ to /a/. High vowel substitution is observed in the /*uak/ to /i/ and /*it/ to /u/ correspondences. The back vowel shift can be seen in the /*oʔ *ok *oop *oot *ook/ to /u/ and /*uʔ *up *ut *uk *uup *uut *uuk/ to /ɯ/ correspondences; and it is worth noting that /*uaʔ *uap *uat/ are treated differently from *uC and *uuC rhymes, merging instead with *oC and *ooC into Mara /u/.

Table 5.13 Mara reflexes of PKC obstruent-final rhymes

	PKC				
Mara (KVB)	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/i/	*ik *iat *iak			-	*uak
/a/	-	-	*at *aap *ak *aat *aak	-	-
/au/	*iit	-	-	-	-
/ɔ/	-	-	-	*ot	-
/u/	*it			*ok *oop *oot *ook	*uap *uat
/ɯ/	-	-	-	-	*up *uup *ut *uut *uk *uuk

Nasal-final rhymes in PKC have been lost in Mara, according to Löffler (2004) in favor of nasal vowels which were also later lost. Evidence comes from a comparison of PKC VN and VVN rhymes to their open syllable counterparts. For example, where /*oo/ is reflected in Mara /u/, /*oN *ooN/ is reflected in Mara /e/. Likewise, /*ee *ia/ correspond to Mara /i/, but /*eN/ and */eeN *iaN/ correspond to /ei/ and /ai/, respectively. Löffler takes these differences in vowel

development as evidence for vowel nasalization (and coda nasal loss) followed by vowel denasalization, resulting in divergence. In addition, while /*ii *ua/ and /*uu/ corresponded to /i/ and /u ɯ/, respectively, /iN iiN uN uuN uaN/ have merged to Mara /au/, a further illustration of high vowel substitution.

Table 5.14 Mara reflexes of PKC nasal-final rhymes

	PKC				
Mara (KVB)	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/e/	-	-	-	*om *oom *on *oon *oŋ *ooŋ	-
/ei/	-	*em *en *eŋ	-	-	-
/a/	-	-	*am *aam *an *aaŋ *aŋ	-	-
/ai/	*iam *eem *ian *een *iaŋ *eeŋ		*an		
/au/	*im *iiŋ *in *iŋ	-	-	-	*um *uum *uam *un *uun *uan *uŋ *uuŋ *uaŋ

Table 5.15 includes all liquid and glide-final rhymes with laterals highlighted in red and rhotics highlighted in green. To facilitate comparison with open syllables, long vowels and diphthongs are added in italics here. PKC coda liquid and glide losses have resulted in variable effects on the preceding vowel. In some cases, the vowel has remained unchanged, as in the changes from /*il/ to /i/ and /*aar/ to /a/ which follow the open syllables /*ii/ and /*aa/ in staying put. In some cases, PKC glides have been reanalyzed as nuclear in Mara, resulting in diphthongs, for example, in the correspondences /*aw/ to /au/ and /*uy/ to /ui/ and some coda liquids have also lenited to high vowels, as in /*eel *el/ to /ei/.

There is also evidence of four of the previously discussed diachronic processes in Maraic at work. Coda loss in liquids and glides has had less predictable effects on the vowel than stops or nasals; and coda liquids appear to have blocked vowel shifts predictable in open syllables, for example in changes from /*eer/ to /e/ (despite /*ee/ to /i/), /*uur *ur/ to /u/ (despite /*uu/ to /ɯ/), and /*uar/ to /ua/ (despite (/*ua/ to /i/). That such VVC syllables were insulated from these diachronic vowel changes suggests codas in some rhymes were not lost until after some vowel changes had already taken place. There is also evidence of high vowel substitution in /*il *iar *iaw *ar *uul *ul *uuy/ to /i/ (with /*ar/ also in the mix) and in /*iir *ool *oor *or *uur *ur/ to /u/; as well as evidence of the Mara back vowel shift in the latter /*ool *oor *or/ to /u/ correspondence.

Table 5.15 Mara reflexes of PKC liquid- and glide-final rhymes

	PKC				
Mara (KVB)	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/i/	**ii* **ia* **il* **iar* **iaw*	**ee*	**ar* **ay*	-	**ua* **uul* **ul* **uuy*
/ia/	-	-	**al* **aal* **aay*	-	-
/e/	-	**eer*	-	-	-
/ei/	**ial*	**el* **eel*	**ay*	**ooy*	**ual* **uay*
/ai/	-	-	**ay*	-	-
/a/	-	-	**aa* **aar*	-	-
/au/	-	-	**aw*	-	-
/ɔ/	-	-	**aa* **aar* **aaw*	-	**uu*
/u/	**ir*	-	**aw*	**oo* **ool* **or*	**uur* **ur*
/ua/	**iir*	-	-	-	**uar*
/ui/	-	-	-	-	**uy*
/ɯ/	-	-	-	-	**uu*

This section has focused on the 5 processes described for Maraic that are relevant in our discussion of Mara: (1) the loss of glottal stops (2) the debuccalization of coda stops, (3) the raising of /e/ to /i/, (4) the substitution of high vowels /i u/, and (5) the back vowel chain shift: /a/ → /ɔ/ → /u/ → /ɯ/. These processes are further explored in the sections that follow in relation to Lutuv, Zotung, and Zophei, however future work on Mara and its various dialects is vital for understanding the diachronic changes from PKC to Proto-Maraic and the relationship between Maraic languages.

5.5 Diachronic changes from PKC to Lutuv

As is illustrated in this section, Lutuv shares only some of the processes discussed for Mara in the previous section. Like Mara, Lutuv has also lost coda glottal stops, but unlike Mara, it did not transparently develop final glottal stops from oral stops. This observation is further discussed in this section as identifying a diachronic phonological change that separates Lutuv from Mara (and Zophei). There is evidence of /*e/ raising to /i/ along with /*i/ centralizing to /ɨ/ (also present in NTZ and LTZ), as well as some high vowel substitution and high back vowel centralization. However, Lutuv is lacking the /a/ to /o/ raising present in Mara. Table 5.16 offers an overview of the correspondences between PKC rhymes and Lutuv reflexes. Tables 5.17-5.20 further divide this table into PKC syllable types.

Like in the previous section, the tables in this subsection show the synchronic Lutuv rhyme on the left and each row represents the PKC rhymes associated with reconstructed words corresponding to rhymes in Lutuv lexical items.

Table 5.16 Lutuv reflexes of PKC rhymes

	PKC				
Lutuv	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/ɨɨ/	*ii *iin *iat *iʔ *in (*iak) *ik *il *ial	-	*aaw		*uul *uy *ul
/ii/	*iat	*eʔ *eel *eek *ewʔ *em	-	*oop	-
/yy/	-	-	*ay	*ooy	*uay
/yə/	-	-	-	*oo *or *oy	*ua *uaʔ
/ie/	*ia *ian	*ee *eel	*aal *aay *al *ay	*ooy	-
/ing/	*ii *im *iit *iiŋ *ik *iŋ	-	-	-	*ul
/ee/	*iam *ian *iaŋ	*ee *eem *eel *en *el *eeŋ	*ay *an *aw	-	-
/aa/	*iir	*er *erʔ	*aa *ak *aʔ *aar *aak *ar	*oor *oŋ	*uar
/əə/	-	-	*at *an	*ook *oy *ok	*uap
/əng/	*ir	*eŋ	-	*oon	*un *uum *uŋ *uaŋ
/oo/	*im	-	*aaw	*oom *oon *om *ooŋ	-
/ɯɯ/	*iaw	-		-	*uur *uak *ua
/ɯə/	-	-	-	*ool	-
/uu/	-	-	*aa *aw *ay	-	*uk *uan *uun (*uaŋ)
/ung/	-	-	-	-	*uu *un *uʔ *uŋ *um *uul
/uo/	-	-	*aam *aan *am	*ooŋ *oŋ	*uam
/ʉʉ/	-	-	-	*ool	*uu *uuk *uut *uk *ut *uum

Table 5.17 offers Lutuv vowels corresponding to PKC open syllable rhymes. Lutuv has undergone final glottal stop deletion, merging /*aa aʔ/ to /aa/, and merging (then centralizing) /*ii *i/ to /ɨɨ/. However, /*eʔ/ appears to have lost its glottal stop later and rather than merging with /*ee/, which developed variably into /ie ee/, /*eʔ/ alone underwent the /*e/ to /i/ raising noted in Mara. There is further evidence of a front vowel shift raising mid vowels and centralizing high vowels in Lutuv, including the change from /*ia/ to /ie/ and from /*ii *iʔ/ to /ɨɨ/. As for the back vowel shift, /*aa *aʔ/ did not raise to /oo/, though there is evidence of the /*uu/ to /*ʉʉ/ change discussed for NTZ and LTZ in Sections 5.8-5.9. It is also worth noting that Lutuv has seen some spontaneous development of VN rhymes, for example in /*ii/ to /ing/ and /*uu *uʔ/ to /ung/ correspondences.

Table 5.17 Lutuv reflexes of PKC open syllable rhymes

	PKC				
Lutuv	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/ɨɨ/	*ii *iʔ	-	-	-	
/ii/	-	*eʔ	-	-	-
/yə/	-	-	-	*oo	*ua *uaʔ
/ie/	*ia	*ee	-	-	-
/ing/	*ii	-	-	-	-
/ee/	-	*ee	-	-	-
/aa/	-	-	*aa *aʔ	-	-
/ʉʉ/	-	-	-	-	*ua
/uu/	-	-	*aa	-	-
/ung/	-	-	-	-	*uu *uʔ
/ʉʉ/	-	-		-	*uu

Table 5.18 offers Lutuv correspondences with PKC final stops, including some Vʔ syllables added for comparison. Lutuv does not have glottal stop-final rhymes and it appears

while Zophei lost oral stops in favor of glottal stop, Lutuv lost both final oral and glottal stops, as evinced by /*iʔ *ik/ merging and raising to /~~ii~~/, /*eʔ *eek/ merging and raising to /ii/, and /*aʔ *aak *ak/ merging to /aa/. Several stop final rhymes /*at *ook *ok/ merged to /əə/ as well. Lotven (2020a) offers three hypotheses for these observed differences between Lutuv and Zophei: (1) Lutuv lost all final stops without differentiating oral from glottal articulations, (2) Lutuv followed Zophei in the loss of final glottal stop and the debuccalization of final oral stops, then once again lost final glottal stops, (3) Lutuv participated in both final glottal stop deletion and debuccalization of coda stops, but they happened in the reverse order, merging *VT (where T represents an oral stop) with *Vʔ, then merging *Vʔ with *VV. The back vowel shift shows that centralization of the high back vowel has disregarded final stops and vowel length (/*uut *ut *uuk *uk/ to /~~ɯɯ~~/).

Table 5.18 Lutuv reflexes of PKC obstruent-final rhymes

	PKC				
Lutuv	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/~~ii~~/	**iʔ* *ik *iat (*iak)	-			
/ii/	*iat	**eʔ* *eek	-	*oop	-
/ing/	*iit *ik	-	-	-	-
/aa/	-	-	**aʔ* *aak *ak	-	-
/əə/	-	-	*at	*ook *ok	*uap
/ɯɯ/	-		-	-	*uak
/uu/	-	-	-	-	*uk
/~~ɯɯ~~/	-	-	-	-	*uut *uuk *ut *uk

Lutuv, unlike Zophei, has only 3 VN rhymes, /ing əng ung/, an innovation that has shown variable developments in VN rhymes. As illustrated in Table 5.19, in some cases nasals have behaved as expected for a Maraic language with a loss in place distinction, for example in the merging of /*im *iiŋ *iŋ/ to /ing/, though in other cases like the change from /*iin *in/ to /ɨɨ/, it appears the nasal was lost prior to the centralization of /i/ to /ɨ/. Final nasal loss has resulted in diphthongization as well, as in the development of /uo/ from /*aam *am *aan *oŋ *ooŋ *uam/. The reduction in number of contrasts has also merged some VN rhymes with different vowels, such as /*eŋ *oon *un *uŋ *oŋ *uam/ to /əng/.

Table 5.19 Lutuv reflexes of PKC nasal-final rhymes

	PKC				
Lutuv	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/ɨɨ/	*iin *in	-	-	-	-
/ii/	-	*em	-	-	-
/ie/	*ian	-	-	-	-
/ing/	*ii *im *iit *iiŋ *ik *iŋ	-	-	-	*ul
/ee/	*iam *ian *iaŋ	*eem *en *eeŋ	*an	-	-
/aa/	-	-	-	*oŋ	-
/əə/	-	-	*an	-	-
/əng/	-	*eŋ	-	*oon	*un *uum *uŋ *uaŋ
/oo/	*im	-	-	*oom *oon *om *ooŋ	-
/uu/	-	-	-	-	*uun *uan (*uaŋ)
/ung/	-	-	-	-	*um *uŋ *un
/uo/	-	-	*aam *aan *am	*ooŋ *oŋ	*uam
/ʉʉ/	-	-	-	-	*uum

Lutuv reflexes of PKC liquid- and glide-final rhymes are given in Table 5.20, where merger across vowel categories is shown especially in the development of /ɨi ie aa/. Of particular interest is the merger of nearly all rhotic-final rhymes with /*aa/. The only *Vr rhymes not merging into /aa/ (setting aside the suspect /*ir/ to /əng/ correspondence) are /*uur/ (which likely merged with /*ua/) and /*or/ (which likely merged with /*oo/) prior to the merger of all remaining rhotic-final rhymes into /*aa/. In Table 5.20, laterals are highlighted in red and rhotics in green. To facilitate comparison with open syllables, long vowels and diphthongs are added in italics here.

Table 5.20 Lutuv reflexes of PKC liquid- and glide-final rhymes

	PKC				
Lutuv	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/ɨi/	**ii* **ial* **il*	-	**aaw	-	**uul* **uy* **ul*
/ii/	-	**eel* **ewʔ*	-	-	-
/yy/	-	-	**ay	**ooy	**uay
/yə/	-	-	-	**oo* **oy* **or*	**ua* **uyʔ*
/ie/	**ia*	**ee* **eel*	**aal* **aay* **al* **ay*	**ooy	-
/ing/	**ii*	-	-	-	**ul*
/ee/	-	**ee* **el* **eel*	**ay* **aw*	-	-
/aa/	**iir*	**er* **erʔ*	**aa* **ar* **aar*	**oor*	**uar*
/əə/	-	-	-	**oy*	-
/əng/	**ir*	-	-	-	-
/ɔɔ/	-	-	**aaw	**oon* **ooŋ*	-
/ɯɯ/	**iaw*	-	-	-	**uur* **ua*
/ɯə/	-	-	-	**ool*	-
/uu/	-	-	**aa* **aw* **ay*	-	-
/ung/	-	-	-	-	**uu* **uul*
/ɯɯ/	-	-	-	**ool*	**uu*

Despite surface similarities between Mara and Lutuv that have prompted its analysis as a Maraic language, diachronic evidence of separate developments from Mara suggest Lutuv may be less closely related than previously believed. Where Mara (and Zophei) underwent /a/ to /o/ raising, Lutuv did not; where Zophei lost final glottal stops and debuccalized final oral stops to /ʔ/, Lutuv lost all stops and has no final glottal stops; and while in Mara /*aar/ developed into /aa/, in Lutuv /*iir *er *erʔ *aar *ar *oor *uar/ all merged with /*aa/. An additional misleading surface similarity is found between Mara and Lutuv /ɯ/; Lutuv's /ɯ/ has developed from the PKC /*ua/ diphthong, while Mara's /ɯ/ has developed from PKC /*uʔ *(u)up *(u)ut *(u)uk/. Taken together, these developments evince a closer relationship between Zophei and Mara than between Lutuv and Mara, and suggest that many surface similarities between Lutuv and other Maraic languages may be due to contact.

5.6 Diachronic changes from PKC to Zotung

Zotung is unique in Maraic languages for several reasons that make it appear like a more conservative Kuki-Chin language (possibly more closely related to Southern languages) that has changed dramatically due to contact with other Maraic languages. Zotung has several retentions from PKC including: /j/, which has fricated to /z/ in all Central and Maraic languages but is retained in some Southern languages; implosives, which are analyzed in Van Bik (2009) as developing into plain voiced stops in all Kuki-Chin languages except some Southern languages (Mindat Cho, Daai); and /θ/, which Van Bik (2009) reconstructs for PKC and is retained only in the Southern language Mindat Cho. In addition, Zotung has no lateral or sibilant affricates, opting for consonant deletion over affrication in the loss of onset clusters.

As explicated in the remainder of this section, rhyme data from the word list in Shintani (2015) also suggests that surface similarities between Zotung and Mara are due to contact, as

many of the diachronic changes described for Mara do not play out in the same way in Zotung. Table 5.21 offers an overview of Zotung reflexes of PKC rhymes and Tables 5.22-5.25 further divide PKC syllables by type. in line with the previous sections, the tables in this subsection show the synchronic Zotung rhyme on the left and each row represents the PKC rhymes associated with reconstructed words corresponding to rhymes in Zotung lexical items.

Table 5.21 Zotung reflexes of PKC rhymes

	PKC				
Zotung	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/i/	*ii (*iak) *iʔ *il *iat *iaw				
/iʔ/	*ik				
/ĩ/	*ii *in *im *iŋ	*eŋ			*ul
/ia/		*ee *eem *eet *er *eek			
/e/		*ee	*al		
/eʔ/		*eʔ			
/æ/		*eʔ *ewʔ *eel	*aa *ay		
/a/			*aar		
/ã/			*am		
/aʔ/			*ak		
/ə/			*aʔ		
/o/			*aa *aal *at *ar *aŋ		*uul *uam
/õ/	*iit			*oom *om	*uu *uŋ *um *uur
/oe/	*ir				
/ou/			*ay		
/ouʔ				*ok	
/u/		*en	*aw	*ooŋ	*uu *uk *uut *uŋ
/ui/					*uuy *uy
/uiʔ/					*uʔ *ut
/ũĩ/					*um *ul *un
/ue/			*aan		*uay
/ueʔ/				*ool	*ul
/ua/	*iap			*oor	*uum *uap *uaŋ *uuy *uaʔ *uar *ua
/ɯ/	*uaŋ (*uan)		*aw		
/ũ̃/		*eŋ			*uum
/ɯa/	*ia *iam *iat *ian	*eeŋ			

Table 5.22 shows that treatment of *Vʔ rhymes from PKC is variable, suggesting a mix of internal changes and borrowing. In one rhyme /eʔ/, the glottal stop was retained from PKC, but other cases show merger of VV and Vʔ rhymes or further divergence of such rhymes into different vowel categories. Glottal stop deletion (robustly attested Zophei) occurs in only two Zotung vowels, merging /*ii *iʔ/ to /i/ and /*ua *uaʔ/ to /ua/. Other rhymes such as PKC /*uu *uʔ/ have further diverged. While /*uu/ corresponds with Zotung /u/ or /õ/, PKC /*uʔ/ corresponds with Zotung /uiʔ/.

One such split relevant to the study of the Maraic back vowel shift involves the low vowels /*aa *aʔ/; while /*aa/ has correspondences with Zotung /oo/ (as in Mara) and /æ/ (not attested in any other Maraic variety), /*aʔ/ corresponds with Zotung /ə/. This differential treatment of /*aa/ and /*aʔ/ suggests that, unlike Mara and Zophei, glottal stops were not lost before the raising of /*a/ to /o/. One possibility is that Zotung innovated /*aa/ to /æ/ and words evincing /*aa/ raising to /oo/ are borrowed from Mara.

Table 5.22 Zotung reflexes of PKC open syllable rhymes

	PKC				
Zotung	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/i/	*ii *iʔ				
/ĩ/	*ii				
/ia/		*ee			
/e/		*ee			
/eʔ/		*eʔ			
/æ/		*eʔ	*aa		
/ə/			*aʔ		
/o/			*aa		
/õ/					*uu
/u/					*uu
/uiʔ/					*uʔ
/ua/					*ua *uaʔ
/ɯa/	*ia				

In Zotung, only some PKC rhymes follow the Zophei path of glottal stop loss and debuccalization of oral stops, others pattern with Lutuv in treating all final stops equally. Table 5.23 presents Zotung reflexes of PKC rhymes ending in an oral stop with Vʔ rhymes added in italics for comparison. The one clear example of the Zophei method is found in the set of changes from /*iʔ/ to /i/ and /*ik/ to /iʔ/. The merger of /*ua *uaʔ *uap/ to /ua/ evinces deletion rather than debuccalization, as occurred in Lutuv. The mid front vowel rhymes merit particular attention as well. It appears /*ee *eet *eek *eem *er/ have all merged to /ia/, suggesting coda deletion and diphthongization occurred in these vowels regardless of final consonant identity.

Table 5.23 Zotung reflexes of PKC obstruent-final rhymes

	PKC				
Zotung	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/i/	**iʔ* (*iak) *iat				
/iʔ/	*ik				
/ia/		*eet *eek			
/aʔ/			*ak		
/eʔ/		**eʔ*			
/æ/		**eʔ*			
/ə/			**aʔ*		
/o/			*at		
/õ/	*iit				
/ouʔ				*ok	
/u/					*uut *uk
/uiʔ/					**uʔ* *ut
/ua/	*iap				**uaʔ* *uap
/ɯa/	*iat				

Zotung reflexes of PKC nasal-final rhymes are given in Table 5.24. The loss of coda nasals in favor of nasalized vowels looks straightforward in, for example, changes from /*im *in *iŋ/ to /ĩ/, /*oom *om/ to /õ/, and /*uum/ to /ʉ̃/ (the latter example also involves the /u/ to /ɯ/ Maraic back vowel shift). There are also instances where VN rhymes were lost in favor of non-

nasalized vowels that are sometime diphthongal, for example in the /*eem/ to /ia/ change. Non-nasalized vowels from VN sources are possible borrowings from Mara or Lutuv which lack nasal vowels. There is also some evidence of the Maraic back vowel shift in /*aŋ/ to /o/, /*oŋ/ to /u/, and the previously mentioned /*uum/ to /ʉ̃/ changes.

Table 5.24 Zotung reflexes of PKC nasal-final rhymes

	PKC				
Zotung	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/ĩ/	*im *in *iŋ	*eŋ			
/ia/		*eem			
/ã/			*am		
/o/			*aŋ		*uam
/õ/				*oom *om	*um *uŋ
/u/		*en		*ooŋ	*uŋ
/ũĩ/					*um *un
/ue/			*aan		
/ua/					*uum *uaŋ
/ɯ/	*uaŋ (*uan)				
/ʉ̃/		*eŋ			*uum
/ɯa/	*iam *ian	*eeŋ			

Liquid- and glide-final PKC rhymes in Table 5.25 also contain some evidence of the Maraic back vowel shift in the /*aal *ar/ to /o/ change, in this example without differential treatment of liquids (perhaps some contextual merger between /l/ and /r/ codas has occurred). Examples of PKC /*aw/ rhymes in Zotung offer possible examples of borrowings from multiple sources. While the back vowel shift in Zophei and Lutuv includes /au/ to /u/ to /ʉ/ (/ɯ/ in Mara), the Zotung data from Shintani (2015) includes items that appear to indicate different stages of the shift. The /*aw/ to /u/ change is attested in Zotung, but the /*aw/ to /ɯ/ change (likely by way of /u/ as in Mara) is also attested. In addition, words that retained /*uu/ as /u/ are also found in the data, though without further research on Zotung, it is unclear which of these changes

occurred internally and which were introduced through borrowings. In Table 5.25, laterals are highlighted in red and rhotics in green. To facilitate comparison with open syllables, long vowels and diphthongs are added in italics.

Table 5.25 Zotung reflexes of PKC liquid- and glide-final rhymes

	PKC				
Zotung	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/i/	**ii* *il *iaw				
/ĩ/	**ii*				*ul
/ia/		**ee* *er			
/e/		**ee*	*al		
/æ/		*eel *ewʔ	**aa* *ay		
/a/			*aar		
/o/			**aa* *aal *ar		*uul
/õ/					**uu* *uur
/oe/	*ir				
/u/			*aw		**uu*
/ui/					*uuy *uy
/ũĩ/					*ul
/ue/					*uay
/ueʔ/				*ool	*ul
/ua/				*oor	*uuy **ua* *uar
/ɯ/			*aw		
/ɯa/	**ia*				

Zotung data collected from Shintani (2015) offers the best look into Zotung currently available. Those data suggest future research should consider whether Zotung is more closely related to Southern Kuki-Chin languages, patterning with onset trends in those languages rather than Central and Maraic languages. However, superficial similarities including syllable structures simplification and back vowel shift phenomena indicate that Zotung has changed through contact with neighboring languages like Mara and Lutuv. Though Zotung lacks coda consonants other than /ʔ/, it does not appear to have consistently lost coda /ʔ/ or to have debuccalized coda oral stops like Zophei. Likewise, there are some examples of the Maraic back

vowel shift, but little consistency in distribution. It is likely that the inconsistency in Zotung changes is due to differing sources for lexical items. Comparison between Zotung varieties and between Zotung and other Maraic and Southern varieties will help to further flesh out the story of syllable structure simplification and language contact in Maraic, as well as the diachronic relations between Zotung and surrounding languages.

5.7 Diachronic changes from PKC to TRZ (Lower Zophei B)

Of the three varieties of Zophei investigated in this research, the most conservative rhyme system belongs to the Tlawngrang dialect; although Tlawngrang has some innovations not found in the Lawngtlang or Nuitah varieties. This section examines rhyme changes from PKC to TRZ, keeping in mind the five diachronic processes described for Maraic in Van Bik (2009). In particular, the loss of glottal stops and the loss of coda consonants in favor of glottal stops are both observed in TRZ, as is high vowel substitution, which appears unidirectional /*u/ to /i/ as in Lutuv). The raising of /e/ to /i/ and the back vowel chain shift in Mara are observed marginally in TRZ, but are more relevant in our discussions of LTZ and NTZ in Sections 5.8-5.9. Table 5.26 offers an overview of TRZ vowel reflexes of PKC rhyme types by comparing the elicited word list to Van Bik (2009) with correspondences found in Appendix C. Tables 5.27-5.30 further divide this table into PKC open syllable rhymes, stop-final rhymes, nasal-final rhymes, and liquid/glide-final rhymes.

Like in the previous sections, the tables in this subsection show the synchronic TRZ rhymes on the left and each row represents the PKC rhymes associated with reconstructed words corresponding to rhymes in TRZ lexical items.

Table 5.26 TRZ reflexes of PKC rhymes

	PKC				
TRZ	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/ii/	*ii *il *iʔ *iat or *iak *iit	-	-	-	*uul *ul
/ih/	*ik *ial *ia	-	-	-	*ut
/ia/	-	*er *erʔ	-	-	-
/ing/	*ii *in *iŋ *im *iiŋ *ir *iin	*eŋ	-	*on	*uum *un *um *uŋ *ul
/ee/	*ian	*ee *eel *eʔ	*al *ay *aay *aaw	*ooy	
/eh/	*ik *iap *iat	*eet *eek	*at		
/ei/	-	*ee *eel *eʔ *el	*aal *ay *al	*ool	-
/øø/	-	*ewʔ	*aar *aaw *ay *aw	*oyʔ	*uaŋ (or *uan)
/aa/	-	-	*aa *aar *ar	*oor	-
/ah/	-	-	*at *ak *aak	-	-
/ai/	*iam *iaŋ *ian	*em *eeŋ *en *eŋ	*am *aay *aan *aw *an	*oon	-
/au/	-	-	*aw	*oo *olʔ *oʔ *oy *oop	*uu *um *ua *uur *uk *uuy
/ang/	-	*em	*aam *an *am *aaŋ *aan *aŋ	-	-

Table 5.26 TRZ reflexes of PKC rhymes, cont'd

/oo/	*iir	-	*aa *aar *aʔ	*oŋ *or	-
/oh/	-	-	-	*ook *ok	*uap
/ong/	*im	-	-	*oom *oŋ *om *olʔ *ooŋ	*uam *uaŋ
/uu/	-	-	-	-	*uu *uum *uʔ *uul
/uh/	-	-	-	-	*up *uuk *uut *uk *uak
/ui/	-	-	*ay	*ool *ooy *oy	*uuy *uay *uy *uyʔ
/ua/	-	-	-	-	*ul *ual *ua *uar *uaʔ
/ung/	-	-	-	-	*uum *un *um *uŋ *uun

Table 5.27 shows TRZ reflexes of PKC open syllable rhymes with Vʔ rhymes included as well. TRZ data offers evidence of glottal stop deletion resulting in the following mergers /*ii *iʔ/, /*ee *eʔ/, /*oo *oʔ/, /*aa *aʔ/, /*uu *uʔ/, and /*ua *uaʔ/. Open syllables show no evidence of mid vowel raising or high vowel substitution, however it is worth noting that /*ee *eʔ/ appear to have developed into both /ee/ and /ei/, suggestive of borrowing. Other likely borrowings (likely from Hakha Lai) are indicated by the /*uʔ/ to /uh/ correspondence, which must have occurred after the loss and re-innovation of final glottal stops in Zophei. Some evidence of the back vowel chain shift can also be seen in Table 5.27, first in the raising of /*aa *aʔ/ to /oo/, then in the diphthongization of /*oo *oʔ/ to /au/. The /*aa/ to /aa/ correspondences are also likely borrowings into TRZ (from Hakha Lai) after low vowel raising took place.

Table 5.27 TRZ reflexes of PKC open syllable rhymes

	PKC				
TRZ	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/ii/	*ii *iʔ	-	-	-	-
/ia/	*ia	-	-	-	-
/ing/	*ii	-	-	-	-
/ee/	-	*ee *eʔ	-	-	-
/ei/	-	*ee *eʔ	-	-	-
/aa/	*aa	-	-	-	-
/au/	-	-	-	*oo *oʔ	*uu *ua
/oo/	-	-	*aa *aʔ	-	-
/uu/	-	-	-	-	*uu *uʔ
/uh/	-	-	-	-	*uʔ
/ua/	-	-	-	-	*ua *uaʔ

Table 5.28 offers TRZ reflexes of PKC stop-final rhymes, which in most cases show a reduction from /*p *t *k/ to /ʔ/. The loss of final oral stops in favor of glottal stop is seen in diachronic changes from /*ik *ut/ to /*ih/ (which also shows unidirectional high vowel substitution), /*eet *eek/ to /*eh/, /*at *ak *aak/ to /ah/, and /*uut *uk/ to /uh/. There are also stops in a number of rhymes that were deleted altogether, for example in correspondences between /*iit/ and /ii/ as well as /*up/ and /uu/, possibly evidence that oral stops in some lexical items were lost in favor of glottal stop before the loss of final glottal stop, or that such words were later borrowings.

Table 5.28 TRZ reflexes of PKC stop-final rhymes

	PKC				
TRZ	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/ii/	*iit *iat (or *iak)	-	-	-	-
/ih/	*ik	-	-	-	*ut
/eh/	*ik *iap *iat	*eet *eek	*at		
/ah/	-	-	*at *aak *ak	-	-
/au/	-	-	-	*oop	*uk
/oh/	-	-	-	*ook *ok	*uap
/uu/	-	-	-	-	*up
/uh/	-	-	-	-	*uut *uk *uuk *uak

PKC nasal-final rhymes in some cases lost place of articulation contrasts only, such as in /*uum *um *uun *un *uŋ/ to /ung/ and /*am *an *aŋ/ to /ang/. Unidirectional high vowel substitution is also observed in the diachronic change from /*im *iin *in *iiŋ *iŋ *uum *um *un *uŋ/ to /ing/ (but not /*iN *iiN/ to /ung/). Some nasal finals have been lost, most notably in the innovation of the /ai/ diphthong from /*iam *ian *iaŋ *eeŋ *em *en *eŋ *am *aan *an *aw/, a change not present in the more innovative LTZ and NTZ varieties which have /eng/ instead of /ai/, having preserved the final nasal. The loss of /*eng/ in favor of /ai/ is likely conditioned by contact with Mara, which has undergone a similar change /*iam *ian *iaŋ *eem *een *eeŋ/ to Mara /ai/, having lost nasal codas in favor of nasalized vowels then losing contrastive vowel nasality (Löffler, 2004). TRZ reflexes of PKC nasal-final rhymes are presented in Table 5.29.

Table 5.29 TRZ reflexes of PKC stop-final rhymes

	PKC				
TRZ	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/ing/	*im *iiŋ *iin *iŋ *in	*eŋ	-	*on	*uum *un *um *uŋ
/ee/	*ian	-	-	-	-
/øø/	-	-	-	-	*uan (or *uaŋ)
/ai/	*iam *iaŋ *ian	*em *en *eeŋ *eŋ	*am *an *aan *aw	*oon	-
/au/	-	-	-	-	*um
/ang/	-	*em	*aam *an *am *aaŋ *aan *aŋ	-	-
/oo/	-	-	-	*oŋ	-
/ong/	*im	-	-	*oom *ooŋ *om *oŋ	*uam *uaŋ
/uu/	-	-	-	-	*uum
/ung/	-	-	-	-	*uum *un *um *uŋ *uun

Liquid- and glide-final rhymes in TRZ are given in Table 5.30, where there are examples of several of the diachronic phonological processes discussed for Maraic languages. Glottal stop deletion is observed, for example, in the merger of /*uuy *uy *uyʔ/ to /ui/. Some instances of liquid deletion are noted, such as in the diachronic changes from /*ial/ to /ia/ and from /*il *uul *ul/ to /ii/, a process that also evinces unidirectional high vowel substitution. The raising of /e/ can be seen in the change from /*er *erʔ/ to /ia/; and the Maraic back vowel shift is observed in changes from /*olʔ *oy/ to /au/ and /*ol *ooy *oy/ to /uu/. It is worth also noting the innovation of /øø/ from /*ewʔ *aar *ay *aaw *aw/ is an innovation in LTZ and TRZ only and, as Arden (2010) describes the vowel for Sabeu Mara, is a possible contact-induced change. As will be shown in Section 5.8, NTZ retains the intermediate development /oi/, which corresponds to the

LTZ and TRZ /øø/. In Table 5.30, laterals are highlighted in red and rhotics in green. To facilitate comparison with open syllables, long vowels and diphthongs are added in italics here.

Table 5.30 TRZ reflexes of PKC liquid and glide-final rhymes

	PKC				
TRZ	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/ii/	*il	-	-	-	*uul *ul
/ia/	*ial	*er *erʔ	-	-	-
/ing/	*ir	-	-	-	*ul
/ee/	-	*eel	*al *ay *aay	*ooy	
/ei/	-	*eel *el	*aal *ay *al	*ool	-
/ee/	-	-	*al *aaw	-	-
/øø/	-	*ewʔ	*aar *aaw *ay *aw	*oyʔ	-
/aa/	-	-	*aar *ar	*oor	-
/ai/	-	-	*aw *aay	-	-
/au/	-	-	*aw	*olʔ *oy	*uur *uuy
/oo/	*iir	-	*aar	*or	-
/ong/	-	-	-	*olʔ	-
/uu/	-	-	-	-	*uul
/ui/	-	-	*ay	*ool *oy *ooy	*uuy *uyʔ *uy *uay
/ua/	-	-	-	-	*ul *uar *ual

TRZ is the most conservative Zophei variety investigated in this research, offering insight into Proto-Maraic. TRZ shows diachronic evidence of glottal stop deletion, oral stop debuccalization, unidirectional high vowel substitution (/u/ for /i/), and some evidence of the back vowel shift present in Mara. As previously mentioned, Van Bik describes this chain shift as a drag chain, first /*u/ → /ɯ/, then /*ɔ/ to /u/, then /*a/ to /ɔ/, however TRZ data only shows low vowel raising /*a/ to /o/ and some instances of /*o/ to /au/. This observation coupled with further

vowel shifts in LTZ and NTZ (discussed in Section 5.10) suggests that these changes were the earliest developments in this chain shift for Zophei, possible evidence of a push chain that later affected high vowels. Investigating whether a push chain analysis also works for Mara and other Maraic languages merits future comparative research.

TRZ shows two innovations notable in its divergence from other Zophei varieties. First, where LTZ and NTZ have /eng/, TRZ has innovated /ai/, resulting in a reduction in VN rhymes from five to four. Further reduction in VN rhymes is observed in Lutuv, which has only three, as described in Section 5.5. TRZ has also shared the innovation of /øø/ with LTZ, a rhyme that corresponds to /oi/ in NTZ. TRZ and LTZ are both considered Lower Zophei while NTZ is considered Upper Zophei; although, as will be shown in the sections that follow, LTZ and NTZ appear more closely related, suggesting the developments of /øø/ from /oi/ and /ai/ from /eng/ may be due to contact with Mara. Section 5.8 discusses rhyme developments in the more innovative NTZ variety.

5.8 Diachronic changes from PKC to Nuitah Zophei (Upper Zophei)

Nuitah Zophei (NTZ) developments from PKC suggest it is more innovative than TRZ and more conservative than LTZ, offering a sort of intermediate view of the Maraic vowel shifts as they have played out in Zophei. In addition, NTZ retains some forms not found in the more conservative TRZ or the more innovative LTZ. Such a distribution offers possible evidence of contact-induced changes from Mara since TRZ and LTZ (but not NTZ) dialect regions border the Mara-speaking area. The loss of glottal stops and the loss of coda consonants in favor of glottal stops are both observed in NTZ, as is high vowel substitution. The raising of /e/ to /i/ is also present in NTZ as well as the centralization of /i/ to /ɨ/, which taken together make up the front vowel shift in Zophei. The back vowel shift is more advanced in NTZ than in TRZ with

evidence of /a/ → /o/ → /u/ → /ʉ/, though NTZ lacks the /au/ diphthong present in both TRZ and LTZ. In addition, where TRZ and LTZ have /ø/, NTZ has the more conservative /oi/.

Table 5.31 offers an overview of the diachronic rhyme developments from PKC to NTZ, which is further divided into open syllable rhymes in Table 5.32, stop-final rhymes in Table 5.33, nasal-final rhymes in Table 5.34, and liquid/glide-final rhymes in Table 5.35. As in the previous sections, the tables in this subsection show the synchronic NTZ rhymes on the left and each row represents the PKC rhymes associated with reconstructed words corresponding to rhymes in NTZ lexical items.

Table 5.31 NTZ reflexes of PKC rhymes

	PKC				
NTZ	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/~~ii~~/	*ii *iit *iʔ *il				*uŋ *ul *uul
/ii/		*ee *eel *eʔ		*ool	
/ih/	*ik				*ut
/ia/	*ia (*iak) *iat *ial	*er *erʔ			
/ing/	*iin *iŋ *in *ir *iiŋ	*eŋ		*oon	*uum *um *un
/ee/		*ee *el *eet	*aal *al		
/eh/	*iap *iat	*eet *eek	*at		
/eng/	*iam *ian *iaŋ	*eem *eeŋ *em *eŋ *en	*am *aan *aw	*oon	
/aa/			*aar *ar	*oor	
/ah/			*at *ak *aak	*ook *ok	
/ai/	*ian	*eʔ *eel	*aay *ay	*ooy	
/ang/		*em	*aam *aaŋ *am *aŋ *an		
/oo/	*iir		*aa *aar *aʔ		
/oi/		*ewʔ	*ay *aw	*or	*uaŋ (*uan)
/ong/	*im			*oom *ooŋ *olʔ *om *oŋ	*uam *uaŋ
/uu/			*aw	*oo *oop *oy *oʔ *olʔ *oyʔ	*uu *uur *ua *uk *uuy
/uh/					*uʔ *uuk *uap *uut *uk *uak
/ui/			*ay	*ool *oy *ooy	*uuy *uyʔ *uy *uay
/ua/					*ul *uaʔ *uar *ua *ual
/ung/					*uum *uun *uŋ *um *un
/~~uu~~/					*uu *up *uul *uʔ *uum

PKC open syllables and those closed with a glottal stop mostly pattern together in NTZ, evincing the loss of final glottal stops described in other varieties of Zophei. Table 5.32 offers evidence of this merger with, for example, /*ua *uaʔ/ merging to /ua/. In most cases the merger was followed by a shift, so the front vowel shift is seen in /*ee *eʔ/ to /ii/ and /*ii *iʔ/ to /~~ii~~/ developments; and the back vowel shift is seen in /*aa *aʔ/ to /o/, /*oo *oʔ/ to /uu/, and /*uu *uʔ/ to /~~uu~~/ mergers. As additional notes, instances of /*uu/ to /uu/ and /*uʔ/ to /uh/ are likely borrowings from Hakha Lai and there were no examples of high vowel substitution in open syllable rhymes in the data collected for this study.

Table 5.32 NTZ reflexes of PKC open syllable rhymes

	PKC				
NTZ	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/~~ii~~/	*ii *iʔ	-	-	-	-
/ii/	-	*ee *eʔ	-	-	-
/ia/	*ia	-	-	-	-
/ee/	-	*ee	-	-	-
/ai/	-	*eʔ	-	-	-
/oo/	-	-	*aa *aʔ	-	-
/uu/	-	-	-	*oo *oʔ	*uu *ua
/uh/	-	-	-	-	*uʔ
/ua/	-	-	-	-	*ua *uaʔ
/~~uu~~/	-	-	-	-	*uu *uʔ

Table 5.33 offers NTZ reflexes of PKC stop-final rhymes, which, like in TRZ, have been lost largely in favor of glottal-stop final rhymes. In some cases, the loss of glottal stops appears to have occurred after the front and back vowel shifts, so while *Vʔ rhymes pattern with *VV

rhymes, *VT rhymes do not, for example, in changes from /*eet *eek/ to /eh/ (rather than /ii/), /*at *aak *ak/ to /ah/ (rather than /oo/), and /*uut *uuk *uk/ to /uh (rather than /~~uu~~/). In this process, some (unidirectional) high vowel substitution is noted in the /*ik *ut/ to /ih/ merger. It is worth mentioning here that /*ook *ok/ have lowered (or centralized) to /ah/ [ə] (also observed in LTZ), rather than innovating /oh/ as in TRZ),

Table 5.33 NTZ reflexes of PKC obstruent-final rhymes

	PKC				
NTZ	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/~~i~~i/	*iit	-	-	-	-
/ih/	*ik	-	-	-	*ut
/ia/	*iat/*iak	-	-	-	-
/ee/	-	*eet	-	-	-
/eh/	*iap *iat	*eet *eek	*at	-	-
/ah/	-	-	*at *aak *ak	*ook *ok	-
/uh/	-	-	-	-	*uut *uuk *uk *uap *uak
/~~uu~~/	-	-	-	-	*up

Apart from the loss of coda nasal place contrasts, PKC nasal-final rhymes show little diachronic change in NTZ, as shown in Table 5.34. For example, /*iin *in *iiŋ *iŋ/ merged to /ing/ and /*aam *am *an *aaŋ *aŋ/ to /ang/. With some exceptions, mergers of /*iaN *(e)eN/ to /eng/ and /*uaN *(o)oN/ to /ong/ are also observed, as in TRZ. One relevant difference from TRZ (and similarity with LTZ) is the retention of /eng/ rather than the innovation of /ai/.

Table 5.34 NTZ reflexes of PKC nasal-final rhymes

	PKC				
NTZ	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/ɨi/					*uŋ
/ing/	*iin *iiŋ *in *iŋ	*eŋ		*oon	*uum *un *um
/eng/	*iam *ian *iaŋ	*eem *eeŋ *em *eŋ *en	*am *aan	*oon	
/ai/	*ian				
/ang/		*em	*aam *aaŋ *am *aŋ *an		
/oi/					*uaŋ/*uan
/ong/	*im			*oom *ooŋ *om *oŋ	*uam *uaŋ
/ung/					*uum *un *um *uŋ *uun
/ɯɯ/					*uum

Table 5.35 includes NTZ reflexes of PKC lateral-final (green), rhotic-final (red), and glide-final rhymes (black) with VV syllables added in italics for comparison. Coda liquid deletion has occurred in all Zophei varieties investigated in this study, so vowel shifts observed between TRZ and the more innovative NTZ variety have occurred more recently than did liquid deletion leaving behind the following mergers: /*ii *il/ to /ɨi/, /*ee *eel/ to /ii/, and /*uu *uul/ to /ɯɯ/. In addition, the merger of /*ewʔ *aay *ay *or/ to NTZ /oi/ offers the more conservative diphthong which developed into TRZ and LTZ /øø/. Although the varieties of Mara discussed in Van Bik (2009) do not include /ø/, Arden's (2010) description of the Sabeu dialect does, so it is possible that the coalescence of /oi/ to /øø/ was conditioned by contact with Mara.

Table 5.35 NTZ reflexes of PKC liquid- and glide-final rhymes

	PKC				
NTZ	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/ɨi/	**ii* *il				*uul *ul
/ii/		**ee* *eel		*ool	
/ia/	**ia* *ial	*er *erʔ			
/ing/	*ir				
/ee/		**ee* *el	*aal *al		
/eng/			*aw		
/aa/			*aar *ar	*oor	
/ai/		*eel	*aay *ay	*ooy	
/oo/	*iir		**aa* *aar		
/oi/		*ewʔ	*ay *aw	*or	
/ong/				*olʔ	
/uu/			*aw	**oo* *oy *olʔ *oyʔ	**uu* *uuy *uur *ua
/ui/			*ay	*ool *oy *ooy	*uuy *uyʔ *uy *uay
/ua/					*ul *ual **ua* *uar
/ɯu/					**uu* *uul

The NTZ vowel system appears, as is further supported in Section 5.9, more similar to the more innovative LTZ than to the more conservative TRZ, however NTZ maintains the more conservative /oi/ and /eng/ rhymes where /TRZ has /øø/ and /ai/, possibly due to the influence of Mara. NTZ similarities with LTZ are surprising given the community's Upper/Lower Zophei distinction where NTZ is the only Upper Zophei variety investigated here. Section 5.9 describes rhyme developments in LTZ.

5.9 Diachronic changes from PKC to Lawngtlang Zophei (Lower Zophei B)

LTZ is the most innovative Zophei variety investigated in this study. It shows evidence of the same final glottal stop loss and final stop debuccalization as TRZ, NTZ, and Mara, as well as the most advanced front and back vowel shifts in the Zophei varieties investigated here. Table 5.36 offers an overview of LTZ reflexes of PKC rhymes, further broken down by PKC open syllable rhymes, stop-final rhymes, nasal-final rhymes, and liquid and glide-final rhymes in Tables 5.37-5.40, respectively.

Table 5.36 LTZ reflexes of PKC rhymes

	PKC				
LTZ	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/ɨɨ/	*ii *il *iʔ *iat or *iak *iit	-	-	-	*uul *ul
/ii/	-	*ee *eel *eʔ	-	*ool	-
/ih/	*ik *ial *ia *iap	*eet *eek	*at	-	*ut
/ie/	-	*er *erʔ	-	-	-
/ing/	*im *in *iŋ *iin *iiŋ *ir	*eŋ	-	*on	*uum *un *um *uŋ
/yy/	-	-	*ay	*ool *ooy *oy	*uuy *uay *uy *uyʔ
/ee/	*ian	*ee *eel *eʔ	*al *ay *aay	*ooy	
/eh/	*iat	-	-	-	-
/ei/	-	*el	*aal *al	-	-
/eng/	*iam *iaŋ *ian	*eN *eeŋ	*am *an *aan *aw	*oon	-
/øø/	-	*ewʔ	*aar *aaw *ay *aw	*oyʔ	*uaŋ (or *uan)
/aa/	*aa	-	*aar *ar	*oor	-
/ah/	-	-	*at *ak *aak	*ook *ok	-
/au/	*iir	-	*aa *aar *aʔ	*oŋ *or	-
/ang/	-	*em	*aam *an *am *aaŋ *aan *aŋ	-	-
/ong/	*im	-	-	*oom *oŋ *om *olʔ *ooŋ	*uam *uaŋ

Table 5.36 LTZ reflexes of PKC rhymes, cont'd

/uu/	-	-	*aw	*oo *olʔ *oʔ *oy *oop	*uu *um *ua *uur *uk *uuy
/uh/	-	-	-	-	*uʔ *uuk *up *uk *uut *uap *uak
/uo/	-	-	-	-	*ul *ual *ua *uar *uaʔ
/ung	-	-	-	-	*uum *un *um *uŋ *uun
/~~uu~~/	-	-	-	-	*uu *uum *uʔ *uul

Table 5.37 offers evidence of glottal stop deletion and vowel shift in LTZ reflexes of PKC open syllable rhymes. Glottal stop deletion is evidenced by the patterning of *VV syllables with their *Vʔ counterparts, for example in the merger of /*ii *iʔ/ to /~~ii~~/, the one counter example found here is the /*uʔ/ to /uh/ correspondence, which is likely a later borrowing (from Hakha Lai). The back vowel shift described between PKC and TRZ and between TRZ and NTZ is the most advanced in LTZ where some changes are no longer transparent.

TRZ data reveals a shift from /*aa/ to /oo/ and from /*oo/ to /au/, while LTZ offers evidence of changes from /*aa/ to /au/ and /*oo/ to /uu/. The latter change from /*oo/ to /uu/ also occurred in NTZ. Taken together with the /*oo/ to /au/ change in TRZ, it suggests an /*oo/ to /au/ to /uu/ change in both NTZ and LTZ. The /*aa/ to /au/ change was only found in the LTZ data collected for this study, an indication that the /*oo/ to /au/ change occurred twice for LTZ, once since TRZ diverged from PKC, and once since LTZ diverged from NTZ. The further raising of /*ua *uaʔ/ to /uo/ is also noted for LTZ only. The centralization of high vowels (/*uu *uʔ/ to /~~uu~~/ and /*ii *iʔ/ to /~~ii~~/), which occurred in NTZ, has taken place in LTZ as well. The

raising of /*ee *eʔ/ to /ii/ is found in NTZ, though further raising of /*ia/ to /ie/ was only noted for LTZ. That /*ee *eʔ/ reflexes are split between LTZ /ii/ and /ee/ likely stems from splitting of reflexes between /ee/ and /ei/ noted for TRZ. TRZ /ei/ mostly corresponds to LTZ /ii/ while TRZ /ee/ was mostly unchanged in LTZ.

Table 5.37 LTZ reflexes of PKC open syllable rhymes

	PKC				
LTZ	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/~~ii~~/	*ii *iʔ	-	-	-	-
/ii/	-	*ee *eʔ	-	-	-
/ie/	*ia	-	-	-	-
/ee/	-	*ee *eʔ	-	-	-
/aa/	*aa	-	-	-	-
/au/	-	-	*aa *aʔ	-	-
/uu/	-	-	-	*oo *oʔ	*uu *ua
/uh/	-	-	-	-	*uʔ
/uo/	-	-	-	-	*ua *uaʔ
/~~uu~~/	-	-	-	-	*uu *uʔ

The debuccalization of coda stops as well as front and back vowel shifts are evinced in the obstruent-final rhyme correspondences in Table 5.38. In some cases, such as /*ik/ to /ih/, /*at *ak *aak/ to /ah/, and /*up *uut *uuk *uk/ to /uh/, it appears that the loss of coda oral stops in favor of glottal stops occurred after the merger and vowel shifts affecting *VV and Vʔ rhymes. There are some counterexamples, such as /*iit/ to /~~ii~~/ and /*oop/ to /uu/, which have participated in the shift. These lexical items may have debuccalized oral stops before the loss of final glottal stops or they may be borrowings from other Maraic languages. Two other vowel developments in LTZ are also shown here as compared with TRZ involving raising and lowering of Vʔ rhymes: PKC /*eet *eek/ (TRZ /eh/) to LTZ /ih/; and PKC /*ok *ook/ (TRZ /oh/) to LTZ /ah/, also present in NTZ. PKC diphthongs /*ia/ and /*ua/ also suggest variation by coda stop place and/or

lexical item most evident in /ia/ in the following correspondences: /*iat/ (or /*iak/) to /i̵i̵/, /*iap/ to /ih/, and /*iat/ to /eh/.

Table 5.38 LTZ reflexes of PKC obstruent-final rhymes

	PKC				
LTZ	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/i̵i̵/	*iit *iat (or *iak)	-	-	-	-
/ih/	*ik *iap	*eet *eek	*at	-	*ut
/eh/	*iat	-	-	-	-
/ah/	-	-	*at *aak *ak	*ok *ook	-
/uu/	-	-	-	*oop	*uk
/uh/	-	-	-	-	*up *uuk *uap *uut *uk *uak

LTZ neutralization of final nasal place has largely involved merger, for example in the development of LTZ /eng/ from /*iaN *eeN *eN *aaN *aN *ooN/ sources and the development of LTZ /ong/ from /*ooN *oN *uaN/ sources. Some unidirectional high vowel substitution is also noted in the split in correspondences between PKC /*uum *um *un *uŋ/ and LTZ /ing ung/. Examples of nasal-final rhymes in PKC corresponding with VV rhymes in LTZ may be borrowings from other Maraic languages. It is also worth noting that LTZ has retained the /eng/ rhyme where TRZ has innovated /ai/. Nasal-final rhyme correspondences between LTZ and PKC are presented in Table 5.39.

Table 5.39 LTZ reflexes of PKC nasal-final rhymes

	PKC				
LTZ	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/ing/	*im *in *iin *iŋ *iiŋ	*eŋ	-	*on	*uum *un *um *uŋ
/ee/	*ian	-	-	-	-
/eng/	*iam *ian *iaŋ	*em *eeŋ *en *eŋ	*am *aan *an *aw	*oon	-
/øø/	-	-	-	-	*uan (or *uaŋ)
/au/	-	-	-	*oŋ	-
/ang/	-	*em	*aam *am *aan *an *aaŋ *aŋ	-	-
/ong/	*im	-	-	*oom *ooŋ *om *oŋ	*uam *uaŋ
/uu/	-	-	-	-	*um
/ung	-	-	-	-	*uum *un *um *uŋ *uun
/~~uu~~/	-	-	-	-	*uum

LTZ reflexes of PKC liquid- and glide-final rhymes are presented in Table 5.40, the loss of coda liquids and glides in Zophei was variably accompanied by vowel changes. In some cases, the loss of coda liquids did not affect vowel identity, for example in the merger of /*uu *uul/ to /~~uu~~/—it appears the centralization of /uu/ was a later development . Noting unidirectional high vowel substitution, a similar situation is also evidenced in the /*ii *il *uul *ul/ to /~~ii~~/ correspondences.

Low vowels have taken varied paths from PKC to LTZ, for example, PKC /*ay/ has correspondences with /yy ee øø/. Similar variation is shown in correspondences between /*aar/ and /øø aa au/, showing three patterns: (1) /*aar/ follows glide-final rhymes in innovating /øø/

(like in TRZ), (2) /*aar/ lost its coda with no vowel change, and (3) /*aar/ follows /*aa/ in participating in the /*aa/ to /oo/ to /au/ back vowel shift. Such varied paths of PKC rhymes is suggestive of contact-induced borrowing, likely from divergent sources. There are also a number of rhymes /*ay *ool *ooy *oy *uuy *uy *uyʔ *uay/ that in TRZ and NTZ have merged to /ui/ but a further diachronic coalescence has rendered this rhyme /yy/ in LTZ, showing parallel development in the coalescence of /ui oi/ to /yy øø/. In Table 5.40, laterals are highlighted in red and rhotics in green. To facilitate comparison with open syllables, long vowels and diphthongs are added in italics here.

Table 5.40 LTZ reflexes of PKC liquid- and glide-final rhymes

	PKC				
LTZ	**/*i/**	**/*e/**	**/*a/**	**/*o/**	**/*u/**
/~~ii~~/	**ii* **il*	-	-	-	**uul* **ul*
/ii/	-	**ee* **eel*	-	**ool*	-
/yy/	-	-	**ay	**ool* **oy* **ooy	**uuy* **uyʔ* **uy* **uay
/ing/	**ir*	-	-	-	-
/ie/	**ia* **ial*	**er* **erʔ*	-	-	-
/ee/	-	**ee* **eel*	**al* **ay* **aay	**ooy	
/eng/	-	-	**aw	-	-
/ei/	-	**el*	**aal* **al*	-	-
/øø/	-	**ewʔ	**aar* **aaw* **ay* **aw	**oyʔ	-
/aa/	-	-	**aa* **ar* **aar	**oor	-
/au/	**iir*	-	**aar	**or	-
/ong/	-	-	-	**olʔ	-
/uu/	-	-	**aw	**oo* **oy* **olʔ	**uu* **uuy* **uur* **ua*
/uo/	**iaw	-	-	-	**ul* **ual* **ua* **uar*
/~~uu~~/	-	-	-	-	**uu* **uul*

Correspondences between PKC and LTZ offer evidence that it is the most innovative Zophei variety investigated in this study. Like TRZ and NTZ, LTZ has undergone final glottal stop deletion, debuccalization of coda oral stops, loss of the final nasal place distinction, and coda liquid/glide loss with varied and divergent developments likely due to contact-induced borrowing. As in NTZ, LTZ retains the /eng/ rhyme lost in TRZ; but with TRZ, LTZ innovates /øø/ (where NTZ has /oi/). The front and back vowel shifts are more advanced in LTZ than in NTZ, with additional changes including: a second diphthongization of /oo/ to /au/ (the first indicated in the comparison of PKC and TRZ), raising of /*ia/ to /ie/, and of /*ua/ to /uo/. In addition, LTZ has developed /yy/ through coalescence of the diphthong /ui/, similar to the development of /øø/ from /oi/.

In the sections that follow, correspondences between lexical items are used to further examine the diachronic vowel shifts in Maraic varieties with specific focus on three processes in Zophei varieties: the back vowel shift in Section 5.10, the front vowel shift in Section 5.11, and the coalescence of height harmonic diphthongs in Section 5.12.

5.10 Zophei back vowel shift

Zophei varieties offer opportunities to study vowel shift phenomena through comparative phonological analysis. As discussed in Section 3.3 that there is no straight line between synchronic varieties—one is not “older” than the other just because one retains more conservative features. That a diachronic change occurred between TRZ and NTZ data does not indicate that TRZ developed into NTZ, since both have continued to develop since their divergence from a common ancestor. However, for transparency of data source, I refer to changes between, for example, TRZ and NTZ to indicate developments in NTZ data that are not present in the TRZ data set.

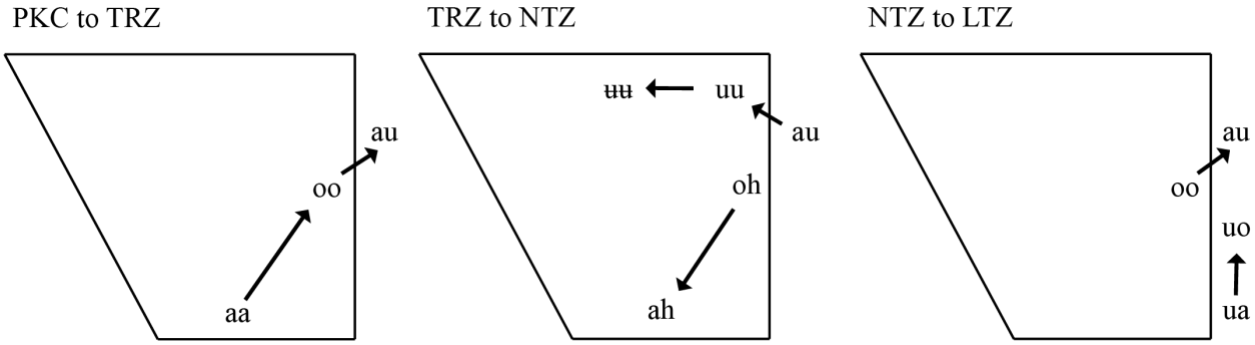
This section focuses on the back vowel shift (/a/ → /ɔ/ → /u/ → /ɯ/) described for Mara in Van Bik (2009), which is analyzed there as a pull chain /u/ to /ɯ/, then /ɔ/ to /u/, and last /a/ to /o/. Van Bik (2009) notes a similar change described by Bradley (unpublished 1969, cited in Labov, 1994) for Akha (/ɔ/ → /o/ → /u/ → /ü/). This shift, as well as the front vowel shift described in Section 5.5, largely involve vowel raising, a phenomenon that follows the general tendency for peripheral vowels to raise (Labov, Yaeger, & Steiner, 1972; Labov, 1994, 2001, 2010). According to Labov (1994). This raising effect crowds the high vowels, which, unable to raise physiologically while maintaining a wide enough constriction to constitute a vowel, tend to diphthongize or centralize. Vowels centralized in this way may be fricativized, /i/ to /i̞/ to /z/ and /u/ to /u̞/ to /v/ (Faytak, 2014). Vowel raising in Zophei has involved monophthongization (through smoothing and coalescence), diphthongization (or vowel breaking), loss of high vowel length contrast (merger), and high vowel centralization involving fricativization.

The data collected for this project offers evidence of a back vowel shift in Zophei that has proceeded differently from what Van Bik (2009) reports for Mara, suggesting a push chain has occurred in Zophei varieties. By way of overview, Figure 5.41 presents vowel shifts from PKC to TRZ, TRZ to NTZ, and NTZ to LTZ. There are two notational or phonetic differences to note between the Mara and Zophei vowel spaces. First, [o] and [ɔ] are not contrastive in Mara or Zophei, so differences between /ɔ/ in Mara and /o/ in Zophei are notational.[34] Next, where /u/ lost its rounding in Mara /ɯ/, NTZ and LTZ centralized /uu/ to /u̞u̞/ with some audible lip frication. Without acoustic comparison however, the difference between Mara /ɯ/ and NTZ/LTZ /u̞u̞/ may be notational as well, and neither language boasts both (unlike Lutuv).

[34] Zophei /o/ is perceptually close to [ɔ], though without a phonological contrast, the difference is not relevant to this research.

One relevant difference with Mara is worth noting, that is the inclusion of /au/ into the chain (/oo/ to /au/ to /uu/), and in addition, the /oo/ to /au/ change appears to have occurred twice, once from PKC to TRZ and once from NTZ to LTZ.

Figure 5.41 Overview of Zophei back vowel shift



To further explore this back vowel shift, individual lexical items are compared between PKC, Hakha Lai (from Van Bik, 2009), TRZ, NTZ, LTZ, Lutuv, Mara (from Van Bik, 2009), and Zotung (from Shintani, 2015) in Tables 5.42-5.45. For a full table of correspondences collected for this study, see Appendix C and for a description of how these data were collected and organized, see Section 3.3.

Table 5.42 presents some correspondences between Maraic languages for TRZ and NTZ /oo/ and /aa/. (5.42a-b) show that PKC /*aa *aʔ/ raised to Zophei /oo/, which diphthongized to /au/ in LTZ. Other PKC rhymes such as /*aar *ar/ in (5.42c-d) moved into the /aa/ position in Zophei. Zotung appears to have undergone similar /*a/ raising, though /*aʔ/ was raised to /ə/ instead of /o/. Lutuv did not undergo the /*a/ to /o/ raising, instead merging /*aa *aʔ *aar *ar/ to /o/. This innovation shared between Zophei and Mara suggests that they are more closely related to each other than either is to Lutuv. The Mara examples here do not show the same change, but other /*a/ to /ɔ/ correspondences in Mara are described in Section 5.3. A further development in

LTZ shows /oo/ diphthongized to /au/ in (5.42a-b), and since LTZ is the most innovative Zophei variety investigated in this research, this appears to be the most recent change noted in this shift.

Table 5.42 /a/ to /o/, /o/ to /au/

	PKC	H.Lai	TRZ	NTZ	LTZ	Lutuv	Mara	Zotung	Gloss
a)	*thaa	thâa-I thăa-II	thóó	thóó	tháú	thaa	thá	thò jő	strength
b)	*taʔ	taʔ	tóó	tóó	táú	taa	-	tə́	measure
c)	*tsaar	tsâar-I tsăar-II	tsaa	tsaa	tsaa	tsaa	chá	-	be dry
d)	*thar	thâr-I thăr-II	thaa	thaa	thaa	thaa	thì	ʔa thò	be new

The /o/ to /au/ development is has also occurred between PKC and TRZ and is reflected in the TRZ data in Table 5.43. Examples (5.43a-f) show a variety of /*o/ rhymes (as well as /*aw/) merging to TRZ /au/. NTZ and LTZ have both undergone a further development from /au/ to /u/. The /*o/ to /u/ change in Mara is also exemplified here, though Van Bik (2009) includes no indication that Mara made use of the development of /au/ in this chain shift. Lutuv data is more varied, showing the innovation of the /yə/ diphthong in (5.43a,e); development of /au/ to /u/ similar to (or through borrowing from) Mara in (5.43f); and high vowel substitution in (5.43c).

Together with the previous table, LTZ is shown to have undergone /o/ to /au/ diphthongization twice, once from PKC to TRZ, then once from NTZ to LTZ, this results in two partially overlapping paths, the earlier one passing through /au/ (/*o/ to /au/ to /u/) and the later one innovating /au/ again (/*a/ to /o/ to /au/). Although long vowels and diphthongs in this shift rise within the vowel space, the PKC /*ok/ rhyme (debuccalized as /*oh/ in TRZ) fall and/or are centralized in NTZ and LTZ to /*ah/ in (5.43g). This opposing movement of long and short syllable rhymes is reminiscent of observations made on more well-studied languages. As proposed in Labov, Yaeger, & Steiner (1972) and further discussed and exemplified in Labov

(2010), West Germanic languages show a tendency for peripheral vowels to rise within the vowel space and for non-peripheral vowels to fall. Comparisons between such well-described shifts and those investigated for Zophei merit further investigation. A different development is also evidenced in (5.43h) where TRZ /oh/ raises to /uh/ in NTZ and LTZ. This correspondence parallels the LTZ /eh/ to /ih/ innovation exemplified in Table 5.50, but it is not as well attested as the /oh/ to /ah/ [ə] lowering (or centralization) in (5.43g).[35]

Table 5.43 /o/ to /au/, /au/ to /u/

	PKC	H.Lai	TRZ	NTZ	LTZ	Lutuv	Mara	Zotung	Gloss
a)	*ʔoo	ʔòo	áú	úú	úú	yə	ú	-	voice
b)	*soʔ	soʔ	sáú	súú	suu	-	sù	-	pierce
c)	*hroop	hroop-I hroʔ-II	hrau	hrúú	hrúú	pa hrii	-	-	to eat (with a spoon)
d)	*hrolʔ	hrolʔ	hráú	hrúú	hrúú	-	-	-	insert
e)	*zoy[36]	zôy-I zŏy-I	zau	zuu	zuu	zyə	-	-	be skinny
f)	*thaw	thâw-I thoʔ-II	thau	thúú	thuu	thúú	thú	thǽ kú thó kú	get up
g)	*wok	vok	voh	vah	váh	vəə	vū	vóúʔ	pig
h)	*tsuap	tsuap	tsoh	tsuh	tsuh	pa tsəə	pā-chú	túá	lungs

Table 5.44 offers evidence of the change from /uu/ in TRZ to /~~uu~~/ in NTZ and LTZ. This development occurred after the loss of coda glottal stops and liquids, indicated in (5.44a-c) by the merger of /*uu *uʔ *uul/ to TRZ /uu/ and NTZ/LTZ /~~uu~~/. PKC syllables containing the /*u/ vowel and a coda oral stop were debuccalized to *Vʔ syllables, which did not participate in the shift, as in (5.44d-g). Mara and Lutuv data show no distinction between rhymes in (5.44a-b, d-f)

[35] Since /ah/ is treated phonologically as a short low vowel, this change can be analyzed as phonological lowering, but the vowel is phonetically central [ə], so it can also be considered centralization phonetically.
[36] **zoy* is only reconstructed for Proto-Central Chin.

including *VV, *VT, and *Vʔ rhymes, merging to /ʉ/ in Lutuv and /ɯ/ in Mara. Lutuv has some forms with final nasals (5.44c, h) the source of which is unknown.

Table 5.44 /uu/ to /ʉʉ/

	PKC	H.Lai	TRZ	NTZ	LTZ	Lutuv	Mara	Zotung	Gloss
a)	*yuu	zùu	pá zúú	pa zʉ́ʉ́	pá zʉʉ	pa zʉʉ	pā-zɯ́	pà jú	rat, mouse
b)	*ɗuʔ	duʔ	dúú	dʉ́ʉ́	dʉ́ʉ́	-	dɯ̄	-	want
c)	*kuul	kûul-I kŭul-II	kuu	kʉʉ	kʉ́ʉ́	kong	-	-	be hunchbacked
d)	*thuuk	thuuk-I thuʔ-II	thuh	thuh	thuh	thʉʉ	thɯ́	-	be deep
e)	*ruk	pa-ruk	sáng rúh	sán ruh	sáng rúh	suo tsa rʉʉ	pā-chá-rɯ̄	tá rúʔ	six
f)	*ʔuut	ʔuut-I ʔuʔ-II	uh	uh	ùh	ʉʉ	ɯ́	ʔù	be burnt
g)	*puak-II (*pua-I)	pùa-I puak-II	puh	puh	púh	phɨɨ	pī	-	carry (on back)
h)	*hmuʔ-II (*hmuu-I)	hmŭu-I hmuʔ-II	hmuh	hmuh	hmúh	hmong	hmō	múíʔ	see

In addition to the second /oo/ to /au/ development in LTZ, it is also worth noting vowel raising (or backing) in the second vowel of the TRZ/NTZ diphthong /ua/ to LTZ /uo/, exemplified in Table 5.45. Examples (5.45a-c) show PKC /*ua *uaʔ *uar/ rhymes have merged to /ua/ in TRZ and NTZ (as well as Zotung), which is raised to /uo/ in LTZ. Further allophony has developed in LTZ /uo/, which is produced as [uo] in (5.45a) and as [yo] in (5.45b-c)

Table 5.45 /ua/ to /uo/

	PKC	H.Lai	TRZ	NTZ	LTZ	Lutuv	Mara	Zotung	Gloss
a)	*khua	khûa	khua	khua	khúó	khi̵i̵	khì	khùà	village
b)	*tuaʔ	tuaʔ	túá	tua	túó	tyə	tú	tùà	to do
c)	*yuar	zûar-I zŭar-II	zúá	zúá	zuo	zaa	zùa	jùà	to sell
d)	*kul-I (*kulʔ-II)	kulʔ	tsá kúá	kúá	tsá kuo	-	-	kùèʔ lú	to surround

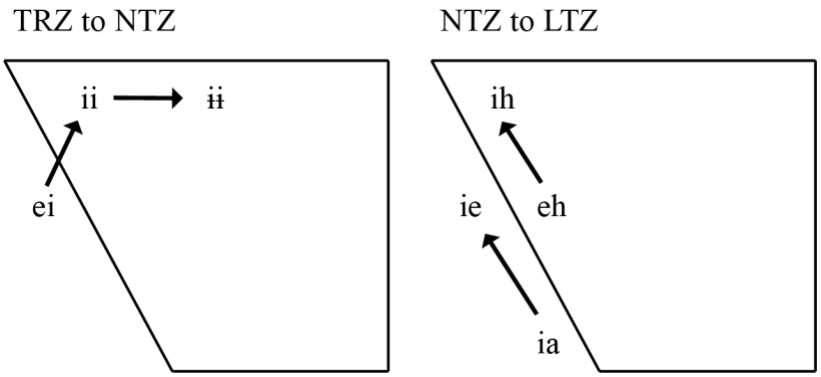
This investigation into vowel differences in Zophei dialects reveals evidence of the Maraic back vowel shift described in Van Bik (2009) for Mara. While Mara data indicates the chain /a/ → /ɔ/ → /u/ → /ɯ/, which Van Bik (2009) analyzes as a drag chain, Zophei data supports a push chain analyses /aa/ → /oo/ → /au/ → /uu/ → u̵u̵ in changes between Zophei varieties. In addition, this investigation has also noted other changes to back vowels including a lowering of /oh/ to /ah/, raising of /ua/ to /uo/ and a secondary /oo/ to /au/ development. Section 5.11 involves parallel shifts in the front vowel system.

5.11 Zophei front vowel shift

Like the back vowel shift in Zophei, the front vowel shift involves vowel raising, in this case even of short vowels, and monophthongization. The shift is absent in TRZ, but is visible in NTZ and LTZ data, with further developments in LTZ. Taken together, the front vowel shift includes diachronic changes from TRZ to NTZ indicating the shift /ei/ → /ii/ → /i̵i̵/, as well as raising in LTZ of /eh/ to /ih/ and of /ia/ to /ie/ (parallel to LTZ's /ua/ to /uo/ innovation). Unlike in the back vowel shift discussed in Section 5.10, where diachronic changes between varieties suggest a push chain hypothesis, no such analysis is forthcoming for the front vowel shift. Rather, as schematized in Figure 5.46, the shift from TRZ to NTZ involves monophthongization

of /ei/ to /ii/ and centralization of /ii/ to /ɨɨ/, then LTZ further innovated raising of the short vowel /eh/ to /ih/ and of the second member of the diphthong /ia/ to /ie/.

Figure 5.46 Overview of Zophei front vowel shift



This front vowel shift is further exemplified in Tables 5.47-5.50 with individual lexical items compared between PKC, Hakha Lai (from Van Bik, 2009), TRZ, NTZ, LTZ, Lutuv, Mara (from Van Bik, 2009), and Zotung (from Shintani, 2015). A full table of the correspondences collected from this study is presented in Appendix C with a description of its contents in Section 3.3.

Front mid vowels in Zophei often have unpredictable correspondences between varieties, though lexical comparison reveals innovations in NTZ and LTZ. A lexical item with /ee/ in TRZ may correspond to NTZ /ai ee/ and LTZ /ee ei/; likewise a lexical item with TRZ /ei/ may correspond to NTZ /ee ai ii/ and LTZ /ei ee ii/. It is likely, then, that borrowing has obscured much of the story of front mid vowels in Zophei, however some correspondences betray changes between varieties. Table 5.47 illustrates the monophthongization of /ei/ to /ii/, an innovation in NTZ and LTZ not present in TRZ. Mara (5.47a-b) and Lutuv (5.47b-c) data also offer evidence of such monophthongization. This innovation parallels the monophthongization of /au/ to /uu/ also present in NTZ and LTZ.

Table 5.47 /ei/ to /ii/

	PKC	H.Lai	TRZ	NTZ	LTZ	Lutuv	Mara	Zotung	Gloss
a)	*mee	me-heʔ	méi	míi	míi	mie	mi	n̩íá	goat
b)	*θeʔ	-	sei	síi	síi	sii	sī	θéʔ	go
c)	*ɓeel	bêel	bei	bii	bii	bii	bèi	-	pot

In addition to the smoothing of /ei/ to /ii/, NTZ and LTZ varieties (as well as Lutuv) have also centralized /ii/ to /i̽i̽/, as evidenced in Table 5.48. Mara does not appear to have undergone this change, although Arden (2010) does include /i̽/ as a vowel in the Sabeu dialect, so adoption of this centralization may vary by Mara dialect. Much like the parallel monophthongization of /ei au/ to /ii uu/, the centralization of /ii/ to /i̽i̽/ has its parallel in the centralization of /uu/ to /u̽u̽/.

Table 5.48 /ii/ to /i̽i̽/

	PKC	H.Lai	TRZ	NTZ	LTZ	Lutuv	Mara	Zotung	Gloss
a)	*khlii	thlîi	thlii	thli̽i̽	thli̽i̽	thli̽i̽	thlì	khì væ̀ khì sà̰	wind
b)	*kriʔ	triʔ	tsíi	tsi̽i̽	tsi̽i̽	tsi̽i̽	chí	rí	fear
c)	*kul	kûl	sáng kii	sáng ki̽i̽	sáng ki̽i̽	soo ki̽i̽	pa-kì	θà̰ kṹ́	twenty
d)	*kil	kìl	kíi	ki̽i̽	ki̽i̽	ki̽i̽	kí	sà kí	angle, corner, horn

LTZ has also seen innovations not present in NTZ, including the raising of /ia/ to /ie/ and /eh/ to /ih/, evidenced in Tables 5.49 and 5.50. In Table 5.49, where TRZ and NTZ have /ia/, LTZ has /ie/, an innovation also found in some Lutuv correspondences such as (5.49a). Like other changes to Zophei front vowels, this diphthong raising finds its parallel in the /ua/ to /uo/ change presented in Table 5.45 above.

Table 5.49 /ia/ to /ie/

	PKC	H.Lai	TRZ	NTZ	LTZ	Lutuv	Mara	Zotung	Gloss
a)	*ɓia	bĭa	bíá	bia	bíé	bie	bī	ɓúá	word
b)	*hrial	hrîal-I hrl̊al-II	tsá hria[37]	hria	tsa hrie	tsa hrii	chā-hrì	-	avoid
c)	*pher	phêr	á phia	a phia	phie	a phaa	-	phìà	mat
d)	*merʔ	merʔ	mia	mia	mie	tsa maa	chā-mì	-	twist

Table 5.50 presents data on the development of /ih/ from /eh/ in LTZ. Examples (5.50a-b) show that /ih/ in TRZ and NTZ corresponds to /ih/ in LTZ, and examples (5.50c-g) further indicated that /eh/ in TRZ and NTZ corresponds to /ih/ in LTZ, offering evidence of a merger.This raising of short mid vowels is reminiscent of the /oh/ to /uh/ correspondence given in (5.43h), although where that development is limited in its application (most examples including lowering or centralization of /oh/ to /ah/), this development is well attested in the data collected for this study.

[37] Our LTZ language assistant also notes use of monophthongal *tsa hrii* as in Mara.

Table 5.50 /eh/ to /ih/

	PKC	H.Lai	TRZ	NTZ	LTZ	Lutuv	Mara	Zotung	Gloss
a)	*hrik	hrik	hrih	hrih	hrih	a hr~~ii~~	hrī	~~c~~íʔ	louse
b)	*kut (or *khut)	kut	kih	kih	kih	k~~uu~~	kū	kúíʔ	hand
c)	*mik	mit	meh	mih	mih	ming	mō	míʔ	eye
d)	*tiap (or *tiam)	tep-I teʔ-II	pá teh	teh	pa tih	-	-	ʔæ̀ tùà	taste
e)	*leet	leet	leh	leh	pa líh	-	-	líá	change (one's mind)
f)	*ʔeek	ʔeek	éh	eh	íh	ii	-	ʔíá	feces
g)	*sat-II (*saa-I)	sâa-I sat-II	seh	seh	sih	səə	sà	ʔa sò	be hot

The Zophei front vowel shift shows parallels in the back vowel shift discussed in the previous section, including the monophthongization of diphthongs, the raising of diphthong offglides, and the centralization of high vowels. Section 5.12 focuses on the coalescence of diphthongs /ui ai oi/ to /yy ee øø / between Zophei varieties.

5.12 Diphthong coalescence in Zophei

Following the treatment of the vowel shifts addressed in Sections 5.10-5.11, this section discusses the coalescence of diphthongs /ui ai oi/ to /yy ee øø/ in Zophei varieties. For these three innovations, NTZ is the most conservative variety, retaining all three diphthongs /ui ai oi/, while LTZ is the most innovative, with all three monophthongs /yy ee øø/. The TRZ variety has participated in two of the three coalescence processes, with one retention /ui ee øø/.

Coalescence involves the merger of two segments into a single segment with some features of each input segment contributing to the features of the output segment. In describing the features involved in these coalescence processes, I make use of height [+/- high, +/- low],

backness [+/-back], and rounding [+/-round] features (Chomsky & Halle, 1968). Also, I leave out the monophthongization of TRZ /au/ to NTZ /uu/, since the output monophthong is contained within the diphthong.

Table 5.51 offers correspondences showing the coalescence of /ai/ to /ee/, an innovation in both TRZ and LTZ that resulted in a merger. This coalescence process involves the [-high] feature of /a/ and the [-low, -back] features of /i/, resulting in the mid-front vowel /ee/ with the features [-high, -low, -back, -round], as evidenced in (5.51a-e). Examples (5.51f-g) show lexical items with /ee/ in all three varieties, indicating a merger of /ai ee/ to /ee/.

Table 5.51 /ai/ to /ee/

	PKC	H.Lai	TRZ	NTZ	LTZ	Lutuv	Mara	Zotung	Gloss
a)	*weʔ	veʔ	véé	vái	véé	vee	-	pæ ɓùà	visit
b)	*rian	rĭan	hréé	hrai	hréé	hrie	rāi	rúá	work
c)	*hmeel	-	hméé	hmái	hméé	hmie	-	mǽ	face
d)	*tay	tây-I tăy-II	téé	tái	tee	tee	tèi	tæ̀	win
e)	*phooy	phôoy-I phŏoy-II	phéé	phái	phéé	phie	phía	-	uproot
f)	*lee	lĕe	léé	léé	lee	hnee	-	té	and, with
g)	*ŋal	ŋâl	ngee láng	ngee	ngee lang	ngie luo	ngìà lý	-	shin, calf

The coalescence of /oi/ to /øø/ has also occurred in TRZ and LTZ only, with NTZ examples retaining the diphthong, as shown in Table 5.52. This coalescence involves the [-high, -low, +round] features of /o/ and the [-back] feature of /i/, resulting in the [-high, -low, -back, +round] vowel /øø/.

Table 5.52 /oi/ to /øø/

	PKC	H.Lai	TRZ	NTZ	LTZ	Lutuv	Mara	Zotung	Gloss
a)	*ray	-	rǿǿ	rói	rǿǿ	ruu	rēi	ʔa ròù	take a long time
b)	*ɓaw	bàw	bøø	boi	bøø	buu	bàù	-	swell
c)	*yuaŋ-I *yuan-II	zûaŋ-I zûan-II	zøø	zói	zǿǿ	zuu	á záw	ʔa jʉ̀	fly
d)	*tewʔ	tewʔ	tǿǿ	tói	tǿǿ	pa-tii	pa-tei	thæ̀	bite

Table 5.53 offers evidence of the coalescence of /ui/ to the monophthong /yy/, an innovation in LTZ only. Both /u/ and /i/ are [+high, -low] vowels, so this coalescence involves the [-back] feature of /i/ and the [+round] feature of /u/, resulting in the [+high, -low, -back, +round] vowel /yy/. This innovation can also be seen in some Lutuv correspondences (5.53a-d).

Table 5.53 /ui/ to /y/

	PKC	H.Lai	TRZ	NTZ	LTZ	Lutuv	Mara	Zotung	Gloss
a)	*lay	lây	lui	lui	lýý	pa lyy	pā-lei	læ̀	tongue
b)	*ɓooy	bòoy	búí	búí	býý	byy	béi	-	master
c)	*tuay	tûay	rá tui	ra tui	ra tyy	ə rɨɨ tyy	tèì	rùʔ túé	edible bamboo
d)	*poy	pòy-moʔ-I pǒy-moʔ-II	púí moo	púí	pyy mau	pyy pəə	-	-	matter
e)	*hool	hôol-I hǒol-II	húí	húí	hýý	h~~uu~~	-	-	search for
f)	*ruuy	rɨ̌i-I riit-II	rúí	rúí	rýý	pa rɨɨ	pā-rī	rùì	be drunk
g)	*tuy	tîi	túí	tuí	týý	t~~ii~~	tí	túí	water

Since NTZ was shown to be more innovative than TRZ concerning the vowel shifts discussed in Sections 5.10-5.11, these coalescence processes may have occurred through contact with Mara and Lutuv varieties. Lutuv correspondences indicate similarities in the development of /yy/ from /ui/, but Mara correspondences here do not indicate similarities. This lack of evidence may be due to the variety of Mara included in Van Bik (2009)—Arden's (2010) description of the Sabeu variety includes /yy ee øø/. This speculation of contact-induced changes is thus largely based on geography. NTZ has none of these innovations and is in the east of the Zophei-speaking area, neighboring Senthang and Lutuv-speaking villages. TRZ is in the west of the Zophei-speaking area, neighboring Mara-speaking villages and has undergone the coalescence of /ai oi/ to /ee øø/. LTZ is in the southwest of the Zophei-speaking area, neighboring Mara and Lutuv-speaking villages and has undergone all three coalescence processes. Without corresponding vowel data from Mara varieties, this is only speculation, however future research comparing Mara and Zophei varieties may offer evidence of such contact.

5.13 Summary

This chapter described rhymes in Zophei and compared rhyme developments in Zophei with those in other Kuki-Chin languages, with special focus on Maraic languages. In pursuing that concern, it overviewed rhyme developments in related languages, offered phonetic and phonological description of Zophei rhymes, and compared diachronic developments in three Zophei varieties with Mara, Lutuv, and Zotung. Vowel shifts between Zophei varieties are also evidenced through comparative phonological analysis, contributing to the literature on Kuki-Chin, Maraic, and vowel shift phenomena.

Section 5.2 overviewed rhymes in Kuki-Chin, with Central languages offering the most conservative rhymes and Maraic, the most innovative. PKC is reconstructed with a 5-vowel system /*i *e *a *o *u/, where Zophei innovates /y ø ɨ ʉ/ in different varieties. Maraic has undergone trading of monophthongs and VN rhymes for diphthongs, yet innovative Zophei varieties have again reduced the number of diphthongs in favor of monophthongs. PKC had many permitted codas /*w *j *l *lʔ *r *rʔ *m *mʔ *n *nʔ *ŋ *ŋʔ *p *t *k/ with only /ŋ/ retained in Zophei.

Analyses of CVʔ and CVV rhyme contrasts are variably described in terms of vowel length (V vs. VV) or syllable structure (VC vs. VV) with the status of glottal stops the most prominent issue. Though other Kuki-Chin languages show evidence of morphological glottal stops (as in verbal stem alternations), no such evidence from Zophei has been found in this research and I treat final glottal stops in Zophei as part of the phonetic realization of monomoraic vowels, an analysis useful to our understanding of tone in Chapter 6. All Kuki-Chin languages apart from Zotung make use of minor syllables. Zophei minor syllables make use of only one vowel /ə/ (orthographic <a>), but may be assigned tone, as discussed in Chapter 6.

Section 5.3 compared Zophei rhymes across varieties to reveal few similarities and many differences, with innovations in NTZ and LTZ favoring a reduction in the number of diphthongs and short monophthongs and an increase in the number of long monophthongs. This section also presented acoustic exemplification of TRZ and LTZ vowel spaces, summary tables of attested syllables (examples in Appendix B), and a discussion of the allophonic relationship between [uo] and [yo].

Sections 5.4-5.9 expanded on comparative phonological data from Van Bik (2009), with data appearing in Appendix C, to discuss rhyme developments in various Maraic languages, Mara in Section 5.4, Lutuv in Section 5.5, Zotung in section 5.7, Tlawngrang Zophei in Section 5.7, Nuitah Zophei in Section 5.8, and Lawngtlang Zophei in Section 5.9, each summarized in turn.

Mara offers among the most reduced inventory of syllables within Kuki-Chin languages with no codas permitted (apart from glottal stop, which may be analyzed as part of the phonetic realization of a short vowel). In addition to the loss of oral stops, according to Löffler (2004), Mara has undergone a loss of VN rhymes in favor of nasalized vowels and then has lost contrastive vowel nasality in favor of other vocalic distinctions. Mara has undergone a back vowel shift /a/ → /ɔ/ → /u/ → /ɯ/ and raising of /*e/ to /i/, both processes are also evidenced in other Maraic languages. The analyses presented here point to the necessity of future Mara dialect research in understanding the historical development of Maraic.

Lutuv's rhyme developments appear superficially similar to those of other Maraic languages, but with some notable differences. Lutuv is the only Maraic language lacking Vʔ syllables, suggesting a different diachronic path in the loss of final oral stops and glottal stops. Lutuv has also merged nearly all rhotic-final rhymes into /aa/, rather than the piecemeal loss seen

in Zophei. Lutuv only retains three nasal-final rhymes, the smallest inventory in any Maraic language investigated here. There is evidence of vowel shift phenomena in Lutuv as well, including raising that has crowded the high vowel space with six monophthongs /i y ɨ ʉ ɯ u/, although the shift does not mirror that of Mara or Zophei, since Lutuv is lacking the earliest vowel development shared between those two languages: raising /*a/ to /o/. The development of /ɯ/ in Mara and Lutuv can also be considered superficial rather than shared—Mara's /ɯ/ has its origins in /uC/ syllables while Lutuv's /ɯ/ is largely from /ua/ coalescence. The analysis of Lutuv presented here suggests that Lutuv is less closely related to Zophei and Mara than those languages are to each other. Furthermore, superficial similarities between Lutuv and other languages obscure differences in their diachronic development, a situation likely indicative of contact-induced phonological changes in Lutuv, which occupies a geographically central position in the Maraic-speaking region. Further research on Lutuv is necessary to better understand the relationship between Lutuv and other Maraic languages.

To a greater extent than Lutuv, Zotung's surface similarities to other Maraic languages in terms of syllable structure simplification obscure differences in diachronic development. Complicating the analysis, Zotung shows little internal consistency in development, suggestive of contact-induced phonological changes. For example, there is evidence in Zotung of Zophei/Mara-like coda glottal stop loss and coda oral stop debuccalization and also of Lutuv-like mergers of all three categories. Evidence also shows that the back vowel shift is not regularly applied. The loss of codas in Zotung appears to have been less targeted than in other Maraic languages, which show differential treatment of various VC rhymes likely indicative of individual processes of coda loss. Zotung, on the other hand has, in some cases, disregarded codas in vowel developments, for example in the merger of/*ee *eet *eek *eem *er/ to /ia/. In

addition, Zotung's set of nasalized vowels is larger than the VN rhyme possibilities in Lutuv or Zophei and larger than those proposed for Proto-Mara in Löffler (2004), both of these less selective processes suggest contact-induced changes to Zotung that affected many rhymes at once. Onsets in Zotung may further betray how the language's origins differ from those of Zophei and Mara. Some evidence for differing origins can be found in the onset system as well, since Zotung retains PKC /j θ/ and favors deletion over affrication in onset cluster simplification, like Southern Chin languages. More work on Zotung is necessary to understand its relations to other Maraic languages, yet based on the data analyzed for this study, it is possible that Zotung is more closely related to its Southern Chin neighbors to the south than to its Maraic neighbors to the north and west. The simplification of Zotung's syllable structure may then be a result of contact with the already simplified syllable structure of Lutuv and/or Mara.

Tlawngrang Zophei (TRZ) is the most conservative Zophei variety investigated in this study, with some innovations likely affected through contact with Mara. TRZ data contains evidence of the loss of final glottal stop and the debuccalization of coda oral stops as well as of the /*aa/ to /oo/ raising seen in Mara with further /*oo/ to /au/ diphthongization. The front vowel shift discussed for Nuitah and Lawngtlang Zophei as well as Mara at Lutuv has not occurred in TRZ. Two innovations that are likely contact-induced include the development of /øø/ (also in Lawngtlang, corresponding to Nuitah /oi/) and the development of /ai/ (corresponding to Lawngtlang and Nuitah /eng/). Further developments are seen in the more innovative Nuitah and Lawngtlang varieties.

Nuitah Zophei (NTZ), despite its inclusion in the "Upper Zophei" group, is more phonologically innovative than the "Lower" Tlawngrang variety and more phonologically conservative than the "Lower" Lawngtlang variety. Glottal stop loss and coda oral stop

debuccalization have both occurred in Nuitah Zophei, as in other Zophei varieties, and Nuitah introduces both an extension of the Zophei back vowel shift (/au/ to /uu/ to /~~uu~~/) and evidence of front vowel shift (/ei/ to /ii/ to /~~ii~~/). Nuitah has also retained the diphthong /oi/ where other Zophei varieties have innovated /øø/. Nuitah data in this study is more limited than Tlawngrang and Lawngtlang data, yet if offers a view of an intermediate stage in the innovated vowel shifts that have occurred in Zophei and merits further investigation.

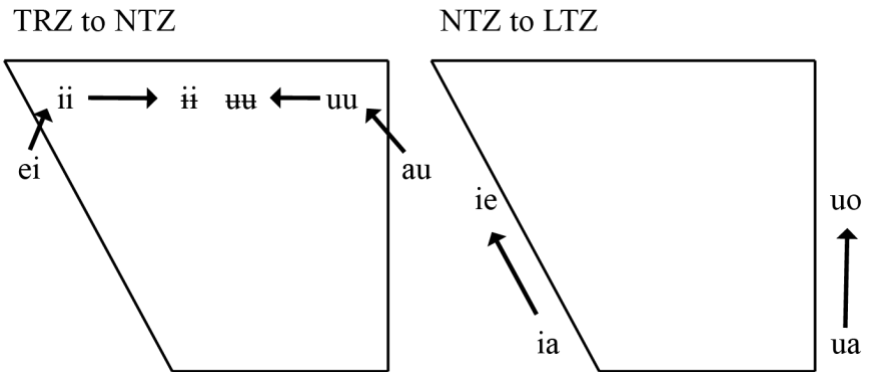
Lawngtlang Zophei (LTZ) is the most innovative Zophei variety investigated in this study with innovations not present in TRZ or NTZ. There is evidence of glottal stop deletion and coda oral stop debuccalization in LTZ, as in all Zophei varieties, and LTZ appears to have undergone and extended the back vowel shift that occurred in TRZ and NTZ. Most notably, LTZ has innovated the diphthongization of /oo/ to /au/, offering evidence that such diphthongization has occurred twice in the history of Zophei, once in developments from Proto-Kuki-Chin to Proto-Zophei and later since LTZ diverged from NTZ. LTZ has also participated in the same front vowel shift as NTZ with some other raising in the front vowel area noted (/eh/ to /ih/ and /ia/ to /ie/). Like TRZ, LTZ has innovated /øø/, likely through contact with Mara, but unlike TRZ and NTZ, LTZ has also innovated /yy/ from /ui/, another potentially contact-induced phonological change conditioned by Mara or Lutuv. Since LTZ is more innovative than other Zophei varieties, future work comparing LTZ to neighboring Mara and Lutuv varieties will help elucidate the relationship between these Maraic languages.

Comparing Proto-Kuki-Chin reconstructions from Van Bik (2009) to three Zophei varieties reveals a series of rhyme developments involving back vowels which offer evidence of a larger vowel shift, much of which appears internal to Zophei. The stages of this shift are seen by first comparing PKC to the conservative TRZ (/*aa/ to /oo/ and /*oo/ to /au/), then TRZ to

NTZ (/au/ to /uu/ and /uu/ to /~~uu~~/), then NTZ to LTZ (/oo/ to /au/). Taken in order, these comparisons reveal a push chain initiated by the raising of /*aa/ to /oo/, which differs from Van Bik's (2009) analysis of Mara.

A comparison of TRZ and NTZ offers evidence of a front vowel shift parallel to the previously-discussed back vowel shift. It includes monophthongization of /ei/ to /ii/ and centralization of /ii/ to /~~ii~~/. Figure 5.54 provides a schematized summary of parallels between Zophei front and back vowel developments, including monophthongization /ei au/ to /ii uu/, centralization /ii uu/ to /~~ii~~ ~~uu~~/, and diphthong raising /ia ua/ to /ie uo/. These innovations taken together offer insight into the process of vowel shift broadly and Maraic vowel development specifically.

Figure 5.54 Parallel vowel developments in Zophei



In addition to front and back vowel shifts, three instances of diphthong coalescence are also discussed in this chapter. Of these three developments, none has occurred in the NTZ variety, suggesting these changes may have been affected through contact with Mara. TRZ and LTZ share the innovation of /øø/ from /oi/ and the merger of /ai/ with /ee/. LTZ has further innovated /yy/ from /ui/.

Rhyme comparison reveals both shared innovations and likely contact-induced changes between Maraic varieties. Mara and Zophei appear to be more closely related to one another than to Lutuv or Zotung, having similar developments in back vowel shift phenomena. In addition, such comparison of lexical items reveals that surface similarities found in Lutuv and Zotung obscure different developments in those languages and may have been conditioned through contact with Mara and Zophei rather than shared with them. Zophei varieties offer evidence of vowel shift phenomena that indicate the Tlawngrang variety is the most conservative and the Lawngtlang variety is the most innovative. Differences in rhyme realization in cognate lexical items between Zophei varieties also offers insight into difficulties to the development of a Zophei orthography and literary tradition. Zophei presents itself as multiple varieties with substantial differences from one another which merit further comparative phonological and phonetic analysis. In addition, this chapter laid the foundation for comparative phonetic and phonological studies of other Chin dialect clusters including Mara (Zàwhnái, Fàbàu, Tlóusài, Sabeu, etc.) and Lai (Hakha, Thantlang, Zo Khua, Cin Khua, Van Ha, Sakta, etc.).

Chapter 6. Tone

6.1 Introduction

Nearly all KC languages are reported to make use of tone for lexical (and in some cases grammatical) contrasts, yet tone is one the least-investigated aspects of KC grammars. Many researchers have noted tone in their work on KC languages, but few have made systematic attempts to describe and analyze it, so accounts of tone in KC are often cursory, and most orthographies do not mark it at all. Depending on the language, leaving out tone marking may not cause difficulties for native speaker readers (the target audiences for these orthographies), but Chhangte, writing on Mizo, states that linguistic study "has been hampered by the absence of tone marks in our orthography" (1986, p. 17). The dearth of tone study in KC presents problems for phonetic, phonological, morphological, syntactic, and pragmatic analysis, since tone is relevant to each field of study, and only tonal analysis can tease underlying lexical tone apart from the various processes that affect surface pitch (Yip, 2002; Leben, 1973; Goldsmith, 1976). This chapter presents background on KC tone research as well as preliminary analysis of tone in Lawngtlang Zophei (LTZ).

LTZ syllables may have surface (L)ow, (M)id, (H)igh, Rising (LM, MH), Falling (HM, ML), or Concave (HMH) pitch patterns. In this analysis, L, H, and toneless morphemes are posited. A surface M may be the default realization of a toneless morpheme, but it may also be the result of phonological processes including *LL and *HL avoidance strategies. Intransitivity is linked with L tone on the verb stem, while transitive affirmative contexts are linked with H tone. Floating L tones associated with pre- and post-verbal agreement markers are also discussed. This chapter is intended to set the groundwork on tone in Zophei, the complexity of which merits continued study.

The organization of this chapter is a follows. A brief history of tone study in KC is given in Section 6.2, followed by discussion of KC pitch and tone inventories in Section 6.3. The relationship between tone and segments is considered in Section 6.4, which treats interactions with consonants, and Section 6.5, which treats interactions with syllable structure. The next two sections are concerned with the phonology of tone: the position of a tone within an utterance in Section 6.6, and common phonological tone processes, such as assimilation, absorption, and polarization in Section 6.7. Section 6.8 focuses on grammatical tone, with particular emphasis on tone involved in plurality and stem alternation. Section 6.9 offers analysis of tone in LTZ. Section 6.10 concludes the chapter.[38]

6.2 Tone research in Kuki-Chin

Early work on KC languages did not often involve discussions of tone, but as interest in and understanding of KC linguistics has grown, the relevance of tone to all aspects of these grammars has made it an unavoidable area of investigation. Stilson (1866, p. 19), writing on Kemī (or Mro-Khimi), discussed the prosodic phonology of the language in terms of the more familiar stress-accent systems found in Europe, "as an almost invariable rule, words of two or three syllables are accented on the last." And Savidge's (1908) description of Mara does not mark or mention tone, although later descriptions suggest extensive use (Arden, 2010). However, Fryer's (1875, p. 48) early work on Khyeng notes the relevance of tone and foreshadows the

[38] In this discussion of surface pitch and underlying tone, I make use of the following abbreviations: (H)igh, (M)id, and (L)ow, with contours written as a series (e.g., HL or HM "Fall", LM or LH "Rise"). Where pitch or tone is marked on vowels, H is noted with an acute accent (x́), L with a grave accent (x̀), and M with no marking (x). Contours are marked on one vowel when it is short (Rise <x̌>, Fall <x̂>) or two vowels when they represent a long vowel or diphthong (Rise <x̀x́>, Fall <x́x̀>.In addition, some sources make use of Chao's (1930) "tone numerals"—a numbering system from 1-5 wherein 1 is the lowest pitch and 5 is the highest—numbers are noted in brackets or superscripted. Contours in this system are marked with multiple numbers (e.g., [53] or x^{53} 'Fall'; [24] or x^{24} 'Rise'). A preceding superscripted <!> is used to indicate downstep ($^{!}$H). Syllable shapes are referred to using the following notation: C-onset consonant, V-short vowel, VV-long vowel, N-sonorant coda, T-obstruent coda, h-glottal stop coda (or marking a short major syllable, depending on language/analysis).

abundance of future research potential, describing the language as "simple in its construction and expression, but elaborate in its tones." Since that time, it has become clear that SC languages described as non-tonal, such as Tarao (Singh 2002, p.1), are rare.

Academic interest in KC tone was pushed forward by Osburne's (1975) treatment of tone in Zahao (a variety of Falam) and has grown since then, especially in the last two decades. Few KC researchers describe languages that are not tonal, as Singh (2002) does for Tarao. Rather, if tone is not analyzed in a work, it is usually placed beyond the scope of the project. Those researchers who take the time to describe KC tone, as Chhangte (1986) does for Mizo, note many processes that affect tone realization and list multiple exceptions to generalizations, suggesting KC languages are rich with opportunities for tone research. This growing attention paid to tone has been reflected in, for example, Reichle's (1981) description of Bawm, Thuan's (2008) work on Falam, Watkins' (2013) analysis of Myebon Sumtu (Sumtu), Zakaria's (2017) treatment of the phonetics and phonology of tone in Hyow, Peterson's work on tone in Khumi (2014, 2019), and Ozerov's discussion of Anal grammatical tone (2018).

Researchers of KC languages often note that tone systems differ by dialect. Take for example Bawm and Hyow. Reichle (1981, pp. 13-15) describes Southern Bawm as having a two-way lexical distinction in nouns and verbs that he refers to as 'Flat' vs. 'Raised', where Flat is realized as a Fall after a Raised syllable.[39] Northern Bawm, on the other hand, has a three-way contrast between L, M (or Rising), and H pitches, with their distribution, in part, lexically constrained.[40] Considering Hyow, the Eastern Gungrupara dialect (E. Hyow), according to

[39] Reichle's description of Southern Bawm is based on discussions with Lorenz Löffler and previous research (Löffler, 1972, 1973). Löffler (1972, p. 285) does not indicate the variety of Bawm described, making reference to 7 pitch patterns: L [22], M [33], H [44], HL [42], MH [34], H Rise [45], and "Passing" [21]. L, H, and HL are analyzed as permitted underlying tones.

[40] L appears in nouns, verbs, and some grammatical particles; H appears in adverbial, adnominal, and phrase-type markers; and the Rise appears in demonstrative/emphatic particles and phrase-type markers.

Zakaria (2017, pp. 22, 75), has one contour contrasting with two level pitches: High-Falling [52], H [44], and L (realized as [11] in stop-final syllables and [22] elsewhere). The Western Gungrupara Laitu variety has two Rising pitch patterns, Kontu Hyow has two Falling pitch patterns, and Laitu Hyow has only contour pitch patterns, with a Convex [Rise-Fall] contour and two distinct Falling contours.[41] These differences in dialect indicate that researchers of KC tone must be careful in compiling data collected from different speakers, especially from different dialect regions.

In addition to these projects, which have incorporated tone into larger grammatical descriptions, a small body of theoretical research has also examined tone in some KC languages. Phonological analyses of tone processes have featured prominently in Hyman and Van Bik (2002a, 2002b: Hakha Lai), Hyman (2007, 2010, 2014: Thantlang Lai, Hakha Lai, Falam, Kuki-Thaadow), Yip (2004: Falam), and Lin (2005: Hakha Lai). Van Bik (2009) also includes a reconstruction of Proto-Kuki-Chin's tone system based on synchronic varieties, a difficult task given the amount of attested variation in KC.[42]

These articles have worked to bring the insights learned through KC tone study to the broader community of tonologists working, especially, on languages spoken in East Asia, Africa, and the Americas. Although Hyman and Schuh's (1974) article on universals of tone focused on African Languages, Hyman's (2009, pp. 6-7, 14-15) update "Universals of Tone Rules: 30 Years Later" featured language data from a few KC languages including Hakha/Thantlang Lai, Mizo, Falam, and Kuki-Thaadow (Thadou). Such work underlines the value of presenting KC tonal

[41] KC languages with only contour tones are rarely described, however Lamkang is similarly reported to have a two-way contrast between a Rise and a Fall (Thounaojam & Chelliah 2007, p. 15).
[42] Few researchers have taken up the topic of diachronic tone change in KC languages. Of note is Konnerth (2018), which uses comparative analysis to connect the H vs. L tone distinction in Monsang to a simplification of PKC's 4-way distinction through category merger.

phenomena to the broader linguistics community. Kuki-Thaadow, for example, in addition to the typologically common phenomenon of High tone spread, also exhibits the typologically uncommon phenomenon of Low tone spread, offering opportunities for the study of a language with both processes. The extensive use of tone in KC languages suggests that its continued study will have far-reaching effects on our theoretical and typological understanding of tone in human language.

6.3 Surface pitch and underlying tone

Speakers manipulate the speed of vocal fold vibration (measured acoustically as f0, in Hz) during voiced consonants and vowels, so it is measurable throughout much of an utterance. Some fluctuations in f0 are meaningful, interpreted by listeners as changes to pitch. Yet, pitch is affected by numerous linguistic and extra-linguistic factors—in addition to pitch differences tied to tone, pitch can also be affected by phrase position, utterance position, and various pragmatic factors.[43] Pitch differences are used in some languages to systematically convey lexical and grammatical information—usage referred to as tone. While *pitch* describes surface contrasts, underlying contrasts are an analyzed as *tone*.

An additional degree of complexity arises because f0 is not necessarily the sole correlate of pitch and tone. Languages may make use of additional cues in the realization of tonal contrasts, including phonation type (such as creaky or breathy voicing), vowel duration, and

[43] Tone languages, like languages without tone, also make use of pitch in intonation for various functions, such as marking clause types or noting emotions like surprise (Downing & Rialland, 2016). Usually an analysis of these processes superimposes an intonation contour on a prosodic phrase or places a boundary tone at the beginning or end of the phrase to effect the output pitch pattern. Zakaria (2017, p. 91) describes Hyow intonation as resulting in Rising or Falling contours associated with the final syllable of a clause. This effect varies based on, for example, whether it is a matrix or embedded clause and whether it is in declarative or imperative mood. As tone and intonation research is not widely pursued within KC linguistics, the interaction between the two has seen little linguistic attention.

amplitude (Yip, 2002). These and other cues may be used to indicate tone contrasts even in whispered speech (Gao, 1999).

In order to discuss pitch patterns in KC languages within the context of previous tone research, it is worth considering the broader typology of pitch and tone inventories. Contours tend to be more marked than level pitch patterns, Rises more marked than Falls, and complex contours (Convex and Concave) more marked than simplex contours (Rises and Falls): HLH, LHL > LH > HL> H, L (Yip, 2002, pp. 27-30; Zhang, 2002; Gordon, 2001; Hyman, 2009). More marked pitch patterns are more likely to be missing from the pitch inventory of a language, or to have restricted distribution.[44] For example in LTZ, Falls are commonplace, but Rises are only found in derived environments. This section discusses pitch pattern inventories in Section 6.3.1, underlying tone and tone features in Section 6.3.2, and offers an example of tone analysis in Khumi in Section 6.3.3. Section 6.3.4 discusses pitch in the LTZ word list recordings collected for this study.

6.3.1 Pitch pattern inventories

Each language features a set of possible pitch patterns that may surface on a syllable. Table 6.11 provides a summary of some of the pitch pattern inventories for KC languages discussed in this chapter. For each language, shaded cells indicate that at least one pitch of the indicated type has been identified in the language (H, L, M, Fall, Rise), with other pitch patterns also noted. All of the languages on this chart (besides Lamkang) have at least two level pitches,

[44] Restrictions may involve syllable shape and prosodic position (see Zhang, 2002). Those involving syllable shape limit contours to syllables with longer vowels and/or sonorant codas, in some cases lengthening syllables to accommodate contours, discussed in Section 6.5. Restrictions involving location often restrict contours to prominent prosodic positions such as the final edge of a prosodic word or phrase, addressed in Section 6.6.

whether the contrast is analyzed as between H and M, or between H and L. Outside of Senthang, each language is reported to have at least one contour tone (Fall, Rise).

Table 6.1 Pitch pattern inventories in KC languages

	High	Low	Mid	Fall	Rise	Other	Sources
Mizo						Extra H	Chhangte, 1986
LTZ						MH, LM, HMH	primary data
Mara					-		Arden, 2010
Senthang				-	-		Ngun Tin Par, 2016
N. Bawm				-			Reichle, 1981
K. Thaadow			-			L Fall[45], ꜜH, ꜜHL	Hyman, 2010
Falam			-			Concave	Thuan, 2008
Khumi			-			12 patterns[46]	Peterson, 2014, 2019
E. Hyow			-		-		Zakaria, 2017
Matu		-				2 Falls, 3 Rises	Shintani, 2016[47]
Zotung		-			-		Shintani, 2015
Lamkang	-	-	-				Thounaojam & Chelliah, 2007

Languages with only level pitches are rare in KC. Senthang is described as having such as system, but with the additional complication of a three-level distinction: L vs. M vs. H. Some languages report only one Falling contour, as in Mara, E. Hyow, and Zotung.[48] Northern Bawm appears to break this tendency with only a Rise, which Reichle (1981) considers to be a variant realization of M tone. Other languages permit both Rises and Falls, such as Mizo, Kuki-Thaadow, Falam, Khumi, and Matu. In addition to level pitches and simple contours, Falam, and LTZ have concave (HMH) contours.

The tone inventories of Maraic languages are often described as involving three pitch (and in some cases tone) levels. In addition to Senthang, Zophei and Mara are also reported to

[45] Pre-pausal L is realized as a Low Fall in Kuki-Thaadow (K. Thaadow).
[46] These 12 patterns in Khumi include 3 Lows (two are checked), 3 Highs (two are checked), Extremely H checked, 3 Rises (one with a final fall, one that is gradual, and one that rises rapidly), and a High Fall.
[47] Shintani (2016) analyzes Matu as having only two lexical tones (H and M).
[48] In addition to these languages that feature a Fall as part of their inventory, Chothe is described as having a two-way contrast between Level and Falling pitch patterns (Singh, 2008, p.26).

use three pitch levels, along with contours. Mara makes a lexical contrast between L, M, and H morphemes, with a HM Fall occurring in derived environments (Arden, 2010, pp. 49-50, 65). The Lutuv tone system is in need of more research, but preliminary fieldwork suggests the use of three pitch levels is also warranted. The only Maraic language as yet described without three pitch levels is Zotung, which has two level tones (M and H) as well as a ML contour (Shintani, 2015, p.xxi). LTZ has three level pitches (L, M, H), two Falls (HM, ML), two Rises (LM, MH), and a Concave contour (HMH).

These pitch inventories, taken together, show that KC languages comprise a diverse typology of tone systems, in some cases exemplifying phenomena that are uncommon in the world's languages; for example, Lamkang and Laitu Hyow permit only contours.

6.3.2 Underlying tone and tone features

The inventory of relevant pitch patterns in a language of investigation, once established, employed in transcription, and analyzed in tandem with phonological and morphosyntactic considerations, can give way to a smaller inventory of underlying, contrasting tones or tone features. Take, for example, Chhangte's (1986, pp. 38-50) analysis of Mizo. The language is described with six pitch patterns: L, M, H, Rising, Falling, and an extra-High also noted as optional for some lexical items. Yet, when syllable shape is taken into account, Mizo's L and M pitches are reduced to only one underlying L tone.[49] In addition, Mizo contours (Rising, Falling) are analyzed as combinations of L and H, (Rising = L+H, Falling = H+L), reducing the underlying inventory to four tones (H, L, HL, LH), composed of two primitives: L and H.

[49] L surfaces on smooth syllables and M on checked syllables Syllable structure concerns, such as the smooth/checked distinction are discussed in Section 6.5.

The decomposition of contours into L and H primitives is used in other analyses as well. Hyman (2010) describes seven surface pitch patterns for Kuki-Thaadow (L, H, HL, LH, L Fall, ꜜH, ꜜHL), yet his analysis makes use of only underlying L and H tone primitive, combined to form three attested underlying patterns: L, H, and HL (LH is not underlying in the language).[50] Hyman (2014) offers similar analyses for other languages, making use of H and L primitives to decompose underlying contour tones for Hakha Lai (L, HL, LH), Thantlang Lai (L, H, HL), and Falam (H, L, HL, LH).[51]

Some analyses also make use of morphemes with no assigned tone, their pitch realization dependent on context. LTZ is analyzed in terms of an underlying H vs. L vs. toneless distinction on all syllables. Surface pitch patterns include L, M, H, HM, ML, LM, MH, and HMH, where the latter three Rises appear only in derived (plural imperative) contexts. Of the remaining pitch patterns, the realization of HM and ML falling contours is dependent on the pitch height of the preceding syllable, with HM following H (H-HM), and ML following M (M-ML). This leaves L, M, H and Falling (HM/ML) pitch patterns as necessary for transcription purposes (with attention paid to the derived Rises LM, MH, and HMH). Yet for tone analysis, this analysi makes use of only H and L primitives. Underlying H tone morphemes are those which never surface as L; underlying L tone morphemes are those which never surface as H; and underlying toneless morphemes are not limited in their surface pitch, as further discussed in Section 6.9.

Other analyses work to decompose underlying tones into their component features. Osburne's (1975) analysis of Falam includes only three underlying tones (L, H, and Rising).[52]

[50] Haokip's (2007) analysis of Kuki-Thaadow considers only three patterns to be relevant (Rising, Falling, and Level), analyzed as the realization of phonologically H, L, and toneless morphemes of all syllable shapes.
[51] Thuan (2008, pp. 44-45) also analyzes Falam as having four tones: H [44], L [21], Rising (or Concave) [23 or 323], and Falling [52 or 42] with some minor contextual variation in the realization of contours.
[52] The Falling tone was not included in Osburne's (1975) work, however her analysis does make reference to a Falling intonation contour. Yip's (2004, pp. 979-980) analysis posits underlying HL syllables that may or may not surface as such based on dialectal variation.

This three-tone system is further analyzed as reflecting the distribution of a binary [+/- High] feature. On a long vowel there are two slots (moras) that hold such features, so L tone on a long vowel is underlying [-High, -High], H tone is [+High, +High], and Rising tone is [-High, +High].[53] A similar analysis has been used for Khumi, described in more detail in the following section.

6.3.3 Case study: Khumi

Peterson (2014, 2019) points out several relevant phonological processes in Khumi that affect the realization of tone. In his analysis, short syllables are considered monomoraic (CV) with one mora, while long syllables are considered bimoraic (CVV), with two moras. Like Osburne's (1975) analysis of Falam, a mora may be underlyingly [+/- High]. Thus, logical possibilities for tone on a syllable include CV, CV́, CVV, CV́V, CVV́, and (although the analysis does not make use of it) CV́V́.

In the absence of phonological and morphological processes that alter the realization of pitch, these underlying patterns are faithfully realized as shown in the second 'Faithful' column of Table 6.2. Monomoraic CV and CV́ are faithfully realized as L and H checked pitches (L^{ʔ}, H^{ʔ}), while bimoraic CVV, CV́V, and CVV́ are faithfully realized as L, HL, and LH pitches, respectively.

[53] Yip (2004) offers a different analysis of Osburne's (1975) data. Based on the observation that toneless syllables all end in an oral stop, glottal stop, or glottalized sonorant, tone and laryngeal features are treated as part of the same contrast. So, a syllable is lexically assigned tone features [L], [H] or [ʔ], with each syllable carrying at least one, and not more than two, specifications.

Table 6.2 Underlying contrasts and surface pitch patterns in Khumi (Peterson, 2019)

Underlying	Faithful	Variant	Phonological Process
CV	L^{ʔ}	L	Deglottalization
		H^{ʔ}	Peak Delay
CV́	H^{ʔ}	L	Deglottalization & H-deletion
		L^{ʔ}	H-deletion
CVV	LL	HL	Peak Delay
CV́V	HL	L	H-retraction[54]
		H	H-deletion
CVV́	LH[55]	HL	H-retraction

However, in some phonological contexts, these underlying tones are predictably realized with the pitch pattern in the third 'Variant' column of Table 2. The processes that result in the variant patterns are found in the fourth 'Phonological Process' column, and further described below:

(a) **Deglottalization**: Non-final CV and CV́ lose their glottalization and surface as long.

(b) **Peak Delay**: CVV́ spreads H onto a following toneless mora.

(c) **H-deletion**: H deletes after H.[56]

(d) **H-retraction**: H shifts left to an immediately preceding toneless mora.

Peterson's investigation revealed more variant pitch patterns that surface in certain morphosyntactic contexts (locative, genitive, irrealis, negative, and imperative), with 12 total pitch patterns listed. For example, in the locative, the contrast between CVV and CVV́ is neutralized to a Gradual Rise, while the contrast between CV, CV́, and CV́V is neutralized to a long unchecked H.

[54] Only in non-final position.
[55] The Rise is more gradual in non-final position.
[56] H-deletion may also be related to the lack of underlying CV́V́.

Peterson's analysis of Khumi offers an example of how the inventory of surface pitch contrasts can be reduced to a smaller inventory of tone contrasts when taking into account phonological and morphosyntactic considerations. Work such as Peterson's analysis of Khumi highlights the potential complexity of KC tone systems and points to possible factors affecting pitch and tone in KC. With these facts in mind, the following section discusses pitch and tone considerations in LTZ word list recordings.

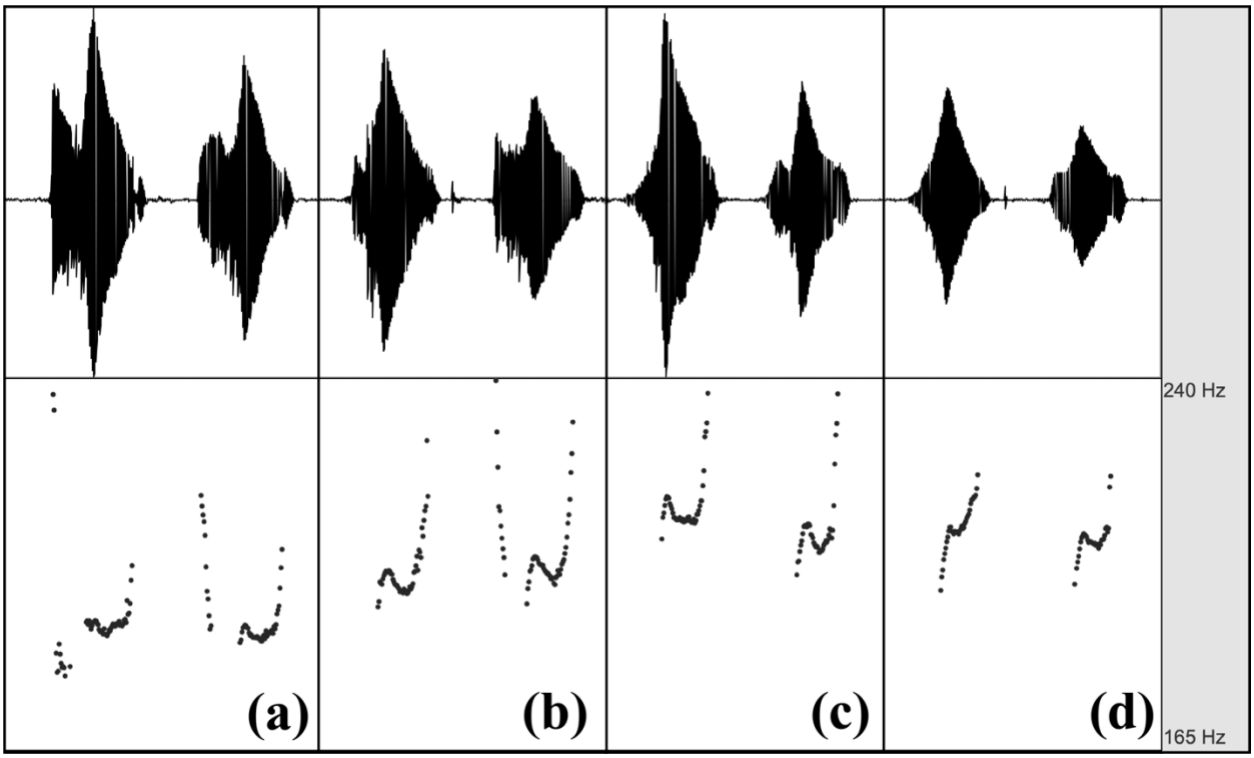
6.3.4 Pitch in LTZ word list recordings

The word list recordings collected for this project include words in isolation and under prefixation, offering some insight into the relationship between tone and pitch in LTZ. This section addresses surface pitch observations taken from these word list recordings, which motivate the need for other data collection instruments (Appendix D and Appendix E) and further phonological and grammatical analysis taken up in the remainder of this chapter. Most notably, while tone in nouns surfaces transparently in the word list, tone in verbs does not.

Consider, for example, the comparison of pitch traces from LTZ word list recordings in Figures 6.3-6.5 of four transitive verbs, all with the same segmental representation: (a) /rii/ 'read/count' (b) /rii/ 'speak' (c) /ríí/ 'tighten' (d) /ríí/ 'tie up.' In Figures 6.3-6.5, the toneless stems are provided on the left (a-b) and the H tone stems on the right (c-d), with two repetitions of each. In Figure 6.3, the realization of each word in isolation involves a similar f0 contour, often with an initially higher pitch that dips before rising at the end of the syllable. In addition, the toneless stems in (6.3a-b) appear to have somewhat lower f0 than the H tone stems in (6.3c-d).[57]

[57] To facilitate comparison across images, the pitch traces in this chapter keep a pitch range of 165-240 Hz. In places where comparison is described in the text, images also keep the same time scale. As in the previous chapter, this was

Figure 6.3 Toneless (a-b) and High (c-d) verbs in isolation, waveforms and f0 traces, (a) *rii* 'read/count' (b) *rii* 'speak' (c) *ríí* 'tighten' (d) *ríí* 'tie up



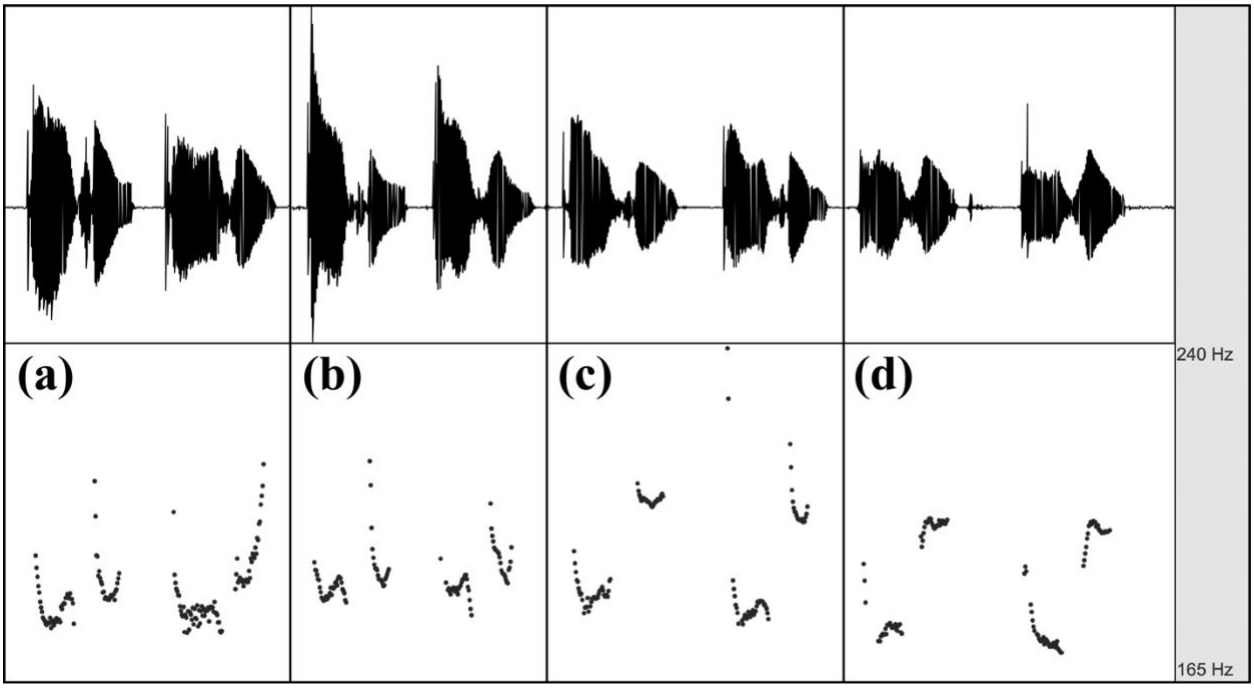
Despite apparent differences in f0 between repetitions, it is important to note that pitch is not absolute, so it is not possible to form hypotheses about how pitch is interpreted by native speakers from the f0 of these words in isolation. For that, we need native speaker intuition and more context. Furthermore, since the interpreted pitch of a syllable is always relative to other pitches in an utterance, tone researchers have less to learn from words in isolation than from words placed in different contexts (Snider, 2018).

Word list data recorded for this study also includes prefixed forms, from which we can glean some information about pitch in context using acoustics, reinforced by native speaker

achieved by using the same window length (6 seconds in Figures 6.3-6.5) in Praat (Boersma & Weenink, 2020). The aspect ratio was further preserved by taking screen captures of maximized application window on the same computer and not modifying the aspect ratio in editing those images. Where spectrograms are included, the range is 0-10,000 Hz. Figures with comparable time scales are given in footnotes.

intuitions. Figure 6.4 involves the same set of verbs as in Figure 6.3 but with prefixed plural subjects (two repetitions of each): (a) /aa rii/ 'They read/counted it,' (b) /aa rii/ 'They spoke it,' (c) /aa ríí/ 'They tightened it,' (d) /aa ríí/ 'They tied it up.' In this context, the lexical tone contrast between toneless (a-b) and H (c-d) stems is reflected in the f0 contours. Where the former two stems (6.2a-b) have relatively similar f0 on the first and second syllables, the latter two stems (6.2c-d) have higher f0 on the second syllable. Though not recorded as part of the word list, this process is observed with the /kaa/ 1st and /naa/ 2nd plural agreement markers as well.

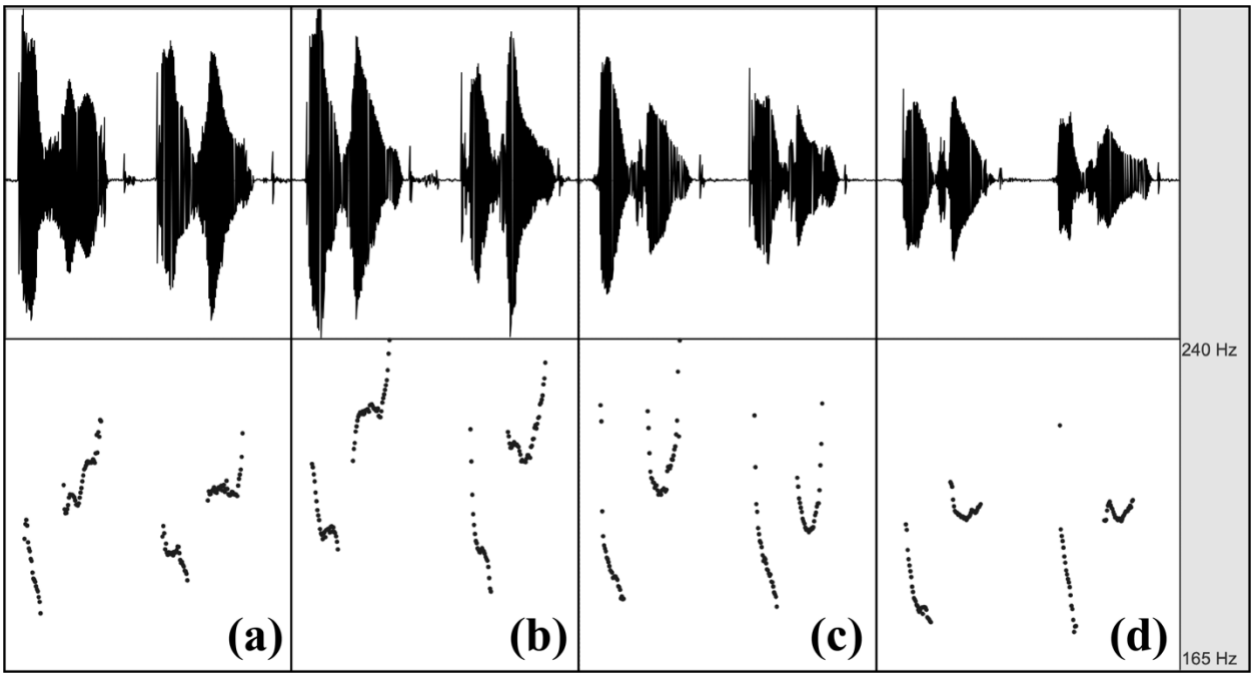
Figure. 6.4 / Toneless (a-b) and High (c-d) verbs, *aa-* prefixation, waveforms and f0 traces, (a) *aa rii* 'They read/counted it,' (b) *aa rii* 'They spoke it,' (c) *aa ríí* 'They tightened it,' (d) *aa ríí* 'They tied it up.'



Yet, lexical contrasts do not surface in all contexts, as illustrated in Figure 6.5 where these four stems are prefixed with a 3rd person singular /a/ marker: (a) /a rii/ 'She read/counted it,' (b) /a rii/ 'She spoke it,' (c) /a ríí/ 'She tightened it,' (d) /a ríí/ 'She tied it up.' Unlike in

Figure 6.4 where only H stems (c-d) have raised pitch on the second syllable, each stem in Figure 6.4 exhibits a jump in f0 from the first to the second syllable and the lexical contrast between toneless and H stems is not apparent. Unlike in Figure 6.3, H tone stems do not appear to have higher f0 than toneless stems, since the toneless stem in (6.5b) surfaces with the highest f0 in these examples and the toneless stem in (6.5a) has a similar pitch height to those H tone stems in (6.3c-d). Differences here are likely an artifact of recording a word list where the speaker's starting pitch may vary from day to day or token to token. This same phenomenon is also observed with other singular agreement markers /ka/ 1st and /na/ 2nd, marking transitive subjects.

Figure 6.5 Toneless (a-b) and High (c-d) verbs, *a-* prefixation, waveforms and f0 traces, (a) *a rii* 'She read/counted it,' (b) *a rii* 'She spoke it,' (c) *a ríí* 'She tightened it,' (d) *a ríí* 'She tied it up.'

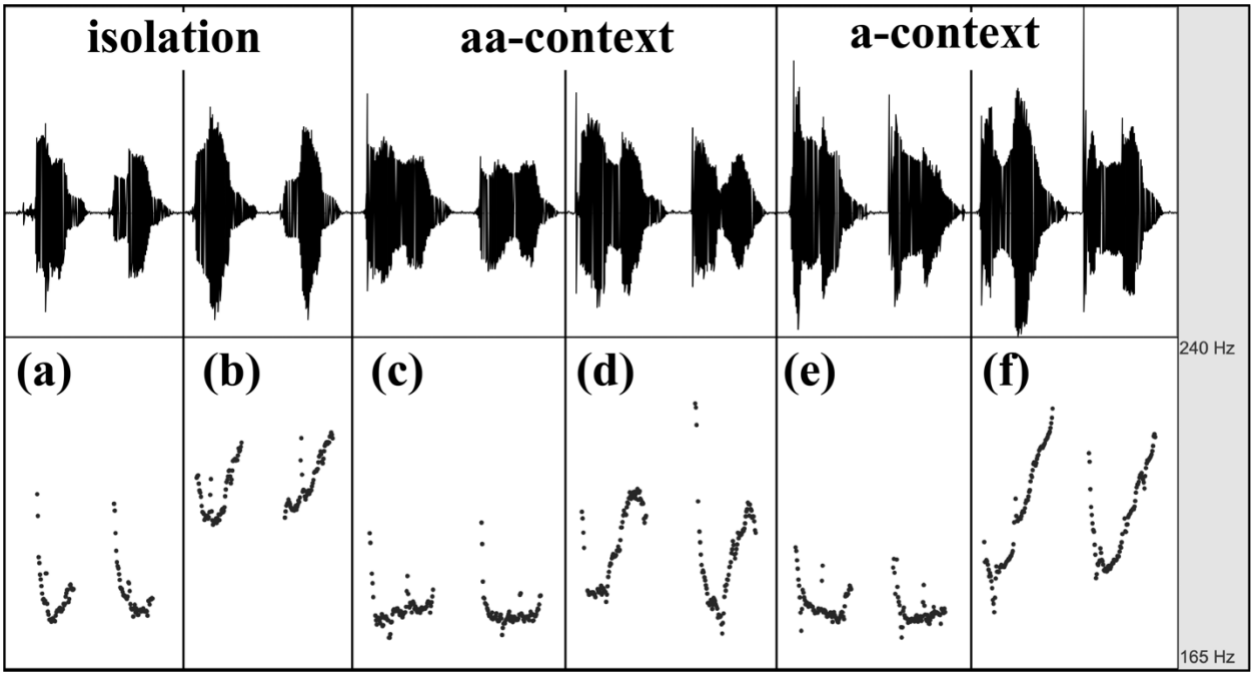


Although words in isolation (Figure 6.3) are not particularly useful in investigating LTZ verbal tone, contexts where contrasts surface (Figure 6.4) and where they are obscured (Figure

6.5) are valuable in setting a research agenda. The /aa/ context reveals a potential diagnostic context for teasing apart tone distinctions in transitive verbs, while the /a/ context reveals a further puzzle as to what accounts for lexical contrast neutralization. This puzzle is further discussed in Section 6.9.

Unlike transitive verbs, LTZ nouns are more transparent with regards to their underlying tones. Recall in the verbal domain that major syllable /aa/ prefixation in Figure 6.2 reveals a lexical contrast that is not apparent under minor syllable /a/ prefixation in Figure 6.3. Segmentally identical /aa/ and /a/ markers show up in the nominal domain as well, indicating 3rd person plural (/aa/) and 3rd person singular (/a/) possession. However, in the nominal domain, a contrast is clearly observable in all three contexts. In Figure 6.6, the tonal minimal pair /leeng/ ‘shoulder’ (6.6a,c,e) and /lééng/ ‘cart,’ (6.6b,d,f) are given with two repetitions each: in isolation in (6.6a-b), with the 3rd person plural possessive marker /aa/ in (6.6c-d), and with the 3rd person singular possessive marker /a/ in (6.6e-f).

Figure 6.6 Toneless (a, c, e) and High (b, d, f) nouns, waveforms and f0 traces, (a) *leeng* 'shoulder,' (b) *lééng* 'cart,' (c) *aa leeng* 'their shoulder,' (d) *aa lééng* 'their cart,' (e) *a leeng* 'his shoulder,' (f) *a lééng* 'his cart,'[58]



The differential treatment of prefixed nouns and verbs suggests that the neutralization in Figure 6.3 is not due to regular phonological rules, but rather grammatical tone processes Most notably, the /a/ possessive context in (6.6e-f) shows toneless (6.6e) and H (6.6f) nouns surfacing with a contrast, contra the /a/ agreement context in Figure 6.5 wherein toneless (6.5a-b) and H (6.5c-d) verbs surfaced with no contrast.

In considering morphophonology for this puzzle, the relevant question is whether the /a/ verbal agreement marker could differ from the /a/ nominal possessive in introducing the H tone that neutralizes lexical contrasts in verbs but not nouns. In comparing the /a/ agreement marker in Figure 6.5 with the /a/ possessive marker in Figure 6.6, a morphophonological analysis might

[58] The time scale for this image differs from others in this section and was taken with a 7.5 sec window.

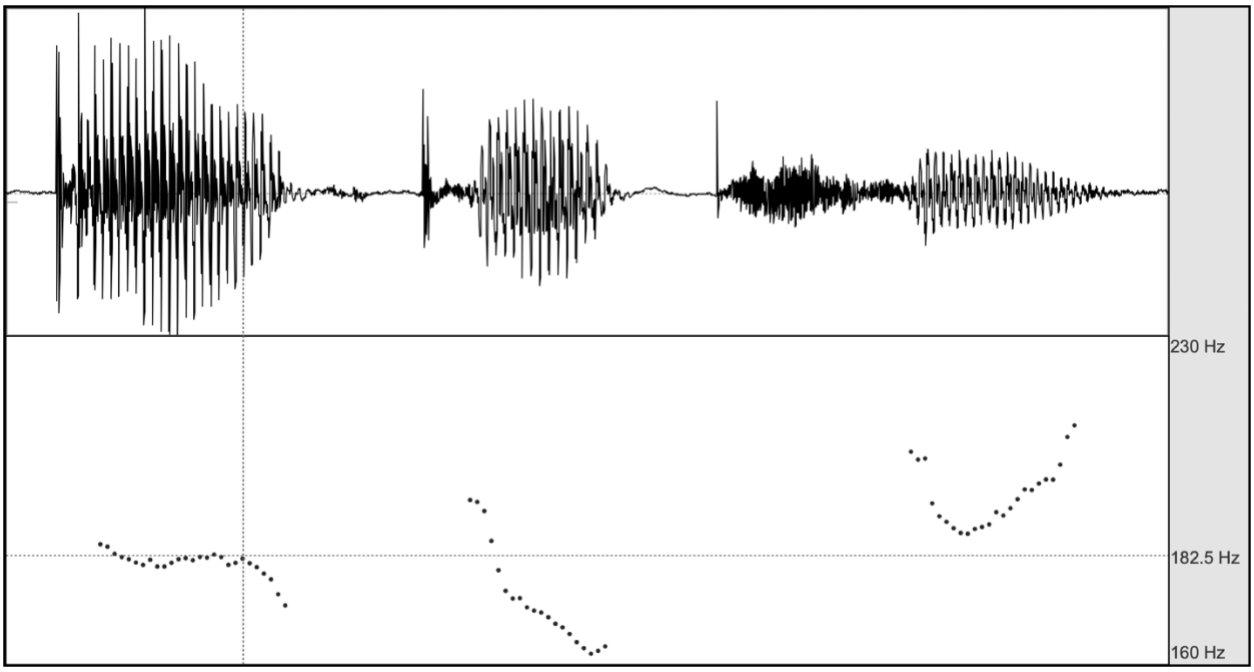
consider that the agreement marker comes with a floating H tone that surfaces not on the morpheme itself but on the following toneless verb. This H tone would then be vacuously applied to the H tone verb, neutralizing the lexical contrast between toneless and H. If this H tone is consistently applied when these (and possibly other morphemes with the same floating tone) are present, then this may be a viable analysis.

There are some barriers to this analysis, however, that reveal further mysteries. First, the application of H tone is not consistent following the 1st person plural object marker /ma/. In imperatives with /ma/, no H tone shows up and the lexical contrast surfaces as M vs. H (*ma miing* 'Watch us!' vs. *ma báá* 'Feed us!') suggesting that /ma/ does not have this H floating tone. Yet in declarative contexts with /ma/, H tone does show up on the following verb. If H tone is not tied to /ma/, then it could be tied to a preceding subject marker. One could then posit that /a/ but not /aa/ would induce H tone. However, regardless of the preceding subject agreement marker, the stem receives H tone, neutralizing lexical contrasts (*a ma míing* 'She watched us,' vs. *aa ma míing* 'They watched us'). In these transitive declarative contexts, it does not look like either the subject or object prefixes is responsible for H tone. Furthermore, lexical contrasts in CVʔ stems are not neutralized to H following /a/ (*a sah* 'She built it,' vs. *a túh* 'She hit him') despite toneless CVʔ stems showing up with H tone elsewhere in Appendix D (such as following /ma/ in negative contexts).

These additional mysteries, especially involving sentential mood (declarative, imperative), polarity (affirmative, negative), and transitivity (intransitive, transitive) suggest that we should also consider morphosyntactic sources for this H tone. With continued research on tone in LTZ, this H tone could be more accurately described as marking transitivity, indicative mood, or the presence of a null object.

To further exemplify the surface pitch contrast in LTZ acoustically, Figure 6.7 shows that LTZ data description requires reference to three pitch levels (L, M, H), demonstrated here on three CVV syllables, with the lowest pitch on the second syllable and the highest pitch on the last.[59]

Figure 6.7 Three pitch levels in LTZ *aa kèè tsǿǿ* 'She ascended.' [60]

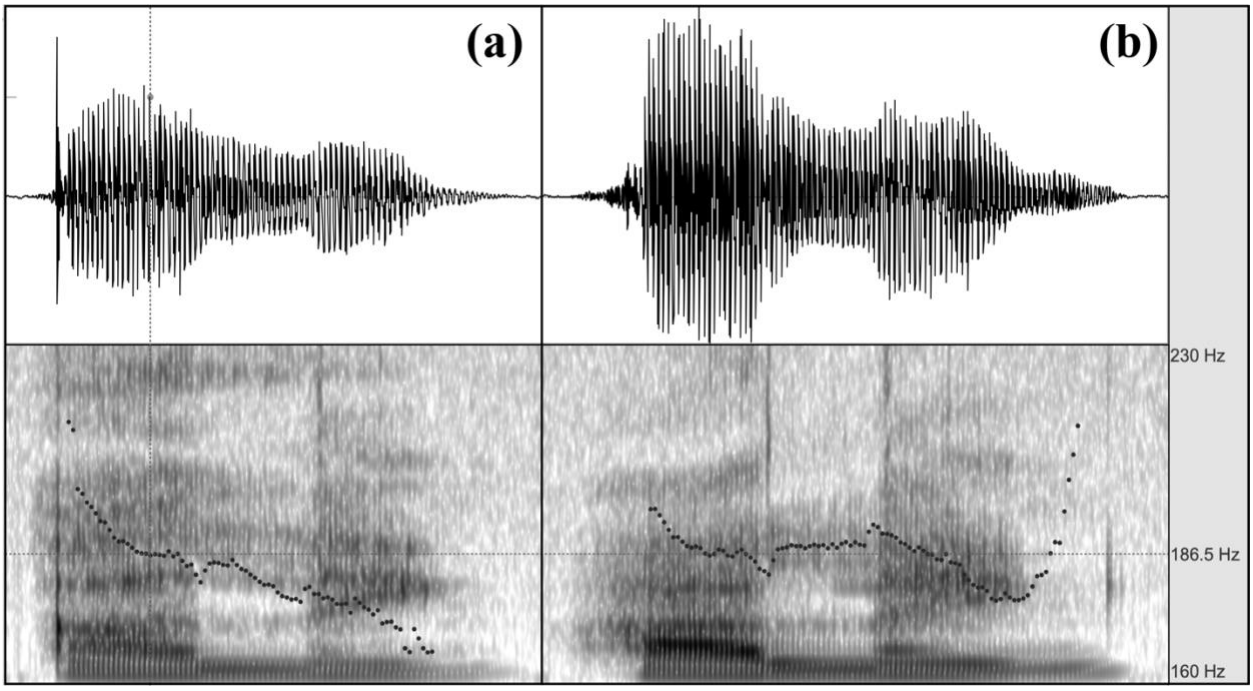


Lawngtlang Zophei Falling (HM or ML), Rising (MH or LM), and Concave (HMH) contour pitch patterns show up in derived environments and are not analyzed here as underlying. As further discussed in Section 6.9, intransitive contexts involve L tone which lowers a toneless stem to L and a H stem to a Fall. Figure 6.8 illustrates this contrast with the tonal minimal pair /leeng/ 'to crawl' and /lééng/ 'to be large,' each with the prefixal 3rd person singular intransitive

[59] The pitch of a H syllable following a L is generally lowered, although L-H is not a common combination in the data recorded for this study, so this and other downdrift phenomena were not investigated as part of this project.
[60] The scale for the pitch trace in Figure 6.7 has been changed here to160-230Hz to accommodate the L tone. The time scale on this image is .75 sec. A cursor is set up at 182.5 Hz to aid in comparison as well.

subject marker /aa/. These forms are segmentally identical to the 3rd person plural transitive subject marker in Figures 6.4 and (6.6c-d). In (6.8a) [aa lèèng] 'She crawled,' the pitch falls during the onset /l/ and the second syllable has lower pitch than the first. In (6.7b) [aa leèng] 'It's large,' the pitch stays level during the onset /l/ and falls on the following vowel.[61]

Figure 6.8 Comparison of [M-L] and [M-ML] pitch patterns in LTZ, (a) [aa lèèng] 'She crawled,' (b) [aa leèng] 'It's large.' [62]



While LTZ surface pitches include H, M, L, Falling (HM, ML), Rising (LM, MH), and Concave (HMH) patterns, morphemes are analyzed here as underlyingly H, L, or toneless. Further discussion of this contrast can be found in Section 6.9

[61] Variation between [HM] and [ML] Falls have been observed in LTZ, although these Falls do not appear to be contrastive. Rather, HM follows H and ML follows M, so all Falling pitch patterns in Appendix D and Appendix E data are marked as HM, for consistency. MH and HMH patterns have only been identified in plural imperatives, discussed further in Section 6.8, but were not recorded as part of the word list audio data and so are not included in these images.

[62] This image differs from previous images in making use of a 1.2 sec window, adding a line for pitch at 186.5 Hz to facilitate comparison across tokens and a spectrogram to help show the pitch fall on the lateral vs. the vowel.

In working to reduce the inventory of surface pitches that are useful for transcription to a smaller inventory of underlying tones, phonological and grammatical factors must be taken into account, as illustrated using word list data from LTZ. The sections that follow treat these individual considerations in turn, including interactions between tone and consonants (Section 6.4), tone and syllable structure (Section 6.5), and tone and syllable position (Section 6.6). Section 6.7 discusses phonological processes involved in tone realization, while Section 6.8 focuses on morphosyntactic considerations.

6.4 Tone and consonants

Consonants are known to have an influence on f0, in some cases leading to diachronic phonological change in tone systems. Since f0 is tied to the speed of glottal vibration, relevant consonantal features that tend to affect it are those involving the glottis. These include the voicing of onsets, and the presence of coda glottal stops /-ʔ/ and glottal fricatives /-h/, discussed in turn.

Onset voicing is known to have an influence on pitch realization; most commonly, voiced consonants are followed by lower f0 on a following vowel than are voiceless or aspirated onsets. This relationship between onset voicing and lower tone has been observed across many languages from different families (Ohala, 1973; Bradshaw, 1999; Tang, 2008). In English, this effect is localized to the initial edge of the vowel following the onset (Lisker & Abramson, 1964; Chistovich, 1969; Lea, 1973), while in Japanese, it lowers f0 for the duration of the vowel (Shimizu, 1989; Oglesbee, 2008). In languages where these effects are phonologized, consonants involved in pitch or tone lowering are called ‘depressor consonants’ or ‘depressors.’

Laryngeal contrasts in Mizo onset stops have been linked to differences in the initial f0 of the following vowel; and like English, the effect does not persist throughout the vowel.

Lalhminghlui & Sarmah (2020) offer evidence from a nonce word production task that speakers of Mizo produce vowels with lower f0 following voiced stops than following voiceless unaspirated or voiceless aspirated stops (with the highest initial f0 following the aspirated series).[63] Working to mitigate this influence of surrounding consonants on pitch for automated tone detection in Mizo, Sarma, Sarmah, Lalhminghlui, & Prasanna (2015), opted to disregard the first and last 20% of the vowel; their model detected tones in a corpus with 70% accuracy. These types of study elucidate the relationship between f0 (as measured) and pitch (as interpreted), helping us to understand the link between the phonetics and phonology of tone systems.[64]

Coda consonants, especially those with glottal features like /h ʔ/ have been known to affect pitch and condition diachronic tone change, for example in Vietnamese (Haudricourt, 1954; Maran, 1973; Matisoff, 1973).[65] The tendency is for a final glottal fricative /-h/ to induce a falling pitch contour (due to the slackening of the vocal folds) and for a final glottal stop /-ʔ/ to induce a rising pitch contour (due to the tensing of the vocal folds).[66]

Ostapirat (1998), using comparative analysis and internal reconstruction of verbal stem alternation, suggests a similar tone split process may have occurred in Tedim (Tiddim) long syllables. In synchronic Tedim, all checked syllables (those with short vowels ending in an oral

[63] Sarmah & Wiltshire (2010) also note statistically significant effects of consonant place and manner of articulation on f0 in Mizo.

[64] These phonetic pressures tied to onset consonants may lead to diachronic change. Phonetic pitch lowering linked to onset voicing has been known to phonologize, as in the West African languages Ewe and Gengbe, (Ansre, 1961; Bole-Richard, 1983; Lotven & Berkson, 2019b). One common result of this phonologization process is a phonotactic restriction, such as in Thai, where voiced stops are disallowed as onsets of syllables with H tone (Perkins, 2011), and Kera, where the full range of tone contrasts is only available to syllables with sonorant onsets (Pearce, 2005). This process may be responsible for the development of lexical tone (tonogenesis) or tone change, such as "tonal bifurcation," described in Hyman (2013) and exemplified by the Southern Bantu groups Nguni and Shona (Downing, 2009). During tonal bifurcation, a voicing contrast (/p/ vs. /b/), realized in part through phonetic f0 cues on the following vowel (/pá/ [pá] vs. /bá/ [bă]) is reanalyzed by speakers as a tone contrast (/pá/ vs. /pă/).

[65] Note that here the discussion of /-h/ refers to a voiceless glottal fricative, although often KC languages without coda /-h/ use an orthographic <h> to indicate a final glottal stop.

[66] Glottal stops are not always diachronically connected with pitch raising, since final glottal stops may be realized with attendant creaky voice on the preceding vowel, commonly associated with the realization of L or Falling pitch patterns (Hombert, Ohala, & Ewan, 1979, p. 54).

or glottal stop) take L tone, but long syllables have three options: Level, Rising, or Falling tone. Ostapirat's analysis treats this system as the result of a diachronic near-merger of open syllables with long vowels (e.g., /-aa/), syllables with long vowels closed in a glottal stop (e.g., /-aaʔ/), and syllables with long vowels closed in a glottal fricative (e.g. /-aah/). All three syllable types likely had underlying Level tone before the merger, but the tense glottal features of /-ʔ/ were associated with a pitch rise and the lax glottal features of /-h/ were associated with a pitch fall; both pitch phenomena were reinterpreted as underlyingly contrastive. In modern Tedim, CVV syllables with Level tone derive from older open syllable rhymes, those with Rising tone derive from older glottal stop-final rhymes, and those with Falling tone derive from older glottal fricative-final rhymes.

Such interactions have likely conditioned tone change in other KC languages as well, especially in Maraic, which has seen especially radical reductions in coda consonants accompanied by an expansion of tonal contrasts (Lotven et al., 2019a). In order to further investigate these phenomena, more research on more Maraic varieties in necessary. And although some f0 differences between voiced and voiceless onsets are noted in the word list recordings collected for this project, onset voicing does not have a phonological effect on pitch in LTZ. Although interactions between tone and consonants are not commonly reported for KC languages, interactions with syllable structure are, as discussed in the next section.

6.5 Tone and syllable structure

Underlying tone and surface pitch realization often interact with syllable structure in KC. Common effects involve differences in pitch realization between syllables of different shapes. For example, in Zotung, a language with only CVV and CVʔ syllables, the underlying H vs. L

contrast is realized as Convex [454] vs. Falling [42] on CVV syllables, but as High [55] vs. Low-Falling [31] on CVʔ syllables, when not neutralized (Shintani, 2015, p. xxi).

Yet, some analyses of KC tone do not appear to require reference to syllable structure. For example, in Sumtu, the contrast between L and H is realized on all minor and major syllables, although it is analyzed as underlying only for the latter (Watkins, 2013, pp. 84, 95); and Anal's contrast between L, H, and toneless morphemes applies to all major syllables, long and short, checked and smooth (Ozerov, 2018, pp. 712-713). Nonetheless, differences in tone realization based on syllable shape are commonly described in KC languages.

Some syllable shapes may be restricted to only one underlying tone. For example, all CVT syllables (where, recall, T is a voiceless oral stop) are L in Falam, Kuki-Thaadow, Mizo, and Tedim; H in Thantlang Lai; LH in Hakha Lai; and HL in Tedim. CVVT syllables are all L in Hakha and Thantlang Lai; HL in Falam, Kuki-Thaadow, and Mizo; and LH in Tedim (Hyman & Van Bik, 2002a; Hyman, 2007, 2014; Ostapirat, 1998). These cases may indicate that there are limited underlying tones available to certain syllable shapes, especially those with short vowels and/or obstruent codas, or that certain shapes are assigned a default tone. Regardless of analysis, the range of attested interactions between syllable shape and tone indicates that syllable structure phonotactics are crucial considerations in the investigation of KC tonal phonology.

In Tibeto-Burman languages more broadly, syllable shape descriptions often divide syllables first into minor and major syllables. This split describes the difference between the first and second syllables of an iamb, as in the Zophei word *pa hnaa* 'snore.' Matisoff (1989) refers to this minor+major syllable iambic structure as a 'sesquisyllable.' More than one minor syllable may precede a major syllable, but minor syllables are never found on the final edge of a prosodic

word or phrase. Minor syllables are discussed in Section 6.5.1 and major syllables in Section 6.5.2.

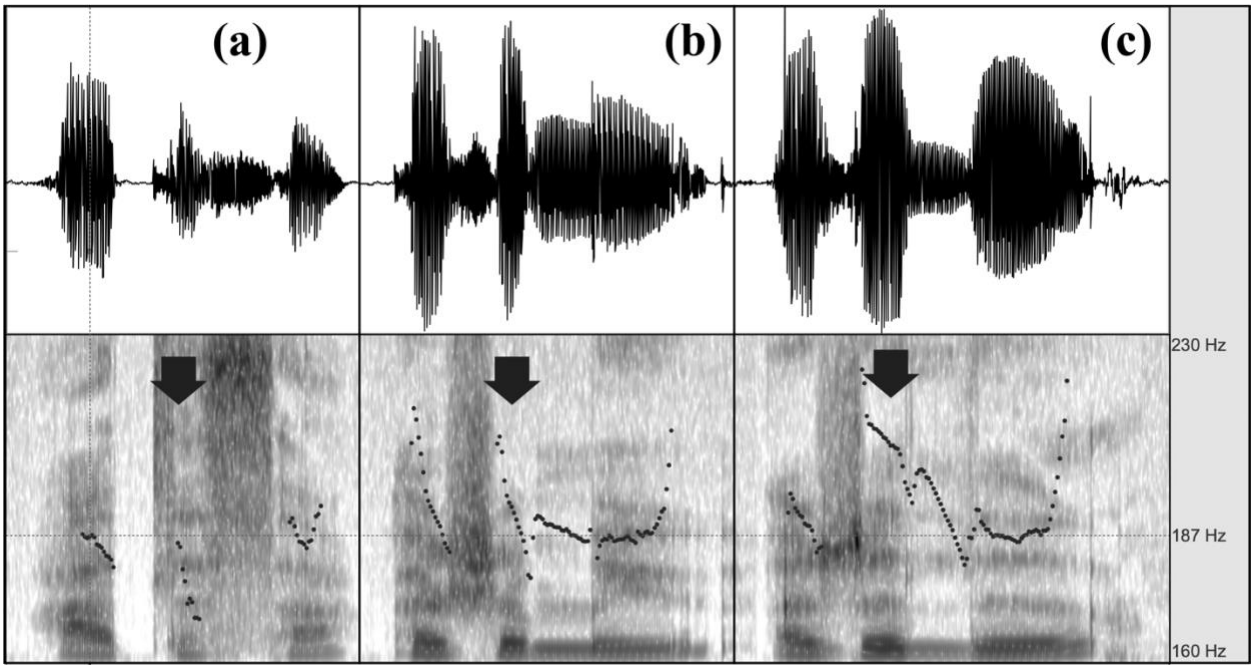
6.5.1 Minor syllable tone

Minor syllables often do not have access to the full range of tonal contrasts available to major syllables, in part, due to their shorter duration (Matisoff, 1989; Henderson, 1952; Thomas, 1992; Butler, 2014). For example, Lemi minor syllables do not exhibit a tonal contrast and are realized with default mid pitch (Herr, 2011, p. 58); and while Sorbung's major syllables contrast L, M, and H tone, minor syllable tone is dependent on phonological context (Mortensen & Keogh, 2011, pp. 79-82).[67] In Hakha Lai, minor syllables are toneless, an analysis supported by evidence from compounding, wherein a major syllable loses its tone when shortened to a minor syllable. For example, when HL *hnáà* 'ear,' LH *kèé* 'leg,' and L *sàà* 'animal' appear as the first word in a compound, they are reduced to toneless minor syllables, realized with a "mid-to-high pitch," as in ***hna*** *hmáà* 'ear wound,' ***ke*** *hmáà* 'leg wound' and ***sa*** *hmáà* 'animal wound' (Hyman & Van Bik, 2002a, p. 17).

In LTZ, tone is not predictable from syllable structure, and minor syllables can surface with L, M, or H pitch, as in the following words: ***tlà*** *sah* 'let boil,' ***ra*** *møø* 'bamboo,' and ***rá*** *l̈ɨ̈* 'ocean.' For the three trisyllabic words in Figure 6.9, the first and last syllables surface with M pitch. Consider the second syllable of each word, marked with an arrow. In (6.9a) *aa tlà sah* 'He let it boil,' L tone surfaces on the target syllable; in (6.9b) *a ra møø* 'the bamboo,' M surfaces on the target syllable; and in (6.9c) *a rá l̈ɨ̈* 'the ocean,' H surfaces on the target syllable.

[67] Minor syllables may have reduced segmental inventories as well, as discussed in (Mortensen, 2021). For example, only 10 out of the 22 onset consonants in Lemi can occur in a minor syllable (Herr, 2011, p. 58) and minor syllable vowels may undergo harmony processes, described for Hyow (Zakaria, 2017, pp. 68-69) and Lamkang (Thounaojam & Chelliah 2007, pp. 30-35).

Figure 6.9 Minor syllable pitch contrast in Lawngtlang Zophei, (a) *aa tlà sah* ‘He let it boil,’ (b) *a ra møø* ‘the bamboo,’ (c) *a rá lɨɨ* ‘the ocean,’ [68]



When a major syllable is shortened to a minor syllable, its tone remains; for example, when the negative marker *bèh* occurs before the 2nd person singular marker *tsih*, the resulting iamb is realized as *bà tsih*, retaining L tone on the minor syllable. While minor syllables in some KC languages like Lemi and Hakha Lai do not contrast in pitch, Zophei shows that KC researchers should take care to investigate tone in all syllable shapes.

6.5.2 Major syllable tone

Major syllables, those without restricted distribution or reduced inventories, are often divided into checked and smooth syllables in analyses of KC languages, such as Hakha Lai (Hyman & Van Bik, 2002a) and Hyow (Zakaria, 2017). Checked syllables are closed with an

[68] This image was taken with a 2.25 sec window.

oral or glottal stop (CVVT, CVT, CVʔ), while smooth syllables include open syllables and syllables closed with a sonorant (CVV, CVVN, CVN).

In many Sino-Tibetan languages (Bola, Maru, Tangkhul, Trung, Jingpho, Karen, Xiamenese, Cantonese), there are fewer tonal contrasts available to shorter or checked syllables (Hyman, 2014). For example, Tedim smooth syllables have Level, Rising, or Falling surface pitch patterns, while checked syllables have only Low pitch (Ostapirat, 1998, pp. 242). Likewise, Daai has a lexical tone contrast between H (realized as a High-Falling pitch) and L (realized variably as L, M, or H), but this contrast only shows up on CVV, CVN, CVVN, and CVVT syllables, but not CVT ones (So-Hartmann, 2009, pp. 47-49). And Bawm smooth syllables contrast L, H, and HL tone, while checked syllables only contrast L with H (Löffler, 1972).

Checked syllables do not usually occur with contours, part of a more general cross-linguistic tendency for contour tones to prefer longer vowels (Gordon, 2001; Yip, 2002; Zhang, 2002). In Vaiphei, for instance, L can be realized on all syllable shapes, but Falling and Rising tone cannot show up on syllables ending in glottal stops (Suantak, 2013, p. 121). Such interactions between syllable structure and tone have led some researchers to suggest final glottal stops in checked syllables are not segments, but rather a feature of tone (Chhangte, 1986; Yip, 2004; Peterson, 2014, 2019).[69]

However, these restrictions do not exist for all KC languages, some allowing contour tones to surface on checked syllables. Zotung's Falling [31] tone occurs in syllables closed with

[69] The contrast between CVV and CVʔ in KC languages may also be characterized, depending on language-specific processes, as a contrast between long CVV and short CV syllables (Lotven et al., 2019a). The analysis of CVʔ as a short open syllable is less clear in languages where the final glottal stop may be analyzed as a consonant, for example, for the purposes of morphological operations in Senthang (Ngun Tin Par, 2016). However, some Maraic languages, like Mara (Van Bik, 2009) and Zophei, have undergone syllable restructuring by merging CVV and CVʔ, then re-innovating CVʔ from CVT. In these languages a simple long vs. short distinction for open syllables may be appropriate. To avoid confusing minor syllables with short major syllables, as well as to indicate where CVʔ syllables have been lengthened, <h> is used here to mark checked syllables in Zophei whether or not they have been lengthened.

a glottal stop (Shintani, 2015). Lamkang allows for Falling and Rising tone realization regardless of syllable type (Thounaojam & Chelliah, 2007) and Thantlang Lai checked syllables can surface with LH or HL contours (Hyman, 2014). Such contours are often described differently from smooth syllable contours: for example, Kuki-Thaadow is described as having 'sharp' contours that usually occur on diphthongs and CVʔ syllables (Krishan, 1980, pp. 28-29).

Contouring may also involve vowel lengthening and contour simplification may involve vowel shortening. In Falam, long vowels with a Rise are realized as extra-long and short vowels with a Rise are realized as half-long (or long, on the final edge of a word) (Osburne, 1975, p. 54). Lengthening occurs in derived environments in Zophei, such as when H tone marking subject/object plurality appears on the CVʔ prohibitive marker *kheh*. When the stem is toneless, this plural H lengthens the final syllable to a MH rise, as in *miing kheh/kheéh* 'Don't watch him/them,' and to a HMH Concave tone when the stem is H, as in *báá khéh/khéeéh* 'Don't feed him/them.'[70] In Mizo, if a process shortens a syllable with a contour, the tone is simplified according to the second member of the contour: LH to H and HL to L (Chhangte, 1986, pp. 45-49). These examples show that while some languages may limit contours to smooth syllables, others may lengthen checked syllables to accommodate contours.

For the purposes of the LTZ analysis presented here, checked syllables (CVʔ) and minor syllables (CV) are considered monomoraic, consisting of one mora (V). Smooth syllables (CVV and CVVN) as well as checked syllables with lengthening <CVVh> are considered bimoraic, consisting of two moras (VV). Concave tone (HMH) shows up on super long syllables (CVVV, CVVVN, and <CVVVh>), considered trimoraic—consisting of three moras (VVV). Where there

[70] The Concave tone in Zophei is likely the result of both H tone spread from the stem onto the prohibitive marker, and the avoidance of two adjacent underlying H tones, resolved through contouring (see the Obligatory Contour Principle: Leben, 1973; Goldsmith, 1976; Odden, 1986).

is a reduction in the prominence of a CVʔ syllable in a non-final prosodic position, it is treated as a minor syllables (Ca).

6.5.3 Summary

Even in cursory descriptions of KC tone systems, the importance of syllable shape is commonly noted, indicating widespread relevance in KC languages. While smooth syllables usually have access to the largest inventory of tones in a language, minor syllables and checked syllables usually see a reduction. Minor syllables surface with default or context-dependent pitch in Lemi, Sorbung, and Hakha Lai. Likewise, checked syllables are analyzed as having limited underlying tones in Falam, Tedim, and Daai. Even in languages where contours show up on checked syllables, their realization is often described differently from contours on smooth syllables, as in Falam and Kuki-Thaadow. Synchronic processes where tone and syllable structure covary, like LTZ and Mizo, offer opportunities for the study of their interaction. In addition to syllable-based phonotactic restrictions on underlying tone and surface pitch realization, the position of a syllable within a word or phrase is also a reported factor.

6.6 Tone and syllable position

In many KC languages, contours are limited to the final edge of a prosodic word or phrase, where contours are cross-linguistically more common (Gordon, 2001; Yip, 2002).[71] In Zotung, for example, all tonal contrasts and contours are limited to occurring "at the end of a semantic junction" and are neutralized elsewhere to a "slightly rising rhythm" (Shintani, 2015, p.

[71] Hyman & Van Bik (2002a, 2004) note that three out of the four phonological changes to underlying tone observed in their Hakha Lai data affect the final tone of a sequence. And although final edge phenomena appear more often than initial edge phenomena in the KC literature and occupy the bulk of this discussion, initial edge phenomena are also attested. In Kuki-Thaadow, an initial boundary L tone conditions a change from %L + H to LH in utterance-initial or post-pause position (Hyman, 2010).

xviii). In Sumtu, pre-pausal H is realized as HL, which Watkins (2013) analyzes as involving a final boundary L tone that docks to the H to form a HL contour. In Southern Bawm, Reichle (1981, pp. 13-14) describes 'Raised' tone as only occurring on demonstrative, emphatic, and phrase-type morphemes limited to phrase-final position where the vowel length contrast on Raised syllables is neutralized. Other KC languages permit non-final contours, such as LTZ, where Falls (but not Rises) appear non-finally.

Even closely-related KC languages and dialects differ in whether they permit non-final contours. Hakha Lai and Falam do, but Thantlang Lai does not. In Hyman's (2007) analysis, contour tones are disallowed before like tones in Falam (*LH-H, *HL-L), before unlike tones in Hakha Lai (*LH-L, *HL-H), and before any tone in Thantlang Lai. Thus, unlike in Falam where LH-L is a licit sequence, it is not found in Hakha Lai (ruled out by the fall between syllables), nor in Thantlang (ruled out by the nonfinal contour).[72] While Hakha Lai avoids pitch changes between syllables and favors pitch changes within syllables (i.e., contour tones), Thantlang Lai and Kuki-Thaadow favor pitch changes between syllables. In addition, Kuki-Thaadow utterances *may* end in a contour (with level pitch also available to final syllables), but Thantlang Lai utterances *must* end in a contour (Hyman, 2007, 2010).

To account for the often-constrained realization of contour tones, researchers consider two options: (1) level tones are underlying and may be realized as contours in some contexts (finally), or (2) contours are underlying and may be reduced to level tones in some contexts (non-finally). Shintani's (2016) analysis of Matu involves the former—Pre-pausal H and M on

[72] According to Hyman (2007, p. 12), Thantlang Lai avoids jumps from L to H across a syllable boundary, which works to unify both phrase- and word-level tone alternations. The effects of this ban on L-H are visible in the morphological process of compounding (or genitive marking). Underlying L-H in /bòòy vóók/ [bòòy vŏk] 'chief's pig' and underlying L-HL in /bòòy zóòng/ [bòoy zòóng] 'chief's monkey' both surface as L-LH, avoiding the L-H jump between syllables. Nominal compounds in Thantlang, thus, surface with only three attested tone patterns: H–LH, H–HL, and L–LH. These observations and analyses serve as the basis of an Optimality Theoretic treatment in Lin (2005).

smooth syllables are realized as Rises. Zakaria's (2017) analysis of Hyow, on the other hand, involves the latter—HL tone only shows up in pre-pausal position and is reduced to H elsewhere. In competing analyses of Falam, both strategies have also been employed. Thuan (2008) makes use of contour simplification, claiming underlying LH and HL only surface phrase-finally. Osburne's (1975) analysis, on the other hand, treats LH as underlying and HL as derived.[73]

Observations and analyses of final-edge phenomena involving contour tones have been presented as part of the grammars of many KC languages. Some languages only permit contours on the final edge of a word, phrase, sentence, or utterance, while others, like LTZ, allow Falling contours to show up non-finally. These claims are supported by phonological and morphological phenomena involving final lengthening of checked syllables to accommodate contours and non-final shortening of smooth syllables, simplifying contours to level pitches. These and other phonological phenomena are further discussed in the following section.

6.7 Phonological processes

Hyman and Schuh (1974), Hyman (2009), and Cahill (2008) discuss phonological processes common in the world's languages, including tone spreading, contouring, and contour simplification. Many of the processes discussed in these sources are also found in KC languages, some included in Hyman (2009). This section describes some of these processes with exemplification from KC languages. Processes that affect changes to tone height (vertical assimilation) are addressed in Section 6.7.1. Tone spread from one syllable to another, involving

[73] Thuan (2008) claims the simplification of contours is due to a dissimilation process that neutralizes both LH and HL contours to H before L(H), and to L before H(L). In this analysis, Falam avoids adjacent identical tones, so contours are simplified to preserve an alternating tone pattern (LH-LH-LH-LH surfaces as L-H-L-H). For Osburne (1975), underlying LH is realized as L before (L)H and as H elsewhere. In final position, where underlying LH surfaces faithfully, HL is derived, realized with a final Falling intonation contour. However, methodological and dialectal differences complicate comparison of these two analyses.

replacement or contouring (horizontal assimilation), is addressed in Section 6.7.2. The simplification of contours through tone absorption is briefly treated in Section 6.7.3. Section 6.7.4 discusses tone polarization, which is reported in multiple KC languages. Section 6.7.5 provides a discussion of Kuki-Thaadow tone processes from Hyman (2010, 2021).

6.7.1 Vertical assimilation

Vertical assimilation refers to a change in tone height, for example, lowering H to M before L, or raising L to M before H (Hyman & Schuh, 1974; Hyman, 1975, 2009). For example, L in Bawm is raised to M between two H tones (Löffler, 1972). Vertical assimilation is more commonly perseverative (affecting change to the second tone in a pair), and more commonly reported for rises (L-H realized as M-H or L-M) than for falls (H-L realized as H-M or M-L). LTZ offers an example of a (common) perseverative process that (uncommonly) works to avoid Falls. The language permits L-H Rises across a syllable boundary, but not H-L Falls. The usual result is a H-M Fall; for example, at the final edge of the prosodic word, the L negative marker *bèh* is raised to M after H, as in *báá beh* 'She didn't feed him,' avoiding H-L in favor of H-M.

6.7.2 Horizontal assimilation

Horizontal Assimilation refers to spreading tone features from one syllable to another. Spreading rules are diverse, varying along a number of parameters that are discussed with examples below (Archangeli & Pulleyblank, 1994; Hyman, 2009):

(a) **Domain**: *Does spread occur in a limited domain?* Some spreading processes apply when the right conditions are met in any prosodic word or phrase, while others are limited to only certain morphological contexts. In Hyow, some possessive and person-marking prefixes borrow tone from the following verb, H if the verb is H(L), and L if the

verb is L; a process Zakaria (2017, p. 67) analyzes as only applying within words.[74] On the other hand, spreading processes that occur between words suggest that the domain in Hakha/Thanthlang Lai, Falam, and Kuki-Thaadow is the intonational phrase (Hyman, 2007).[75]

(b) **Direction**: *Is spread from left to right (common) or right to left (uncommon)?* Some processes in KC are described with rightward spread. In Falam, the tone of a toneless suffix is dependent on that of the preceding syllable. Only LH contours trigger the spread, so these morphemes are realized as H after a contour (LH) or L elsewhere (after a H or L) (Osburne, 1975, p. 84). However, in some KC languages, tone spread is described as favoring the uncommon leftward direction, in some cases having to do with the realization of tone on minor syllables. For example, *tsə* 'anymore' in Senthang can be realized as L or H based on the following syllable tone. Ngun Tin Par (2016, p. 58) analyzes *tsə* as underlyingly H, which surfaces in most contexts, but the morpheme is realized as L before another L syllable.[76] Leftward spread is not limited to minor syllables however. In Zophei, the underlying H tone verb *báá* 'feed' is realized as HM

[74] In KC word-formation processes, non-final morphemes commonly undergo tone change. In Paite, Falling and Falling-Rising tones are both neutralized to Rising tone when they show up on the first member of a bi-syllabic compound (Singh, 2006). And in Vaiphei, a L morpheme is realized as a Rise when it's the first member of a compound (Suantak, 2013, p.122).

[75] Although not investigated for this research project, limited elicitation with a Nuitah Zophei speaker suggests that H tone may spread from a preverbal object onto a following toneless verbal agreement prefix, meriting further research on the domain of spread in that dialect.

[76] It is also worth noting that some word formation processes involve tonal allomorphy, wherein a morpheme's underlying form differs according to context. In Thantlang Lai, an agreement or possessive prefix is H before HL, and HL before H, which is not due to normal phonological processes. In Kuki-Thaadow, person prefixes in the nominal and verbal domain also have tonal allomorphs: L before H(L) and HL before L. Tonal allomorphy is not limited to prefixal elements in Kuki-Thaadow—the postverbal dual and irrealis markers have L and HL allomorphs depending on the preceding tone as well (Hyman, 2010).

before L in *a báa bà tsíh* ‘You didn’t feed yourself’, where H partially assimilates to the following L since HL is not a licit Fall in the language.

(c) **Extent***: Is the spreading bounded or unbounded within the domain? (i.e., does it affect adjacent syllables only or continue to a domain edge?)* Spreading processes in KC languages are usually described as bounded, limited to only adjacent syllables.

(d) **Attractors**: *Does the process target a position? (e.g., the domain edge, a stressed or prosodically strong syllable)* When contours appear non-finally in the world’s languages, they tend to target stressed syllables or those in strong prosodic positions (Zhang, 2002). Since structure of the ‘sesquisyllable’ in KC languages favors iambic feet, prosodically *weak-**strong***, over trochaic feet, prosodically ***strong**-weak*, it is not often clear whether contouring is licensed by the final edge or the prominent syllable. See Section 6.6 for examples of processes that target this position.

(e) **Inhibitors**: *Do segments block spread? (e.g., depressor consonants)*
Spread may continue within a domain until it is impeded by other segments, especially, depressor consonants. Phonological depressor consonant effects have not been described for KC languages, and spreading is most often bounded, so inhibitor effects have not been reported for KC languages.

(f) **Target delinking**: *Is spread complete (e.g. L-H → L-L) or partial (e.g., L-H → L-LH)?* Spread that erases the tone of the target is considered complete, while spread that preserves the tone of the target through contouring is considered partial. Partial spread is described for Kuki-Thaadow (Hyman, 2010), where underlying /L-H/ is realized as [L-

LH] and /H-L/ is realized as [H-HL]. Similar effects are described for LTZ, for example in (b) above. Complete spread is not usually noted for KC languages; and when spread that appears complete is observed, the target is often analyzed as toneless, so there is no loss of underlying tone.

(g) **Trigger delinking**: *Does tone spread (e.g., H-L → H-HL) or shift (e.g., H-L → L-HL)?* Tone spread where the trigger does not maintain its tone is considered tone shift. Hyman (2021) notes apparent examples of this phenomenon in Kuki-Thaadow, analyzed as the result of interactions between H and L tone spread. For example, a sequence of L+H+L, as in /*kèèl+góóng+gùùp*/ 'goat+thin+six,' surfaces as L+L+HL in [*kèèl gòòng gúùp*] 'six thin goats.' Here, L on the first syllable spreads to the following syllable to form a LH contour (which cannot surface non-finally), and H on the second syllable spreads to the third syllable to form a HL contour. In the end, the second syllable H (which triggers H spread) does not surface on the trigger syllable, only on the final syllable.

(h) **Iteration**: *Does tone spread create the conditions to repeat the process?* Hyman & Van Bik (2004, pp. 832-834) offer an analysis of tone change from an underlying Rise to a surface Fall, which occurs in phrase-initial position, as well as after a Rising tone. Thus, a series of three underlying Rises LH-LH-LH is realized as %HL-HL-HL in initial position and as LH-HL-HL in non-initial position (not following a Rise). This process occurs iteratively such that a series of Rises is realized as series of Falls as long as the left-most underlying Rise is in phrase-initial position.

6.7.3 Absorption

Contours may simplify when next to like tones, in other words LH-H may simplify to L-H and HL-L may simplify to H-L, where the second tone of the contour merges with the following syllable. This process is more commonly progressive, as described for Mizo and Bawm. In Mizo, When a long vowel with LH tone appears before a syllable with H or HL tone, the vowel is shortened and /LH-H(L)/ is reduced to [L-H(L)] (Chhangte, 1986, p.49-50). In Bawm, HL is realized as H before a L, so the underlying sequence /HL-L/ surfaces as [H-L] (Löffler, 1972, p. 286).

6.7.4 Polarization

Many KC languages are described as having tone processes where a morpheme takes the polar opposite tone from its neighbors. For example, the nominalizing suffix *-tíʔ* in Hyow alters underlying stem tone, rendering preceding H tone stems L (Zakaria, 2017, pp. 86-89).[77] Anal offers an example of spreading and polarization that occurs when a stem has two or more toneless suffixes. In (1-2), nouns are suffixed with two toneless morphemes: the plural marker *hin* followed by *tʰuŋ* 'inside.' The L tone from *kʰù* 'village' in (1) and the H tone from *ín* 'house' in (2) spread onto the plural marker, realized as L in the former and H in the latter. The second toneless affix *tʰuŋ* takes the polar opposite tone from the plural marker, H in (1) and L in (2), resulting in a LLH or HHL pattern across the word (Ozerov, 2018, p. 714).

(1) *kʰù-hìn-**tʰúŋ***
village-pl-inside
'inside villages'

(2) *ín-hín-**tʰùŋ***

[77] Additionally, the expansive and diminutive suffixes in Hyow (both with HL tone) trigger a change in the stem tone from HL to H, or from H to L (Zakaria, 2017)

house-pl-inside
'inside houses'

In Sumtu, if two or more toneless morphemes, such as *-khɔ* 'also' or locative *-a*, are in a sequence, they take the polar opposite tone from each other as well, resulting in an alternating HLHL or LHLH sequence according to the tone of the root (Watkins, 2013).

Sorbung offers evidence of a general dissimilation rule, where a sequence of two adjacent smooth syllables with H tone /H-H/ is realized as [H-M] (Mortensen & Keogh, 2011). LTZ similarly avoids sequences of L-L, with the most common repair strategy being raising of the second tone to M, resulting in a L-M sequence.

In polarization rules, contours may be treated differently depending on the language. For example, in Mizo, pronominal clitics take the opposite tone of the following syllable, a process which considers only the first tone in LH and HL contours (Chhangte, 1986, pp. 42-43). Northern Bawm phrase-type markers are analyzed as underlyingly M (or Rising), but they are realized as L before a morpheme with higher tone (H or Rising) (Reichle, 1981, p. 13-14).

6.7.5 Case Study: Kuki-Thaadow

Hyman's (2010, 2021) analysis of Kuki-Thaadow identifies several processes discussed in this section, including tone spreading and absorption. Consider H tone spread, analyzed in Hyman (2021). When the H tone noun *zóóng* 'monkey' is followed by a H or HL modifier, there is no change to either tone, as in *zóóng thúm* 'three monkeys' and *zóóng gíèt* 'eight monkeys.' However, when it is followed by the L tone modifier *gùùp* 'six,' H spreads to the second morpheme, resulting in a Fall: *zóóng gúùp* 'six monkeys.' L tone spread likewise fails to apply when a L tone noun like *kèèl* 'goat,' is followed by a L or HL modifier, for example, in *kèèl*

gùùp ‘six goats’ and *kèèl gíèt* ‘eight goats. When followed by a H tone modifier, L spreads rightward, resulting in a Rise, as in *kèèl thŭm* ‘three goats.’

Table 6.10 summarizes these and other phenomena in Kuki-Thaadow. In (6.10a-c), a non-final HL contour is realized as H, accomplished through L tone spread (6.10a) or downstepping (6.10b-c), depending on context. In (6.10a), L spreads to the final syllable (where contours may surface in the language) and it associates with H to form LH. In (6.10b), L spread onto the following H cannot result in a non-final contour, so the following H is downstepped (ꜜH). (6.10c) similarly shows downstepping applied to HL to form a downstepped Fall (ꜜHL).

In (6.10d-e), as discussed above, H and L spreading derive final contours: HL from H spread, and LH from L spread. In (6.10f), no final contour surfaces due to a simplification of the prefinal HL to H before L, through absorption.

Table 6.10 Tone processes in Kuki-Thaadow (Hyman, 2010)

	Underlying	**Surface**	**Phonological Process**
a)	HL + H	H-LH	L spread
b)	HL + H + H	H-ꜜH-H	Downstep
c)	HL + HL	H-ꜜHL	Downstep
d)	H + L	H-HL	H spread
e)	L + H	L-LH	L spread
f)	HL + L	H-L	Absorption

Several of these processes have the effect of avoiding non-final contours. In (6.10a, d-e) final contours are derived through spreading, while in (6.10b-c, f) non-final contours are avoided through downstep and absorption. Research on Kuki-Thaadow reveals the complexities of KC tone systems and their value to our typological and theoretical understanding of contouring, contour simplification, downstep, and tone spread, among other phenomena.

Beyond the mechanics of these phonological processes, it is worth focusing, more specifically, on the domain of application. While some processes apply to any word or phrase that provides the appropriate phonological context, others are limited to certain word classes or even specific morphemes.

6.8 Grammatical tone

Tonal phenomena that are not attributable to the regular phonology of a language, and are limited in application to only certain morphological and syntactic contexts, are grouped together under the term 'grammatical tone' (Rolle, 2018). Languages that make use of grammatical tone are often described as using it for multiple processes; for example, Anal uses tone in marking tense-aspect-modality (TAM) distinctions and person agreement in the verbal complex (Ozerov, 2018). KC languages are reported to use tone in expressing a wide variety of grammatical concepts including polarity, transitivity, mood, syntactic category, subordination, nominalization, and relativization, some of which are closely connected phenomena, both synchronically and diachronically.

There are many examples of tone tied to the exponence of certain morphological and syntactic processes in KC languages. This section addresses the connection between tone and morphological exponence in Section 6.8.1, before turning to the role of tone in marking plurality in Section 6.8.2 and stem alternation in Section 6.8.3.

6.8.1 Tone tied to morphological exponence

Identifying and analyzing grammatical tone involves consideration of the relationship between tone and meaning. Since tone is always realized on segments, it is the work of the analyst to decide whether a morpheme's tone is baked into its lexical entry, or whether it should

be treated separately. Consider, first, a clear case of lexically-specified tone: the tonal minimal triplet *ley* 'tongue,' *lěy* 'earth,' and *lêy* 'bridge' in Sizang does not have transparent semantic connections, so it likely involves three words that have accidentally identical segments and differ in lexical tone (Sarangthem, 2010, p. 76). A somewhat less clear case is found in Falam plural subject and object markers, which, in addition to a final *-n*, have H tone; compare the first person singular *ka-* to the plural *kán-* (Osburne, 1975, p. 115). Here, like the unrelated lexical items in Sizang, we could analyze these surface forms as faithful realizations of underlyingly different morphemes. But, unlike the Sizang example, these two forms each include 1st person information, so we could alternatively split *kán* into two morphemes: (1) *ka*, a first person marker that is not specified for plurality, and (2) ́x-*n* (where x is the stem), marking plurality with a combination of tone and coda consonant.

Tone tied to agreement marking is commonplace in KC languages. For example, in Senthang, tone alone differentiates a singular (H) from a plural (L) subject pro-clitic in affirmative declarative contexts—*ká* (1st person singular subject) is distinct from *kà* (1st person plural subject) (Ngun Tin Par, 2016, p. 92). Like the previous Falam example, the difference between these surface forms may be analyzed in terms of lexical tone (singular subject clitics are underlyingly H, plural subject clitics are underlyingly L) or grammatical tone (subject clitics are unspecified for plurality, which is indicated with H tone).[78]

A similar situation is reported in Hyow, where tone alone differentiates certain combinations of subject and object. The 1st person object and the 3rd person subject of a transitive verb are both marked with a vowel that harmonizes with the stem vowel, (e.g., *o-* in the

[78] Another similar example of grammatical or lexical tone (depending on analysis) involves the directional morpheme *va-* in Senthang which differentiates andative *vá séi?* 'go!' from venitive *và sèi?* 'come!' on the basis of tone—tone that also spreads rightward to the verb stem (Ngun Tin Par, 2016, p. 40).

case of a verb root like *bop*). The 3rd person subject may be omitted before a 1st person object, leaving two cells in the agreement paradigm that are segmentally identical (involving just one harmonized pro-clitic vowel). So, L on that initial vowel in *ò-bóp* 'He beats me' indicates a 1st person object, and H on that vowel in *ó-bóp* 'He beat him' indicates a 3rd person object (Zakaria, 2017, pp. 74, 323-324).

Morphological processes where no segmental content is involved are widely attested in KC. According to Hyman (2010), Kuki-Thaadow makes use of H tone to mark genitives, disambiguating right- from left- branching noun phrases (i.e., 'goat's leg bone' vs. 'goat-leg's bone'), and agentive nominalizations from others (i.e., 'goat-biter' vs. 'goat-biting').[79] Hyman speculates that this marking may have developed diachronically from a genitive morpheme related to the enclitic possessive marker *-áá*, or to the proclitic 3rd person possessive marker *a-*.

Zophei also uses tone to mark possession in limited contexts. Like many other KC languages, the third person singular possessive marker in Zophei is *a-*, and in Tlawngrang Zophei, the process is fully productive, for example in *mei* 'goat' vs. *a mei* 'his goat,' or *a zong* 'monkey' vs. *a a zong* 'his monkey'. In the Lawngtlang variety, on the other hand, this prefix fails to apply to nouns that begin with /a/ lexically. Words that have H tone on either syllable, (e.g. *a hmíí* 'food dishes', *á kyy* 'bee,' and *á zoong* 'monkey') resist this prefix, resulting in gaps that may be filled through other periphrastic constructions. If the noun is toneless, however, it belongs to a small class of words that mark possession with a final H tone, as presented in Table 6.11.

[79] Löffler (1972, p. 288) also notes this type of behavior in Bawm, linking it to L intransitive/H transitive pairs discussed in Section 6.9, for example, *thìng chàr* 'dry wood' and *thìng chár* 'wood-drying' or 'dried wood,' likely related to stem alternation.

Table 6.11 High tone as a possessive marker in Zophei

	Noun	Gloss	Possessed Noun	Gloss
a)	a hlyo	‘saw’	a hlýó	‘his saw’
b)	a thleeng	‘grave’	a thlééng	‘his grave’
c)	a tshii	‘sesame seed’	a tshíí	‘his sesame seed’
d)	a tuu	‘hoe’	a túú	‘his hoe’

Grammatical tone research reveals tone phenomena that are synchronically and diachronically derivable from segmental morphology, offering evidence of their historical origins. For example in Anal, some contexts allow the 1st person subject marker *níŋ* to be omitted, resulting in compensatory lengthening and/or tone change (Ozerov, 2018, p. 721). KC languages offer opportunities for the study of diachronic change from morphemes with particular morphophonological tone behavior to morphemes without segmental material. The following section discusses evidence of the historical grammaticalization of tone in marking plurality.

6.8.2 Plural marking

Plural marking has been linked with H tone in several KC languages. As previously discussed for Falam (Osburne, 1975), this plural H may show up on agreement morphemes, but in other languages, it can also surface on verb stems or other verbal morphology, as in Senthang and LTZ. In Falam, H tone (in addition to *-n*) redundantly marks plurality on agreement markers, yet Senthang, LTZ, and Sumtu distinguish some plural agreement morphology entirely with tone. In the latter, while dual forms take a LH pattern, plural forms take a HH pattern, notably rare for sequisyllables in a language previously mentioned for its tone polarization processes (Watkins, 2013, p. 125).

In Senthang, H tone involved in plural marking is tied to the morpheme *há*^{i} but may be instead realized on a preceding morpheme, such as the verb stem or other post-verbal

morphology. Consider the imperative negator *la^{i}*, which is realized as M in the singular in (3), as well as in the plural in (4) when followed by the plural marker *há^{i}*. In constructions where the segmental plural marker *há^{i}* is left out, *la^{i}* surfaces with both tones, and is realized with a MH Rise, as in (5) (Ngun Tin Par, 2016, pp. 96-100).

(3) Ø ɖɛŋ la^{i} tsì=ʔ
3O beat.up NEG 2S=IMP
"Don't beat him up."

(4) Ø ɖɛŋ la^{i} há^{i} tsì ʔú=ʔ
3O beat.up NEG PL 2S PL=IMP
"(Y'all) don't beat them up."

(5) Ø ɖɛŋ lǎ^{i} tsì (ʔú)=ʔ
3O beat.up NEG.PL 2S (PL)=IMP
"(Y'all) don't beat him up."

In LTZ, similar phenomena are noted with the cognate plural marker *héé*, which triggers a change to the following or preceding morpheme depending on context. When this segmental morpheme shows up, it has H tone, as in (6), but in some non-final contexts, the segmental content is absent and the H tone remains. In (7), the plural H tone is realized on the following 2nd person marker only and the segmental *hee* marker does not appear.

(6) naa mìing héé tsíh máa
2S watch PL 2S.PL Q
'Did y'all watch each other?'

(7) a mìing ma tsih/tsíh
INTR watch NEG 2S/2S.PL
'You/Y'all didn't watch each other.'

Segmental plural marking on LTZ transitive verbs is, in some contexts, optionally interpreted as applying to the logical subject or object; and this independence from participant

agreement morphology also applies to the plural H tone marker. While in (7), H tone on the *tsih* 2nd person subject marker indicates subject plurality, the same is not true of (8). In (8), even though the 2nd person subject marker is singular, it appears with plural H—interpreted as indicating the plurality of an otherwise unexpressed object.

(8) Ø báá ba tsíh
3O feed NEG 2S.PL
'You did not feed them.'

Even when there is no segmental agreement morphology, as in imperative constructions with 3rd person objects in (9-10), plural H tone can appear on other morphemes, like the toneless prohibitive marker *kheh*. In (9) the toneless verb and toneless prohibitive marker both surface with M tone, but in (10) when the subject (the addressee) and/or the object is plural, H tone surfaces on the final edge of the prohibitive marker. This plural H lengthens the CVʔ syllable to accommodate the MH rising contour.[80]

(9) Ø miing kheh
3O watch PROHIB
'Don't watch it!' (Singular Addressee)

(10) Ø miing kheéh
3O watch PROHIB.PL
'Don't watch it!' (Plural Addressee)
or 'Don't watch them!' (Singular/Plural Addressee)

When there is no post-verbal morphology, as in (11-12), plural H may surface on a morpheme to the left (as in Senthang), in this case on the verb stem. A toneless verb with

[80] This plural imperative Rise was not familiar to the Tlawngrang language assistant consulted for this study and may be an innovation in LTZ.

singular arguments surfaces as M in (11) and as MH when one or both of the arguments are plural, as in (12).

(11) Ø miing
3O watch
'Watch it!' (Singular Addressee)

(12) Ø miíng
3O watch.PL
'Watch it!' (Plural Addressee)
or 'Watch them!' (Singular/Plural Addressee)

In summary, H tone has been linked to plurality in several KC languages including Falam, Sumtu, Senthang and LTZ. While all four of these languages use H tone in pre-verbal agreement to some extent in marking plurality, plural H also shows up on the verb stem or other post-verbal morphology in the Maraic languages Senthang and LTZ. Trade-offs between segmental *há*^{i}*/héé* postverbal plural markers and plural H offer evidence of diachronic change and grammatical tone development. A notable difference between the behavior of plural H in these two languages is that in Senthang, it associates to the left of the position of the omitted segmental marker, but in Zophei, it associates to the right if there is an available host morpheme or to the left if there is not.

The following section discusses stem alternation, a near-ubiquitous phenomenon in SC languages that Henderson (1967, p.171) describes as, "one of the most straightforward examples of…tonal morphology".

6.8.3 Stem alternation

Verbs in KC languages often take one of two or more stems, depending on language-specific, syntactic and pragmatic factors (Bedell et al., 2021). Factors that license specific stems

are varied, and include polarity, transitivity, mood, syntactic category, subordination, nominalization, and relativization (King, 2009). Differences between stem forms appear as segmental and/or tonal alternations, although the derivation of one stem form from another is often unpredictable or only partially predictable. Alternations themselves may involve stem forms that have different vowels, coda place features, glottalization (of vowels or sonorants), syllable structure (CVV vs. CVC), and/or tone. Tone is involved in stem alternations in many KC languages, including Falam (Osburne, 1975; Thuan, 2008), Sizang (Sarangthem, 2010), Mizo (Chhangte, 1986), Tedim (Henderson, 1967; Bhaskararao, 1994), Hyow (Zakaria, 2017), Vaiphei (Suantak, 2013), and Zotung (Shintani, 2015), further discussed in this section.

While stem forms (often referred to as Stem I, II, III) may be idiosyncratic, some researchers have noted restrictions in Stem II formation (usually occurring in transitive contexts, among others). Commonly reported limitations include a reduction in the number of tonal contrast available to Stem II forms. Examples are reported in several languages:

- In Hyow, Stem I verbs are most often L or HL, while Stem II verbs are usually H (Zakaria, 2017, p. 263).
- In Kuki-Thaadow, nearly all Stem II forms are L tone, with a few exceptional HL forms that are partially predictable by syllable structure (Hyman, 2010).
- In Falam, Stem II (but not Stem I) verbs are restricted to L and HL tone (Thuan, 2008, p. 91).

- In Paite, alternations involving segments (coda oral or glottal stop addition or substitution) neutralize Stem I tones to a Stem II Rise, and those involving only tone change neutralize Stem I tones to a Stem II Fall (Singh, 2006, pp. 25-28).[81]
- In Senthang, only H and L (not M) are available to Stem II forms (Ngun Tin Par, 2016).

Although it is not predictable which verbs will exhibit stem alternation, researchers often note patterns that can fully or partially derive Stem II forms from Stem I forms. In Hakha Lai, where 80% of verbs exhibit stem alternation with tonal and/or segmental changes, Stem II forms are mostly predictable from the tone and syllable structure of Stem I forms; and nearly all Stem II verbs have Rising tone (Hyman & Van Bik, 2002b). In Falam, verbs with CVV or CVN structure in Stem I have predictable Stem II tone. In addition to segmental changes, L in Stem I corresponds to HL in Stem II, while other Stem I tones (H, HL, and LH) correspond to L in Stem II (Thuan, 2008, pp. 87-90).

While Central Chin languages like Hakha Lai and Falam preserve coda consonants commonly used in stem alternation, Maraic languages do not. The diachronic reduction of coda consonant inventories has put phonological pressure on the system of stem alternation in Maraic, pushing speakers to use different contrasts, or different grammatical constructions altogether. In Senthang, a Maraic language that retains a few coda consonants /mʔ n ŋ/, seven patterns for alternation are described, some of which rely entirely on tone (Ngun Tin Par, 2016, p. 75). In Table 6.12, patterns (6.12a, e-h) involve differences in tone between stem forms, with stem

[81] Singh (2006) calls Stem I forms 'simple,' which occur in most contexts including declarative, interrogative negative, and imperative; and Stem II forms 'infinitive,' which occur in nominalizations. It is worth noting that there is no standard for use of the terms Stem I and Stem II.

forms in (6.12f-h) differing only in tone. Senthang also has some verbs with three stem forms, for example *ɔ̀ʔ* ‘sleep.I,’ *ɔ́ʔ* ‘sleep.II,’ and *ɔ́ɔ́* ‘sleep.III’.

Table 6.12 Stem alternation patterns in Senthang (Ngun Tin Par, 2016, p. 75)

	Pattern			**Example**			
a)	CVV	→	CV́ʔ	tsoo	→	tsóʔ	‘buy’
b)	CV́h	→	CV́V́	hníʔ	→	hníí	‘know’
c)	Cúú	→	Cáih	túú	→	táíʔ	‘sharpen’
d)	Cúú	→	Cámʔ	kúú	→	kámʔ	‘shoot’
e)	CVŋ	→	CV̀n	tsɔŋ	→	tsɔ̀n	‘learn’
f)	CV́N	→	CV̀N	kún	→	kùn	‘enter’
g)	CV́V́	→	CV̀V̀	séí	→	sèì	‘go’
h)	CV̀V̀	→	CV́V́	vàì	→	váí	‘visit’

LTZ, which has lost all codas except for /-ŋ/, has limited stem alternation with only eight attested examples, all of which are underlyingly toneless: *nuu/nah* ‘hide,’ *lau/lah* ‘get,’ *r~~uu~~/ruh* ‘steal,’ *pii/pih* ‘give,’ *tsuu/tsah* ‘buy,’ *ruu/rah* ‘break,’ *ph~~ii~~/phih* ‘sweep,’ and *~~ii~~ sah/ih sah* ‘let sleep.’ Even the root verb in the latter example has lost its stem alternation in favor of the Stem II form *ih* ‘sleep’ when not suffixed with the causative *-sah*.

As previously mentioned, stem alternation often involves changes to transitivity; and, although not always synchronically linked to stem alternation, many KC languages mark transitivity with tone. Löffler (1972, p. 288) describes links between tone and transitivity in Bawm, most clearly illustrated with intransitive/transitive verb pairs such as càr ‘to be dry’ and chár ‘to dry,’ predictably distinguished by L tone in the intransitive and H tone in the transitive. In Senthang, in addition to its involvement in stem alternation, tone reportedly differentiates indicative from imperative, and transitive from intransitive (Ngun Tin Par, 2016). Tone interacts

with transitivity in Hyow as well, with the same segmental verb stem showing up with L tone in transitive contexts and H tone in intransitive contexts (Zakaria, 2017, p. 265).

In Southern Bawm, verbs with long vowels are realized as L in intransitive contexts, and (with a few CVVT exceptions) as M in transitive contexts. In addition, when a transitive verb is used as a reflexive or reciprocal, it has L tone like other intransitive verbs (a phenomenon that also occurs in Zophei). Checked syllables take the opposite pattern, and are L in transitive and M in intransitive (reflexive/reciprocal) contexts (Reichle, 1981).

Although stem alternation is largely absent in LTZ, transitivity is productively tied with tone on the verb stem. In the transitive context in (13), the toneless stem *miing* 'watch' and the H stem *báá* 'feed' surface faithfully as M and H, respectively.[82] However, examples (14-15) offer evidence of L tone associated with intransitivity; the toneless stem *miing* 'watch' is realized as L, while the H tone stem *báá* 'feed' is realized as a Fall in phrase-final position in (14) and as M in phrase-medial position in (15).[83]

(13) aa Ø miing/báá
3PS 3O watch/feed
'They watched/fed him.'

(14) aa mìing/báa
3S watch/feed
'She watched/fed herself.'

(15) aa mìing/baa héé
3PS watch/feed PL
'They watched/fed themselves.'

[82] In some other transitive contexts, as previously discussed, the addition of a H tone neutralizes the difference between toneless and H verbs.

[83] This phenomenon is similar to Hyman's (2010) analysis of Kuki-Thaadow where a non-final L+H on the same syllable (here, in a position before H) is realized as a downstepped ꜜH tone. The analysis of Zophei presented here makes use of only M rather than ꜜH, but recognizes that future work may reanalyze M tone in this and some other contexts as ꜜH.

The relationship between tone in stem alternation and transitivity merits further study, especially in Maraic languages where coda consonants are few and grammatical tone is commonplace.

The following section turns to preliminary analysis of tone in LTZ.

6.9 Tone in Lawngtlang Zophei

The previous sections of this chapter have established the importance of considering multiple levels of grammar in the analysis of tone in KC languages. As research on tone in Zophei, and Maraic more generally, is in its infancy, this section presents preliminary analyses of the data collected for this study, especially those data presented in Appendix D and Appendix E, described in Section 3.6.

As a brief summary, LTZ monomoraic syllables can show up with L, M, or H pitch, bimoraic syllables may additionally appear with a HM (or [ML]) fall; and a monomoraic (checked) major syllable may be lengthened to accommodate a HM contour. Where plural H tone appears in imperative contexts, LM, MH, and HMH contours are also possible. The analysis presented here makes use of L, H, and toneless morphemes as well phonological and grammatical tone processes. Phonological processes include the realization of M pitch on underlyingly L, H or toneless morphemes and the avoidance of certain sequences including *HL and *LL. Grammatical processes include marking intransitivity with L tone, some transitive contexts with H tone, and floating L tone tied to certain agreement morphemes.

Section 6.9.1 considers the analysis of toneless morphemes in LTZ, followed by H tone morphemes in Section 6.9.2 and L tone morphemes in 6.9.3. Particular attention is paid to the question of whether M tone is underlying in Section 6.9.4, and to morphemes with floating L tone in Section 6.9.5.

6.9.1 Toneless morphemes

There are asymmetries in the way the phonology of LTZ treats the M pitch compared to H and L, as similarly described for Yoruba (Pulleyblank, 2004). Due to these asymmetries, the analysis presented here for LTZ does not consider M tone to be underlying but rather always derived. Surface M may be either the default realization of a toneless morpheme, the combination of H and L tone on the same syllable, H tone lowered in the avoidance of a HL fall (*HL), or L tone raised in the avoidance of two adjacent L tone syllables (*LL). So, a syllable that surfaces with M pitch may be underlyingly L, H, H+L, or toneless.

Toneless morphemes are identified through their phonological behavior, as they surface with the most available pitch patterns, including L, M, H, HM, LM, MH, and HMH. Thus, to understand their phonological behavior, it is worth examining them in relation to more clearly H and L morphemes. Consider the toneless verbs *sah* 'build' and *miing* 'watch' in (16-19). In (16), both toneless verbs (as well as the toneless 3PS agreement prefix) surface as default M. In (17), where L tone marks intransitivity, these same toneless verb stems surface as L.

(16) aa Ø sah/miing
3PS 3SO build/watch
'They hit/watched him'

(17) aa sàh/mìing
3SS hit/watch
'She left/watched self.'

Transitive affirmative contexts include H tone, which may neutralize the difference between toneless stems like those in (18) and H tone stems like those in (19).[84]

[84] Monomoraic and bimoraic verbs are often treated differently by processes that assign H tone—in (a), the monomoraic verb surfaces as M and the bimoraic verb surfaces as H, while in (b) the opposite is true. The process

(18) sáah/míing hee píh
build/watch PL.IRR 1PS
'Let's build/watch it.'

(19) túuh/báá hee píh
hit/feed PL.IRR 1PS
'Let's hit/feed him.'

Toneless morphemes can also be realized with contours (HM, MH, LM, or HMH), as in (20-23). Some contexts, like (20), allow only bimoraic syllables to surface as HM, leaving monomoraic stems short. In others, like (21) where the segmental *-àà* IRR marker is missing, an affixed L tone is left behind and the contour is licensed for either syllable shape, lengthening <CVh> syllables. This process is similar to the plural H affixation in (22-23) where either syllable shape may be realized as a LM rise with a combination of intransitive L tone and plural H tone in (22). Transitive imperatives may involve HMH or MH rises depending on the syllable shape of the stem, as in (23).

(20) aa pa sah/míing
3PS 1SO build/watch
'They built/watched me.'

(21) a sáah/míing hee
3SS build.IRR/watch.IRR PL.IRR
'She'll build/watch them.'

by which toneless stems receive H tone in (a-b) and other transitive contexts merits further investigation, as does the differential treatment of syllable shapes for such tone assignment.

a) a Ø sah/míing
3SS 3SO hit/watch
'She hit/watched him.'

b) ma sáh/miing ba héé Ø
1PO build/watch NEG PL 3PS
'They did not build/watch us.'

(22) a sàah/mìing
PFX build/watch
'Build/Watch yourselves.'

(23) sáaáh/miíng
build.PL/watch.PL
'Build it./Watch it.' (plural addressee)
or 'Build/Watch them' (singular or plural addressee)

More permissive than H or L tone morphemes, toneless morphemes may surface with L, M, H, HM, LM, MH, and HMH pitch patterns, with only the HM contour attested in non-final position, as in (18). Various processes that affect the realization of toneless morphemes are discussed in the remainder of this chapter.

6.9.2 High tone morphemes

Unlike toneless morphemes, H tone stems cannot start with L tone and are limited to M, H, HM, and HMH surface patterns. Consider the H tone verb stems *túh* 'hit' and *báá* 'feed.' In some transitive contexts where toneless stems surface as default M (as in 13, 16), bimoraic H tone stems surface faithfully as H, as in (24). Comparing toneless stems in (16) and H tone stems in (25), lexical contrasts are neutralized in monomoraic stems and only bimoraic stems show a transparent M vs. H surface distinction. Although the contrast between H and toneless monomoraic stems is opaque in many contexts, it surfaces in others, such as (25) between toneless *sah* 'build' and H tone *túh* 'hit'.[85]

(24) aa Ø tuh/báá
3PS 3SO hit/feed
'They hit/fed him.'

[85] This contextual neutralization indicates that phonological or grammatical tone processes are obscuring tone realization in some but not all transitive contexts. It is not likely that such neutralization is due to stem alternation since obscuring contexts often differ in terms of agreement morphology rather than, say, transitivity or embedding.

(25) a Ø sah/túh
3SS 3SO build/hit
'She built/hit him.'

In intransitive contexts, where toneless stems are realized as L, as in (17), H tone stems are realized as HM, as in (26). There, the M of the falling HM contour is the result of an underlying lexical H tone and a transitive L tone on the same syllable in final position.

(26) aa túuh/báa
3SS hit/feed
'She hit self/fed self.'

HM tone can also surface on bimoraic H tone stems before a L tone morpheme, as in (27), while monomoraic stems surface with M tone instead. H tone stems with plural H in the imperative, surface as HMH, as in (28). Compared with the toneless stems in (23), the contrast in monomoraic stems is neutralized to HMH, and the contrast in bimoraic stems is between toneless stems realized as MH, and H stems realized as HMH.

(27) a tuh/báa bà tsih
PFX hit/feed NEG 2SS
'You/She/Y'all didn't leave/hit self/watch self/feed self.'

(28) túuúh/báaá
hit.PL/feed.PL
'Hit it!/Feed him!' (plural addressee)
or 'Hit/Feed them' (singular or plural addressee)

H tone stems are more limited in their surface realization than toneless stems, in not appearing with L or Rising (LM, MH) pitch patterns. The addition of L tone to a bimoraic stem with lexical H tone results in a HM contour in final position or before L; it is realized as M

elsewhere. Monomoraic stems are lengthened in final position to accommodate HM contours and are realized as M non-finally.[86]

6.9.3 Low tone morphemes

Mirroring H tone syllables, which do not surface as L, L tone morphemes do not surface as H. The only surface patterns attested in L tone morphemes are L, M, and HM. There are two relevant phonological restrictions involving surface L realization. The first is a ban on L tone in two consecutive syllables (*LL) and the second is a ban on H to L falls within or between syllables (*HL). No such restrictions apply to sequences of H tone or L to H rises—see (6) for evidence of HH and LH sequences. No monosyllabic verb stems have been identified with L tone, but L is examined here through its association with negative, irrealis, and intransitive contexts.

Negative marking in LTZ involves L tone and the segmental NEG marker *beh*, *ba*, or *ma*. The full form *beh* surfaces finally, or before the Q marker *máá*, and it is reduced to a minor syllable *bà* to prosodify with a following major syllable.[87] The suppletive form *mà* shows up when there is a 1st person subject and has no major syllable counterpart yet identified. These three forms are exemplified in (29-31) where they appear with L tone following surface M tone verbs. This L tone surfaces when the full NEG marker *bèh* appears in final position in (29), as well as in medial position on the minor syllables in (30-31), before H in (30), and before M in (31).

[86] A similar relationship between M and Falling tone is described for Bawm in Löffler (1972), where Falling tone is realized as M (underlying /L/) before H.
[87] The negative marker's failure to prosodify with the question marker is likely evidence of a (clitic, word, phrase, etc.) boundary between these morphemes.

(29) Ø sah/tuh **bèh** Ø
3SO build/hit NEG 3SS
'She didn't build/hit it.'

(30) pa sah/tuh **bà** héé Ø
1SO build/hit NEG PL 3PS
'They did not feed/watch/hit me/you'

(31) tsa sah/tuh **mà** nih
2SO build/hit NEG 1SS
'I didn't build/hit you.'

In (29-31), no difference is observed between monomoraic stems that are toneless (/sah/ 'build') and those that have H tone (/túh/ 'hit'). This is likely the result of the H tone stem lowering to M to avoid a HL Fall from the stem to the NEG marker (*HL).

Since intransitive contexts involve L tone, they present an opportunity to examine sequences of L tone, revealing the *LL avoidance strategy of raising the second L to M. In (32), underlying H tone verbs (/túh/ 'hit' and /báá/ 'feed') are lowered to M due to the intransitive L; and as in (29), L tone surfaces faithfully on the NEG marker [bèh]. However, in (33) the underlying toneless verbs (/tshuh/ 'leave' and /miing/ 'watch') with intransitive L are realized as L and the NEG marker is raised to M. The same pattern is observed between an intransitive verb and a following L tone IRR marker /àà/ in (34-35).

(32) a tuh/baa **bèh** Ø maa
PFX hit/feed NEG 3SS Q
'Didn't she hit/feed herself?'

(33) a tshùh/mìing **beh** Ø maa
PFX leave/watch NEG 3SS Q
'Didn't she leave/watch herself?

(34) aa baa **àà**
3SS feed IRR
'She will feed herself.'

(35) aa mìing **aa**
3SS watch IRR
'She will watch herself.'

As shown in (36-38), this apparent OCP constraint (Leben, 1973) on adjacent L tone syllables is violated in (36) but not in (37), where raising of the second L to M is used as a *LL avoidance strategy instead. The apparent difference between (36) and (37) is the number of total underlying adjacent L-tone moras, two in the former (in which both L tones surface) and three in the latter (in which the L NEG marker is raised to M). It is not the case, however, that *LL can be described as a ban on three adjacent L-tone moras, since when NEG is not in final position, as in (33), such raising of L to M after L happens for both monomoraic and bimoraic stems. Rather, a more reasonable conclusion is that *LL is violable, but only (so far attested) in the situation of *LL at the end of an utterance realized on two monomoraic syllables.

Example (38) shows a different morphological and prosodic environment where contouring is an available repair strategy in *LL avoidance as well (produced [aa tshuaà]).

(36) a tshùh bèh Ø
PFX leave NEG 3SS
'She didn't leave.'

(37) a mìing **beh** Ø
PFX watch NEG 3SS
'She didn't watch herself.'

(38) aa tshuh **áa**
3SS leave IRR
'She didn't leave.'

The other apparent constraint on tone realization to address is the ban on H to L falls (*HL). As previously discussed, it is typologically uncommon to favor Rises over Falls, as does LTZ. And unlike *LL, this ban does not appear to be violable. *HL avoidance involves raising L to M (here, on the NEG marker /beh/) following H in (39).

(39) Ø báá **beh** Ø
3SO feed NEG 3SS
'She didn't feed him.'

When the irrealis marker is placed before another morpheme, its segmental information can be elided, leaving its L tone behind. The toneless stems in (40), which have H tone in this transitive affirmative context, are realized as HM which lengthens monomoraic stems. This lowering also affects the following H tone PL marker, which is realized as M. The H tone stems in (41) are unaffected, rather the lowering effect is only seen on the PL marker.

(40) a Ø sá**a**h/mí**i**ng **hee**
3SS 3PO build.IRR/watch.IRR PL.IRR
'She'll build/watch them.'

(41) a Ø túh/báá **hee**
3SS 3PO hit/feed PL.IRR
'She'll hit/feed them.'

Underlying L tone morphemes may be realized with L, M, or Falling pitch patterns. Their realization is conditioned by various factors including phonological environment, syllable structure, and prosodification. Avoidance strategies are employed to get around apparent *LL and *HL constraints including H tone lowering and L tone raising which involve vertical and horizontal assimilation. With these characteristics of toneless, L, and H tone morphemes in mind, we turn to the consideration of M tone as underlying.

6.9.4 Is Mid tone underlying?

This analysis of tone in LTZ has so far not made reference to underlying M tone, rather M tone is analyzed as the result of several processes. Surface M can be the realization of a H+L tone syllable in a non-final position before M or H pitch syllables.[88] It can be the realization of underlying L raised to M following H (due to *HL), or following L (due to *LL). Or, it can be the default realization of an underlying toneless morpheme. As considered in Pulleyblank's (2004) analysis of Yoruba, surface M tone can be analyzed as the result of several phonological processes in LTZ, yet phonological rules need not make reference to M tone as a trigger for any rule so far suggested.

This section has presented phonological constraints that motivate L raising to M, or H lowering to M, but never L deleting in favor of H or H in favor of L. If there were a M tone, on the other hand, it would readily be lost in favor of either L or H lexical tones. The restrictions

[88] The phenomenon where H is lowered to M due to the presence of L could be described in some contexts, like Hyman (2010) does for Kuki-Thaadow, as a downstepped H. This terminology is appropriate and may be useful for future research, however is not adopted for this preliminary analysis. By way of explanation, the LTZ tone data presented in this thesis are based on conversations with Ms. Sung, whose intuitions did not recognize a surface distinction between M and $^{!}$H. Thus, rather than complicate these transcriptions by converting a portion of the syllables marked with M to $^{!}$H based on incomplete tonal analysis, I retain M in all cases for data integrity.

*LL and *HL do not make reference to M tone either and there is no prohibition on sequences of M tone.

In addition to *LL, OCP effects also prohibit the realization of a trimoraic syllable with three H tones. For example, *báá* 'Feed him!' is not lengthened to **bááá* with the addition of the plural H tone, but rather to the HMH *báaá* 'Feed them!' Insertion between the lexical H and the plural H of a default M (or of a L raised to M after H) avoids this illicit *HHH sequence within a syllable.[89] Sequences of M tone, as in (42), are commonplace, and no lengthening has been found to accommodate M.[90]

(42) ma miing beh Ø
1PO watch NEG 3SS
'She didn't watch/feed us.'

In transitive and intransitive contexts that involve an addition of H or L tone, bimoraic toneless stems do not preserve M tone, and the resultant pitch patterns are H /mííng/ or L /mìì̀ng/ across the entire syllable. However, processes where H or L tone are added to the final edge of a stem commonly produce contours. In other words, while H and L are often preserved in phonological processes, if there were such a M tone in the language, it would always be deleted in favor of other tones.

There are two potential counterexamples to this tendency that are worth considering. First, the plural contexts (22-23) involve the addition of H tone that produces a Rising LM or MH contour rather than affecting the tone of the entire syllable. Second, in irrealis marking in (38), a similar situation is found where L tone does not affect the entire syllable, but rather only

[89] In Bawm, a language analyzed as having underlying L, H, and HL only, a sequence of HLH surfaces as HMH (Löffler, 1972).
[90] Note that in example (42), there no evidence of NEG L tone on the stem or NEG marker, which surfaces as *beh*, possibly due to a floating H tone associated with plurality.

appears on the final edge, resulting in a Falling contour. These situations involve special morphological processes where mora augmentation with associated H or L can be synchronically traced to suffixal morphology: *-héé* or *-àà*. Thus, rather than consider these cases to constitute evidence of an underlying M failing to undergo normal phonological raising or lowering, I treat this contour derivation as morphophonological, where the added grammatical H or L only appears on the final edge of the stem.

In LTZ, H and L tone marked on a mora must be there for lexical, phonological, or grammatical reasons. The same is true for H or L tone morphemes that surface M. Some differences, such as between H and toneless stems are lexical. The raising of L to M after L is phonological. And the application of plural H tone and irrealis L tone can be explained by productive morphological processes. The following section discusses floating tone associated with certain agreement morphemes.

6.9.5 Morphemes with floating L tone

Transitive contexts provide many examples of toneless morphemes surfacing with tone other than M, which in some cases may be due to floating tones associated with particular agreement prefixes. In (43-44), the verb is either prefixed by the 1PO marker *ma-* or there is a null 3PO. In these contexts, both bimoraic (43) and monomoraic (44) stems reveal their underlying contrast; so no extra morphophonological processes are needed to explain their tonal behavior.[91]

(43) ma/Ø miing bà/báá ba tsíh
1PO/3PO watch NEG/feed NEG 2PS
'Y'all did not watch/feed us/them.'

[91] It is worth noting that the M tone on NEG following *sah* 'build' in (44) is unexpected and does merit an explanation.

(44) ma/∅ sah ba/túh ba tsíh
1PO/3PO build NEG/hit NEG 2PS
'Y'all did not build/hit us/them.'

By contrast, the prefixal 2SO marker *tsa-* and the 1SO marker *pa-* in (45-46), introduce L tone, realized on the following verb. This L has the effect in (45-46) of lowering the H tone stem (/báá/ 'feed') to M and the toneless stem (/miing/ 'watch') to L. After the toneless stem, the NEG marker surfaces as M, avoiding a sequence of L tones (*LL).

(45) tsa **mìng** ma/**baa** mà píh
2SO watch NEG/feed NEG 1PS
'We didn't watch/feed you.' or 'We didn't watch/feed y'all.'

(46) pa **mìng** ba/**baa** bà tsíh
1SO watch NEG/feed NEG 2PS
'Y'all didn't watch/feed me.'

This lowering is also observed on the H monomoraic stem /túh/ 'hit'—realized as M in (47-48). Curiously, this L fails to apply to the toneless stem /sah/ 'build,' which surfaces as M as well, obscuring the lexical tone contrast.[92]

(47) tsa sah/**tuh** mà píh
2SO build/hit NEG 1PS
'We didn't build/hit you.' or 'We didn't build/hit y'all.'

(48) pa sah/**tuh** bà tsíh
1SO build/hit NEG 2PS
'Y'all didn't build/hit me.'

[92] It is possible that *sah* receives the floating L tone from the preceding morpheme, which would result in an illicit *LL sequence and the repair strategy here is to raise the first L of the sequence to M rather than the second, the opposite phenomenon observed with bimoraic stems.

These 1st and 2nd person agreement markers may appear post-verbally, where they also appear to trigger tone lowering on the following morpheme. While pre-verbal agreement markers prosodify as minor syllables *tsa-* and *pa-*, their post-verbal counterparts surface as full monomoraic major syllable forms. In (49), where the H tone Q marker *máá* is not preceded by *tsih* or *pih*, it surfaces faithfully as H. In (50), where the same Q marker is preceded by the 1PS marker *píh*, it surfaces as HM, evidence of H lexical tone and L floating tone realized on the same final syllable. The addition of this floating L tone to a H morpheme produces Falling contours, unlike mora augmentation discussed for plural H and irrealis L, which results in Rising and Convex contours.

(49) Ø báá ba héé Ø máá
3SO feed NEG PL 3SS Q
'Didn't she feed them?' or 'Didn't they feed him?' or 'Didn't they feed them?'

(50) Ø báá ma píh **máa**
1SO feed NEG 1PS Q
'Didn't we feed him?' or 'Didn't we feed them?'

In (51), floating L is associated with both pre- and post-verbal markers. Floating tone from the pre-verbal *pa-* lowers the following toneless stem to L and the following H stem to M. Floating tone from the post-verbal *tsih/tsíh* lowers the following H tone Q marker to HM. Example (52) shows this same process is true of the 1st person post-verbal marker *nih*.

(51) pa **mììng** ba/**baa** bà tsih/tsíh **máa**
1SO watch NEG/feed NEG 2SS/2PS Q
'Didn't you/y'all watch/feed me?'

(52) tsa **mììng** ma/**baa** mà nih/níh **máa**
2SO watch NEG/feed NEG 1SS/1SS.PL Q
'Didn't I feed you/y'all?'

This lowering can also be seen in the imperative paradigm. In (53), the *ma-* 1PO marker is followed by faithful surface forms [miing] and [báá]. In (54), however, the *pa-* 1SO marker introduces a L tone to the stem, resulting in the surface forms [mììng] and [báa].

(53) ma miing/báá
1PO watch/feed
'Watch/Feed us!'

(54) pa **mììng/báa**
1SO watch/feed
'Watch/Feed me!'

A previously mentioned, in many transitive affirmative contexts, H tone is introduced from an unknown source, often neutralizing the contrast between bimoraic toneless and H stems. This transitive H tone is realized on the stem when preceded by a null 3SO marker in (55) and when preceded by the 1PO marker *ma-* in (56), neutralizing the tone contrast of the stem.

(55) ka/na/a Ø míing/báá
1SS/2SS/3SS 3SO watch/feed
'I/you/she watched/fed him.'

(56) na/naa/a/aa ma míing/báá
2SS/2PS/3SS/3PS 1PO watch/feed
'You/y'all/she/they watched/fed us.'

In (57-58), these stems are preceded by the 1SO and 2SO markers *pa-* and *tsa-*, respectively, and they surface as HM, a pitch pattern indicating the presence of both the (lexical and/or transitive) H and the L floating tone from *pa-/tsa-* object markers.

(57) naa/aa pa **míing/báa**
2PS/3PS 1SO watch/feed
'Y'all/they watched/fed me.'

(58) kaa/aa tsa **míing/báa**
1PS/3PS 2SO watch/feed
'We/they watched/fed you.'

In some contexts, the L tone associated with the *pa-/tsa-* morphemes appears on the H tone Q marker, which is realized as HM in (59).[93]

(59) ka/na/a pá/tsá míing/báá **máa**
1SS/3SS/2SS 1SO/2SO watch/feed Q
'Did I/you/she watch/feed me/you?'

It is worth noting, as well, that when the subject marker is singular, as in (60-61), the transitive H tone surfaces on both the pre-verbal object marker and the stem. Transitive H neutralizes the contrast between toneless and H stems, which are realized as HM due to the floating L tone introduced by the object markers.

(60) na/a **pá** **míing/báa**
2SS/3SS 1SO watch/feed
'You/she watched/fed me.'

(61) ka/a **tsá** **míing/báa**
1SS/3SS 2SO watch/feed
'I/she watched/fed you.'

This differential treatment of singular (60-61) and plural (57-58) subject contexts does not appear to be related to the bimoraic structure of the plural subject markers, nor the monomoraic structure of the singular subject markers. A difference based entirely on the syllable

[93] The distance of this floating L tone from the object marker raises the question of where in the structure this L tone is inserted. Future research will consider two possibilities: (1) phonological or morphological processes force the L tone to be realized on the Q marker (possibly at the final edge of the verbal complex), and (2) these marker are inserted lower in the syntactic structure, where they show up post-verbally before the Q marker, and are raised to a higher position, leaving the floating L behind to dock to Q.

structure of these subject markers wrongly predicts differential treatment of the *ma-* marker in (56) depending on subject plurality.

Many of the contexts found in Appendix D include tone phenomena that are not yet understood. These include situations where monomoraic or bimoraic stems fail to realize their lexical contrast, situations where the source of L and H tone is not predicted (such as H tone in many transitive contexts), and situations where lexical tone associated with a stem is realized on other morphemes, such in (62-63). The toneless stem in (62) and the H stem in (63) are both realized as H, obscuring the underlying lexical contrast between stems. However, the non-adjacent Q marker reveals the tonal contrast, with HM surfacing in (62) and H in (63).

(62) ka/na/a Ø míing héé **máa**
1SS/2SS/3SS 3PO watch PL Q
'Did I/you/she watch them?'

(63) ka/na/a Ø báá héé **máá**
1SS/2SS/3SS 3PO feed PL Q
'Did I/you/she feed them?'

These and other puzzles offer a rich area for future research on tone in Zophei, Maraic, and KC languages more broadly.

6.10 Summary

This chapter provided a survey of the literature on tone in KC languages as well as a preliminary analysis of tone phenomena in Lawngtlang Zophei. Previous research has noted that nearly all KC languages are tonal, with broad variation described between languages and between dialects of the same language. Although tone analysis on KC languages often makes use of only L and H tone primitives (as well as toneless morphemes), pitch pattern inventories may

be large, including multiple level and contour pitches. The inventory of pitch patterns in LTZ includes L, M, H, HM, ML, LM, MH, and HMH but can be reduced to two tones, with underlying L, H, and toneless morphemes.

Although not investigated for LTZ, interactions between consonants and tone are noted for some KC languages. Interactions with syllable structure and syllable position are more commonplace, with contours preferring longer syllables in many KC languages. KC researchers often divide syllables into minor and major syllables, where the former only shows up on non-final syllables and may have a reduced inventory of segments or tones. Major syllables are often divided into smooth and checked syllables, where the latter ends in an oral or glottal stop. LTZ has Cə minor syllables, as well as smooth CVV, CVVN and checked CVʔ syllables. Minor and checked syllables are considered monomoraic and smooth syllables are considered bimoraic for the purposes of this analysis; super long syllables with HMH are considered trimoraic. In LTZ, any syllable shape may be underlyingly L, H, or toneless; contours lengthen short syllables; and Falls but not Rises occur non-finally.

The phonology of tone in the world's languages includes rules for tone spreading, absorption, and polarization; all of which are described for KC languages. LTZ tone processes involve spreading rules that are limited to adjacent syllables and may result in contours. In addition, a restriction on adjacent L tones may result in dissimilation, for example, with L-L surfacing as L-M. Many of these phenomena are limited to certain morphosyntactic contexts, evincing grammatical tone. For example, word list recordings collected for this project reveal neutralization in the verbal domain not found in the nominal domain that suggests a grammatical H tone appears in many transitive contexts. In addition to marking transitivity with H tone, LTZ

makes use of H tone in marking (subject or object) plurality and possession (in toneless nouns beginning in /a/).

Evidence from Senthang and LTZ suggests that H tone used to mark some plural agreement is related to segmental marking synchronically and diachronically, offering opportunities to study the grammaticalization of tone in Maraic. H tone marking plural in LTZ shows up on pre- and post-verbal agreement marking as well as on the stem or other affixes. In imperative contexts, this H tone may lengthen L stems to LM, M stems to MH, and H stems to HMH. While Senthang associates plural H tone to the left of the segmental morpheme's position in the verbal complex, LTZ favors association of plural H to the right. It surfaces to the left in LTZ only when there is no other post-verbal morphology to host it.

Many KC languages use tone in marking stem alternation, with some restrictions in tone described for Stem II forms. Stem alternations is used to indicate, among other things, polarity, transitivity, mood, syntactic category, subordination, nominalization, and relativization. LTZ has few stem alternants, which are all toneless, but the language does make use of tone in transitivity, both L for marking intransitive contexts and H for marking transitive contexts. While intransitive L on a toneless stem is realized as L, on a H stem, it is realized as a ML fall. Transitive H does not show up in all contexts, but it may neutralize the contrast between toneless and H stems.

The analysis presented here for LTZ makes use of two tone primitives (L and H), as well as toneless morphemes. Toneless morphemes surface as M unless given tone by another phonological or grammatical source. Underlying L tone may surface as M if raised to avoid a sequence of two L tones (*LL); underlying H tone may surface as M, if lowered to avoid a H-L fall (*HL); and underlying H+L on a syllable is that is (a) not final, and (b) not after L, will also

surface as M. While underlying toneless morphemes may surface with any pitch pattern, underlying L morphemes will not surface as H, and underlying H morphemes will not surface as L. These observations were motivated through evidence from verbal morphology including H tone plural morphology and L tone negative and irrealis morphology. H plural marking and L irrealis marking may show up without segmental morphology.

Floating L tones associated with pre- and post-verbal agreement markers were also discussed in this chapter. Where agreement markers surface pre-verbally, floating L is realized on the following verb. Where they surface post-verbally, floating L is realized on other following morphemes. In some constructions, both occur in the same phrase and in others, even pre-verbal marking seems to induce lowering on post-verbal morphology. Continued study of LTZ tone will work to reveal the complex interactions of these various lexical, phonological, and grammatical sources for tone phenomena.

Chapter 7. Conclusion

7.1 Summary of contributions

The results of the project presented in this thesis constitute the first effort to describe and analyze the phonetics and phonology of Zophei. In contextualizing the Zophei sound system in relation to other Kuki-Chin (KC) languages, it is intended to open multiple avenues of research on Zophei specifically, and Maraic more broadly. The major contributions of this thesis include:

(1) the creation of multiple instruments for collecting comparative lexical and tone data as well as the data collected with those instruments (presented in the Appendices),

(2) a description of the phonetics and phonology of the Zophei sound system,

(3) comparative phonological analysis of Maraic languages, and

(4) a preliminary analysis of tone in Lawngtlang Zophei.

This study is, to the best of my knowledge, the first linguistic treatment of the Zophei language and the most comprehensive research available on the sound systems of Maraic languages as well as on tone in KC.

7.2 Summary of major findings

This research has revealed that there are at least three major dialects of Zophei spoken in Chin State, Burma/Myanmar with phonological inventories differing between varieties, some of which were likely conditioned through contact with Mara, Lutuv, Senthang, and Lai. Zophei varieties share phonological onset inventories with some phonetic variation, but rhyme variation between dialects offers evidence of vowel shift involving front and back vowels. Further investigation into the tone in Lawngtlang Zophei has revealed a rich tone system with grammatical tone involved in marking plurality, irrealis, negation, possession, and agreement. These efforts will contribute to and open avenues of linguistic research, especially in the areas of

historical comparative analysis, vowel shift, and tonal phonology. More detail on the findings of this thesis are presented in the chapter summaries below.

7.3 Summary of chapters

Chapter 1 described the historical and social context for KC, Maraic, and Zophei. Early speakers of the language Van Bik (2009) reconstructs as Proto-Kuki-Chin migrated to the doab between the Irrawaddy and Chindwin rivers between the 4th and 8th centuries. From there, flooding in the 13th and 14th centuries pushed people north, as well as west where they settled in the mountainous and forested Chin Hills. This history of migration contextualizes the language dispersal and shifting language contact situations that have resulted in the variation seen in modern-day KC languages. KC languages (according to Peterson, 2017b) can be divided into three major subgroups: Northwestern, Central (Core Central, Maraic), and Peripheral (Northeastern, Southern, Khomic) languages. Maraic languages sit geographically between Core Central, Southern, and Khomic languages and are so-classified due to shared or parallel phonological innovations that have reduced the number of allowable syllable shapes (through a loss of codas and reconfigured vowel length distinctions) in favor of expanded vowel inventories and tone systems. In addition, this chapter described British invasion of the KC-speaking area and more recent events leading to the modern global diaspora which has brought a large community of KC language speakers, including thousands of Zophei speakers, to Indiana (where this research has taken place).

Chapter 2 overviewed Maraic language sound systems. It provided previous research on Mara, Senthang, and Zotung as well as description of the Lutuv consonant and vowel inventories based on primary data, revealing similarities and differences between onset and rhyme inventories in these languages. Like Zophei, all four other Maraic languages share a three-way

voicing contrast in labial /p pʰ b/ and coronal stops /t tʰ d/ (with Zotung having implosives /ɓ ɗ/ in place of the voiced series) and a two-way contrast in dorsals /k kʰ/. All have the fricative series with /v s z h/ and /f/ either through retention or contact with Lai, with an expanded inventory in Zotung (adding /θ ɕ/) and Senthang (adding /x ɣ/). All four languages have sibilant affricates (or possibly palatal stops /c cʰ/ in the case of Zotung) with one in Senthang /ts/, two in Mara /tɕ tɕʰ/ (like Zophei's two /ts/ tsʰ/), and three in Lutuv /ts tsʰ dʒ/. Additionally, Zophei, Mara, and Lutuv have a lateral affricate series /tl /tɬ/ missing in Senthang and Zotung. Voicing contrasts in labial and coronal (but not dorsal) nasals as well as in liquids are retained in Zophei, Mara, Senthang, and Lutuv /m m̥ n n̥ l l̥ r r̥/, but have been lost in Zotung, which innovated a palatal nasal /m n ɲ ŋ l r/. Zotung and Senthang retain glides /w j/ lost in Mara, Lutuv, and Zophei.

Including Zophei varieties, the only shared rhymes between all Maraic languages are /ii aa uu/, with variation due in part to the innovations and vowel shifts that have taken place alongside syllable structure simplification. While Senthang retains coda glides (according to Ngun Tin Par's 2016 analysis) and nasals, including the glottalized labial nasal /-w -j -m -mʔ -n -ŋ/, Zophei varieties and Lutuv have only coda /-ŋ/. Both Zotung and Mara have no allowable coda consonants, with Zotung innovating nasalized vowels and (according to Löffler, 2004) Mara developing then losing them. These changes to syllable structure have resulted in innovated vowels, especially in the high vowel space. Diachronic vowel changes from Proto-Kuki-Chin to the various Maraic languages were discussed in more detail in Chapter 5.

Chapter 3 gave a description of the methods employed in this thesis and offered information pertaining to the Appendices (A-F). The data collected and analyzed in this research is from four language assistants, three who speak Zophei and one who speaks Lutuv. The data

collected with the help of one or more of these language assistants includes: a word list in Appendix A, attested syllables in Appendix B, comparative lexical data in Appendix C, verbal complex data in Appendix D, and verb tone data in Appendix E. In addition, Appendix F includes a summary of orthographic conventions used in this thesis. Based on the data discussed in Chapter 3, the following three chapters focused on the description and analysis of onsets, rhymes, and tone in Zophei.

Chapter 4 described the phonemic inventory and acoustic characteristics of Zophei onset consonants with a particular emphasis on variations in production found in the data collected for this study. Zophei dialects share the same inventory of phonemic onsets with 8 stops /p ph b t th d k kh/, 4 fricatives /v s z h/, 4 affricates /ts tsh tl thl/, 5 nasals /m hm n hn ng/ (/hng/ marginally reported), and 4 liquids /l hl r hr/. There are no onset glides or consonant clusters in Zophei, having lost the former in favor of fricatives and the latter in favor of affricates (with some additional examples of epenthesis and elision). Contextual variation in the production of affricates was observed particularly in TRZ. Relevant acoustic differences between /ts tl/ and /tsh thl/ including longer VOT (involving aspiration) and noisier vowel onsets in the latter set. Additionally, TRZ /tsh/ has a more anterior constriction than /ts/ (i.e., [t͡s] vs. [t͡ʃ]).

Contextual variation in the production of sonorants was observed particularly in LTZ. Voiceless nasals may show up as voiceless aspirated, voiceless unaspirated, or voiced aspirated, with the latter especially in intervocalic environments, but sometimes in word-initial position. Voiceless laterals show similar variation, with voiced aspirated variants only showing up in intervocalic environments. Rhotics in TRZ are retroflex fricatives [ʐ] and [ʂ], while in LTZ, more variation is noted. LTZ voiced rhotics may show up as [ɹ], [ʐ], or [ʒ] and may exhibit

devoicing. Voiceless rhotics may also show up as fricatives [ʂ] or [ʃ]. Devoiced or voiceless rhotics in LTZ, especially preceding rounded vowels, may be produced with a whistle.

This chapter also addressed minor syllable onsets, noting that this study revealed no examples of minor syllables beginning with /ph d ng hl/ in either variety, with an additional lack of /hr/ in TRZ and /h/ in LTZ minor syllables. Some prosodic contexts allow for minor syllable vowel devoicing, which results in apparent (or emergent) consonant clusters.

In addition to offering description and suggestions as to relevant features of Zophei onsets, this chapter indicated that continued work on Zophei dialect study, phonology, and socio-phonetics can target variation in the production of affricates and sonorants described therein.

Chapter 5 described synchronic Zophei rhymes and used comparative techniques to shed light on diachronic rhyme change in Maraic. Compared to Van Bik's (2009) PKC reconstruction, which lists five vowels /*i *e *a *o *u/ and a large inventory of coda consonants /*w *j *l *lʔ *r *rʔ *m *mʔ *n *nʔ *ŋ *ŋʔ *p *t *k/, Maraic languages have expanded their vowel inventories and collapsed their coda consonant inventories. While Senthang permits coda nasals /m mʔ n ŋ/ with one glottalized, Zophei and Lutuv permit only /ŋ/; Zotung and Mara allow no coda consonants, innovating nasal vowels that were lost in Mara. This investigation of lexical correspondences between PKC reconstructed etyma and synchronic Maraic languages has revealed vowel shift between Zophei dialects, a closer relationship between Zophei and Mara than between Zophei and other Maraic languages, and innovations likely conditioned through language contact.

Van Bik's (2009) work on Maraic's relationship to other KC subgroups (mostly based on Mara with some information from Senthang and Zotung) reveals five observations that were discussed in this chapter: (1) the loss of final glottal stops, merging Vʔ with VV syllables, (2) the

loss of coda obstruents in favor of glottal stops, re-establishing a Vʔ vs VV (or long vs. short vowel) contrast, (3) /e/ raising to /i/, (4) substitution of /i/ for /u/ or vice versa, and (5) back vowel shift /a/ → /ɔ/ → /u/ → /ɯ/. Mara offers evidence of these changes and, since some PKC rhymes were merged while others split, evidence of interleaving coda loss and vowel shift phenomena.

Lutuv's rhyme developments are superficially similar to Mara's, but with relevant differences that suggest these changes may be parallel rather than shared innovations. First, although vowel shift is observed in Lutuv, it is lacking the earliest step: /*a/ to /ɔ/. Rather, /*a/ raised to /ə/ and r-final syllables nearly all developed to /a/. Second, Lutuv lacks CVʔ syllables, which have merged with obstruent-final syllables to long vowels. Third, despite Mara and Lutuv both having /ɯ/, they are from different source PKC vowels, /*ua/ in the former and /*u/ in the latter. Taken together, these differences suggest that many apparent similarities may have been conditioned through language contact.

Zotung data analyzed in this chapter offer evidence of multiple paths for language change, likely with some shared innovations and others parallel. Possible contact-induced changes may be evinced through sporadic application of vowel shift phenomena in Zotung, suggesting borrowings rather than internal change. For example, PKC /*aw/ corresponds with both /u/ and /ɯ/ in Zotung; shift may have occurred in Mara or other neighboring languages with borrowings into Zotung occurring at different stages in the shift. Similar unpredictability is found in the loss of final oral and glottal stops. Inconsistencies in innovation, as well as differences in onset development (such as the lack of affricates and the retention of /j/, /θ/, and implosives), indicate that further research on Zotung should consider whether it is more closely related to Southern Chin languages than to other Maraic languages.

In comparing Zophei dialects, TRZ (Lower Zophei A) is revealed to have the most conservative rhymes, followed by NTZ (Upper Zophei), and LTZ (Lower Zophei B) with the most innovative. In additional to the loss of nearly all coda consonants (retaining only /ŋ/), comparison of Proto-Kuki-Chin reconstructions to TRZ reveals the beginnings of the Zophei back vowel shift /*aa/ → /oo/ → /au/, which continues through NTZ /au/ → /uu/ → /ʉʉ/. The short vowel /oh/ also falls in NTZ, merging with /ah/. NTZ also offers evidence of a parallel front vowel shift /ei/ → /ii/ → /ɨɨ/, retained in LTZ. To this, LTZ adds an additional /oo/ → /au/ innovation, which has occurred twice in the history of Zophei, as well as raising of the second nucleus of two diphthongs /ua/ → /uo/ and /ia/ → /ie/. The short vowels /eh ih/ in LTZ follow a similar raising path, /eh/ → /ih/ with /ih/ etyma either staying put or merging with /ii/ to modern /ɨɨ/. Comparative analysis offers evidence that the back vowel shift involves a push chain, initiated with the raising of /*aa/ to /oo/ described for Mara in Van Bik (2009) and continuing through the centralization and fricativization of /u/ to /ʉ/. However, there is no strong evidence for an analysis of the front vowel shift as a push chain or drag chain. This shift has mostly occurred since TRZ split with NTZ, and some further change has been observed in LTZ.

However, NTZ retains some more conservative rhymes and TRZ has some more innovative rhymes, providing evidence of the westward movement of peoples and contact-induced language change. Retentions in NTZ include the diphthongs /ui/ where the LTZ has innovated /yy/, possibly through contact with Lutuv, and /oi/ where both Lower Zophei varieties have innovated /øø/, possibly through contact with Mara. TRZ has also lost /eŋ/ in favor of /ai/, also likely through contact with Mara.

Zophei community members expressed the Upper Zophei area is the older settlement, but the Lower Zophei A region is considered the higher prestige variety, with Vuangtu taken as the

closest to a community standard dialect. Retentions in NTZ also paint a picture of the Zophei language wherein the earlier settlement in modern-day Chin state was in the Upper Zophei region. From there, the Lower Zophei A group must have been established next, retaining a more conservative rhyme system, with some innovations conditioned through contact with Mara. This more conservative rhyme system is likely one reason for the community view of Lower Zophei A as higher prestige.

After the split with Lower Zophei A, the earlier settlement in the Upper Zophei region likely underwent vowel shift involving raising, possibly conditioned through contact with Lutuv, a language with a particularly well-stocked high vowel space. After this shift, speakers of the Upper Zophei varieties likely travelled westward to settle in the Lower Zophei B region, where they picked up more innovations conditioned by continued contact with Lutuv, as well as innovations conditioned by the their contact with Mara and Lower Zophei B. The contact with Lower Zophei B is evidenced by the community view that Lower Zophei forms a dialect region despite Upper Zophei and Lower Zophei B having both undergone vowel shift that excluded Lower Zophei A.

Further research especially on Mara, Senthang, and Lutuv, as well as Zophei from other villages not reported on here, will work to illuminate the processes of innovation and vowel shift in Maraic languages. It is worth noting that this hypothesis of language change and dispersal for the Zophei-speaking population makes reference to contact-induced change conditioned by surrounding Lutuv and Mara. However, in some cases innovations may have occurred in Zophei, which were borrowed into neighboring Lutuv or Mara varieties. Further research on the social situations facilitating language contact in the region, as well as on language variation and change in other Maraic languages will further shed light on these questions. In addition to the analysis of

data collected from Zophei and other Maraic languages, this chapter set up a program to collect data for comparative analysis from more languages and dialects in investigating hypotheses put forward in this chapter (see Appendix C for the pilot instrument). In addition, this chapter concluded that TRZ is the most phonologically conservative Zophei dialect and LTZ is the most phonologically innovative, with no comparative research presented from different fields of linguistics. Future research on comparative syntax, morphology, and lexicon will also add to our understanding of language contact and change in the region.

Chapter 6 discussed the subject of tone in Kuki-Chin broadly, then offered a preliminary analysis of tone in Lawngtlang Zophei. Tone is an under-researched aspect of KC grammars that previous research shows is relevant to the phonetic, phonological, morphological, syntactic, semantic, and pragmatic study of these diverse languages. Tone systems vary between KC languages and dialects; and some languages are described as having large surface pitch inventories, reduced to fewer contrasts through phonological analysis. The tonal analysis of LTZ presented here describes eight pitch patterns (L, M, H, HM, ML, LM, MH, and HMH), reduced to underlying L and H tone, with toneless morphemes also motivated.

Syllable shape and position are known to effect the realization of contour tones in KC languages, with contours preferring longer vowels in positions of more prosodic prominence (often word- or phrase-finally). While syllables of any shape in LTZ may be L, H, or toneless, minor syllables do not surface with contours, and short major syllables may be lengthened to accommodate contours. Rising (LM, MH) and Concave (HMH) contours are also attested in plural imperative contexts. The process that derives these Rises is different from those deriving Falls (HM, ML) in that it is limited to plural imperative contexts, it involves mora augmentation,

and other instances of H and L on the same syllable (regardless of the ordering) result in M, HM, or ML.

Phonological tone processes involving assimilation, absorption, and polarization were described and analyzed in a variety of KC languages. LTZ tone processes involving spreading are limited in domain to adjacent syllables and often result in contouring. Much of the phonology of LTZ tone realization occurs in avoidance of L-L and H-L sequences, suggesting constraints (*LL, *HL). The avoidance of Falls is typologically uncommon, and the language has no such avoidance of L-H Rises. Avoidance strategies for L-L include raising (usually the second syllable) to M. Avoidance of H-L falls usually involves raising L or lowering H to M, or realizing HL on the same syllable as M, HM, or ML depending on context. In addition, the realization of HMH can be analyzed as insertion of M (underlying L), employed in avoiding two H tones on the same syllable.

KC languages also make extensive use of grammatical tone phenomena in marking, for instance, polarity, transitivity, mood, syntactic category, subordination, nominalization, and relativization. This chapter paid particular attention to plurality and stem alternation in KC tone systems. Plural marking in Senthang and LTZ offer evidence of segmental sources for tonal morphology, with some differences in the direction that tones associate when segmental morphology is absent. Senthang plural H associates to the left, while LTZ favors association to the right if there is a host morpheme and to the left if there is not.

Tone is only part of the systems of stem alternation in KC languages, which largely makes use of coda consonants and vowel length to distinguish stem forms. With reduced coda inventories, Maraic languages are particularly valuable in the investigation of stem alternation. Senthang retains some codas and, in addition to syllable shape and consonant type, makes use of

tone in stem alternation. In LTZ, however, only a few verbs with stem alternation are attested and those verbs are all toneless. Rather LTZ makes use of tone to distinguish transitive from intransitive constructions, a potentially diachronically related phenomenon. This chapter also analyzed floating L tone associated with pre-and post-verbal morphology in LTZ, revealing the complexities of the LTZ tone system and the richness of future research potential.

7.4 Future directions

A major goal of this thesis has been to lay the groundwork for research on Zophei and other Maraic languages, especially in working with the large and growing communities in Indiana. This research has endeavored to accomplish this goal through instrument creation, data collection/presentation, and linguistic analysis. As such, continued expansion of data collection using the instruments developed here will result in a more robust understanding of language variation and change in Maraic. In addition to future data collection, transparency in data presentation in the thesis reaches beyond what is analyzed herein, so continued analysis of these data is anticipated and encouraged. The analyses offered in the thesis, especially those pertaining to vowel shift and tone, are also intended as starting points for expanded research programs including those reaching into other areas of linguistic analysis such as syntax and semantics.

In looking forward, it is worth pointing out the extraordinary potential to grow this research in Central Indiana. Current political circumstances in Burma/Myanmar make it impractical if not impossible to conduct fieldwork with speakers of Maraic languages in their home villages. The Maraic-speaking community in Indianapolis is large and growing. Student and faculty researchers at area institutions such as Indiana University have an unprecedented chance to collect novel primary data on these under- and un-described languages, while actively supporting native-speaker, first-generation, undergraduate students. Our understanding of many

of these languages is based on ethnic identity rather than linguistic criteria, so (like Zophei) those speakers identifying as ethnic Mara, Lutuv, Senthang, and Zotung, will likely also be revealed to speak diverse varieties, each adding to our areal understanding of KC, as well as to our typological and theoretical understanding of human language.

7.5 Conclusion

The Maraic languages are some of the most phonologically innovative and least well-researched languages within the Kuki-Chin family. Shifting language contact situations and widespread multilingualism has resulted in a geographically close group of languages with superficial phonological similarities, especially in their defining trait of reduced syllable inventories and associated diachronic changes to vowels and tone. It is suggested here that some such similarities may be due to language contact and may obscure older diachronic relationships. If the three varieties of Zophei discussed here are any indication, continued research on rhyme change and vowel shift in Maraic, in conjunction with the revealed complexities of Zophei verbal morphosyntax and grammatical tone, set the stage for wide-ranging research programs for decades to come.

Appendix A: Zophei Word List

LTZ word	Tone	Gloss	POS	Index#	TRZ word	Gloss	POS	Index#	Ref#
a hlyo	OO	saw	N	3795	a hlua	saw	N	1720	a188
a hmii	OH	food dishes (not rice)	N	2887	a hmei	food dishes (not rice)	N	838	760
a huu	OH	who	WH	3801					a194
a khyy	HO	bee	N	2487	khui	bee wasp	N	463	423a
a khyy ing	HOH	beehive	N	2488					423b
a lee	OO	(in) the middle	N	3162.1	a lee	in the middle	CONJ	1098.1	987b
a lee	OO	half, midway	N	3179	a lee	half, mid-way	N	1114	1000c
a lee tsing tsing	OOHH	half	PHR	3552	a lee tsing tsing	half, midway	N	1477	1322
a reng lee tah	OHHO	underneath	PP	3737	rai	to be underneath	TV	1663	a133
a thleng	OO	grave	N	3510	thlai	grave, tomb	N	1437	1288
a tsang pau	MHH	another, a different one	N	3592	a maa tsang poo	another, a different one	N	1516	a001a
a tseng tseng	OHH	from time to time	ADV	2639	tsai tsai	from time to time	ADV	606.1	551b
a tshii	OO	sesame seed	N	2697	a tshih	sesame seed	N	663	597
a tsuu	OO	outbuilding	N	3658	a tsuh	outbuilding	N	1584	a063
a tuu	OH	now	ADV	2243	a tau	now	ADV	236	213
					a tuu	sheep	N	248	225
a tuu	OO	hoe	N	2227	a tuu	hoe	N	221	201
a zong	HO	monkey	N	3425	a zong	monkey	N	1356	1217
a zong ma tii ah	OOOHO	everything	PHR	3388					1184c
aa	O	chicken	N	2559	aa	chicken	N	534	486a

aa khong pau	OHH	rooster	N	2560	aa khong poo	rooster	N	535	486b
aa l~~uu~~	OO	potato	N	3605	aa luu	potato	N	1529	a013
aa s~~ii~~	OO	star	N	2585	ee sii	star	N	558	507
aa tsang na dang	HHLO	the way it happens	PHR	2081	tsang na dang	the way it is	PHR	78	70c
aa tyy	OO	egg	N	2091	aa tui	egg	N	88	79
					ah	no	INT	1743	a211
					ai	to heat, to dry, to sunbathe	IV	540	490a
ang	O	to open (a mouth)	TV	2573	ang	open (a mouth)	TV	548	497
au	H	to slice, to cut	TV	2544	oo	to slice, to cut	TV	520	474
ba beng	OH	eggplant	N	2012	bau bau	eggplant	N	12	10
ba kh~~uu~~	OH	to cover	TV	2501	ba ra khuu	to cover	TV	476.1	434b
					ba tsuu	fireplace	N	428	389a
baa	H	to feed (with one's hand)	TV	2029	baa	to feed (with one's hand)	TV	29	27
					baa	to owe	IV	43	39a
bah	O	to owe	TV	2044	bah	to owe	TV	43.1	39b
bah	O	to lie face down	IV	2038	boh	to lie face down	IV	38	34
bang	H	arm	N	2000	bang	arm	N	1	1a
bang	O	to hang (clothes)	TV	2031	bang	to hang (clothes)	TV	31	29
bang ka lih	HHH	armpit	N	2001	bang ka lei	armpit	N	2	1b
bang tsa ka lih	HHHH	armpit	N	2002	bang tsa ka lei	armpit	N	3	1c
bau	O	to be small (as a hole)	IV	3779	boo	to be small	IV	1704.1	a172.1

bee pa hrau	OOH	yam	N	3294	bee pa hroo	yam	N	1227	1102
beh	L	not (negation)	PART	3739	beh	not (negation)	PART	1665	a135
bei	H	root vegetable	N	3610	a bee	root vegetable	N	1534	a018
beng	O	cheek	N	2017	bai	cheek	N	17	15
beng	H	to press, to cram	TV	2022	bai	to press into a tight space, to cram	TV	22	20
beng hlau	HH	banana	N	2005	bai hloo	banana	N	5	3
bie	H	word	N	2062	bia	word	N	61	57a
bie rah	HO	to converse	VC	2063	bia rei	to converse	VC	62	57b
bih tah	OO	to be sincere	IV	2193	bia tah	real word	N	188	171c
bii	O	pot	N	2046	bei	pot	N	45	41
bii	O	to sew	TV	3718	bei	to sew, stitch	TV	1645	a116
					bing	to connect	TV	1737	a205
~~bii~~	H	to know, understand	TV	3750	bii	to know	TV	1676	a144
bong	O	thigh	N	3701	bong	thigh	N	1628	a102
bong	O	box	N	2023	bong	box		23	21
bong	H	to help	TV	2035	bong	to help	TV	35	31
bøø	O	to swell	IV	2013	bøø	to swell	IV	13	11
					bua	to be overgrown	IV	1736	a204
bui baa	LH	to be disordered	IV	2015	bue baa	to be disordered	IV	15	13
bung	O	to bend, stoop	IV	3692					a095
					bung kung	banyan tree	N	6	4
					buu	rice (cooked)	N	48	44
byy	H	lord, master, superior	N	2019	bui	lord, master, superior, to be lord	N	19	17
byy tshung	HO	yard, gardening area	N	3730	bui tshung	garden (as in back yard)	N	1657	a127

daa khing	OH	bell, gong	N	2070	daa khing	bell, gong	N	69	63
					dah	to frisk	TV	94	85
					dai	to hammer	TV	96	87
dang	O	to be healthy	IV	2100	dang	to be healthy	IV	97	88
dang	O	way	N	2079	dang	way	N	77	70a
dang	O	palate	N	2131	dang	palate (roof of mouth)	N	127	115
dang	O	to treat	TV	2109	dang	to treat (someone to dinner)	TV	106	96a
dau	O	to stand	IV	2124	doo	to stop, to stand up	IV	120	108
dau	O	to stand yourself up	IV	2216	doo	to stand yourself up, to be standing	IV	211	192b
dee	H	to be quiet	IV	2073	dee	to be quiet	IV	72	66a
dee tii tah	HHO	quietly	ADV	2075	dee tei tah	quietly	ADV	73	66c
					deh	to crush (imperative)	VIMP	1740	a208
					dei	to crush (with one's thumbnail)	TV	1739	a207
deng	O	to fight	IV	2111	dai	to fight	IV	108	97a
deng	H	to welcome, to receive guests	TV	2110	dai khai	to welcome, to receive visitors	TV	107	96b
deng	O	to fight	TV	2112	dai	to fight	TV	108.1	97b
deng mang	HH	almost	ADV	2067	dai mang	almost	ADV	66	60
dih	O	to return	IV	3741	dih	to return, to be correct	IV	1667	a136b
ding	H	to be straight	IV	2130	ding	to be straight	IV	126	114
ding	O	to drink	TV	2089	ding	drink	TV	86	77
ding	O	height	N	3599	tung	height	N	1523	a007
d~~ii~~	H	to end	IV	2076					67a

					doh	to pull (one's self) away	IV	85.1	76a
dong	O	cubit	NC	2083	dong	cubit	NC	80	71
dong	H	to poke, to prick	TV	2104	dong	to poke, to prick, to point	TV	101	91
dong	H	tip	N	2128	dong paa	tip	N	124	112
dong tii	OH	all	Q	2102	dong tei	all	Q	99	89b
døø	O	to oppose	TV	2113	døø	to oppose	TV	109	97c
					dua	to burn	TV	1741	a209
duh tshie	OO	to be a picky eater	VC	3781					a174
					dung khai	to fence in	TV	1540	a024
dung khii	HO	to deceive, to betray	TV	3504	dung pa khei	to deceive	TV	1431	1282
dung khii	HO	to cheat (someone)	TV	3615	dung pa khei	to cheat (as in trick)	TV	1539	a023
duu	H	to pull	TV	2088	dau	to pull, to drag	TV	85	76
duu	H	to love	TV	2108	dau	to love (biblical sense)	TV	105	95
~~duu~~	H	to want	TV	2132	duu	to want, desire, love	TV	128	116
dyo	O	friend (address)	N	3782	?			1707	a175
dyy	H	to collect into	TV	2451	dui	to insert, to put in, to collect into	TV	430	391a
dyy	H	to pack	IV	2452					391b
ee	O	to eat	TV	2550	ee	to eat	TV	526	479a
ee hrii	OH	turmeric, yellow	N	2582	ee hrei	turmeric, yellow	N	555	504
ee sah	OO	to feed	TV	2551	ee sah	to let eat	TV	527	479b
ee sing	OO	ginger	N	2447	ee sing	ginger	N	427	388
ei	O	to be salty	IV	2576	ei	to be salty	IV	551	500a

					ei	to flame, to be ablaze	IV	533	485
eng hnau	OH	vegetables	N	2596	ai hnoo	vegetables	N	569	516
eng hrang	HH	cabbage	N	3541	ai hrang	cabbage	N	1467	1315a
fiang	O	to be clear	IV	2719	fiang	to be clear, to be legible (understandable)	IV	683	614a
haa thyo	HH	sneeze	N	2864	ha thio	sneeze	N	816	739
hang	O	juice, curry	N	2849	hang	juice, curry	N	801	724
hang	O	yawn	N	2873					747
hang	H	to yawn	TV	2873.1					747
hau	H	to wait	IV	3074	hoo	to wait	IV	1016	917a
hau	O	tooth	N	2868	hoo	tooth	N	820	742
hau	O	to pick up	TV	3711	hoo	to pick up	TV	1638	a110
hau tsong	HO	to wait a bit	IV	3075	hoo tsong	to wait a bit	IV	1017	917b
hee	O	mango	N	2851					726
hei	O	to be spicy	IV	3749	hei	to be spicy	IV	1675	a143
hei	O	to ask	TV	2713	hei	to ask	TV	677	700a
					hei	to woo, to court	TV	824	746
hei leng	OO	to ask around	TV	2714	hei lai	to ask around	TV	678	700b
heng	H	to stop (as rain)	IV	2818	hai	to stop (as rain)	IV	772	695
hie	H	to rest	IV	3644	hia	to rest	IV	1570	a051
hie	H	to be necessary	IV	3645	hia	to be necessary, essential	IV	1571	a052a
hie sah	OO	to make necessary	TV	3646	hia sah	to make necessary	TV	1572	a052b
hing	O	to cheat or lie	IV	3306	hing	to cheat or lie	IV	1239	1114a
hing	O	to lie	IV	3634	hing	to lie	IV	1558	a041
hing theng	LH	to be deceitful	IV	3307	hing thai	to be deceitful	IV	1240	1114b

hlang	O	to borrow, to lend	TV	3614	hlang	to borrow, to lend	TV	1538	a022
hlau	O	to be far away	IV	3300	hloo	to be far away, to be remote	IV	1233	1108
hlau	H	song	N	3315	hloo	song	N	1248	1122
hlee	H	to slice open	TV	3188	hlai	to operate	TV	1123	1009
					hleh hlai	to ask about	TV	1757	a225
hleng	O	before, long ago	PP	3295	hlai	before	PP	1228	1103
					hlii dong	bridge, stairs, ladder	N	1107	995
hling	O	thorn	N	3317	hling	thorn	N	1250	1124
hluu	H	earnings	N	3320	hlau	wages	N	1253	1127a
					hluu pui	to be many	IV	1606	a045b
~~hluu~~	O	to be many	IV	3637	hluu	to be many	IV	1563	a045a
hlyy	H	to be extra	IV	3197	hlui	to exceed	TV	1132	1016a
					hma ning	to be last, to be later	IV	882	802a
hma sau	LH	to be first	IV	2747	hma soo	to be first	IV	707	637a
hma sau tseng	LHH	to be very first	IV	2747.1	hma soo tsai	to be very first	IV	707.1	637b
					hmah	grade	N	1752	a220
hmang	O	to use	TV	2926	hmang	to use, to spend	TV	876	798
hmang thlah	HH	picture	N	3761	hmang thlah	picture	N	1687	a155
hmau	O	wound	N	3035	hmoo	wound	N	979	883a
hmee	H	face, front	N	3016	hmee	face, appearance	N	961	871a
hmee	H	face, front	N	3019	hmee	face, front	N	963	873a
					hmee	widower/widow	N	974	882a
hmee lang	OO	later	ADV	3017	hmee lang	future	N	961.1	871b
					hmeh	to press, to massage	VIMP	970	878b

hmii	H	to press	TV	3025	hmei	to press, to massage	TV	969	878a
hming	O	to be well-cooked, to be ripe	IV	3027	hming	to be ripe, to be well-cooked	IV	971	879
hming	O	clothes, thing	N	3703	hming	clothes, thing	N	1630	a104
hming hmau	HO	place	N	3024	hming hmoo	place	N	968	877
hm~~ii~~	H	hair (body), fur	N	2898	hming	hair (body)	N	848	770
hmuh	H	to see	TV	3028	hmuh	to find, to see	TV	972	880
hmuu	H	lips, beak	N	3023	hmau	lips, beak	N	967	876
hmuu	H	to feed (mother pre-chewing food)	TV	3625	pa hmau	to feed	TV	1549	a033
hm~~uu~~	H	to blow, to fan	TV	2880	hmuu	to blow (using breath), to fan (as a fire)	TV	831	753
hmyy	H	to smell good, to be fragrant	IV	3029	hmui	to smell (good), to be fragrant	IV	973	881
hmyy	H	appearance	N	2875	hmui	look, appearance	N	826.1	749a
hmyy	H	look	N	2893	mui	figure, look, appearance	N	844	766
hmyy sang	HH	appearance	N	2876	hmui sang	appearance, face	N	827	749b
hmyy syy	LH	to be serious	IV	3745	hmui sui	really	ADV	1671	a139
					hna khii	snot, mucus	N	1004	906b
hna khuu	HO	nose (lit. sinus hole)	N	3054	hna khau	nose	N	997.1	899c
					hna ruu	rib (bone)	N	1531	a015
					hna ung	nose	N	997	899b
hnaa	O	to sulk, to be upset	IV	2982	nua	to sulk, to be upset	IV	928	839
hnah	H	ribs, flank	N	2971	hnah	side, ribs	N	918	829
hnang	O	to stink	IV	2978	hnang	to smell (bad/good)	IV	924	835

hnang	H	to kiss	TV	3047	hnang	to kiss	TV	991	894
hnang	H	to smell, to sniff	TV	3059	hnang	to smell	TV	1002	904
hnau	H	sinuses	N	3052	hnoo	sinuses	N	996	899a
hnau	H	snot, mucus	N	3061	hnoo	snot, mucus	N	1003.1	905a
hnau hnah	HO	to disturb, to obstruct	VC	3055	hnaa hnoh	to disturb, to obstruct	VC	998	900
hnee	O	pus	N	3056	hnee	pus, sap	N	999	901
					hneh	to urge, to force, to stimulate	TV	1008	910
					hnia tshai	to lean on	TV	1013	915
hning	O	to be in the back, rear (of)	TV	2933	hning	back, rear	N	883	802b
hning khaa	OH	to be behind	VC	2934	hning khaa	to be behind	VC	884	802c
hning tseng	HO	to be last	TV	2935					802d
hnii	H	to blow (your nose)	TV	3038	hnii	to blow (your nose)	TV	982	885
hnii	H	to know	TV	3633	hnii	to know	TV	1557	a040
					hnoh	to mop, to wipe, to clean (imperative)	TV	908.1	819b
					hnong	trash	N	1753	a221
hnuu	H	to wipe	TV	2961	hnau	to mop, to wipe, to clean	TV	908	819a
hnyy	O	to smile, to laugh	IV	2979	hnui	to smile, to laugh	IV	925	836
hnyy	H	to have, to own, to possess	TV	2966	hnui	to own, to have, to possess	TV	913	824
hnyy	H	to have	TV	3000	hnui	to have	TV	946	856
					hoh	to sing (as a barking deer)	IV	776	699
hong	O	cover, wrapper, peel	N	2821	hong	cover, wrapper, peel	N	775	698
hong	O	to open	TV	2572	hong	to open	TV	547	496

					hong sang	to be slow	IV	1695	a163
					hoo	to gather (something that has been dropped)	TV	1555	a038
høø	H	to demand	TV	2833	høø	to set a price for	TV	787	710
hra tøø	OH	stairs	N	3765					a159
hrah	H	also	PART	3796					a189
hrah	O	to awaken	IV	3573	hrah	to wake up	IV	1497	1340a
hrah	O	to be sharp	IV	3266					1077
hrah	O	to be sharp	IV	3289					1097
hrah	O	to be sharp, or pointed	IV	3291					1099
hrang	O	to be angry, to be grumpy, to be savage	IV	3293	hrang	to be wild, to be frantic, to be angry	IV	1226	1101
hrang	O	base, root	N	3542	hrang	base, root	N	1468	1315b
hree	H	to work (do some kind of work)	TV	3091	hree	to work	TV	1033	931a
hree	H	to work	TV	3159	hree	to work	TV	1095	984b
					hree	to play with	IV	1652	a123a
					hreh	to make do work	TV	1033.1	931b
hreng	O	to detain, to tie	TV	3269	hrai	to detain, to tie	TV	1203	1079a
hreng	O	to punish	TV	3285	hrai	to torture	TV	1218	1093
hrie tshøø	OL	to crack	TV	3527	hria tshøø	to split, to crack	TV	1453	1302
hrih	O	louse, lice	N	3280	hrih	lice	N	1213	1088
					hrii	together, simultaneously	ADV	1595	a074
hring	O	to be alive, to live, to be green	IV	3277	hring	to be green, to be alive, to live	IV	1210	1085

					hring	to bear, give birth	TV	1197	1074
hring hring	HH	really	ADV	3286	hring hring	really	ADV	1219	1094
hring zie	HH	behavior, trait	N	2985	hring zia	behavior	N	931	842
					hroh	to eat (porridge)	TV	1206.1	1081b
hrong	O	to share	IV	3271	hrong	to have something shared with you	IV	1205	1080
hrong	O	to follow (a path)	TV	3274	hrong	to follow, go along (a river)	TV	1208	1083a
					hrong	neck, collar, throat	N	1015	916b
hrøø	O	to argue	TV	3759	hrøø	to argue	IV	1685	a153
hruh	O	to be stupid, to be crazy	IV	3103	hruu/hruh	to be foolish	IV	1044	940
hruu	H	to wear, to put clothes on	IV	3141	hrau	to put on clothes, to sheathe	IV	1079	971a
hruu	H	to wear	IV	3723	hrau	to wear	IV	1650	a121
hruu	H	to eat (with a spoon)	TV	3272	hrau	to eat (porridge)	TV	1206	1081a
hruu	H	to insert	TV	3278	hrau	to insert, poke	TV	1211	1086
					hruu/hruh	to be stupid	IV	1585	a064
hryy	O	to lead, guide	TV	3279	hrui	to lead, guide	TV	1212	1087
					hua	to hate	TV	796	719
huu	O	to be lustful	IV	2847	hau	to be horny, to be lustful	IV	799	722
hyy	H	to look for	TV	2850	hui	to look for, to search for	TV	802	725
hyy	H	friend (used by older speakers)	N	2839	hui	friend	N	792.1	716a

hyy kong vee sau	OOHH	friend	N	2841	hui kong vee soo	friend	N	793.1	716c
hyy vee sau	OHH	friend	N	2840	hui vee soo	friend	N	793	716b
ih	O	step- (father or mother)	PART	2586	ee	step- (father or mother)	PART	559	508
ih	O	to sleep, to lie down	IV	2579	ii	to sleep, to lie down	IV	553	502a
ih hning	LH	to fall asleep	IV	3070	ii hning	to fall asleep	IV	1012	914
ih ih	HH	to poop (a poop)	VC	2556	eh eh	dung, stool, to defecate	VC	531	483a
ii	H	to argue	IV	2533	ei	to argue, to challenge	TV	508	464a
ing	H	house	N	2568	ing	house	N	543	492
ing	O	to tolerate	TV	2555	ing	to endure	TV	530	482
ing dong	HO	household	NC	2101	dong	household (counter)	NC	98	89a
ing hmee	HO	front yard	N	3020	ing hmee	front yard	N	964	873b
ing kau	HH	door	N	2315	ing koo	door	N	302	273
ing tshung	HO	interior	N	2686	ing tshung	interior	N	652	590b
ing tshung khuu	HOH	family	N	3600	ing tshung khau	family	N	1524	a008
~~ii~~ khung	HH	bed	N	2486	ii khung	bed	N	462	422
~~ii~~ sah	OO	to let sleep, to let lie down	TV	2580	ii sah	to let lie down	TV	553.1	502b
ka maa	OH	I/me/my (emphatic)	PRO	2340	ka maa	I/me/my (emphatic)	PRO	326	295
					ka tseh	north	N	657	593b
kaa kaa lee	OOO	between	PP	2298	kaa kaa lee	between	PP	286	259
					kah	to crack	IV	289	261b
kang	O	to promise	IV	2364	kang	to swear, promise	IV	349	316

kang	H	bank, shore, flank, side	N	2293	kang	bank, shore, flank, side	N	281	255a
kang	H	to burn	TV	2299	kang	to burn	TV	287	260
kau	H	mouth	N	2320	koo	mouth, entrance	N	307	278a
kau	H	to shoot	TV	2356	koo	to shoot	TV	341	309
kau dah	OO	to be a blabbermouth	VC	2320.1					278b
kau kau	HO	to return	IV	2353	pa koo	to return	TV	338	306
kee	O	to climb up, ascend	TV	2290	kee	to climb up, to ascend	IV	278	252
					kee	to squint	IV	344	312
kee tshøø	LH	to ascend	IV	2701	kee tshøø	ascent, upward slope	N	667	601
					keh	to burst	IV	288	261a
					keh	to be split	IV	297	269
kei	H	to be next to	TV	2285	kee	to be near, to be beside	TV	273	248
kei kang	HO	surroundings	N	2294	kei kang	vicinity	N	282	255b
keng	H	back, rear	N	3672	kai	(upper) back	N	1598	a077
kha d~~ii~~	OH	drool	N	2090	kha dii	drool	IV	87	78
kha pyy	OH	more developed village	N	2139	kha pui	more developed village	N	135	120b
kha tii	LH	to be from a less developed village	IV	3673					a078
khaa	H	to close	TV	2494	khaa	to close, to be closed	TV	470	429
khah	H	mucus	N	2523	khah	mucus	N	498	454
khah	H	handspan	NC	2358	khah	span of a hand	NC	343	311
					khah	throw it	VIMP	478.1	436b
					khai	to shine	IV	1723	a191

khang	O	to protect	TV	2509	khang	to prohibit, to be prohibited	TV	484	442a
khang	O	to plan	TV	3743	khang	to plan	TV	1669	a138a
khau	O	to scratch	TV	2354	khoo	to scratch	TV	339	307
					khau	to throw (something sharp)	TV	478	436
khee	H	to chew	TV	3539	khee	to chew	TV	1465	1313
khei	H	to be frozen	IV	2511	khee	to be frozen	IV	486	443a
kheng	H	to hammer	TV	2516	khai	to hammer, hit with tool	TV	491	447
kheng	H	to hit (a target)	TV	2518	khai	to hit (a target)	TV	493	449
					khia	to break	TV	1742	a210
khie	O	to go out	IV	3784	?			1709	a177
khih	O	to be bitter	IV	2490	kheh	to be bitter	IV	466	425
khii	H	to take the outside off	TV	2521	khei	to peel off	TV	496	452
khing	H	to be equal	IV	3624	khing	to be equal	IV	1548	a032
khing	O	to put on the stove	TV	2507	khing	to put on	TV	482	440
~~khii~~	H	to tie, to bind	TV	2489	khii	to tie, to bind	TV	465	424
~~khii~~	H	chin, jaw	N	2020					18
khong	O	to crow (as a rooster)	IV	2502	khong	to crow (as a rooster)	IV	477	435
khong	H	drum (specific type)	N	2506	khong	drum (specific type)	N	481	439
khong thlah	HO	to take off of	TV	2520					451
khøø	H	to dig through with hands	TV	2531	khøø	to dig with hands	TV	506	462
khøø	O	to be able	PART	2492	khøø	to be able	IV	468	427
khøø bih	HO	grasshopper	N	2514	khee bah	grasshopper	N	489	445
khua khang	LH	to plan	VC	3743.1	khua khang	to plan	VC	1670	a138b

khua suu	OO	to rain	VC	3661	khua	rain	N	1587	a066
khuh	O	knee	N	2343	khuh	knee	N	329	298
					khui ngoo	hornet	N	949	859a
khung	H	to lock (something in)	TV	2484	khung	to lock (something in)	TV	460	420
khung seng	HO	to continue, to proceed, to skip	TV	3683	khung sai	to pass by	TV	1608	a086a
khuo	H	village, atmosphere, weather	N	2497	khua	village, atmosphere, weather, cosmos	N	473	432a
khuo tseng	HH	time, season	N	2640	khua tsai	time	N	606.2	551c
khuo tsheng	HO	visitor (from a different place)	N	2515	khua tshai	visitor	N	490	446
khuu	H	hole	N	2505	khau	hole in the ground	N	480	438
khuu aa dyy	OOO	day breaks	VC	2107	khua dui	daybreak	VC	104	94
kh~~uu~~	H	steam, smoke	N	2513	khuu	steam, smoke	N	488	444
kh~~uu~~	H	to cover	TV	2500	khuu	to cover	TV	476	434a
kh~~uu~~ kh~~uu~~	HH	to cough	VC	2499	khuu khuu	to cough, cough	VC	475	433
khyy	H	to break	TV	2313	khui	to break	TV	300.1	271b
khyy hl~~ii~~	OO	boil	N	3794					a187
khyy hl~~uu~~	HO	Indian Gooseberry	N	3601	khuu hluu	Indian gooseberry	N	1525	a009
khyy pyy	OH	hornet	N	3004					859b
khyy vau	OH	honeybee	N	3349	khui voo	honey bee	N	1282	1153
					kia	to be fried	IV	314.1	284b
kie	O	to fry	TV	2327	kia	to fry (with oil)	TV	314	284a
kih	O	hand	N	2331	kih	hand	N	317	287
kih khøø	OH	elbow	N	2318					276
kih pa ting	HHH	fingernail	N	2240	kih pa ting	nail, claw	N	233	211a
kih tung	OH	fist	N	2324	kih tung	fist	N	311	281

					kii tung	to clench	TV	204	186
king	H	to curl	IV	2310	king	to curl	IV	298	270a
king veng	LO	to take care of, to watch out for	TV	3345	king vai	to take care of, look after	TV	1278	1149c
~~kii~~	H	corner	N	2288	kii	angle, corner, horn, side	N	276	251a
~~kii~~	H	horn	N	2336	kii	horn	N	322	291
kong	H	to be bald	IV	2292	kong	to be bald, to be barren (land)	IV	280	254
kong	O	story, about	N	2362	kong	story, about	N	347	314
kong	O	box	N	2367	kong	box	N	352	319
kong	O	to associate with	TV	2321	kong	to associate with	TV	308	279a
køø	O	to open	TV	2372	køø	to be wide, open	IV	357	324
kua	H	to send	TV	3756	kua	to send	TV	1682	a150
kun jaa	HO	betel nut (mixture)	N	3594	kun jaa	betel nut (mixture)	N	1518	a002
kung	H	age, year	N	2286	kung	age, year	N	274	249
kung	H	stalk/stem (of tree/plant)	N	2360	kung	stem, stalk	N	345	313a
kung hlung	HH	hammer	N	3632	khung lung	hammer	N	1556	a039
					kung sah	to let pass	TV	1608.1	a086b
kuo	H	hole, burrow, cavity	N	2333	kua	den for animals, hole burrow, cavity	N	319	289a
kuu	O	to be skinny	IV	3783					a176
					kuu sih	winter	N	763	687c
~~kuu~~	H	to be hunchbacked	IV	2338	kuu	to be hunchbacked	IV	324	293
kyy	H	to be curved, cracked, to burst	IV	2312	kui	to be curved or cracked	IV	300	271a

la hmee	HO	single mother family, widow	N	3034	la hmee	single parent family	N	978	882e
la hmee	OH	tail	N	2922	la hmee	tail	N	872	794
la hmee nuu	OHH	widow	N	3032	nuh hmee	widow	N	976	882c
					la kong	loin, waist, bottom area, buttock	N	331	300a
la rong	HH	cotton	N	3183	la rang	cotton	N	1118	1004
lah	O	to snatch away, get	TV	3241	lah	to take	TV	1176	1056a
lah	O	vomit	N	3251	loh	vomit	N	1185	1063b
lah	O	to pick up, to get	TV	3732	lua	to pick up, to rake	TV	1659	a129a
lah pa hrau	OHH	to take quickly	TV	3242	lah pa hroo	to take quickly	TV	1177	1056b
lah thlih	OO	brain	N	3500	leh thlii	brain	N	1427	1279
					lai	to stay overnight	TV	1065	958b
					lai phung	to be addictive to (someone)	TV	1588	a067
lang	H	to appear, to be visible	IV	3163	lang	to appear, to be visible	IV	1099	988
lang	O	to dance	IV	3186	lang	to dance	IV	1121	1007
lang	H	to swallow	IV	3240	lang	to swallow, to gulp	TV	1175	1055
lang	H	road	N	3255	lang	road, way, path	N	1189	1067
lang	O	arm span	NC	3259	lang	yard, arm span	NC	1193	1071
lang	H	direction, towards, locative (to)	PP	3189	lang	direction, towards, locative (to)	PP	1124	1010
					lang	to go and come back before night	IV	1181	1060
lang aa	OH	crow	N	3762					a156
lang thyy lang	HHL	lower, down, south	PP	3729	thui lang	lower, down, south	N	1655	a125b

lau	O	to pick up (imperative), to get	VIMP	3733	lau	to pick (fruit)	TV	1659.1	a129b
lau	O	to snatch away	VIMP	3243	loo	to take	VIMP	1177.1	1056c
lee	O	and, with	CONJ	3162	lee	and, with, between, amid among, while	CONJ	1098	987a
lee	H	middle	N	3177	lee	center, middle	N	1112	1000a
lee tah	OO	(locative marker)	PP	3713	lee tah	locative (at)	PP	1640	a112
					leh	to renege, to change (mind)	IV	1163	1043a
leh suu	LH	to vomit	TV	3250	leh sau	to vomit	IV	1184	1063a
leng	H	to be large	IV	3168	lai	to be large	IV	1103	992a
leng	O	to stay overnight	IV	3124	lai	to stay overnight	IV	1064	958a
leng	O	to flow (as water)	IV	3203	lai	to flow (as water)	IV	1138	1020
leng	O	shoulder	N	3234	lai	shoulder	N	1169	1049
leng	O	to crawl	IV	3184					1005
leng	O	to persuade	TV	3164					989a
leng	H	cart	N	3175	lai	cart	N	1110	998
leng pa song	OOO	to entice	TV	2771	lai pa song	to entice	TV	728	656b
leng pa søø	OOO	to persuade	TV	3165	lai pa song	to persuade, to entice	TV	1100	989b
leng pau	HH	big one	N	3169	lai poo	to be large	IV	1104	992b
leng sau	OH	unmarried woman	N	3201	lai soo	unmarried woman	N	1136	1018
lie	O	to lay down	IV	3635	lia	to lay down	IV	1559	a042
lie	H	to lick	TV	3213	lia	to lick	TV	1149	1030
lih hie	OH	pillow	N	2524	la hia	pillow	N	499	455
lii	H	anus, bottom, rear end	N	2346	lei	backside (buttocks)	N	332	300b
					lii	bow (for arrows)	N	1106	994

lii lee l~~uu~~	HHO	upside down (lit. bottom and head)	ADV	3248	lei lee luu	upside down	ADV	1182	1061
lii tung	OH	buttock	N	2347	lei tung	buttocks	N	332.1	300c
ling	O	to roll (something up)	TV	3232	ling	to roll (something up)	TV	1167	1047
ling	H	to slip (on accident)	IV	3689					a092
long	H	to be vacant	IV	3194	long	to be empty, to be vacant	IV	1129	1014a
long	H	to celebrate	IV	3176	long	to celebrate, to be happy, to rejoice	TV	1111	999
long	H	only, alone	PART	3219	long	to be only, to be alone	IV	1155	1036
					long	to be wide (as an opening)	IV	1130	1014b
løø	H	to disappear	IV	3190	løø	to disappear, to be lost, to lose	IV	1125	1011a
løø	H	farm	N	3199	løø	field, farm	N	1134	1017a
					løø thlau nau	farmer (female)	N	1135.2	1017d
					løø thlau poo	farmer (male)	N	1135.1	1017c
løø thluu t~~uu~~	HHH	farmer	N	3200	løø thlau	farmer	N	1135	1017b
					lua	to gather (trash)	TV	1758	a226
lung	H	rock	N	3239	a lung	rock	N	1174	1054
lung	O	heart, liver	N	3208	lung	heart, liver	N	1143	1025
					lung	to be warm, to be hot	IV	1187	1065
					lung kua	cave	N	320	289b
lung pa lih	OOH	to change one's mind	VC	3228					1043b

lung th~~uu~~	HH	hearthstone	N	2449	lung thuu	fireplace	N	428.1	389b
lung tleng	OO	to understand	VC	3691	lung tlai	to understand	VC	1618	a094
luu	H	to pick (as fruit or flowers)	TV	3221	lau	to pick (fruit)	TV	1157	1038
luu	H	to resemble (a person)	TV	3229	lau	to resemble	TV	1164	1044
l~~uu~~	O	head	N	3207	luu	head	N	1142	1024
l~~uu~~ kong	OH	to be bald	VC	3682	luu kong	to be bald	VC	1607	a085
lyy	O	earth, dirt	N	3193	a lui	earth	N	1128	1013
lyy	H	tongue	N	3245	lui	tongue	N	1179	1058
lyy bah	OH	debt	N	3187	lui baa	debt	N	1122	1008
lyy ma ts~~ii~~	~	dust	N	~					a200
lyy thlang	OO	to pour out (liquid)	TV	3640	lui thlang	to pour out (liquid)	TV	1566	a047b
lyy tsang	HO	squirrel	N	2476	lui tsang	squirrel	N	452	413
ma hing nuu	OOH	liar (female)	N	3602.1	ma hing nau	liar (female)	N	1526.1	a010b
ma hing pau	OOH	liar (male)	N	3602	ma hing poo	liar (male)	N	1526	a010a
ma thlau	OH	wing, feather	N	3535	ma thloo	wing	N	1461	1309
ma thleng	OO	sweat	N	3529	ma thlai	sweat	N	1455	1304
ma thl~~ii~~	OO	tears	N	3532	ma thlii	tears	N	1458	1306
ma thøø	HH	fly, maggot	N	2443	ma thøø	fly, maggot	N	423	386
ma tsang	HO	to be elderly	IV	2603	ma tsang	to be elderly	IV	575.1	522b
maa	H	polar interrogative	PART	2901	moo	interrogative particle	PART	851	773
maa maa	HH	rice (cooked)	N	3664					a069
mah	O	to be rare	IV	2925	mah	to be unusual	IV	875	797
mang	H	dream	N	2890	mang	dream	N	841	763
mau	O	to rot, to decay	IV	2911	hmai	to rot, to decay	IV	861	783

mee	H	fire	N	2894	mee	fire	N	845	767
mee ding	OH	cloud, fog	N	2885					758
mee hii	HH	charcoal	N	2826	mee hei	charcoal	N	780	703
mee hii	HH	charcoal	N	2884	mee hei	charcoal	N	835	757
mee kh~~uu~~	HO	smoke, ash	N	2917	mee khuu	smoke	N	867	789
mee mong	HO	pumpkin	N	2909	mee mong	pumpkin	N	859	781
mee sau kung	HOH	pine, fir tree	N	2361	mee soo kung	pine, fir tree	N	346	313b
mei mei	HH	breast, udder	N	3721	mei mei	breast, udder	N	1648	a119
meng	O	to be yellow	IV	3714	mai	to be yellow	IV	1641	a113
meng	H	cost, price	N	2886	mai	cost, price	N	837	759
mie	O	to pinch and twist	TV	2924	mia	pinch, twist, squeeze	TV	874	796
mih	O	eye	N	2892	meh	eye	N	843	765
					mih	to go out (light), to become extinct	IV	846	768a
mih k~~uu~~	OO	to be sleepy	VC	2357	mei kuu	to be sleepy	VC	342	310
mih phie	OO	twins	N	2417	ma phia	twins	N	399	363b
mih r~~uu~~	OO	thief	N	3151	mih ruu	thief	N	1088.1	978c
mih tsuu	OH	to be blind	VC	2604	tsau	to be blind	IV	576	523
mih vang	OH	to blink	VC	2896					768b
mii	O	to be dull, blunt	IV	2908	mei	to be dull, to be blunt	IV	858	780
mii	H	goat	N	2897	mei	goat	N	847	769
mii tii	HH	peach	N	2906					778
ming	O	name	N	2904	ming	name	N	854	776
ming	O	to look at	TV	3636	ming	to look at	TV	1560	a043a
					ming	person	N	857	779
ming kheng	HO	to take care of	TV	3693	ming khai	to take care of	TV	1620	a096

mɨɨ hring pau	HHH	other people, somebody else	N	3671	ming hring poo	other people, somebody else	N	1597	a076
mɨɨ phing	HH	race, tribe, nation	N	2396	ming phing	race, tribe, nation	N	379	344b
mong	O	morning	N	3715	mong	(early) morning	N	1642	a114a
mong hløø	HO	to forget	TV	3191	mong hløø	to forget	TV	1126	1011b
mong khong	OH	trap (falling log)	N	2923	mang khong	trap (falling log)	N	873	795
mong ta rɨɨ	OOH	morning	N	3716					a114b
					mui	to rub	TV	1001	903
muu tshie	HO	to blame	TV	2879					752
myy	H	to be dark	IV	2905	mui	to be night, to be dark	IV	855	777
myy	H	to be dark	IV	2888					761
na maa	OH	you (emphatic)	PRO	2989	na maa	you (emphatic)	PRO	935	845b
naa	O	you	PRO	2988	na	you	PRO	934	845a
naa zɨɨ	OO	clock, o'clock	N	3597	naa zii	clock, o'clock	N	1521	a005
nah	O	to hide (one's self)	IV	3705	noh	to hide	IV	1632	a106a
					nah nah	the way that	PHR	1754	a222
nang	H	to push, to compress	TV	2970	nang	to push, to compress, to press, to massage	TV	917	828
nau	O	ear	N	2952	hnoo tsa kau	ear	N	899	812
nau	H	to beg	TV	2990	noo	to plead for, to request	TV	936	846
nau nɨɨ	HO	Sunday	N	3776					
nee	H	to be close, to be near	IV	2965	nee	to be close, to be near	IV	912	823

nee	H	to approach	TV	2927	nee	to approach	TV	877	799
nei	O	to enter	IV	3684	nei	to enter	IV	1609	a087
neng	H	to be short, to be lower than	IV	2974	nai	to be short	IV	921	832
neng	O	to be soft	IV	2981	nai	to be soft	IV	927	838
ngang	H	to dare	TV	2993	ngang	to dare	TV	939	849
ngau	H	to lack common sense	IV	2995	ngoo	to lack common sense, to make a dumb mistake	IV	941	851a
ngau	H	fish	N	2997	ngoo	fish	N	943	853
ngau th~~uu~~	HO	someone who lacks common sense	N	2995.1	ngoo thuu	to lack common sense	IV	941.1	851b
ngee	O	to listen to	TV	3005	ngee	to listen to, to be obedient to	TV	950	860
ngee d~~ii~~	HO	thatch	N	2127	ngee dii	thatch	N	123	111
ngee d~~ii~~	HO	thatch	N	3015	ngee dii	thatch	N	960	870
ngee lang	OO	shank, calf	N	3011	ngee lang	shin	N	956	866
ngee pa tsh~~ii~~	LOO	to regret	TV	2696	ngee pa tshih	to regret	TV	662	596
					ngei	wild boar	N	937	847
					ngei	to put down	TV	1756	a224
ngeng	H	flesh	N	3685	ngai	flesh	N	1610	a088
ngeng d~~ii~~	HH	to be hungry	VC	3699	ngai dii	to be hungry	VC	1626	a100
ngeng sau	HH	flesh	N	2806	ngai soo	body	N	760	686c
					ngia	to observe	TV	1755	a223
ngie tii	HH	very	ADV	3670					a075
ngii	O	to balance	IV	3793	?			1718	a186
ngøø	O	to be light-skinned	IV	2996	ngøø	to have light/fair skin	IV	942	852

ngøø	H	to cut	TV	3735	sang ngøø	to get a haircut	TV	1661	a131
ngung	H	silver	N	3012	ngung	silver	N	957	867
nih	H	to be easy	IV	3712	neh	to be easy	IV	1639	a111
					nih hlau	day's wages	N	1253.1	1127b
ning	H	to bother	TV	2950					811a
					ning tshua	sunrise	N	641	581c
ning zau	HH	shame, shyness, rudeness	N	2928	ning zoo	shame	N	878	800a
ning zih	HO	to be shy	VC	2929	ning zeh	to be shy	VC	879	800b
nii	O	day, sun	N	2948	ning	day, sun	N	896	809
nii hning nii	OHO	Tuesday	N	3771					a165
nii kha nii	OOO	Monday	N	3770					a164
nii khuo	OO	atmosphere	N	2498	ning khua	village, atmosphere, weather, cosmos	N	474	432b
nii nii	OH	aunt (father's sister)	N	2931	ning ning	aunt (father's sister)	N	881	801b
nii nuu	OH	aunt (father's sister)	N	2930	ning nau	aunt (father's sister)	N	880	801a
nii pa lii nii	OOOO	Thursday	N	3773					a167
nii pa ngau nii	OOOO	Friday	N	3774					a168
nii thau nii	OOO	Wednesday	N	3772					a166
nii tlah	OO	west	N	3613	nii tlah	west	N	1537	a021
nii tshyo	OH	sunrise, east	N	2675	nii tshua	sunrise	N	642	581d
nii tshyo	OH	east	N	3598	nii tshua	east	N	1522	a006
nong	H	to be happy	IV	2945	nong	to be happy, to have fun, to entertain		894	807a
nong	H	to dip	TV	3042	nong	to dip	TV	986	889
nong	O	to murder	TV	2964	nong	to murder, to kill	TV	911	822
nong sah	OO	to make happy	?	2946	nong sah	to make happy	TV	894.1	807b

					noo	buffalo (water buffalo)	N	886	804
nøø	H	to be soft	IV	2984	nøø	to be young, to be soft	IV	930	841
					nøø	child, infant, young	N	888	806a
nøø hih	LH	to be young, to be a child	IV	2941	nøø heh	child, children	N	890	806c
nøø hih tii nuu	OOHH	child (female)	N	2943	nøø høø nau	child (female)	N	892	806f
nøø hih tii pau	OOHH	child (male)	N	2942	nøø høø poo	child (male)	N	891	806d
nøø ing	OH	womb	N	2944	nøø ing	womb (lit. baby house)		893	806h
nøø tii nuu	OHH	child (female)	N	2943.1					806g
nøø tii pau	OHH	child (male)	N	2942.1					806e
nuh ih	OO	step mother	N	2588	nuh ee	step mother	N	561	508b
nuu	H	mother	N	2962	nau	mother	N	909	820
nuu	O	to hide (something)	TV	3706	nau	to hide	TV	1633	a106b
nuu nuu	HH	grandmother	N	2955	me nau	grandmother	N	902	814b
nuu nuu	OH	doll	N	2956					814c
nyo	O	to headbutt	TV	2938					805
					oh	to be caught with a trap	IV	568.1	515b
					ong kua	hole, opening	N	542	491
øø	H	to call	TV	2578	øø	to shout, to scream, to call out	IV	552	501
pa b~~ii~~	OO	to fold	TV	2030					28
pa buu	OO	to squint	TV	3760					a154

pa dau	HO	to stand something up	TV	2215	pa doo	to stand something up	TV	210	192a
pa dee	HO	to quiet	TV	2074	pa dee	to quiet	TV	72.1	66b
pa d~~ii~~	HO	to make end	TV	2076.1					67b
pa ei	HO	to salt	TV	2577	pa ei	to salt	TV	551.1	500b
pa eng	OO	to roast	TV	2566	pa ai	to heat, dry	TV	541	490b
pa hlah	HO	to mix	TV	2852	pa hloh	to mix	TV	804	727
pa hlau	OO	to distance	TV	3678	pa hloo	to distance	TV	1602	a081
pa hlong	HO	to wrap	TV	3322	pa hlong	to wrap, cover	TV	1255	1129
pa hlong	OO	to gather, to marry	TV	3630					a037
pa hløø	HO	to be startled	IV	3160	pa hløø	to be alarmed, startled	IV	1096	985
					pa hmee	widower	N	975	882b
					pa hmee	single father family	N	977	882d
					pa hmoo	to wound	TV	980	883b
					pa hmuu	eagle	N	849	771
pa hnaa	OO	to snore	IV	3060	pa hnaa	to snore	IV	1003	905
pa hnei	HO	to be slippery	IV	2975	pa hneh	to be slippery	IV	922	833a
pa hnei sah	OOL	to make slippery	TV	2976	pa hneh sah	to make slippery	IV	922.1	833b
pa hneng	HO	to comfort, to console	TV	3040	pa hnai	to comfort, to console	TV	984	887
					pa hnoh	to be muddy, to make muddy	IV	910	821
					pa hrah	to wake up	TV	1498	1340b
					pa huu	to simmer	TV	823.1	745b
pa ih	HO	step father	N	2587	pa ee	step father	N	560	508a
pa kang	OO	to roast (on a fire)	TV	2291	pa kang	to roast (on a fire)	TV	279	253

pa keng	HO	to keep	TV	2304	kai	to hold onto	TV	292	264
					pa khai	to shine	TV	1724	a192
pa khang	OO	to block	TV	2510	pa khang	to block, to prohibit	TV	485	442b
pa kheh kheh	HOH	someone (non-specific)	N	3612	pa kheh kheh	someone (non-specific)	N	1536	a020
pa khei	HO	to freeze	TV	2512	pa khee	to freeze	TV	487	443b
pa khong	HO	to collect	TV	2485	pa khong	to gather, to injure	TV	461	421
pa khong	HO	to collect	TV	2495	pa khong	to save, to gather	TV	471	430
					pa kii	to fold	TV	277	251b
pa king	HO	to curl	TV	2311	pa king	to curl (as hair)	TV	299	270b
pa kong	OO	to pair	TV	2350	pa kong	pair/couple	N	335	303
pa kong	OO	to stick together, to put together	TV	2322	pa kong	to join together	TV	309	279b
pa la pa lah	OOOO	quickly	ADV	3437	tsa tlei	to be quick	IV	1368	1229
pa lang	HO	to continue	TV	3226					1042
					pa lee	navel	N	1113	1000b
pa leng	HO	to brag, to show off	IV	3198	pa lai	to show off, to brag, to be egotistical	IV	1133	1016b
pa leng	HO	to stay overnight	IV	3126					958c
pa lih	HO	to flip over, to translate, to respond	TV	3246	pa leh	to flip over, to translate, to respond	IV	1180	1059
pa lih	HO	to turn inside out, to turn over	TV	3185					1006
pa ling	HO	to be hot, to have a fever, to heat	IV	3209	pa ling	to be hot, to have a fever	IV	1144	1026
pa ling	OO	to be done (with)	IV	3462	pa ling	to finish	TV	1391	1249b
pa ling	OO	to be done with	IV	3738	pa ling	to be done with	TV	1664	a134
pa long	HO	to transfer	TV	3468	pa long	to move, to transfer	TV	1397	1253b

					pa ning	to distain, to be sick of, to be annoyed with	IV	898	811b
					pa ong	to confine	TV	517	471
					pa pia	to make a mess	TV	1725	a193
pa pung	OO	to make round	TV	2033	pa pung	to collect into a circle	TV	33	30b
					pa raa thlee	fish trap	N	1625	a099b
pa rii	HO	snake	N	3146	pa rii	snake	N	1084	975
pa røø	HO	to dry	TV	3095	pa røø	to dry (as in clothes)	TV	1037	933b
					pa sau	to feed	TV	685	616
pa sei	HH	husband	N	2767	pa see	husband	N	724	654a
pa sei pau	HHH	husband	N	2768	pa see poo	husband	N	725	654b
pa sih	OO	to heat, to boil	TV	2750	pa seh	to heat, to boil	TV	710	640
pa sih	OO	to make hot	TV	2765	pa seh	to make hot	TV	723.2	653c
pa sih	HO	to hate	TV	3276	pa sih	to hate	TV	1209	1084
pa sih sah	OLO	to make someone warm something up	TV	2766	pa seh sah	to make someone heat something up	TV	723.3	653d
pa sing	OO	to be clear	IV	2721	pa sing	to be be clear, to be transparent	IV	683.2	614c
pa søø	OO	to make long	TV	2778	pa søø	to make long	TV	733.2	661c
pa sung	HH	stick	N	2739	ba sung	stick	N	700	630
pa suu	HO	sugarcane	N	2742	ba suu	sugar cane	N	703	633
pa suu	HO	to clench	TV	2762	pa suu	to grasp	TV	722	652
pa suu	HO	to clench	TV	2828	pa suu	to clench	TV	782	705
pa theng	OO	to clean	TV	2435	pa thai	to clean (to be clean)	TV	415	379
					pa thlai	to make change	TV	1430	1281c

pa thlee	OO	to hang	TV	3513	pa thlee	to hang	TV	1439	1289b
pa thling	OO	to soothe (a baby)	TV	3752	pa thling	to soothe (a baby)	TV	1678	a146
pa thlung	OO	to make more sweet	TV	3531.1					1305c
pa thluu	OO	to toss and catch	TV	3466	pa thlau	to lift up, to shake	TV	1395	1252b
pa thluu	HO	to jump	IV	3679					a082
pa thong	HL	to move	TV	2251	pa thong	to move over	TV	243.1	220b
pa thuu	HO	to start, to wake up	TV	2478	pa thoh	to start	TV	454	414b
pa tih	OO	to taste	TV	2270	pa teh	to taste	TV	259	236
pa tlah	HO	to make a mess	TV	3766	pa tlah	to mix	TV	1692	a160
pa tlang	OO	to line up	TV	3492	pa tlang	to line up	TV	1420	1272c
pa tlau	OO	to make smooth or shiny	TV	3495					1274b
					pa tloh	to boil	TV	1389	1248b
pa tong	OO	to bring together	TV	2255	pa tong	to fold	TV	246.1	223b
pa tong	OO	to make touch	TV	2275	pa tong	to make touch	TV	265	240b
pa tong sah	OLO	to make someone make meet	TV	2275.2					240d
pa tøø	OO	to seat	TV	2260	pa tøø	to seat	TV	250.1	227b
pa tsaa	OO	to dry, to cure	TV	2617	pa tsaa	to dry, to cure	TV	588	534b
					pa tseh	to grip, to clasp	TV	595	541
pa tshang	HO	to finish	TV	3627	pa tshang	to finish	TV	1551	a034b
pa tshang	HO	to complete	TV	2688	pa tshang	to complete	TV	654	591b
pa tshau	HO	to thicken	TV	2708					606b
pa tsheng	OO	to separate (lovers in a tragedy)	TV	3577	pa tshai	to separate	TV	1501	1342b
					pa tshih	to fill	TV	1552.1	a035b
pa tshii	HO	necklace	N	3583	pa tshii	necklace	N	1507	1348

pa tsih	HO	to cut into small pieces	TV	2624					540
					pa tsih	to close by pulling two things together	TV	581	528
pa tsing	HO	to stack	TV	3652					a057
					pa tsing	to be wet	IV	633	576a
					pa tsing sah	to wet	TV	634	576b
pa ts~~ii~~	HH	salt	N	2648	pa tsii	salt	N	614	559
pa tsong	OO	to decrease (trans)	TV	3545					1316b
					pa tsuh	to peck	TV	607	552
pa tyy	HO	to melt	TV	2236					208b
pa ung	HO	to hold in mouth	TV	2548	pa ung	to hold in mouth	TV	524	477b
pa vau	HH	bird	N	3327	pa voo	bird	N	1260	1134
pa vau b~~uu~~	OOH	bird's nest	N	2042	buu	nest	N	42	38
pa vong	OO	to blacken	TV	3329	pa vong	to blacken	TV	1262	135b
pa zah	HO	to reach for	TV	3643	pa zah	to reach for	TV	1569	a050
pa zang	HO	to spread	TV	3396	pa zang	to spread	TV	1327	1191
pa zang	HO	to stretch	TV	3448	pa zang	to stretch	TV	1378	1238
pa z~~ii~~	OO	cucumber	N	3398	pa zii	cucumber	N	1329	1193
pa zuu	OO	to be sharp	IV	3434	pa zau	to be pointed, sharp	IV	1365	1226a
pa zuu	HO	to suck on	TV	3434.1	pa zau	to suck on	TV	1365.1	1226b
pa z~~uu~~	HO	mouse	N	3427	pa zuu	mouse, rat	N	1358	1219
pa zyo	OO	to intensify, to worsen	TV	3416	zua	to intensify, to increase	IV	1347	1209
paa	H	to make a mistake	TV	3700	paa	to mistake, to make a mistake, to be at fault	TV	1627	a101

					paa	tip, edge, sprout	N	1674	a142
paa paa	HH	mushroom	N	2176	paa paa	mushroom	N	172	157
paa paa	HH	flower	N	2166	pang paa	flower	N	162	147
					pai	while	PART	183	168a
pang	H	to drown	IV	2159	pang	to drown, to be wasted	IV	155	140
pang	O	forehead	N	3708	pang	forehead, brow	N	1635	a107
pau	O	father	N	2164	poo	father	N	160	145
					pau	every, any	Q	130	118a
pau pau	HH	grandfather	N	2169	me poo	grandfather	N	165	150
pee	O	to wrestle	TV	2065	pee	to wrestle	TV	64	58
pei	H	to pass by	TV	2186					167
					pei	to exert, make effort, support, side with	IV	27	25a
peng	O	to immigrate, migrate	IV	2171	pai	to immigrate	IV	167	152
peng	O	blanket	N	2144	pai	blanket, cover	N	140	125
peng na ning aa	OLOL	while	PHR	2188					168b
phaa	O	rash	N	2404	phaa	to have leprosy	IV	386	351
phah	H	to arrive at	TV	2374	phah	to arrive	IV	359	326
phah	O	to be astringent, to be rough	IV	2375	pheh	to be astringent	IV	360	327
phau	O	to spread out (as a blanket)	TV	2409	phoo	to spread out	TV	391	356
					phau	to bring, to take	TV	1735	a203
phee	H	leg	N	2414	phee	leg	N	396	360
phee	H	to uproot	TV	2402	phee	to uproot	TV	385	350a
phee	H	to pull out	TV	3584	phee	to pull out	TV	1508	1349

phee	O	to be horizontal	IV	2394	phei	to be horizontal	IV	377	343a
					phee	to take out	TV	370	336
phee hn~~ii~~	HH	footprint	N	2969					827
phee pa ting	HHH	toenail	N	2241	phee pa ting	hoof, toenail	N	234	211b
phee thlah	HO	to uproot	TV	2403	phee thlah	to pull out entirely	TV	385.1	350b
phei	O	money, dollar	NC	2728	phei	money, dollar	NC	689	619
pheng	O	to be flat	IV	2394.1					343b
phie	O	mat	N	2399	a phia	mat	N	382	347
phie	H	to compose (as a song)	TV	2380	phua	to compose	TV	364	331
					phih	to sweep	VIMP	395	359b
phii	H	to slap	TV	2051	phei	to slap	TV	50	46
phing	H	clan, kind	N	2395	phing	clan, kind	N	378	344a
ph~~ii~~	H	to sprinkle	TV	2410	phii	to sprinkle	TV	392	357
ph~~ii~~	H	to sweep	TV	2412	phii	to sweep	TV	394	359
phøø	O	to be spread out	IV	2387	phøø	to be spread out	IV	371	337a
phøø	O	to spread out	TV	2388	phøø	to spread out	TV	371.1	337b
phung	O	to be buried	IV	2376	phung	to bury	TV	361	328a
phung	O	custom	N	2381	phung	custom	N	365	332a
					phung	to be buried	IV	361.1	328b
					phung	to erect	TV	369	335
phung lang	OH	custom	N	2382	phung lang	custom	N	366	332b
phuu	O	to be pregnant	TV	2154	pui	to be pregnant, to carry a baby	TV	150	135
					phuu hlang	to get revenge	TV	367	333

ph~~uu~~	O	to be worthy	IV	2423	phuu	to be deserving	IV	404	368
ph~~uu~~	H	group	N	2140	phuu	group	N	136	121
					pia	to be a troublemaker, to be a bully	IV	1545	a029
pie	H	to be dirty	IV	3620	pia	to be dirty	IV	1544	a028
pih	O	to explode	IV	2145	peh	to explode	IV	141	126
pii	H	to be attached	IV	2003	pei	to be attached	IV	3.1	2a
pii	H	to attach, to tie together	TV	2004	pei	to attach	TV	4	2b
pii	H	to join, connect, attach	TV	2155	pei	to connect, to join, to link	TV	151	136
					pii	to be born	IV	144	129
pii/pih	O	to give	TV	2167	peh	to give	TV	163	148
					ping	to end	IV	1734	a202
ping suh	HO	to be clumsy	VC	3778					a172
p~~ii~~	H	to peel	TV	2398	pii	to peel	TV	381	346
pong	O	carry (as a baby)	TV	2162	pong	to hold on lap, to carry closely	TV	158	143
pøø	H	noise	N	3777	pøø	noise	N	1703	a171
puh	H	to carry (on back)	TV	2149	puh	to carry (on back)	TV	145	130
puh	H	to carry (on back)	TV	2379	puh	to carry on your back	TV	363	330
pung	O	to be round	IV	2032	pung	to be round	IV	32	30a
pung	O	body	N	2147	pung	body	N	143	128
pung pa hlung	HHO	ball	N	2034	pung pa hlung	to be round	IV	34	30c
puu	H	to fall (as a tree)	IV	2163	pau	to fall over (as a tree)	IV	159	144
puu	H	belly	N	2142	pau	belly	N	138	123
puu	H	to dip	TV	2160					141

~~puu~~	H	to accuse	TV	2133	puu	to accuse	TV	129	117
pyy	H	(augmentative)	PART	2138	pui	(augmentative)	PART	134	120a
pyy mau	OO	to be serious	IV	2174	pui moo	to matter, to be serious	IV	170	155
ra au	HO	crow	N	2575	ra oo	crow	N	550	499
ra l~~ii~~	HO	ocean	N	3223	ra lii	ocean	N	1159	1039b
ra møø	OO	bamboo	N	2877	ra møø	bamboo	N	828	750
ra møø	OO	wild bamboo	N	3077	ra møø	wild bamboo	N	1019	919
ra røø	OO	intentionally poorly	ADV	3083	ra røø	to be intentionally poorly done	IV	1025	924b
					ra tshai	to hope for	TV	1586	a065
ra tyy	OO	edible bamboo	N	2199	ra tui	edible bamboo	N	194	177
rah	O	to break down	IV	3082	roh	to break down	IV	1024	924a
rah	O	corpse	N	3087	roh	corpse	N	1029	927
rang	O	to be white	IV	3566	rang	to be white	IV	1490	1334a
rang	H	horse	N	3112	rang	horse	N	1053	949
rang	O	grass, weeds	N	3105	rang	grass, weeds	N	1046	942
rang	O	country	N	3116	rang	land, country, forest	N	1057	953a
					rang pa hrih	forest	N	1058	953b
rang pau	OH	white one	N	3566.1					1334b
rang r~~ii~~	OH	border	N	3121	rang rii	border	N	1061	955b
rang tshung	OO	forest	N	3118	rang tshung	forest	N	1058.1	953c
rau	H	to scold, to shout at	TV	3144	roo	to scold	TV	1082	973
rau	H	to scold	TV	3687	roo	to scold	TV	1612	a090
rei	O	war	N	3099	rei	enemy	N	1041	937a

rei ring	OO	to be careful, to be ready, to expect	IV	3101	rei ring	to be ready, to expect	IV	1042	938
rei thyy	OH	to offer a sacrifice	VC	2464	ree thui	to offer a sacrifice	VC	441.1	402b
rei tshah	OO	to be brave	VC	3081	rei tshah	to be brave	VC	1023	923
reng	O	to be suitable	IV	3153	rai	to be suitable	IV	1090	980
reng	O	work	N	3158	rai	work, job	N	1094	984a
reng	O	to pour in	TV	3132	rai	to pour in	TV	1070	963
rie	O	hail	N	3109	ria	hail	N	1050	946
rie	O	to grind	TV	3107	ria	to grind, to crush, to gnash	TV	1048	944
rih	O	to stay overnight at a farm	IV	3127	reh	to stay overnight on a farm	IV	1065.2	958d
rih	O	to go somewhere and spend the night	IV	3753	reh	to sleep over	IV	1679	a147
rih	O	to be heavy	IV	3110	rii/rih	to be heavy	IV	1051	947
rii	O	language	N	3553	rei	language, speech	N	1478	1323a
rii	H	to tighten	TV	3154	rei	to tighten	TV	1091	981
rii	H	to tie up	TV	3270	rei	to tie up	TV	1204	1079b
rii	O	to read, to count	TV	3088	rei	to read, to count	TV	1030	928
rii	O	to speak	TV	3554	rei	to speak	TV	1478.1	1323b
rii au	OH	to stutter	VC	2590	rei au	to stutter	VC	563	510
ring	O	smell, odor	N	3122	ring	smell	N	1062	956
ring	H	to make a line	TV	3140	ring	to scratch a line	TV	1078	970
ring	H	to regret, to be wary of	TV	3156	ring	to be wary of	TV	1093	983a
ring ~~nii~~	HO	Saturday	N	3775	?			1701	a169
~~rii~~	H	border, line, limit	N	3120	rii	line, limit	N	1060	955a
~~rii~~	O	guts	N	3115	rii	intestines, stomach	N	1056	952

r~~ii~~ vau	OO	to be full (as a stomach)	VC	3629	voo	to be full (as a stomach)	IV	1553	a036
rong	H	neck, throat	N	3072	rong	neck, collar	N	1014	916a
røø	O	to be dry	IV	3094	røø	to be dry, to wither	IV	1036	933a
røø	O	inheritance	N	3114	røø	inheritance	N	1055	951
røø	H	to take a long time	TV	3119	røø	to be late, to take a long time	IV	1059	954
ruh	O	to steal	TV	3150	ruh	to steal	TV	1088	978b
rung	O	to be rich	IV	3134	rung	to be rich	IV	1072	965
					rung roo	mango	N	1658	a128
ruu	H	to break, to destroy	TV	3084	hrau	to break, to destroy	TV	1026	924c
ruu	H	to burn, to grill	TV	3106	rau	to grill, to burn	TV	1047	943
ruu	H	to scorch, to burn	TV	3290	rau	to burn, to scorch	TV	1223	1098
					ruu	to rake	TV	1568	a049
r~~uu~~	O	to be difficult	IV	3727	ruu	to be difficult	IV	1653	a124
r~~uu~~	H	bone	N	3080	ruu	bone	N	1022	922
r~~uu~~	O	to steal	VIMP	3149	ruu	to be a thief	IV	1087	978a
ryo	O	to roll	TV	3288	rua	to roll	TV	1221	1096
ryy	O	to wither (as plants in a drought)	IV	3797					a190
ryy	H	to be drunk	IV	3093	rui	to be drunk	IV	1035	932
ryy	H	string	N	3136	rui	rope	N	1074	967a
ryy thyy	HH	to be tired	VC	3157	rei thui	to be tired	VC	1093.1	983b
ryy thyy	HH	to be tired	VC	3653					a058
sa d~~ii~~	~	sand	N	~					a199
					sa hngia	wild cat	N	1018	918
sa hree	OH	bag, pocket	N	3663	sa hree	bag, pocket	N	1589	a068

sa kheng huu	HHH	to hunt by flushing game	VC	2838	sa khai hau	to hunt by flushing game	VC	792	715
sa khii	HH	deer	N	2504	sa khii	deer	N	479	437
					sa kuu	porcupine	N	1493.1	1337b
sa kuu	HH	porcupine	N	2352	sa kuu	porcupine	N	337	305
sa ming	OO	grandchild	N	2717	sa ming	grandchild	N	681	612c
					sa phia	twins	N	399	363a
sa phuu	OH	animal skin	N	2406					353
					sa phuu	pangolin	N	1493	1337a
sa rang	OO	animal	N	2805	sa rang	animal	N	759	686b
					sa thaa	antelope	N	408	372
sa tlee	OH	unmarried man, boyfriend	N	3470	sa tlee	bachelor, boyfriend	N	1399	1255a
sa tlee pau	OHH	unmarried man, boyfriend	N	3471	sa tlee poo	bachelor, boyfriend	N	1399.1	1255b
sa tsang	HO	rice (uncooked)	N	2733	sa tsang	rice (uncooked)	N	694	624
sa vih	OO	rabbit	N	3361					1164
sa ving	OH	animal skin	N	3368	sa ving	animal skin	N	1299.1	1169b
					sa zoo	wild goat	N	1346	1208
sa zuh	OO	sambar deer (buck)	N	3400	sa zuh	sambar deer (buck)	N	1331	1195a
sah	O	to hurt	IV	2729	sah	to hurt	IV	690	620
sah	O	to be painful or sick	IV	3638	sah	to be painful, to be sick	IV	1564	a046
sah	O	to sing	TV	2792	sah	to sing	IV	746	674
sah	O	to build	TV	2752	sah	to build, to give birth	TV	712	642
sang	O	to be tall, to be high	IV	2811	sang	to be high, to be tall	IV	765	689
sang	O	to scream	IV	3281	sang	to cry out in fear	IV	1214	1089
sang	H	hair (on head)	N	2810	sang	hair	N	764	688

sang	H	to put in	TV	2769	sang	to put in	TV	726	655
sang hning	OH	two	NUM	2987	sang hning	two	NUM	933	844
sang hrau	HO	ten	NUM	2796	sang hroo	ten	NUM	750	678
sang hrau	HO	ten	NUM	3292	sang hroo	ten	NUM	1225	1100
sang khih	HH	one	NUM	2519	sang kheh	one	NUM	494	450
sang k~~ii~~	HO	twenty	NUM	2368	sang kii	twenty	NUM	353	320
sang kuo	HH	nine	NUM	2349	sang kua	nine	NUM	334	302
sang pa l~~ii~~	HHO	four	NUM	3205	sang pa lii	four	NUM	1140	1022
sang pa ngau	HHO	five	NUM	2999	sang pa ngoo	five	NUM	945	855
sang ree	HH	eight	NUM	3097	sang reh	eight	NUM	1039	935
sang ruh	HH	six	NUM	3145	sang ruh	six	NUM	1083	974
sang sa r~~ii~~	HHH	seven	NUM	2790	sang sa rii	seven	NUM	744	672
sang th~~ii~~	HH	comb	N	2436	sang thii	comb	N	416	380
sang thung	HO	three	NUM	2480	sang thung	three	NUM	456	416
sau	H	meat	N	2804	soo	meat	N	758	686
sau pau	HH	muscle	N	3686	soo poo	muscle	N	1611	a089
sau tii	HH	child	N	2716	soo tei	child	N	680	612b
see	H	to be crooked	IV	2756					646a
see ka lee	OOO	to be bent	IV	2756.1	see ka lee	to be crooked, to be bent	IV	716.1	646b
					seh sah	to make hot	TV	723.1	653b
sei	H	slave, machine	N	2793	see	slave	N	747	675
seng	H	to run	IV	2745	sai	to run	IV	705.1	635b
seng	H	to flee	IV	3747	sai	to flee	IV	1673	a141
seng	O	to be red	IV	2815	sai	to be red	IV	769	692
seng	H	to wear (skirt)	IV	2744	sai	to wear (skirt)	TV	705	635a

sie	O	buffalo (mithun)	N	2751	sia	buffalo (mithun)	N	711	641
sie tii ka reng	OHHH	dung beetle	N	3757					a151
sih	O	to be hot	IV	2763	seh	to be hot	IV	723	653a
sii	H	to go	IV	2725	sei	to go, to walk	IV	687	618a
					sii tshing	to get a vaccination	VC	669.1	603b
sing	O	to be wise	IV	2720	sing	to be wise	IV	683.1	614b
					sing	to be clever, to be wise	IV	684	615
					sing	to be wise	IV	704	634
sing ~~sii~~	HO	to store	TV	2740	sing sii	to store, to collect	TV	701	631
~~sii~~	H	to pinch	TV	2783	sii	to pinch	TV	738	666
~~sii~~	H	to wash, to clean	TV	2799	sii	to wash, to clean	TV	753	681
~~sii~~	H	to be numb	IV	2853					728
					soh	to apply for	TV	1746	a214
song	H	to invite	TV	2770	song	to invite	TV	727	656a
song khyy	HH	pocket	N	3767	song khui	rice bag	N	1693	a161
					soo	child	N	679	612
søø	O	to be long	IV	2776	søø	to be long	IV	733	661a
søø nøø	HO	relative, cousin	N	2940	soo nøø	relative, cousin	N	889	806b
søø sah	OO	to make long	TV	2777	søø sah	to make long	TV	733.1	661b
suh	H	to pound	TV	2784	suh	to pound with a tool	TV	739	667
suh	H	to wash (clothes)	TV	2801	suh	to wash (clothes)	TV	755	683
sung	O	to be rare	IV	2785	sung	to be precious, to be rare	IV	740	668a
					sung	mortar	N	767	691a
sung khuu	HO	pestle	N	2522	sung khai	pestle	N	497	453
sung khuu	HO	mortar and pestle	N	2814	sung khau	mortar	N	768	691b

sung sah	HO	to make precious	TV	2786	sung sah	to make precious	TV	740.1	668b
suu	H	to urinate/defecate uncontrollably	PART	2665	sau	to urinate/defecate uncontrollably	TV	632	575
suu	O	to prick	TV	2787	sau	to pierce, to stab	TV	741	669
suu	O	to squeeze, to juice, to milk	TV	2817	sau	to milk, to squeeze	TV	771	694
suu pyy	HH	rainy season	N	2735	sau pui	rainy season	N	696	626
syo	O	to misbehave	IV	2760	sua	to sin	IV	720	650
syo	H	to scoop, to ladle	TV	2816	sua	to scoop, to ladle	TV	770	693
ta tah	OO	really	ADV	2192	ta tah	to be real	IV	187	171b
taa	O	to be old	IV	2244	taa	to be old	IV	237	214
taa	H	to hang (on a wall)	TV	2248	taa	to hang up	TV	241	218
					tah	to be real	IV	186	171a
tang	O	to remain	IV	2253	tang	to remain	IV	245	222
tau	H	to measure	TV	2223	too	to measure, to sharpen	TV	218	199
tau	H	to sharpen	TV	2228	too	to sharpen	TV	222	202
tau	H	to weave	TV	2280	too	to weave	TV	269	244a
tee	O	to be sharp	IV	2195	tee	to be sharp	IV	190	173
tee	H	waist	N	2277	tee	waist	N	267	242
tee	O	to win	TV	2282	tee	to win	TV	270	245
tee mah	HO	to be diligent	VC	2210					187
tee rie	OH	to be persistent	VC	3092	tee ria	to be persistent	VC	1034	931c
tei	O	to participate	TV	2246	tei	to participate, to join	IV	239	216
					tei	alone	ADV	1593	a072
teng	H	to chop off, to cross, cut down a tree	TV	2197	tai	to chop off, to cross, to amputate	TV	192	175
teng ah	OO	at a time	ADV	3690					a093c

teng tah	OO	ablative marker (from)	PP	3709	tai tah	ablative marker (from)	PP	1636	a108
tha ryy	OH	vein	N	2482	tha rui	vein	N	458	418
thaa	O	to be new, fresh	IV	2462	thaa	to be new, to be fresh	IV	440	401
thah	O	to itch, to be itchy	IV	2454	thah	to itch	IV	432	393
thah	O	to itch	IV	3609	thah	to itch	IV	1533	a017
thah	H	already	ADV	3622					a030
					thah	to be spicy	IV	406	370
thang	O	to be famous, to be loud	IV	2460	thang	to be loud, to be famous	IV	438	399
thang	O	to knit	TV	2281					244b
thang pang	HO	news	N	3754	thong pang	news	N	1680	a148
thang tshah	LO	to worship	TV	3657	thang tshah	to worship	TV	1583	a062
thau	H	metal	N	2453	thoo	metal	N	431	392
thau	H	strength	N	2472	thoo	strength	N	448	409
thau	H	to kill	TV	2455	thoo	to murder	TV	433	394
thau die	HH	to be weak	VC	3680	dia	to be weak	IV	1604	a083
					thau pa tlaa	to be sour	IV	405	369a
thau tshang	HH	to be exhausted	VC	2660	thoo tshang	to be exhausted	VC	627	571
thau zang pih	HOO	to support (give strength)	VC	2027	thoo zang peh	to support	VC	27.1	25b
thee	H	to scratch (the ground)	TV	2470	thee	to scratch (the ground)	TV	446	407

theng	H	loom	N	2459	thai	loom	N	437	398
theng	H	to be skillful, to be good at	TV	2473	thai	to be skillful, to be good at	TV	449	410
					thia	to give responsibility	TV	1738	a206
thie	O	to transfer	TV	3780					a173
thing	H	to choose, to select	IV	3742	thing	to choose, select	TV	1668	a137
thing	H	liver	N	2458	thing	liver	N	436	397
thing	H	tree, wood	N	2481	thing	tree, wood	N	457	417
thing hrang	HH	tree root	N	3543	thing hrang	tree root	N	1469	1315c
thing phang	HO	to be worried	VC	2469.1	thing phang	to worry	VC	445.2	406c
thing ryy	HH	rope	N	3137	thing rui	rope, cord	N	1075	967b
					thing thui	fruit	N	425	387b
thing tung	HO	wood block	N	2203	thing tung	(wood) block, log	N	198	180b
th~~ii~~	O	to die	IV	2440	thih	to die	IV	420	384
th~~ii~~	H	blood	N	2431	thii	blood	N	411	375
th~~ii~~ sau	HH	body (flesh)	N	2204					181
thla røø	OH	spirit	N	3148	thla røø	spirit	N	1086	977
thla sih	HO	cold, winter	N	2808	thla sih	winter	N	762	687b
					thla sii	cold	N	761	687a
thla tshie	OH	storm	N	2677	thlii tshia	to be stormy	IV	644	583
thlaa	O	bunch (of bananas)	N	3501	thlaa	bunch	NC	1428	1280
thlah	H	to put in	TV	3768	thlah	to drop	TV	1694	a162
					thlah	to drop	TV	1434	1285
thlah thlah	HO	to drop	TV	3476	tla sah	to let fall, to drop	TV	1404	1259b
thlah thlah	HO	to fall	IV	3475	tlah	to fall	IV	1403	1259a

thlang	H	to loosen, to untie	TV	3675	thlang	to loosen, untie	TV	1601	a080a
thlang thlah	HO	to untie	TV	3677	thlang thlah	to untie	TV	1601.1	a080b
thlau	H	to let go of	TV	3465	thlau	to let slip out, to let fall (food from a table)	TV	1394	1252a
thlau	O	spirit	N	3525	thloo	spirit	N	1451	1300
thlau	H	month	NC	3519	thloo	month	N	1445	1295a
thlau	H	to release	TV	3522	thloo	to release, set free	TV	1448	1297
thlau pau	OO	moon	N	3520	thloo poo	moon	N	1446	1295b
thlau tshang	OH	to pray	VC	3656					a061
thlee	O	to hang down	IV	3512	thlee	to hang down	IV	1438	1289a
thlee tsii	OL	seed	N	3523	thlee tsii	seed, crop	N	1449	1298
					thleh	to break off	IV	1717.1	a185b
thleng	H	to change	IV	3502	thlai	to change	IV	1429	1281a
thleng	H	to change, to exchange	TV	3502.1	thlai	to change, to exchange	TV	1429.1	1281b
thlie	H	to break	TV	3792	thlia	to break off	TV	1717	a185a
thlii	O	wind	TV	3497	thlii	wind, air	N	1424	1276
thlii zau	HH	to tickle	VC	3417	zoo	to tickle	TV	1348	1210
thløø	H	to oppose	TV	3514	thløø	to oppose, to ask someone not to do something	TV	1440	1290
					thluh	to fell, to cut down	TV	1435	1286
thlung	O	to be sweet	IV	3530	thlung	to be sweet	IV	1456	1305a
thlung sah	OO	to sweeten (its not sweet)	TV	3531	thlung sah	to sweeten	TV	1457	1305b

thluu	H	to weed, to hoe, to plow	TV	3534	thlau	to weed, to hoe, to plough	TV	1460	1308
thl~~uu~~	H	(completive)	PART	3791					a184
thong	H	to scoot (yourself) over, to move	IV	2250	thong	to move over	IV	243	220a
thong	H	to punch	TV	2465	thong	to punch	TV	442	403
thøø	O	to be fat	IV	2441	thøø	to be fat	IV	421	385
thøø	H	fat, grease	N	2442	thøø	fat, grease	N	422	385b
					thoo bang	to be tired	IV	58	54
thuh	O	to be deep	IV	2438	thuh	to be deep, to be profound	IV	418	382
					thui	fruit	N	424	387
					thui	to offer a sacrifice	TV	441	402a
thuu	H	to get up, stand up	IV	2466	thau	to stand up, to rise up	IV	443	404
thuu	H	to wake up	IV	2477	thau	to start, to wake up	IV	453	414a
thuu	O	to be tasty, delicious	IV	2271	thau	to be tasty, to be delicious	IV	261	237
thuu	H	to be sour	IV	2425					369b
th~~uu~~	O	to stink	IV	2479	thuu	to stink	IV	455	415
th~~uu~~	H	to paint	TV	2483	thuu	to paint (as a wall)	TV	459	419
th~~uu~~ røø	HH	dove	N	3578					1343
thyo	H	to sneeze	TV	2865	thio	to sneeze	TV	817	739b
thyy	H	lower, down, south	N	3728	thui	lower, down, south	N	1654	a125a
thyy	H	to hear	TV	2456	thui	to hear	TV	434	395
thyy thyy pau	HHH	fruit	N	2446	thing thui poo	piece of fruit	N	426	387c
tie	H	size	N	2261	tia	size	N	251	228

ting	H	to plan	IV	2196	ting	to intend, to plan	TV	191	174
tii	H	testicle	N	2272	tii	testicle	N	262	238
tla møø	HO	accidentally	ADV	3666					a071
tla sah	LO	to let boil	IV	3460	tloh sah	to let boil	TV	1389.1	1248c
tlah	O	to be worthy	IV	3496	tlah	to be worthy	IV	1423	1275
tlah	O	to boil	IV	3458	tloh	to boil	IV	1388	1248a
tlang	O	rim, edge, border	N	3474	tlang	rim, edge, border	N	1402	1258
tlang	O	hill	N	3481	tlang	hill, mountain	N	1409	1263
tlang	O	line	N	3490	tlang	row, line	N	1418	1272a
tlang	H	to redeem, to ransom, to save	TV	3488	tlang	to redeem, ransom, save	TV	1416	1270
tlang	H	lump, clod, solid thing	N	3483					1265
tlau	O	to be glossy, to be shiny	IV	3494	tlang	to shine, to be bright	IV	1422	1274a
tlau	O	to be oily, to be greasy	IV	3486	tloo	to be oily, greasy	IV	1414	1268
tlee	O	to be late	IV	3482	tlee	to be late	IV	1410	1264
tlee	H	to capture, arrest, catch, hold	TV	3697	tlee	to capture, arrest, catch, hold	TV	1624	a099a
tlee pah	OO	to look after something for someone	TV	3641	pa thlee pah	to look after	TV	1567	a048
					tleh	to break	IV	1717.2	a185c
tleng	H	to step on	TV	2664	tlai	to walk on, to trample	TV	631	574b
tleng	H	to pour in (liquid)	TV	3489	tlai	to pour in (liquid)	TV	1417	1271
tleng	H	to pour out	TV	3639	tlai	to pour out	TV	1565	a047a

tleng pie	HH	wall (wooden)	N	2060	tlai pia	wall (wooden)	N	59	55
tleng tseng	HO	to step on	TV	2663	tlai tsai	to walk on, to trample (purposefully)	TV	630	574a
					tlia kui	to fall (due to a broken support)	VC	1750	a218
tlih	O	to break	IV	3789					a182
tling	O	to attain (the amount you want)	TV	3461	tling	to be full, complete, to live up to	IV	1390	1249a
tlong	O	to visit (a different village)	TV	3467	tlong	to visit	TV	1396	1253a
					tlong	to graze, to be in a herd	IV	1408	1262
tløø	O	to be durable, to be lasting	IV	3473	tløø	to be durable	IV	1401	1257
tluh	O	to be as good as	TV	3790					a183
tlung	H	to arrive, to return	IV	3469	tlung	to return, to arrive	IV	1398	1254
					tluu	to doze off	IV	1751	a219
tl~~uu~~	O	to fall over, to doze off	IV	3472	tluh	to collapse, to fall over	IV	1400	1256
tlyy	H	to make a path through a crowd	TV	3720	tlui	to get out of the road	TV	1647	a118
tlyy	O	to miss (a meeting)	TV	3484					1266
					toh	to be adequate, to be enough	IV	189	172
tong	O	to meet	IV	2233	tong	to meet	IV	227	207a
tong	H	to touch	TV	2234	tong	to meet	TV	227.1	207b
tong	H	to touch	TV	2274	tong	to touch	TV	264	240a
tong	H	to wrap	TV	2283	tong	to wrap	TV	271	246

					tong	to be folded, to be brought together	IV	246	223a
tong sah	OO	to make touch	TV	2275.1					240c
tong tsheng	HO	to wrap	TV	2200	tong tshai	to wrap	TV	195	178
tong tsheng	HO	to tie a knot	TV	3538					1312
tøø	O	to be tight	IV	3590	pa tsøø	to be firm, to be strong	IV	1514	1354b
tøø	O	to sit, squat	IV	2259	tøø	to sit	IV	250	227a
tøø	H	to bite	TV	2242	tøø	to bite	TV	235	212
tøø hneng	OH	to sit (on)	TV	2968	nai	to sit upon to press down	TV	915	826
tsa bee	OO	to limp	IV	2037	tsa bei	to limp	IV	37	33
					tsa beh	temple (of the head)	N	55	51
tsa deng	HO	to chase, to hunt	IV	2078	tsa dai	to chase	TV	76	69
tsa ee	HH	crab	N	2542	tsa ee	crab	N	518	472
tsa ee kong	OHO	lobster	N	2344	tsa ee kong	lobster	N	330	299
tsa hlah	HO	to shake	TV	3314	tsa hlah	to shake	TV	1247	1121
tsa hlung	HO	to circle around, to surround	TV	3311	tsa hlung	to go around, to be circling something, to surround	IV	1244	1118
tsa hngie	HH	wild dog	N	2623	tsa hngia	fox, wolf, wild dog	N	593	539
					tsa hning	to shake	TV	445.1	406b
tsa hrie	OO	to avoid	TV	3261	tsa hria	to avoid	TV	1195	1072b
					tsa hrii	to avoid	TV	1194	1072a
tsa hr~~ii~~	OH	floor	N	3763	tsa hrih	floor	N	1689	a157
tsa hrong	OO	to follow (a specific path)	TV	3275	tsa hrong	to follow	TV	1208.1	1083b

tsa hr~~uu~~	LH	to cover	TV	3142	tsa hruu	lid, cover	N	1080	971b
tsa ka hrii	LOH	to mix, to stir	TV	2655	tsa ka hrei	to mix, to stir	TV	621	566
tsa kau	HO	to be cold, to be chilly	IV	3746	tsa koh	to be cold, chilly	IV	1672	a140
tsa kee	HO	tiger	N	2365	tsa kee	tiger	N	350	317
tsa køø	OO	to part/separate (legs, fingers)	TV	2351	tsa køø	to open up, to spread open	TV	336	304
tsa kuh	HO	to put arm around shoulder	TV	2306	tsa kuu	to surround, hug	TV	294	266
tsa kuo	HO	to surround	TV	2363	tsa kua	to surround	TV	348	315
tsa kuo	HO	to surround	TV	2319					277
tsa nuh	HO	to be female	IV	2954	tsa nau	female	N	901	814a
tsa pau	HO	male	N	2173	tsa poo	male	N	169	154
tsa rang	HO	to be fast	IV	3102	tsa rang	to be fast	IV	1043	939
tsa rei	HO	enemy	N	3100					937b
tsa thing	OO	to shake, shutter	TV	2468	tsa thing	to shake, to shudder	TV	445	406a
tsa tlah	OO	mud	N	3647	tsa tloh	mud	N	1573	a053a
tsa tlah	HO	to wash and rinse	TV	3649	tsa tloh	to rinse	TV	1575	a054
tsa tlah	OO	mud, clay	N	3485					1267
tsa tlii	HO	to be fast	IV	3722	tsa tlei	to be fast	IV	1649	a120
					tsa tloh	wallow	N	1591	a070
tsa tsang	HO	right (direction)	N	3608	tsa tsang	right (direction)	N	1532	a016
tsa uh	HH	book	N	3595	tsa uh	book	N	1519	a003
					tsa uh	frog (edible species)	N	537	487b
tsa vih	OO	leech (on land)	N	3354					1158
tsa vong	HO	bear	N	3325	a vong	bear	N	1258	1132
tsa vyy	HO	left	N	3603	tsa vui	left	N	1527	a011

tsaa	O	to be dry	IV	2616	tsaa	to be dried, to be cured	IV	587	534a
tsaa sah	OO	to let dry	TV	2618	tsaa sah	to let dry	TV	588.1	534c
tsah	O	to cry	IV	3564	tsah	to cry	IV	1488	1333a
tsah	O	to buy	TV	2607	tsoh	to buy	TV	579	526a
tsang	H	to be hard	IV	3734	tsang	to be hard, rough	IV	1660	a130
tsang	O	to stay (temporarily)	IV	2654	tsang	to stay (at for a period of time)	IV	620	565
tsang	H	to imitate	TV	2628					542.1b
					tsang dang	the way it is	PHR	77.1	70b
tsang ka rei	HHO	earthworm	N	2619	tsang ka rei	earthworm	N	589	535
tsang pau	OH	uncle (father's sister's husband)	N	3537	tsang poo	uncle (father's sister's husband)	N	1463	1311
tsang sau	OH	person	N	3521	tsong soo	person	N	1447	1296
tsang sau nuu	OHH	someone (f)	N	3611.1	tsong soo nau	someone (female)	N	1535.1	a019b
tsang sau pau	OHH	someone (m)	N	3611	tsong soo poo	someone (male)	N	1535	a019a
tsang sau tsang pau	OHHH	others (things or people)	PHR	3604	aa maa tsong poo	others (things or people)	N	1528	a012
tsang vang	OO	dry season	N	3717	tsang vang	summer, dry season	N	1644	a115
tsau	O	one's share, one's portion	N	3365	tsoo	one's share, one's portion	N	1297.1	1167a
tsau khyy	OO	to cry with, to share one's grief	TV	3565	tsoo khui	to cry with, to share in one's grief	TV	1489	1333b
tsau khyy	OO	to mourn	TV	3719	tsoo khui	to mourn	TV	1646	a117
					tsee	to join an argument	IV	1747	a215

tsei hei	HO	to be rude, to be bossy, to be shameless	VC	2823	tsei hei	to be rude, to be overbearing	VC	777	700c
tseng	~	bark	N	~					a196
tseng	O	to be worn out, to be torn	IV	3567	tsai	to be worn out, to be torn	IV	1491	1335
tseng	H	occasion	N	2638	tsai	occasion for celebrating, time, season	N	606	551a
tseng zung	OO	knife	N	2631	tsii zung	knife	N	600	545
tsha hneng	LH	to be useful, to benefit from	TV	3050	tsha hnai	to be useful	IV	994	897
tsha sah	OO	to make look good	TV	3571	tshah sah	to make good	TV	1495	1338b
tshaa vyy	HO	corn	N	3694	tsaa vui	corn	N	1621	a097
tshaa vyy	HO	corn	N	2903					775
tshah	H	to be good	IV	3570	tshah	to be good	IV	1494	1338a
					tshah	bridle	N	638	580
					tshah	to add, to repeat	TV	635	577
					tshah	upper part	N	656	593a
tshang	H	to be gone	IV	2687	tshang	to be finished, to end	IV	653	591a
tshang	O	to grow, increase, rise	IV	3580	tshang	to grow, to increase, to rise	IV	1504	1345
tshang	O	to repay (a debt)	TV	3619	tshang	to repay (a debt)	TV	1543	a027
tshang	H	to finish, to end	IV	3626	tshang	to be finished	IV	1550	a034a
					tshang	to become, to mature	IV	575	522
tshau	O	to cut, to chop	TV	2681	tshoo	to cut, to chop	TV	647	586
tshau	H	to be thick	IV	2707					606a
tshee	O	to hoe	TV	3788					a181

					tshee	to dig out (a hole)	TV	532	484
					tsheh	to take apart	TV	1748	a216
					tshei	to hit with a stick	TV	1749	a217
tsheng	O	to get divorced	IV	3576	tshai	to divide, to separate	IV	1500	1342a
tsheng	O	to give birth	IV	3764	tshai	to give birth	IV	1690	a158
tsheng	H	generation, era	N	2684	tshai	era, time, generation	N	650	589
tsheng	H	to talk (to)	TV	2753	tshai	to call, to talk to	TV	713	643
tsheng tshii	HH	clothes	N	3704					a105
tsheng tshøø	OO	to distribute	TV	2758	tshai tshøø	to distribute, to apportion	TV	718	648
tshie	O	to be small	IV	2737	tshia	to be small	IV	698	628
tshie hruu	HO	to be bad	IV	2669	tshia hruu	to be poor quality, to be bad	IV	636	578
tshih	O	to be full (as a bucket)	IV	3628	tshih/tshii	to be full (as a bucket)	IV	1552	a035a
tshii zuu	HH	cat	N	3596	tshii zau	cat	N	1520	a004
tshing	H	noon	N	2682	tshing	daylight, noon	N	648	587
tshing	H	to teach, to tell, to inform	TV	2705	tshing	to teach, to tell, to inform	TV	670	604
					tshing	to be barren, to be childless	IV	574	521
					tshing	to stab, prick, pierce, to get a vaccination	TV	669	603a
tshing buh	HH	owl	N	2692					594
tshii hnau	OH	leaf	N	3049	tshing hnoo	leaf	N	993	896
tshong	H	to be strong	IV	2656	tshong	to be strong	IV	623	567
tshong	H	to be strong	IV	3589	tshong	to be strong	IV	1513	1354a

tshong	O	to be cooked	IV	2678	tshong	to be cooked	IV	644.1	584a
tshong	O	to cook	TV	2679	tshong	to cook	TV	645	584b
tshuh	O	to come out, to be born	IV	2672	tshuh	to come out, to be born	IV	639	581a
tshung	O	interior	N	2685	tshung	inside, interior	N	651	590a
tshung kheh	OH	relative	N	3606	tshung khau	relative	N	1530	a014
tshuu	H	to spit out	TV	2702	tshau	to spit out	TV	668	602
tsh~~uu~~	H	to dispute over, to claim	IV	2615	tshuu	to dispute over, to claim	TV	586	533
tsh~~uu~~	H	vagina	N	2711	tshuu	vagina	N	675	609
tsh~~uu~~	H	to confiscate	TV	2676	tshuu	to confiscate, to take away	TV	643	582a
tsie	O	to be striped, to be spotted	IV	3561	tsia	to be striped	IV	1485	1330
tsih	O	to break, to snap (as a rope)	IV	2606	tseh	to break, snap (especially a rope)	IV	578	525a
tsih sah	LO	to break	VC	2606.1					525b
tsii phing	HO	needle	N	3572					1339
					tsii thlah	descendant	N	1432	1283
tsing	H	to fall down, to collapse	IV	2611	tsing	to fall down, to collapse	IV	582	529
tsing	O	to plant, to sow seed	TV	2642	tsing	to plant, to sow seed	TV	608	553
					tsing rua	relative, peers	N	599	544
tsing tlah	HO	mud	N	3648					a053b
tsi~~i~~	H	seed	N	2649	tsii	seed, crop	N	615	560
tsi~~i~~	O	saliva	N	2653	tsii	saliva	N	619	564

tsii	H	to be afraid of	TV	3550	tsii	to fear, to be afraid of	TV	1476	1321a
tsii see	OO	slingshot	N	2699	tsii see	slingshot	N	665	599
tsii tshyy	HO	to be dangerous	VC	3551	tsii tshui	to be dangerous	VC	1476.1	1321b
tsii zau	HO	to respect	TV	3439	tsii zoo	to respect, to revere	TV	1370	1230b
tsong	O	to be few, to be little (amount)	IV	3477	tsong	to be few (people)	IV	1405	1260a
tsong	H	to support, to give aid	TV	2621	tsong	to feed, support, supply	TV	591	537
tsong	O	to learn	TV	2627	tsong	to imitate, to learn	TV	597	542.1a
tsong tii tii	OHH	to be few	IV	3478	tsong tei	to be a little (amount, like water)	IV	1406	1260b
tsøø	O	to sprout	IV	3651	tsøø	to sprout	TV	1577	a056
					tsoo tah	for, in place of	PP	1594	a073
					tsøø voo	one's share, lot	N	1298	1168b
tsuh	O	lungs	N	2634	tsoh	lungs	N	602	547
tsung	O	to decrease	IV	3544	tsung	to decrease, to shrink, to descend, to lower	TV	1470	1316a
tsung	H	top	N	2662	tsung	top, above, surface	N	629	573
tsung	H	to pound with fist	TV	2644	tsung	to pound with fist	TV	610	555
tsuu	H	to dig	TV	2614	tsau	to dig	TV	585	532
tsuu	O	to buy	VIMP	2608	tsau	to buy	VIMP	579.1	526b
					tsuu	to ripen, to come of age	TV	1576	a055
tsyo	H	to sprout	IV	3787					a180

tsyy	O	to pick up	TV	2605	tsui	to lift, to carry (in hand), to borrow, to lend	TV	577	524
tsyy	O	to lift	TV	2633	tsui	to lift	TV	601	546b
tsyy	H	to be short	IV	3688	tsui tei	to be short, brief	IV	1613	a091
tsyy	O	to be elevated	IV	2632					546a
ttui ttui tah	HHO	a pair, a couple	N	3674	ttui ttui tah	a pair, a couple	N	1600	a079
tuh	O	to hit	TV	2268	tuh	to strike, to fight (with weapons)	TV	258	235a
					tuh	to strike, fight (with weapons)	IV	258.1	235b
					tui khuu	steam, vapor	N	818	740
tung	O	block	N	2202	tung	(wood) block, log	N	197	180a
tung	H	to play (an instrument)	TV	2212	tung	to play (an instrument)	TV	207	189
~~tuu~~	H	(relativizer)	PART	2252	tuu	(relativizer)	PART	244	221
~~tuu~~	H	to plant	TV	2265	tuu	to plant, to sow (seed)	TV	255	232
~~tuu~~ tii	OH	grandchild	N	2226	tuu tei	grandchild	N	220.1	200c
~~tuu~~ tii nuu	OHH	granddaughter, niece	N	2225	tuu tei nau	granddaughter, niece	N	220	200b
~~tuu~~ tii pau	OHH	grandson, nephew	N	2224	tuu tei poo	grandson, nephew	N	219	200a
tyo	H	to do	TV	2211	tua	to do	TV	206	188
tyo na dang	HHO	how to do it	PHR	2082	tua na dang	how to do it	PHR	79	70d
tyo pa tshih	OOO	to try	TV	3654	tua pa tshii	to try	TV	1580	a059
tyo tang	HO	to calculate, to think about	TV	2207	tua tang	to count, to calculate	TV	202	184
tyy	H	to melt	IV	2235	tui	to melt	IV	228	208a

tyy	H	water	N	2278	tui	water	N	268	243a
tyy hrei	HH	to be thirsty	VC	3726	tui hree	to be thirsty	VC	1652.1	a123b
tyy ii	HO	water	N	2279					243b
tyy l~~ii~~	HO	pond, lake	N	3222	tui lii	pond, lake	N	1158	1039a
tyy long	HO	boat	N	3170	tui long	boat, ship	N	1105	993
tyy løø	~	to swim	IV	~					a198
tyy sah	OO	to melt	TV	2237	tui sah	to melt	TV	230	208c
tyy vau	HO	river	N	3364	tui voo	river	N	1297	1167
uh	O	to be burnt	IV	2538	uh	to be burnt	IV	514	469
uh	O	to rule, to govern	TV	2564	uh	to rule, to govern	TV	539	489
					ui	to soothe (as a baby)	TV	546	495
					ui hlii	flea (lit. dog flea)	N	1235	1110
					ui tlah	frog (don't touch this species)	N	536	487a
ung	H	to stay, live, exist	IV	2547	ung	to stay, to live, to exist	IV	523	477a
					ung	pot	N	538	488
ung khyy	OO	to stay with and take care of	TV	2303	ung khai	to stay with and look after	TV	291	263
uu	H	voice, sound	N	2581	au	voice	N	554	503
uu	H	to catch with a rope	TV	2595	au	to catch with a trap using a rope	TV	568	515a
					uu	elder	N	528	480a
~~uu~~ sah	OO	to burn food	TV	2540	uu sah	to let burn	TV	516	470
~~uu~~ tii	OH	elder sibling	N	2553					480b
					va dih	to return, to go home	IV	1666	a136a
					va koh	hornbill	N	323	292
va ming	LH	to check up on	TV	3377	va ming	to visit, check up on	TV	1308	1176b

va nuu	OO	to hide	VIMP	3707	va nau	hide	VIMP	1634	a106c
					va pia	to come out (from wear or use), to open by itself	IV	1541	a025
va rih	OO	pheasant	N	3130	va rih	pheasant	N	1068	961
va sii	HO	to come	IV	2726	va sei	to come	IV	688	618b
va sii	OH	to go (somewhere)	IV	2727	va sei	to go	IV	688.1	618c
va tong	OL	to meet	TV	2234.1					207c
					va tshuh	to come out, to rise (as the sun)	IV	640	581b
vaa	O	to throw	TV	3373	vaa	to throw, toss, scatter	TV	1304	1174a
					vaa	to be fair, to have a pale white complexion	IV	1273	1146
vaa thlang	OO	to throw away	TV	3374	vaa thlang	to throw away, discard	TV	1305	1174b
vah	H	pig	N	3359	voh	pig	N	1292	1162
vang	H	to light (as a fire)	TV	3356	vang	to light (to make shine)	TV	1289	1159b
vang	H	to long for, to miss	TV	3736	vang	to long for	TV	1662	a132
vang	H	width	N	3330					1136
					vang	to shine	IV	1288	1159a
vau	H	to clear (jungle)	TV	3333	voo	to clear (jungle)	TV	1266	1139
vee	O	bread made from rice	N	3342	a vee	rice flour, a kind of rice cake	N	1275	1148
vee	O	to be lost, to be confused	IV	3370	vee	to stray, to be lost, to wander	IV	1301	1171
vee	H	to visit	TV	3376	vee	to visit	TV	1307	1176a

vee dee	HH	bird-lime	N	2068	vee dee	bird-lime	N	67	61
vee sau	HH	friend	N	3358	vee soo	friend	N	1291	1161
					vei	to hunt	TV	1745	a213
veng	O	sky, heaven	N	3369	vai	sky, heaven	N	1300	1170
veng	O	to guard, to watch	TV	3343	vai	to guard, watch	TV	1276	1149a
veng kheng	LO	to guard, to watch	TV	3344	vai khai	to guard, watch	TV	1277	1149b
veng tah	OL	for a reason, because	PP	3710	vai tah	reason	N	1637	a109
ving	H	skin	N	3367	ving	skin	N	1299	1169a
v~~ii~~	O	to drill, to bore a hole	TV	3337	vii	to drill, bore a hole	TV	1270	1143
vong	H	to come	IV	3724	vong	to come out	IV	1651	a122
vong	O	to be black	IV	3328	vong	to be black, dark	IV	1261	1135a
vuh	O	to be heavy for (someone's back)	TV	3785					a178
					vuh	to fall on top of	TV	1744	a212
					vuh tsang	ashes, dust	N	1256	1130
					vui	good harvest	N	1293	1163
vyy	O	fart	N	3341	vui	fart, to fart	N	1274	1147
vyy	O	time, instance	NC	3375	vui	time, instance	N	1306	1175
vyy	O	to bury (a body), to have a funeral	TV	3331	vui	to bury (a body), to have a funeral	TV	1264	1137
vyy	H	to fart	TV	3341.1	vui	to fart	TV	1274.1	1147b
vyy	O	to be cooked	IV	2871					745a
yy	H	to droop	IV	2598	ui	to droop	IV	571	518
yy	O	to be rotten	IV	2589	ui	to be rotten	IV	562	509
yy	H	to wear (a necklace)	IV	2597	ui	to wear (necklace)	TV	570	517
yy	H	dog	N	2546	ui	dog	N	522	476
za byy	OH	rat (short-tailed)	N	2040	za bui	rat (short-tailed)	N	40	36

za hau	OH	fermented rice	N	3393	zuu hoo	fermented rice	N	1324	1188b
za kheh	OO	one hundred	NUM	3414	zah	hundred	NUM	1345	1207
zaa pah	OO	to try to get	TV	3786					a179
zang	H	to be light (not heavy)	IV	3422	zang	to be light (not heavy)	IV	1353	1214
zang	H	penis, stinger	N	3432	zang	penis	N	1363	1224
zau	H	to be enough	IV	3623	zoo	to be enough	IV	1547	a031
zau	O	to stop	IV	3758					a152
					zau pui	all	Q	1315	1183
zee	~	what	WH	~					a195
zee lee	HH	where	WH	3695	zee lee tah	where	WH	1622	a098
					zee mai poo	anything	N	131	118b
zee pau pau	OOO	any, every, anything	Q	2136					118c
					zee zong pui	everything	N	1517	a001b
zee zong vøø tii	OOHH	of all else	PHR	3387	zee zong via tee	everything	N	1318	1184b
zeng	O	night	N	3428	zai	night	N	1359	1220
zeng	H	to smoke	TV	3449	zai	to smoke	TV	1379	1239
zie	H	manner, habit, custom	N	3423	zia	manner, habit	N	1354	1215
zii	H	to comb, to fan	TV	3405	zei	to flap, flutter, fan, comb, brush	TV	1336	1199a
zii	H	to shave, to scrape	IV	3441	zia	to scrape, shave	TV	1372	1232
zing	O	to be dark	IV	3399	zing	to be dark	IV	1330	1194
zing	H	to believe, to trust	TV	3394	zing	to believe, to trust	TV	1325	1189
zi̱i̱	H	to be wet	IV	3655					a060

~~zii~~	H	to be wet	IV	3755					a149
zong	O	to compete, to work hard	IV	3618	zong	to compete, to work hard	IV	1542	a026
zong	H	also, too	PART	3385	zong	also, too	PART	1316	1184a
					zong	to carry together	TV	1326	1190
zong tshuh	OO	to descend	IV	2700	zong tshuh	descent, downward slope	N	666	600
					zoo	to respect, to revere	TV	1369	1230a
zøø	H	to fly	IV	3420	zøø	to fly	IV	1351	1212
zuh	O	to leak	IV	3421	zuh	to leak	IV	1352	1213
zuh hee	OH	cup	N	3268	zuu hee	cup	N	1202	1078b
zuh neng	OO	eld's deer	N	3401	zuh nai	eld's deer	N	1332	1195b
zung	H	urine	N	3455	zung	urine	N	1385	1245
zung	O	to urinate	TV	3454	zung	to urinate	TV	1384	1244
zuu	O	to be skinny	IV	3407	zau	to be skinny, to be feeble	IV	1338	1200
					zuu hree	cup	N	1201	1078a
~~zuu~~	O	alcohol	N	3392	zuu	beer, liquor, alcohol	N	1323	1188a
~~zuu~~	H	to subtract	TV	3436					1228
zyo	H	to keep as a pet	TV	3446	zua	to spare, to keep as a pet	TV	1376	1236
zyo	O	to sell	TV	3443	zua	to sell	TV	1374	1234a
zyy	H	to follow (a person, a path)	TV	3412	zui	to follow (a person, a river)	TV	1343	1205

Appendix B. Zophei Attested Syllable Examples

(summarized in Tables 5.9 and 5.10)

Part I. Tlawngrang Zophei attested syllable examples (summarized in Table 5.9)

/p/

pii ‘to be born’ pee ‘to wrestle’ pøø ‘noise’ paa ‘to mistake’ poo ‘father’ puu ‘to accuse’	peh ‘to explode’ pa thlee pah ‘to look after’ puh ‘to carry (on one’s back)’ pia ‘to be dirty’ pei ‘to be attached’ pai ‘blanket’ pau ‘belly’ pui AUGMENTATIVE	ping ‘to end (like a hole or tunnel)’ pang ‘forehead’ pong ‘to hold on lap’ pung ‘body’

Minor syllable: pa zii ‘cucumber’

/ph/

phii ‘to sweep’ phee ‘leg’ phøø ‘to spread out’ phaa ‘to have leprosy’ phoo ‘to spread out’ phuu ‘group’	phih ‘sweep’ IMPERATIVE pheh ‘to be astringent’ phah ‘to arrive’ a phia ‘mat’ phei ‘to slap’ phau ‘to bring phua ‘to compose’	phing ‘clan, kind’ thing phang ‘to worry’ phung ‘custom’

No minor syllables

/b/

bii ‘to know’ a bee ‘root vegetable’ bøø ‘to swell’ baa ‘to feed (by hand)’ boo ‘to be small’ buu ‘nest’	tsa beh ‘temple (of head)’ bah ‘to owe’ boh ‘to lie face down’ bia ‘word’ bei ‘pot’ bai ‘cheek’ bau bau ‘eggplant’ bui ‘lord, superior’ bua ‘to be overgrown’	bing ‘to connect’ bang ‘arm’ bong ‘box’ bung kung ‘banyan tree’

Minor syllable: ba suu ‘sugar cane’

/t/

tii ‘testicle’ tee ‘waist’ tøø ‘to sit’ taa ‘to be old’ too ‘to sharpen’ tuu ‘to plant’	pa teh ‘to taste’ vai tah ‘reason’ toh ‘to be enough’ tuh ‘to strike, to fight’ tia ‘size’ tuu tei ‘grandchild’ tai ‘to chop off’ a tau ‘now’ tui ‘to melt’ tua ‘to do’	ting ‘to plan’ tang ‘to remain’ tong ‘to meet’ tung ‘block’

Minor syllable: ta tah ‘to be real’

/th/

thii ‘blood’ thee ‘to scratch (ground)’ thøø ‘fat, grease’ thaa ‘to be new, to be fresh’ thoo ‘metal’ thuu ‘to stink’	thih ‘to die’ thah ‘to itch’ pa thoh ‘to start’ thuh ‘to be deep’ thia ‘to give responsibility’ thai ‘loom’ thau ‘to be delicious’ thui ‘fruit’	thing ‘wood’ thang ‘to be loud, famous’ thong ‘to punch’ sang thung ‘three’

Minor syllable: tha rui ‘vein’

/d/

kha dii ‘drool’ dee ‘to be quiet’ døø ‘to oppose’ daa khing ‘bell, gong’ doo ‘to stop, to stand’ duu ‘to want’	dih ‘to return’ deh ‘to crush’ IMPERATIVE dah ‘to frisk’ doh ‘to pull (one’s self) away’ dia ‘to be weak’ dei ‘to crush’ dai ‘to hammer’ dau ‘to pull’ dui ‘to insert, to collect into’ dua ‘to burn’	ding ‘to drink’ dang ‘way’ dong ‘to poke, to prick’ dung khai ‘to fence in’

No minor syllables

/k/

kii ‘angle, corner, horn’ kee ‘to ascend’ køø ‘to be wide, to be open’ kaa kaa lee ‘between’ koo ‘mouth, entrance’ kuu ‘to be hunchbacked’	kih ‘hand’ keh ‘to burst’ kah ‘to crack’ tsa koh ‘to be cold’ meh kuh ‘to be sleepy’ kia ‘to fry’ kei kang ‘vicinity’ kai ‘upper back’ hnoo tsa kau ‘ear’ kui ‘to be curved, cracked’ kua ‘to send’	king ‘to curl’ kang ‘side, shore’ kong ‘box’ kung ‘age, year’

Minor syllable: see ka lee ‘to be bent’

/kh/

khii ‘to tie’ khee ‘to chew’ khøø ‘to be able’ khaa ‘to close’ khoo ‘to scratch’ khuu ‘to cough’	kheh ‘to be bitter’ khah ‘mucus’ khoh ‘throw it’ (imperative) khuh ‘knee’ khia ‘to break apart’ khei ‘to peel off’ khai ‘to hit (a target)’ khau ‘hole (in the ground)’ khui ‘to break’ khua ‘village, weather’	khing ‘to be equal’ khang ‘to prohibit’ khong ‘to crow (as a rooster)’ khung ‘to lock (something in)’

Minor syllable: kha dii ‘drool’

/ʔ/

ʔii khung ‘to sleep’ ʔee ‘to eat’ ʔøø ‘to shout’ ʔaa ‘chicken’ ʔoo ‘to slice, to cut’ ʔuu ‘elder’	ʔeh ‘dung’ ʔah ‘no’ ʔoh ‘to be caught’ ʔuh ‘to be burnt’ ʔei ‘to argue’ ʔai ‘to dry (one’s self)’ ʔau ‘voice’ ʔui ‘dog’	ʔing ‘house’ ʔang ‘to open (one’s mouth)’ ʔong kua ‘hole, opening’ ʔung ‘to stay, to exist’

Minor syllable: ʔa zong ‘monkey’

/v/

vii ‘to drill a hole’ vee ‘to visit’ vaa ‘to throw’ voo ‘to clear (jungle)’ vuu tsang ‘ashes, dust’	voh ‘pig’ vuh ‘to fall on top of’ zei zong via tee ‘everything’ vei ‘to hunt’ vai ‘sky, heaven’ vui ‘time, instance’	ving ‘skin’ vang ‘to long for’ vong ‘to come out’

Minor syllable: va dih ‘to return’

/s/

sii ‘to wash, to clean’ see ‘slave’ søø ‘to be long’ soo ‘meat’ pa suu ‘to grasp’	pa sih ‘to hate’ pa seh ‘to heat, to boil’ sah ‘to build’ soh ‘to apply for’ suh ‘to pound’ sia ‘buffalo’ sei ‘to go’ sai ‘to run’ sau ‘to milk, to squeeze’ hmui sui ‘really’ sua ‘to scoop’	sing ‘to be wise’ sang ‘to cry out in fear’ song ‘to invite’ sung ‘to be rare’

Minor syllable: sa rang ‘animal’

/z/

pa zii ‘cucumber’ zee lee tah ‘where’ zøø ‘to fly’ zoo ‘to be enough’ zuu ‘alcohol’	ning zeh ‘to be shy’ pa zah ‘to reach for’ zuh ‘to leak’ zia ‘manner, habit’ zei ‘to flap’ zai ‘to smoke’ zau ‘to be skinny’ zui ‘to follow’ zua ‘to keep as a pet’	zing ‘to believe, to trust’ zang ‘to be light’ zong ‘to compete’ zung ‘urine’

Minor syllable: za bui ‘short-tailed rat’

/h/

pa huu ‘to simmer’ zuu hee ‘cup’ høø ‘to set a price for’ hoo ‘tooth’	nøø heh ‘child’ hoh ‘to sing (as a barking deer)’ hia ‘to be necessary’ hei ‘to ask’ hai ‘to stop (as rain)’ hau ‘to be lustful’ hui ‘to look for’ hua ‘to hate’	hing ‘to cheat, to lie’ hang ‘juice, curry’ hong ‘to open’

Minor syllable: ha thio ‘to sneeze’

/ts/

tsii ‘seed’ tsee ‘to join an argument’ tsøø ‘to sprout’ tsaa ‘to be dried’ tsoo ‘one’s share’ tsuu ‘to ripen, to come of age’	pa tsih ‘to close’ tseh ‘to break’ tsah ‘to cry’ tsoh ‘to buy’ a tsuh ‘outbuilding’ tsia ‘to be striped’ tsei hei ‘to be rude’ tsai ‘to be worn out’ tsau ‘to dig’ tsui ‘to lift’	tsing ‘to plant’ tsang ‘to be hard’ tsong ‘to learn’ tsung ‘to pound (with a fist)’

Minor syllable: tsa dai ‘to chase’

/tsh/

tshii zau ‘cat’ tshee ‘to dig out (a hole)’ kee tshøø ‘ascent’ tshoo ‘to cut, to chop’ tshuu ‘to confiscate’	pa tshih ‘to fill’ tsheh ‘to take apart’ tshah ‘to be good’ tshuh ‘to come out’ tshia ‘to be small’ tshei ‘to hit with a stick’ tshai ‘to call, to talk to’ tshau ‘to spit out’ tsii tshui ‘to be dangerous’ nii tshua ‘sunrise’	tshing ‘to teach, to inform’ tshang ‘to grow’ tshong ‘to be strong’ tshung ‘interior’

Minor syllable: tsha hnai ‘to be useful’

/tl/

tlee ‘to be late’ tløø ‘to be durable’ tau pa tlaa ‘to be sour’ tloo ‘to be oily, to be greasy’ tluu ‘to doze off’	tleh ‘to break’ tlah ‘to fall’ tloh ‘to boil’ tluh ‘to fall over’ tlia kui ‘to fall (because of a broken support)’ tsa tlei ‘to be fast’ tlai ‘to pour in (liquid)’ tlui ‘to get out of the road’	tlang ‘rim, edge, border’ tlong ‘to visit’ tlung ‘to return, to arrive’

Minor syllable: tla sah ‘to let fall’

/thl/

thlii ‘wind, air’ thlee ‘to hang down’ thløø ‘to oppose’ thloo ‘to release, to set free’	thleh ‘to break off’(Imperative) thlah ‘to drop’ thluh ‘to fell’ thlia ‘to break off’ thlai ‘to change’ thlau ‘to weed, to plough’	pa thling ‘to soothe (a baby)’ thlang ‘to loosen, to untie’ thlung ‘to be sweet’

Minor syllable: thla røø ‘spirit’

/hm/

hmee ‘face, front’ hmoo ‘wound’ hmuu ‘to blow, to fan’	hmeh ‘press it’ (Imperative) hmah ‘grade’ hmuh ‘to find, to see’ hmei ‘to press, to massage’ hmai ‘to rot, to decay’ hmau ‘lips, beak’ hmui ‘appearance’	hming ‘to be well-cooked’ hmang tlah ‘picture’

Minor syllable: hma soo ‘to be first’

/m/

mee ‘fire’ ra møø ‘wild bamboo’ ka maa ‘I (emphatic)’ pui moo ‘to matter’	mih ‘to go out (as a light)’ meh ‘eye’ mah ‘to be unusual’ mia ‘to pinch, to twist’ mei ‘goat’ mai ‘cost, price’ mui ‘appearance’	ming ‘name’ mang ‘dream’ mong ‘morning’

Minor syllable: ma thloo ‘wing’

/hn/

hnii ‘to know’ hnee ‘pus, sap’ pa hnaa ‘to snore’ hnoo ‘sinuses’	hneh ‘to urge, to force’ hnah ‘side, ribs’ pa hnoh ‘to be muddy’ hnia tshai ‘to lean on’ pa hnai ‘to comfort’ hnau ‘to mop, to wipe’ hnui ‘to have’	hning ‘back, rear’ hnang ‘to kiss’ hnong ‘trash’

Minor syllable: hna khau ‘nose’

/n/

nii tshua ‘sunrise’ nee ‘to approach’ nøø ‘infant’ naa zii ‘clock’ noo ‘to plead for, to request’ tsa nuu ‘female’	nih hlau ‘day’s wages’ neh ‘to be easy’ nah…nah ‘the way that’ noh ‘to hide (one’s self)’ nuh ee ‘step mother’ nei ‘to enter’ nai ‘to be short’ nau ‘to hide’ nua ‘to sulk, to be upset’	ning ‘day, sun’(not recorded) nang ‘to push, to compress’ nong ‘to be happy’

Minor syllable: na maa ‘you (emphatic)’

/ng/

ngee lang ‘shin’ ngøø ‘to have light/fair skin’ ngoo ‘fish’	ngia ‘to observe’ ngei ‘wild boar’ ngai ‘flesh’	ngang ‘to dare’ ngung ‘silver’

No minor syllables

/hl/

hlii dong ‘bridge, stairs, ladder’ pa hløø ‘to be alarmed’ hloo ‘song’ hluu ‘to be many’	hleh hlai ‘to ask about’ tsa hlah ‘to shake’ pa hloh ‘to mix’ hlai ‘to operate’ hlau ‘wages, earnings’ hlui ‘to exceed’ a hlua ‘saw’	hling ‘thorn’ hlang ‘to borrow, to lend’ pa hlong ‘to wrap, to cover’ tsa hlung ‘to surround’

No minor syllables

/l/

tui lii ‘pond, lake’ lee ‘and, with’ løø ‘farm’ loo ‘take it’ (Imperative) luu ‘head’	leh ‘to renege’ lah ‘to take’ loh ‘vomit’ lia ‘to lick’ lei ‘buttocks’ lai poo ‘to be large’ lau ‘to pick (fruit)’ lua ‘to gather (trash)’ lui ‘tongue’	ling ‘to roll (something up)’ lang ‘to dance’ long ‘to celebrate’ a lung ‘rock’

Minor syllable: la hmee ‘tail’

/hr/

tsa hrii ‘to avoid’ hree ‘to work’ hrøø ‘to argue’ bee pa hroo ‘yam’ tsa hruu ‘cover’	hrih ‘lice’ hreh ‘to make do work’ hrah ‘to wake up’ hroh ‘to eat (porridge)’ hruh ‘to be stupid’ tsa hria ‘to avoid’ ee hrei ‘turmeric, yellow’ hrai ‘to torture’ hrau ‘to insert, to poke’ hrui ‘to lead, to guide’	hring ‘to live’ hrang ‘to be angry’ hrong ‘to follow’

No minor syllables

/r/

rii ‘intestines, stomach’ ree thúí ‘to offer a sacrifice’ røø ‘to be dry’ pa raa thlee ‘fish trap’ roo ‘to scold’ ruu ‘bone’	va rih ‘pheasant’ reh ‘to sleep over’ roh ‘to break down’ ruh ‘to steal’ ria ‘to grind’ rei ‘to read, to count’ rai ‘work, job’ rau ‘to grill, to burn’ rui ‘rope’ rua ‘to roll’	ring ‘to scratch a line’ rang ‘country’ rong ‘neck, collar’ rung ‘to be rich’

Minor syllable: ra tui ‘edible bamboo’

Part II. Lawngtlang Zophei attested syllable examples (summarized in Table 5.10)

/p/

píí ‘to be attached’	pih ‘to explode’	píng suh ‘to be clumsy’
pýý AUGMENTATIVE	lyy páh ‘debt’	peng ‘blanket’
pee ‘to wrestle’	púh ‘to carry (on one’s back)’	pang ‘forehead’
póó ‘noise’		pong ‘to carry’
páá ‘to make a mistake’	pié ‘to be dirty’	pung ‘body’
pau ‘father’	péi ‘to pass by’	
púú ‘belly’		
pi̍i̍ ‘to peel’		
pú̍ú̍ ‘to accuse’		

Minor syllable: pa zi̍i̍ ‘cucumber’

/ph/

phíí ‘to slap’	pháh ‘to arrive at’	phíng ‘clan, kind’
phéé ‘leg’		pheng ‘to be flat’
phóó ‘to spread out’	phie ‘mat’	thíng phang ‘to be worried’
phaa ‘rash’	phei ‘money (counter)’	phung ‘custom’
phau ‘to spread (as a blanket)’		
phuu ‘to be pregnant’		
phi̍i̍ ‘to sweep’		
phú̍ú̍ ‘group’		

No minor syllables

/b/

bii ‘pot’	khóó bih ‘grasshopper’	beng ‘cheek’
býý ‘lord, superior’	bah ‘to lie face down’	báng ‘arm’
tsa bee ‘to limp’	tshíng búh ‘owl’	bong ‘box’
bøø ‘to swell’		bung ‘to bend, stoop’
báá ‘to feed (by hand)’	bié ‘word’	
bau ‘to be small (as a hole)’	béi ‘root vegetable’	
pa buu ‘to squint’		
bi̍i̍ ‘to know’		
pa vau bú̍ú̍ ‘bird’s nest’		

Minor syllable: ba béng ‘eggplant’

/t/

~~uu~~ tíí ‘elder sibling’	pa tih ‘to taste’	tíng ‘to plan’
týý ‘to melt’	bih tah ‘to be sincere’	téng ‘to cut’
téé ‘waist’	tuh ‘to hit’	tang ‘to remain’
tøø ‘to sit’		tong ‘to meet’
taa ‘to be old’	tié ‘size’	tung ‘block’
táú ‘to sharpen’	tyo pa tshih ‘to try’	
a túú ‘now’	tei ‘to participate’	
t~~íí~~ ‘testicle’		
t~~úú~~ ‘to plant’		

Minor syllable: ta tah ‘really’

/th/

thýý ‘to hear’	thah ‘to itch’	thíng ‘wood’
théé ‘to scratch (ground)’	thuh ‘to be deep’	théng ‘loom’
th~~øø~~ ‘fat’		thang ‘to knit’
thaa ‘to be new’	thie ‘to transfer’	thóng ‘to punch’
tháú ‘metal’	thýó ‘to sneeze’	sáng thung ‘three’
thuu ‘to be delicious’		
th~~íí~~ ‘blood’		
th~~uu~~ ‘to stink’		

Minor syllable: tha rýý ‘vein’

/d/

dýý ‘to collect into’	dih ‘to return’	ding ‘to drink’
dee ‘to be quiet’	kau dah ‘to be a blabbermouth’	déng ‘to welcome (guests)’
døø ‘to oppose’	duh tshie ‘to be a picky eater’	dang ‘way’
daa khíng ‘bell, gong’		dóng ‘to poke, to prick’
dau ‘to stand’	tháú dié ‘to be weak’	dúng khii ‘to deceive’
dúú ‘to pull’	dýó ‘friend’	
d~~íí~~ ‘to end’		
d~~úú~~ ‘to want’		

No minor syllables

/k/

kýý ‘to be curved, cracked’	kih ‘hand’	kíng ‘to curl’
kee ‘to ascend’	tsá kuh ‘to put your arm	kéng ‘back, rear’
køø ‘to open’	around one’s shoulder’	káng ‘side, shore’
kaa kaa lee ‘between’		kong ‘box’
káú ‘mouth’	kie ‘to fry’	kúng ‘age, year’
kuu ‘to be skinny’	kéí ‘to be next to’	
k~~íí~~ ‘corner’		
k~~úú~~ ‘to be hunchbacked’		

Minor syllable: see ka lee ‘to be bent’

/kh/

khíí ‘to take the outside off of’	khih ‘to be bitter’	khíng ‘to be equal’
khýý ‘to break’	kháh ‘mucus’	khéng ‘to hammer’
khéé ‘to chew’	khuh ‘knee’	khang ‘to protect’
khøø ‘to be able’		khong ‘to crow (as a rooster)’
kháá ‘to close’	khie ‘to go out’	khúng ‘to lock (something
khau ‘to scratch’	khéí ‘to be frozen’	in)’
khúú ‘hole’		
kh~~íí~~ ‘chin, jaw’		
kh~~úú~~ ‘to cough’		

Minor syllable: kha d~~íí~~ ‘drool’

/ʔ/

ʔíí ‘to argue’	ʔih ‘to sleep’	ʔíng ‘house’
ʔýý ‘dog’	teng ʔah ‘at a time’	ʔeng hnáú ‘vegetables’
ʔee ‘to eat’	ʔuh ‘to be burnt’	ʔang ‘to open (as a mouth)’
ʔóó ‘to call’		ʔúng ‘to stay, live, exist’
ʔaa ‘chicken’	ʔei ‘to be salty’	
ʔáú ‘to slice’		
ʔúú ‘to catch with a rope’		
ʔ~~íí~~ khúng ‘bed’		
ʔ~~uu~~ sah ‘to burn’		

Minor syllable: ʔá zong ‘monkey’

/v/

vyy ‘to be cooked’	sa vih ‘rabbit’	víng ‘skin’
véé ‘to visit’	vuh ‘to be heavy for’	veng ‘sky
zee zong vóó tíí ‘of all else’	váh ‘pig’	váng ‘to long for, to miss’
vaa ‘to throw’		vóng ‘to come’
váú ‘to clear (jungle)’		
v~~ii~~ ‘to drill’		

Minor syllable: va tòng ‘to meet’

/s/

síí ‘to go’	sih ‘to be hot’	sing ‘to be wise’
hmỳỳ sýý ‘to be serious’	sah ‘to build’	séng ‘to run’
séé ‘to be crooked’	súh ‘to pound’	sang ‘to scream’
søø ‘to be long’		sóng ‘to invite’
sáú ‘meat’	sie ‘buffalo’	sung ‘to be rare’
suu ‘to squeeze’	sýó ‘to scoop’	
s~~íí~~ ‘to wash, to clean’	séí ‘slave, machine’	
pá s~~uu~~ ‘sugarcane’		

Minor syllable: sa rang ‘animal’

/z/

zíí ‘to comb, to fan’	níng zih ‘to be shy’	zíng ‘to believe, to trust’
zýý ‘to follow’	pá zah ‘to reach for’	zéng ‘to smoke’
zéé léé ‘where’	zuh ‘to leak’	záng ‘to be light’
zǿǿ ‘to fly’		zong ‘to compete’
zaa pah ‘to try to get’	zíé ‘manner, habit, custom’	zúng ‘urine’
záú ‘to be enough’	zýó ‘to keep (as a pet)’	
zuu ‘to be skinny’		
zíí ‘to be wet’		
zuu ‘alcohol’		

Minor syllable: za býý ‘short-tailed rat’

/h/

méé híí ‘charcoal’	nǹǿ híh ‘to be young’	hing ‘to cheat, to lie’
hýý ‘to look for’		héng ‘to stop (as rain)’
hee ‘mango’	híé ‘to be necessary’	hang ‘yawn’
hǿǿ ‘to demand’	hei ‘to be spicy’	hong ‘to open’
háá thýó ‘sneeze’		
hau ‘tooth’		
huu ‘to be lustful’		

No minor syllables

/ts/

tsíí phing ‘needle’	tsih ‘to break, to snap’	tsíng ‘to plant’
tsýý ‘to be short’	tsah ‘to buy’	tséng ‘occasion’
tsøø ‘to sprout’	tsuh ‘lungs’	tsáng ‘to be hard’
tsaa ‘to be dry’		tsong ‘to learn’
tsau ‘one’s share’	tsie ‘to be striped, spotted’	tsúng ‘to pound (with a fist)’
tsúú ‘to dig’	tsýó ‘to sprout’	
tsíí ‘seed’	tséí hei ‘to be rude’	
a tsuu ‘outbuilding’		

Minor syllable: tsá deng ‘to chase, to hunt’

/tsh/

tshíí zúú ‘cat’	tshih ‘to be full’	tshíng ‘to teach, to inform’
tsíí tshyy ‘to be dangerous’	tsháh ‘to be good’	tshéng ‘to talk to’
tshee ‘to hoe’	tshuh ‘to come out’	tshang ‘to grow’
kèè tshǿǿ ‘to ascend’		tshóng ‘to be strong’
tsháá vyy ‘corn’	tshie ‘to be small’	tshung ‘interior’
tsháú ‘to be thick’	nii tshýó ‘sunrise, east’	
tshúú ‘to spit out’		
pá tshii ‘necklace’		
tshúú ‘to confiscate’		

Minor syllable: tshà hnéng ‘to be useful’

/tl/

tsá tlii ‘to be fast’	tlih ‘to break’	tling ‘to attain’
tlyy ‘to miss (as a meeting)’	tlah ‘to boil’	tléng ‘to pour in (liquid)’
tlee ‘to be late’	tluh ‘to be as good as’	tlang ‘rim, edge, border’
tløø ‘to be durable’		tlong ‘to visit (another village)’
tlau ‘to be oily, greasy’		
tl~~uu~~ ‘to fall over, to doze off’		tlúng ‘to arrive, to return’

Minor syllable: tlá møø ‘accidentally’

/thl/

thlee ‘to hang down’	lah thlih ‘brain’	pa thling ‘to soothe (a baby)’
thlǿǿ ‘to oppose’	thláh ‘to put in’	thléng ‘to change’
thlaa ‘bunch (of banana)’		thláng ‘to loosen, to untie’
thláú ‘to let go of’	thlié ‘to break’	thlung ‘to be sweet’
thlúú ‘to weed, hoe, plow’		
thli~~i~~ ‘wind’		
thl~~úú~~ COMPLETIVE		

Minor syllable: thla rǿǿ ‘spirit’

/hm/

hmíí ‘to press’	hmúh ‘to see’	hming ‘to be well-cooked’
hmýý ‘appearance’		hmang ‘to use’
hméé ‘face, front’		
hmau ‘wound’		
hmúú ‘lips, beak’		
hm~~íí~~ ‘body hair, fur’		
hm~~úú~~ ‘to blow’		

Minor syllable: hmà sáú ‘to be first’

/m/

míí ‘goat’	mih ‘eye’	ming ‘name’
mýý ‘to be dark’	mah ‘to be rare’	méng ‘cost, price’
méé ‘fire’		máng ‘dream’
ra møø ‘wild bamboo’	mie ‘to pinch and twist’	mong ‘morning’
máá máá ‘cooked rice’	méí méí ‘breast, udder’	
mau ‘to rot, to decay’		
múú tshie ‘to blame’		
m~~íí~~ phíng ‘race, tribe, nation’		

Minor syllable: ma thláú ‘wing’

/hn/

hnýý ‘to have’	hnáh ‘ribs, flank’	hning ‘to be in the back’
hnee ‘pus’		pá hneng ‘to comfort’
hnaa ‘to sulk, to be upset’	pá hnei ‘to be slippery’	hnáng ‘to kiss’
hnáú ‘sinuses’		
hnúú ‘to wipe’		
hn~~íí~~ ‘to know’		

Minor syllable: hná khuu ‘nose’

/n/

néé ‘to be close’	níh ‘to be easy’	níng ‘to bother’
n~~øø~~ ‘to be soft’	nah ‘to hide (one’s self)	néng ‘to be short’
naa z~~ii~~ ‘clock’	tsá nuh ‘to be female’	náng ‘to push, to compress’
nau ‘ear’		nóng ‘to be happy’
núú ‘mother’	nyo ‘to headbutt’	
n~~ii~~ ‘day, sun’	nei ‘to enter’	

Minor syllable: na máá ‘you (emphatic)’

/ng/

ngii ‘to balance’		ngéng ‘flesh’
ngee lang ‘shank, calf’		ngáng ‘to dare’
ng~~øø~~ ‘to cut’		ngúng ‘silver’
ngáú ‘fish’		

No minor syllables

/hl/

hlýý ‘to be extra’	pá hlah ‘to mix’	hling ‘thorn’
hléé ‘to slice open’		hleng ‘before, long ago’
pá hl~~øø~~ ‘to be startled’	a hlyo ‘saw’	hlang ‘to borrow, to lend’
hláú ‘song’		pá hlong ‘to wrap’
hlúú ‘earnings’		tsá hlung ‘to surround’
khyy hl~~ii~~ ‘boil’		
hl~~uu~~ ‘to be many’		

No minor syllables

/l/

líí ‘bottom, anus’	pá lih ‘to turn over’	ling ‘to roll (something up)’
lyy ‘earth, dirt’	lah ‘to pick up’	leng ‘to persuade’
lee ‘and, with’		lang ‘to dance’
l~~øø~~ ‘farm’	lié ‘to lick’	lóng ‘to celebrate’
láú ‘to pick up (imperative)’		lúng ‘rock’
lúú ‘to resemble’		
týý l~~ii~~ ‘pond, lake’		
l~~uu~~ ‘head’		

Minor syllable: la hméé ‘tail’

/hr/

ee hríí ‘turmeric, yellow’	hrih ‘lice’	hring ‘to live’
hryy ‘to lead, to guide’	hrah ‘to be sharp’	hreng ‘to punish’
hréé ‘to work’	hruh ‘to be stupid, crazy’	hrang ‘to be angry’
hrøø ‘to argue’		hrong ‘to follow (a path)’
bee pa hráú ‘yam’	tsa hrie ‘to avoid’	
hrúú ‘to insert’	týý hréí ‘to be thirsty’	
tsa hr~~íí~~ ‘floor’		
tsà hr~~úú~~ ‘to cover’		

Minor syllable: hra tǿǿ ‘stairs

/r/

rii ‘to read, to count’	rih ‘to be heavy’	ríng ‘to regret’
rýý ‘string’	rah ‘corpse’	reng ‘work’
røø ‘to be dry’	ruh ‘to steal’	rang ‘country’
ráú ‘to scold’		róng ‘neck, throat’
rúú ‘to burn, to grill’	rie ‘to grind’	rung ‘to be rich’
r~~úú~~ ‘bone’	ryo ‘to roll’	
r~~ii~~ ‘guts’	rei ‘war’	

Minor syllable: ra tyy ‘edible bamboo’

Appendix C. Correspondences between Proto-Kuki-Chin, Hakha Lai, Three Varieties of Zophei, Hnaring Lutuv, Mara, and Zotung

Abbreviations	
PKC:	Proto-Kuki-Chin (Van Bik, 2009)
H. Lai:	Hakha Lai (Van Bik, 2009)
TRZ:	Tlawngrang Zophei (field data)
NTZ:	Nuitah Zophei (field data)
LTZ:	Lawngtlang Zophei (field data)
H. Lutuv:	Hnaring Lutuv (field data)
Mara:	Mara (Van Bik, 2009)
Zotung:	Zotung (Shintani, 2015)

TRZ /x/	**LTZ /x/**	**PKC /x/**	**PKC**	**H. Lai**	**TRZ**	**NTZ**	**LTZ**	**H. Lutuv**	**Mara**	**Zotung**	**Gloss**
/ii/	/i̵i̵/	/*ii/	*khlii	thlîi	thlii	thli̵i̵	thli̵i̵	thli̵i̵	thlì	khì væ̀ khì sà̰	wind
		/*iʔ/	*kriʔ	t̨iʔ	tsíí	tsí̵í̵	tsí̵í̵	tsi̵i̵	tsí	rí	to fear
		/*iit/	*hniit	hniit-I hniʔ-II	hníí	hní̵í̵	hní̵í̵	hning	hnó	mò̰	to blow (one's nose)
		/*iat/ or /*iak/	*phiat or *phiak	phiak-I phiaʔ-II	phíí	phíá	phí̵í̵	phi̵i̵ [p^{h}si̵i̵]	phí	phí	to sweep
		/*il/	*kil	kìl	kíí	kí̵í̵	kí̵í̵	ki̵i̵	kí	sà kí	angle, corner, horn
		/*uul/	*ruul	rûul	pá rii	pá ri̵i̵	pá ri̵i̵	pa ri̵i̵	pā-rì	hù pò[94]	snake
		/*ul/	*kul	kûl	sáng kii	sáng ki̵i̵	sáng ki̵i̵	soo ki̵i̵	pa-kì	θà̰ kúĩ́	twenty
/ia/	/ie/	/*ia/	*ɓia	bĭa	bíá	bìà	bié	bie	bī	ɓúá	word

[94] This may not be cognate, but it is possible that *hu* corresponds to H. Lai *rûul*.

		/*ial/	*hrial	hrîal-I hrl̊al-II	tsá hria	hria	tsa hrie[95]	tsa hr̥i̥	tsā-hrì	-	to avoid
		/*er/	*pher	phêr	á phia	a phia	phie	a phaa	-	phìà	mat
		/*erʔ/	*merʔ	merʔ	mia	mia	mie	tsa maa	tsā-mì	-	to twist
		/*iaw/	*haʔ thiaw	haʔ-thĭaw	há thió	há thìò	háá thýó	ha thɯɯ	há-thī	hà chí	to sneeze
/ih/	/ih/	/*ik/	*hrik	hrik	hrih	hrih	hrih	a hr̥i̥	hrī	ɕíʔ	louse
		/*ut/	*kut (or *khut)	kut	kih	kih	kih	k̥u̥u̥	kū	kúíʔ	hand
/ing/	/ing/	/*im/	*ʔim	ʔîn	íng	íng	íng	ing	ó	ʔḯ	house
		/*iin/	*riin	rĭin	ríng	ríng	ríng	tsa r̥i̥	rò	-	to make a line
		/*in/	*thin	thĭn	thíng	thíng	thíng	th̥i̥	pa-thī	phl̂	liver
		/*iiŋ/	*thiiŋ	thîiŋ	ee síng	ai sing	ee sing	ie sing	-	-	ginger
		/*iŋ/	*thiŋ	thîŋ	thíng	thíng	thíng	thing	thó	thḯ	tree, wood
		/*ir/	*kir	kîr-I kĭr-II	kíng	king	kíng	kəng	tsā-kú	kòè	to curl
		/*eŋ/	*hleŋ	hlêŋ-I hlĕn-II	hing	hing	hing	həng	-	lḯ ‘cheat’ ʔa hu̍ ‘lie’	to lie, cheat
		/*oon/	*ɗoon	-	díng	díng	ding	dəng	dò	-	to drink
		/*uum/	*yuum	zŭum-I zumʔ-II	zíng	zíng	zíng	zəng	zó	ju̍/ju̍	to believe
		/*um/	*tum	tûm-I tŭm-II	tíng	tíng	tíng	-	-	-	to plan
		/*un/	*phun	phŭn	phíng	phíng	phíng	phəng	phō	-	clan, kind
		/*uŋ/	*hnuŋ (or *nuŋ)	hma-nùŋ	hning	hn̥i̥	hning	hnəng	-	nù lḁ	back
/ing/	/i̥i̥/	/*ii/	*nii	nîi	ning	n̥i̥	n̥i̥	ning	nò	nḯ (sun) nl̂ (day)	day, sun
		/*ul/	*hmul (or *mul)	hmûl	hmíng	hm̥íi̥	hm̥íi̥	hming	-	mḯ	hair

[95] Our LTZ language assistant also notes variable use of the monophthongal *tsa hrii*, as in Mara.

/ee/	/ee/	/*ian/	*rian	rĭan	hréé	hrai	hréé	hrie	rāi	rúá	to work
		/*ee/	*lee	lĕe	léé	léé	lee	hnee	-	té	and, with
		/*eʔ/	*weʔ	veʔ	véé	váí	véé	vee[96]	-	pæ̀ ɓùà	to visit
		/*eel/	*hmeel	-	hméé	hmáí	hméé	hmie	-	mǽ	face
		/*al/	*ŋal	ŋâl	ngee láng	ngee	ngee lang	ngie luo	ngià lý	-	shin
		/*aay/	*waay	văay-I vayʔ-II	vee	-	vee	vie	pā-vīa	-	to stray
		/*ay/	*tay	tây-I tăy-II	téé	táí	tee	tee	tèi	tæ̀	to win
		/*ooy/	*phooy	phôoy-I phŏoy-II	phéé	pháí	phéé	phie	phía	-	to uproot
/ee/	/ei/	/*al/	*pa-sal	pa-sâl	pa séé	pa séé	pá séí	-	-	-	husband
/ee/	/øø/	/*aaw/	*khaaw	khăaw-bok	khéé bah	-	khǿǿ bih	khoo bɯə pəə	-	-	grasshopper
/ei/	/ei/	/*aal/	*raal	râal	rei	ree	rei	tsa rie	tsā-rìa	rò	enemy, war
		/*al/	*ʔal	ʔâl-I ʔăl-II	ei	ee	ei	ie	ìa	ʔa ʔè	to be salty
		/*el/	*tel	tèl-I tĕl-II	tei	tee	tei	tee	-	-	to participate
/ei/	/ee/	/*ay/	*phay	phây-I phăy-II	phei	phai	phee	phie	-	-	to be horizontal
/ei/	/ii/	/*ee/	*mee	me-heʔ	méi	míí	míí	mie	mi	ɲíá	goat
		/*eʔ/	*θeʔ	-	sei	síí	síí	sii[97]	sī	θéʔ	to go
		/*eel/	*ɓeel	bêel	bei	bii	bii	bii	bèi	-	pot
		/*ool/	*mool	mòol-mok-I mŏol-mok-II	mei	mii	mii	mɯə	-	ʔa ŋúéʔ	to be dull

[96] Specifically used to visit someone who is sick.
[97] This only means ‘travel’ in Lutuv, as in ‘to go far’.

/eh/	/eh/	/*iat/	*riat	pa-riat	sáng réh	sán reh[98]	sáng réh	suo tsa rii	pā-tsā-rí	tá rʉ̀à	eight
/eh/	/ih/	/*ik/	*mik	mit	meh	mih	mih	ming	mō	míʔ	eye
		/*iap/	*tiap (or *tiam)	tep-I teʔ-II	pá teh	teh	pa tih	-	-	ʔæ̀ tùà	to taste
		/*eet/	*leet	leet	leh	leh	pa líh	-	-	líá	to change (one's mind)
		/*eek/	*ʔeek	ʔeek	éh	eh	íh	ii	-	ʔíá	feces
		/*at/	*sat-II (*saa-I)	sâa-I sat-II	seh	seh	sih	səə	sà	ʔa sò	to be hot
/øø/	/øø/	/*ewʔ/	*tewʔ	tewʔ	tʊ́ʊ́	tóí	tʊ́ʊ́	pa-tii	pa-tei	thæ̀	to bite
		/*aar/	*kaar	kăar	tsá køø	kaa	tsa køø	-	-	-	to separate
		/*ay/	*ray	-	rʊ́ʊ́	rói	rʊ́ʊ́	ruu	rēi	ʔa ròù	to take a long time
		/*aaw/	*maaw	mâaw	rá møø	-	ra møø	aa rɨ̀ɨ	rā-mò	-	bamboo
		/*aw/	*ɓaw	bàw	bøø	boi	bøø	buu	bàù	-	to swell, to bump up
		/*oyʔ/	*khoyʔ	khoyʔ	khʊ́ʊ́	khuu	khʊ́ʊ́	khyə	-	-	to dig, touch
		/uaŋ/ or /uan/	*yuaŋ-I *yuan-II	zûaŋ-I zûan-II	zøø	zói	zʊ́ʊ́	zuu	á zó	ʔa jʉ̀	to fly
/aa/	/aa/	/*aa/	*lay-ɓaa	lây-bàa	lúí baa	lui bɔɔ	lyy báh	lyy buu	lì-bà	læ̀	debt
		/*aar/	*tsaar	tsâar-I tsăar-II	tsaa	tsaa	tsaa	tsaa	tsá	-	to be dry
		/*ar/	*thar	thâr-I thăr-II	thaa	thaa	thaa	thaa	thì	ʔa thò	to be new
		/*oor	*woor-I) (*worʔ-II)	vòrʔ-I vôrʔ-II	váá	váá	vaa	vaa	-	vùà	to throw (at)
/ai/	/eng/	/*iam/	*thiam	thîam-I thĭam-II	thái	théng	théng	thee	thái	thɤ́ thʊ́á	to be skillful in
		/*ian/	*rian	rĭan	rái	réng	reng	ree	rāi	rʊ́á ló	work

[98] NTZ data shows evidence of anticipatory assimilation of nasal place to a following consonant. This phenomenon is not found in LTZ or TRZ data and merits further research.

		/*iaŋ/	*liaŋ	lîaŋ	lai	leng	leng	lee tung	-	-	shoulder
		/*eem/	*peem	pêem-I pěem-II	pai	peng	peng	pee	pài	pía	to migrate
		/*em/	*hrem	hrêm-I hrěm-II	hrái	hréng	hreng	hrii	hrí[99]	-	to torture to punish
		/*en/	*kh(r)en	khên-I khěn-II	tsháí	tshéng	tsheng	tshee	tshài	mứá kúú	to separate, to get divorced
		/*eeŋ/	*tleeŋ	tleŋʔ	tláí	tléng	tléng	pa tlee	-	ʔa thɯ̀à	to pour in, to rinse
		/*eŋ/	*beŋ[100]	bèŋ-I běn-II	báí	béng	béng	-	-	-	to press, to cram
		/*am/	*tsam	tsăm	tsáí	tséng	tséng	dʒuo	-	-	occasion
		/*aan/	*haan	hâan-I hăan-II	hai	héng	héng	-	hía	húé và̀	to cease
		/*an/	*tan	tân-I tăn-II	táí	téng	téng	tee	tái	-	to cut off
		/*aw/	*ɗaw	dâw-I dăw-II	dái	déng	deng	~~tɯɯ~~ dee	dàù	ɗứ kú	to fight
		/*oon/	*roon	rŏon-I ronʔ-II	rái	réng	reng	roo	rỳ	-	to pour in
/ai/	/ee/	/*aay/	*hlaay (or *lay)	hlâay-I hlăay-II	hláí	hláí	hléé	-	-	-	to operate
/au/	/uu/[101]	/*aw/	*thaw	thâw-I thoʔ-II	thau	thúú	thuu	thuu	thú	thǽ kú thó kú	to get up
		/*oo/	*ʔoo	ʔòo	áú	úú	úú	yə	ú	-	voice
		/*oʔ/	*soʔ	soʔ	sáú	súú	suu	-	sù	-	to pierce
		/*oop/	*hroop	hroop-I hroʔ-II	hrau	hrúú	hruu	pa hrii	-	-	to eat (porridge)

[99] Van Bik (2009) notes Mara monophthongization is a secondary development
[100] Van Bik (2009) reconstructs this only for Proto-Central Chin, so it has /b/ rather than /ɓ/
[101] *réí áú* TRZ *rii áú* LTZ 'to stutter' shows /au/ in both dialects (from PKC *aa)

		/*olʔ/	*holʔ	holʔ	háú	húú	húú	-	-	-	to poke
		/*oy/	*zoy[102]	zôy-I zŏy-I	zau	zuu	zuu	zyə	-	-	to be skinny
		/*uu/	*nuu	nûu	náú	nuu	núú	nung	nó	nṍ	mother
		/*uk/	*hruk (or *ruk)	hruk	hrau	húú	húú	hruu	-	-	to put on clothes
		/*um/	*yum	zûm-I zŭm-II	pá zau	zung	pa zuu	-	pa-zo	ʔa jű̍	to be sharp, pointed
		/*uur/	*hmuur	hmŭur	hmáú	hmúú	hmúú	hmɯɯ	hmū	mo̍	lips
		/*uuy/	*tuuy	-	thau	thuu	thuu	-	-	mú̱á rù̱à thù̱à	to be tasty
		/*ua/	*ɗua-I (*dua-II)	dŏo-I doot-II	dáú	dúú	dúú	dyə	-	-	to love
/ah/	/ah/	/*at/	*phrat-II (*phraa-I)	thră-I thrat-II	tshah	tshah	tsháh	phəə	phā	-	to be good
		/*aak/	*khaak	khaak	khah	khah	kháh	duo khaa	dà-khó	-	mucus
		/*ak/	*sak-II (*saa-I)	săa-I sak-II	sah	sah	sah	səə	sā	sàʔ	to build
/ang/	/ang/	/*em/	*lem-I (*lemʔ-II)	lemʔ	láng	láng	láng	-	-	-	to swallow
		/*aam/	*laam	lâam-I lăam-II	lang	lang	lang	luo	là	ʔa lò	to dance
		/*am/	*sʰam	sâm	sáng	sáng	sáng	suo	sá	sa̍	hair (head)
		/*aan/	*ɓaan	bâan	bang	beng	báng	buo	bá	-	arm
		/*an/	*klan-I (*klanʔ-II)	tlăn-I tlanʔ-II	tláng	tláng	tláng	aa thləə	tsā-tlāi	-	to redeem
		/*aaŋ	*klaaŋ	tlâaŋ	tlang	tlang	tlang	tluo	tlà	-	hill, mountain
		/*aŋ/	*ɗaŋ	dâŋ	dang	dang	dang	duo	dà	-	palate
/oo/	/au/	/*iir/	*thiir	thîir	thóó	thóó	tháú	thaa	thúá	-	metal

[102] **zoy* is only reconstructed for Proto-Central Chin.

				(or thîar)							
		/*aa/	*thaa	thâay-I thăay-II	thóó	thóó	tháú	thaa	thá	thò jő	strength
		/*aʔ/	*taʔ	taʔ	tóó	tóó	táú	taa	-	tə́	to measure
		/*aar/	*hnaar	hnăar	hnóó	hnóó	hnáú	hnaa tsa ~~buu~~	-	nà	nose, sinus
		/*oŋ/	*ŋoŋ	ŋòŋ-I ŋŏn-II	ngoo	ngóó	ngáú	ngaa	-	-	to lack sense
		/*or/	*klor	tlôr-I tlŏr-II	tlóó	tloi	tlau	tlyə	tlù	-	to be oily
/oh/	/ah/	/*ook/	*rook	rook-I roʔ-II	roh	rah	rah	rəə	rú	-	to break down
		/*ok/	*wok	vok	voh	vah	váh	vəə	vū	vóúʔ	pig
/oh/	/uh	/*uap/	*tsuap	tsuap	tsoh	tsuh	tsuh	pa tsəə	pā-tsú	túá	lung
/ong/	/ong/	/*im/	*hnim	hnîm-I hnĭm-II	nóng	nóng	nóng	noo	-	-	to dip
		/*oom/	*ɓoom	bôom	bong	bong	bong	boo	bỳ	héʔ ɓɔ̃	box, basket
		/*om/	*pom	pôm-I pŏm-II	póng	pong	pong	poo	pù	pɔ̀	to carry
		/*ooŋ/	*hooŋ	hôoŋ	hong	hong	hong	hoo	hỳ	ʔa fú	cover
		/*oŋ/	*ɗoŋ (or *toŋ)	dŏŋ	dong	dóng	dóng	-	dó	-	cubit
		/*olʔ/	*kolʔ	kolʔ	kong	kóng	kóng	-	-	-	to be bald
		/*uam/	*nuam-I (*nuamʔ-II)	nŭam-I nuamʔ-II	nong	nóng	nóng	nuo	-	nò θó	to be happy, comfortable
		/*uaŋ/	*khuaŋ	khûaŋ	khong	khong	khóng	aa khəŋ	khò	khúá	drum
/uu/	/~~uu~~/	/*uu/	*yuu	zùu	pá zúú	pa z~~úú~~	pá z~~uu~~	pa z~~uu~~	pā-zʉ́	pà jú	rat, mouse
		/*uʔ/	*ɗuʔ	duʔ	dúú	d~~úú~~	d~~úú~~	-	dū̃	-	to want
		/*uum/	*suum (or *siim)	sŭum	pá súú	pa s~~úú~~	pá s~~uu~~	pa t~~uu~~	-	tùà	to grasp

		/*uul/	*kuul	kûul-I kŭul-II	kuu	ku̶u̶	kúú	kung	-	-	to be hunchbacked
/uh/	/uh/	/*uʔ/	*hmuʔ-II (*hmuu-I)	hmŭu-I hmuʔ-II	hmuh	hmuh	hmúh	hmung	hmō	múíʔ	to see
		/*uut/	*ʔuut	ʔuut-I ʔuʔ-II	uh	uh	uh	u̶u̶	úɯ	ʔù	to burn
		/*uuk/	*thuuk	thuuk-I thuʔ-II	thuh	thuh	thuh	thu̶u̶	thúɯ	-	to be deep
		/*uk/	*ruk	pa-ruk	sáng rúh	sán ruh[103]	sáng rúh	suo tsa ru̶u̶	pā-tsá-rūɯ	tá rúʔ	six
		/*uak/	*puak-II (*pua-I)	pùa-I puak-II	puh	puh	púh	pɯɯ	pī	-	to carry a person (on back)
/uu/	/uh/	/*up/	*kup	kup-I kuʔ-II	tsá kúú	kúú	tsá kuh	-	-	-	to surround, to embrace
/ui/	/yy/	/*ay/[104]	*lay	lây	lui	lui	lýý	pa lyy	pā-lei	læ̀	tongue
		/*ool/	*hool	hôol-I hŏol-II	húí	húí	hýý	hu̶u̶	-	-	to search for
		/*ooy/	*ɓooy	bòoy	búí	búí	býý	byy	béi	-	master
		/*oy/	*poy	pòy-moʔ-I pŏy-moʔ-II	púí moo	púí	pyy mau	pyy pəə	-	-	to matter
		/*uuy/	*ruuy	rĭi-I riit-II	rúí	rúí	rýý	pa ri̶i̶	pā-rī	rùì	to be drunk
		/*uy/	*tuy	tîi	túí	tuí	týý	ti̶i̶	tí	túí	water
		/*uyʔ/	*ʔuyʔ	ʔuyʔ	ui	úí	yy	-	-	-	to be rotten
		/*uay/	*tuay	tûay	rá tui	ra tui	ra tyy	a ri̶i̶ tyy	tèì	rùʔ túé	edible bamboo
/ua/	/uo/	/*ul/	*kul-I (*kulʔ-II)	kulʔ	tsá kúá	kúá	tsá kuo	-	-	kùèʔ lú	to surround

[103] See footnote 97.
[104] See also *lui baa* ‘debt’ where Mara has ‘lii’

		/*ua/	*khua	khûa	khua	khua	khúó	khɯɯ	khì	khùà	village
		/*uaʔ/	*tuaʔ	tuaʔ	túá	tua	týó	tyə	tú	tùà	to do
		/*ual/	*hrual	hrûal-I hrŭal-II	rúá	rúá	ryo	-	-	-	to roll
		/*uar/	*yuar	zûar-I zŭar-II	zúá	zúá	zyo	zaa	zùa	jùà	to sell
/ung/	/ung/	/*uum/	*puum (or *ɓuum)	pŭum-I pumʔ-II	pung	púng	pung	pəng	pō	ʔa pu̍̃	to be round, to be piled
		/*um/	*tum	tŭm	tung	tung	tung	tong	tō	tō̤	block, post
		/*uun/	*ŋuun	ŋûun	ngúng	ngúng	ngúng	nguu	ngò	-	silver
		/*un/	*yun	zûŋ-I zŭn-II	zúng	zúng	zung	zung	pā-zō	ʔa jṳ̃	to urinate
		/*uŋ/	*phuŋ	phûŋ	phung	phung	phung	phung	phau	phō̤ thó	custom

Appendix D. Lawngtlang Zophei Verbal Complex

Underlying toneless verbs: tshuh ‘leave,’ miing ‘watch,’ sah ‘build’
Underlying High Tone verbs: túh ‘hit,’ báá ‘feed,’

Part I. Intransitive contexts

Intransitive Affirmative Declarative

1) kaa/naa/aa tshùh/túuh/mìing/báa
   1SS/2SS/3SS leave/hit/watch/feed
   ‘I/you/she left/hit self/watched self/fed self.’ **CONTEXT D**

2) kaa tshùh/tuh/mìing/baa héé píh
   1PS leave/hit/watch/feed PL 1PS
   ‘We left/hit self/fed self/watched self.’

3) naa tshùh/tuh/mìing/baa héé tsíh
   2PS leave/hit/watch/feed PL 2PS
   ‘Y’all left/hit self/watched self/fed self.’

4) aa tshùh/tuh/mìing/baa héé
   3PS leave/hit/watch/feed PL
   ‘They left/hit self/watched self/fed self..’

Intransitive Affirmative Interrogative

5) kaa/naa/aa tshùh máá/tuh máa/mìing maa/baa máa
   1SS/2SS/3SS leave Q/hit Q/watch Q/feed Q
   ‘Did I/you/she leave/hit self/watch self/feed self?’

6) kaa tshùh/tuh/mìing/baa héé píh máa
   1PS leave/hit/watch/feed PL 1PS Q
   ‘Did we leave/hit each other/watch each other/feed each other?’

7) naa tshùh/tuh/mìing/baa héé tsíh máa
   2PS leave/hit/watch/feed PL 2PS Q
   ‘Did y’all leave/hit each other/watch each other/feed each other?’

8) aa tshùh/tuh/mìing/baa héé máá
   3PS leave/hit/watch/feed PL Q
   ‘‘Did they leave/hit each other/watch each other/feed each other?’

Intransitive Negative Declarative

9) a tshùh mà/tuh mà/mìing ma/báa mà nih/píh
PFX leave NEG/hit NEG/watch NEG/feed NEG 1SS/1PS
'I/We didn't leave/hit self/watch self/feed self.'

10) a tshùh bà/tuh bà/mìing ba/báa bà tsih/tsíh
PFX leave NEG/hit NEG/watch NEG/feed NEG 2SS/2PS
'You/Y'all didn't leave/hit self/watch self/feed self.'

11) a tshùh bèh/tuh béeh/mìing beh/báa béeh Ø
PFX leave NEG/hit NEG/watch NEG/feed NEG 3SS
'She didn't leave/hit self/watch self/feed self.'

12) a tshùh bà/tuh bà/mìing ba/báa bà héé Ø
PFX leave NEG/hit NEG/watch NEG/feed NEG PL 3PS
'They didn't leave/hit self/watch self/feed self.'

Intransitive Negative Interrogative

13) a tshùh ma/tuh mà/mìing ma/baa mà nih máa
PFX leave NEG/hit NEG/watch NEG/feed NEG 1SS Q
'Didn't I leave/hit myself/watch myself/feed myself?'

14) a tshùh ba/túuh bà/mìing ba/báa bà tsih máa
PFX leave NEG/hit NEG/watch NEG/feed NEG 2SS Q
'Didn't you leave/hit yourself/watch yourself/feed yourself?' **CONTEXT C**

15) a tshùh beh/tuh bèh/mìing beh/baa bèh Ø maa
PFX leave NEG/hit NEG/watch NEG/feed NEG 3SS Q
'Didn't she leave/hit herself/watch herself/feed herself?'

16) a tshùh ma/tuh mà/mìing ma/baa mà píh máa
PFX leave NEG/hit NEG/watch NEG/feed NEG 1PS Q
'Didn't we leave/hit each other/watch each other/feed each other?'

17) a tshùh ba/tuh bà/mìing ba/baa bà tsíh máa
PFX leave NEG/hit NEG/watch NEG/feed NEG 2PS Q
'Didn't y'all leave/hit each other/watch each other/feed each other?'

18) a tshùh ba/tuh bà/mìing ba/baa bà héé Ø máá
PFX leave NEG/hit NEG/watch NEG/feed NEG PL 3PS Q
'Didn't they leave/hit each other/watch each other/feed each other?' **CONTEXT F**

Intransitive Affirmative Imperative

19) A tshùh/túuh/mìing/báa
PFX leave/hit/watch/feed
'Leave/hit yourself/watch yourself/feed yourself. **CONTEXT G**

20) A tshùuh/túuúh/mìing/báaá
PFX leave/hit/watch/feed
'Leave/Hit yourselves/Watch yourselves/feed yourselves.'

Intransitive Negative Imperative

21) A tshùh/tuh/mìing/baa kheh
PFX leave/hit/watch/feed PROHIB
'Don't leave/hit yourself/watch yourself/feed yourself.' **CONTEXT H**

22) A tshùh/tuh/mìing/baa kheéh
PFX leave/hit/watch/feed PROHIB
'Don't watch/feed yourselves'

Part II. Transitive contexts

Transitive Affirmative Declarative

23) na/a pá sah/tuh/míing/báa
2SS/3SS 1SO build/hit/watch/feed
'You/she built/hit/watched/fed me.'

24) naa/aa pa sah/tuh/míing/báa
2PS/3PS 1SO build/hit/watch/feed
'Y'all/they built/hit/watched/fed me.'

25) ka/a tsá sah/tuh/míing/báa
1SS/3SS 2SO build/hit/watch/feed
'I/she built/hit/watched/fed you.'

26) kaa/aa tsa sah/tuh/míing/báa
1PS/3PS 2SO build/hit/watch/feed
'We/they built/hit/watched/fed you.'

27) ka/na/a Ø sah/túh/míing/báá
1SS/2SS/3SS 3SO build/hit/watch/feed
'I/you/she built/hit/watched/fed him.' **CONTEXT A**

28) kaa/naa/aa Ø sah/tuh/miing/báá
1PS/2PS/3PS 3SO build/hit/watch/feed
'We/y'all/they built/hit/watched/fed him.'

29) na/naa/a/aa ma sah/tuh/míing/báá
2SS/2PS/3SS/3PS 1PO build/hit/watch/feed
'You/y'all/she/they built/hit/watched/fed us.'

30) ka/a tsá sah/tuh/míing/báá héé
1SS/3SS 2PO build/hit/watch/feed PL
'I/she built/hit/watched/fed y'all.'

31) kaa/aa tsa sah/tuh/miing/baa héé
1PS/3PS 2PO build/hit/watch/feed PL
'We/they built/hit/watched/fed y'all.'

32) ka/na/a Ø sah/tuh/míing/báá héé
1SS/2SS/3SS 3PO build/hit/watch/feed PL
'I/you/she built/hit/watched/fed them.'

33) kaa/naa/aa Ø sah héé/tuh héé/miing hée/báá héé
1PS/2PS/3PS 3PO build PL/hit PL/watch PL/feed PL
'We/y'all/they built/hit/watched/fed them.'

Transitive Affirmative Interrogative

34) na/a pá sah máá/tuh máá/míing máa/báá máa
2SS/3SS 1SO build Q /hit Q /watch Q /feed Q
'Did you/she build/hit/watch/feed me?'

35) naa/aa pa sah máá/tuh máá/miing máa/baa máa
2PS/3PS 1SO build Q /hit Q /watch Q /feed Q
'Did y'all/they build/hit/watch/feed me?'

36) ka/a tsá sah máá/tuh máá /míing máa/báá máa
1SS/3SS 2SO build Q /hit Q /watch Q /feed Q
'Did I/she build/hit/watch/feed you?'

37) kaa/aa tsa sah máá/tuh máá/miing máa/baa máa
1PS/3PS 2SO build Q/hit Q/watch Q/feed Q
'Did we/they build/hit/watch/feed you?' **CONTEXT B**

38) ka/na/a Ø sah máá/tuh máá/míing máa/báá máá
1SS/2SS/3SS 3SO build Q/hit Q/watch Q/feed Q
'Did I/you/she build/hit/watch/feed him?'

39) kaa/naa/aa Ø sah máá/tuh máá/miing máa/báá máá
1PS/2PS/3PS 3SO build Q/hit Q/watch Q/feed Q
'Did we/y'all/they build/hit/watch/feed him?'

40) na/naa/a/aa ma sah máá/tuh máá/míing máa/báá máá
2SS/2PS/3SS/3PS 1PO build Q/hit Q/watch Q/feed Q
'Did you/y'all/she/they build/hit/watch/feed us?'

41) ka/a tsá sah/tuh/míing/báá héé máá
1SS/3SS 2PO build/hit/watch/feed PL Q
'Did I/she build/hit/watch/feed y'all?'

42) kaa/aa tsa sah/tuh/miing/baa héé máá
1PS/3PS 2PO build/hit/watch/feed PL Q
'Did we/they build/hit/watch/feed y'all?'

43) ka/na/a Ø sah héé máá/tuh héé máá/míing héé máa /báá héé máá
1SS/2SS/3SS 3PO build PL Q/hit PL Q/watch PL Q/feed PL Q
'Did I/you/she build/hit/watch/feed them?'

44) kaa/naa/aa Ø sah/tuh/miing/báá héé máá
1PS/2PS/3PS 3PO build/hit/watch/feed PL Q
'Did we/y'all/they build/hit/watch/feed them?' **CONTEXT E**

Transitive Affirmative Imperative

45) sáah/túuh/miing/báá
build/hit/watch/feed
'Build it!/Hit it!/Watch it!/Feed him!'

46) sáaáh/túuúh/miíng/báaá
build.PL/hit.PL/watch.PL/feed.PL
'Build it!/Hit it!/Watch it!/Feed him!' (plural addressee)
or 'Build/Hit/Watch/Feed them' (singular or plural addressee)

47) pa sáah/túuh/mìing/báa
1SO build/hit/watch/feed
'Build/Hit/Watch/Feed me!'

48) ma sááh/túúh/miing/báá
1PO build/hit/watch/feed
'Build/Hit/Watch/Feed us!'

49) sáah/túuh/míing/báá hee píh
build/hit/watch/feed PL.IRR 1PS
'Let's build it./hit it./watch it./feed him.'

Transitive Negative Declarative

50) tsa sah mà/tuh mà/mìing ma/baa mà nih/níh
2SO build NEG/hit NEG/watch NEG/feed NEG 1SS/1SS.PL
'I didn't build/hit/watch/feed you/y'all.'

51) Ø sah mà/tuh mà/miing ma/báá ma nih
3SO build NEG/hit NEG/watch NEG/feed NEG 1SS
'I didn't build/hit/watch/feed him.'

52) Ø sah mà/tuh mà/miing ma/báá ma níh
3PO build NEG/hit NEG/watch NEG/feed NEG 1SS.PL
'I didn't build/hit/watch/feed them.'

53) tsa sah mà/tuh mà/mìing ma/baa mà píh
2SO build NEG/hit NEG/watch NEG/feed NEG 1PS
'We didn't build/hit/watch/feed you.'
or 'We didn't build/hit/watch/feed y'all.'

54) Ø sah mà/tuh mà/miing mà/báá ma píh
1SO build NEG/hit NEG/watch NEG/feed NEG 1PS
'We didn't build/hit/watch/feed him.'
or 'We didn't build/hit/watch/feed them.'

55) pa sah bà/tuh bà/mìing ba/baa bà tsih
1SO build NEG/hit NEG/watch NEG/feed NEG 2SS
'You didn't build/hit/watch/feed me.'

56) Ø sah bà/tuh bà/miing ba/báá ba tsih
3PO build NEG/hit NEG/watch NEG/feed NEG 2SS
'You did not build/hit/watch/feed him.'

57) ma sáh/túh/miing/báá ba tsih
1PO build/hit/watch/feed NEG 2SS
'You did not build/hit/watch/feed us.'

58) Ø sah ba/tuh bà/miing ba/báá ba tsíh
3PO build NEG/hit NEG/watch NEG/feed NEG 2SS.PL
'You did not build/hit/watch/feed them.'
'Y'all did not build/hit/watch/feed him/them

59) ma/Ø sah ba/túh ba/miing bà/báá ba tsíh
1PO/3PO build NEG/hit NEG/watch NEG/feed NEG 2SS.PL
'Y'all did not build/hit/watch/feed us/them.'

60) pa sah bà/tuh bà/mìing ba/baa bà tsíh
1SO build NEG/hit NEG/watch NEG/feed NEG 2PS
'Y'all didn't build/hit/watch/feed me.'

61) pa/tsa/Ø sah bèh/tuh bèh/mìing beh/báá beh Ø
1SO/2SO/3SO build/hit/watch/feed NEG 3SS
'She didn't build/hit/watch/feed me/you/him'

62) ma sáh/túh/miing/báá beh Ø
1PO build/hit/watch/feed NEG 3SS
'She didn't build/hit/watch/feed us'

63) tsá sáh/túh/miing/báá ba héé Ø
2PO build/hit/watch/feed NEG PL 3SS
'She did not build/hit/watch/feed y'all.'

64) Ø sah bà/tuh bà/miing ba/báá ba héé Ø
3SO build NEG/hit NEG/watch NEG/feed NEG PL 3SS
'She did not build/hit/watch/feed them.'

65) pa/tsa sah bà/tuh bà/mìing ba/baa bà héé Ø
1SO/2SO build NEG/hit NEG/watch NEG/feed NEG PL 3PS
'They did not feed/watch/hit me/you'

66) Ø sah bà/tuh bà/miing ba/báá ba héé Ø
3SO build NEG/hit NEG/watch NEG/feed NEG PL 3PS
'They did not build/feed/watch/hit him.'

67) ma/tsa/Ø sáh/túh/miing/báá ba héé Ø
1PO/2PO/3PO build/hit/watch/feed NEG PL 3PS
'They did not build/hit/feed/watch us/y'all/them.'

Transitive Negative Interrogative

68) tsa sah mà/tuh mà/mìng ma/baa mà nih/níh máa
2SO build NEG/hit NEG/watch NEG/feed NEG 1SS/1SS.PL Q
'Didn't I build/hit/watch/feed you/y'all?'

69) Ø sah mà/tuh mà/miing ma/báá ma nih/níh máa
3SO build NEG/hit NEG/watch NEG/feed NEG 1SS/1SS.PL Q
'Didn't I build/hit/watch/feed him/them?'

70) tsa sah mà/tuh mà/mìng ma/baa mà píh máa
2SO build/hit/watch/feed NEG 1PS Q
'Didn't we build/hit/watch/feed you?'
or 'Didn't we build/hit/watch/feed y'all?'

71) Ø sah mà/tuh mà/miing ma/báá ma píh máa
1SO build NEG/hit NEG/watch NEG/feed NEG 1PS Q
'Didn't we build/hit/watch/feed him?'
or 'Didn't we build/hit/watch/feed them?'

72) pa sah bà/tuh bà/mìng ba/baa bà tsih/tsíh máa
1SO build NEG/hit NEG/watch NEG/feed NEG 2SS/2PS Q
'Didn't you/y'all build/hit/watch/feed me?'

73) ma sáh ba/tuh bà/miing ba/báá ba tsih máa
1PO build NEG/hit NEG/watch NEG/feed NEG 2SS Q
'Didn't you build/hit/watch/feed us?'

74) ma sáh ba/tuh bà/miing ba/báá ba tsíh máa
1PO build NEG/hit NEG/watch NEG/feed NEG 2SS Q
'Didn't y'all build/hit/watch/feed us?'

75) Ø sah bà/tuh bà/miing ba/báá ba tsih máa
3PO build NEG/hit NEG/watch NEG/feed NEG 2SS Q
'Didn't you build/hit/watch/feed him?'

76) Ø sah bà/tuh bà/miing ba/báá ba tsíh máa
3PO build NEG/hit NEG/watch NEG/feed NEG 2SS.PL Q
'Didn't you build/hit/watch/feed them?'
or 'Didn't y'all build/hit/watch/feed them?'

77) pa/tsa sah bèh/tùh beh/mìing beh/báá beh Ø máá
1SO/2SO build NEG/hit NEG/watch NEG/feed NEG 3SS Q
'Didn't she build/hit/feed me/you?'

78) Ø sah bèh /tuh bèh/miing beh/báá beh Ø maa
3SO build NEG/hit NEG/watch NEG/feed NEG 3SS Q
'Didn't she build/hit/watch/feed him?'

79) ma sáh/túh/miing/báá beh Ø maa
1PO build/hit/watch/feed NEG 3SS Q
'Didn't she build/hit/watch/feed us?'

80) tsá sah bà/tuh bà/báá ba héé Ø máá
2PO build/hit/feed NEG PL 3SS Q
'Didn't she build/hit/feed y'all?'

81) tsa mìing ba héé Ø máá
2PO watch NEG PL 3SS Q
'Didn't she watch y'all?'

82) Ø sah bà/tuh bà/miing ba/báá ba héé Ø máá
3SO build NEG/hit NEG/watch NEG/feed NEG PL 3SS Q
'Didn't she build/hit/watch/feed them?'
or 'Didn't they build/hit/watch/feed him?'
or 'Didn't they build/hit/watch/feed them?'

83) pa/tsa sah bà/tuh bà/mìing ba/baa bà héé Ø máá
1SO/2SO build NEG/hit NEG/watch NEG/feed NEG PL 3PS Q
'Didn't they build/hit/watch/feed me/you?'

84) ma sáh/túh/miing/báá ba héé Ø máá
1PO build/hit/watch/feed NEG PL 3SS Q
'Didn't they build/hit/watch/feed us?'

85) tsa sah bà/tuh bà/mìing ba/baa bà héé Ø máá
2PO build NEG/hit NEG/watch NEG/feed NEG PL 3SS Q
'Didn't they build/hit/watch/feed y'all?'

Transitive Negative Imperative

86) Ø túuh/báá khéh
3O hit/feed PROHIB
'Don't hit it!/feed him!'

87) Ø sáh/miing kheh
3O build/watch PROHIB
'Don't build/watch it!'

88) Ø tuh/báá khéeéh
3O hit/feed PROHIB.PL
'Don't hit it!/feed him! (Plural Addressee)'
or 'Don't hit/feed them! (Singular or Plural Addressee)'

89) Ø sah/miing kheéh
3O build/watch PROHIB.PL
'Don't build/watch it! (Plural Addressee)'
or 'Don't build/watch them! (Singular or Plural Addressee)'

90) pa sah khèh/tuh khèh/mìing kheh/báá kheh
1SO build PROHIB/hit PROHIB/watch PROHIB/feed PROHIB
'Don't build/hit/watch/feed me!'

91) ma sáh kheh/túh kheh/báá khéh
1PO build PROHIB/hit PROHIB/feed PROHIB
'Don't build/hit/watch/feed us!'

92) ma miing kheh
1PO watch PROHIB
'Don't watch us!'

Irrealis

93) a sáah/túh/míing/báá hee
3SS build.IRR/hit.IRR/watch.IRR/feed.IRR PL
'She'll build/hit/watch/feed them.' **CONTEXT I**

Appendix E. Verbal Tone Data

Ar	Verb	Tone	Gloss	PFX	A	B	C	D	E	F	G	H	I
1	bah	O	owe	Y			L	L	M	L	L	L	
1	bah	O	lie prone	Y			L	L		L	L	L	
1	bøø	O	swell	Y			L	L		L	L	L	
1	dang	O	healthy	Y			L	L		L	L	L	
1	dau	O	stand	Y			L	L		L	L	L	
2	hei	O	ask	Y	H	M	L	L	M	L	L	L	HM
1	hrah	O	awaken	Y			L	L		L	L	L	
1	ih	O	sleep	Y			L	L		L	L	L	
1	khih	O	bitter	Y			L	L		L	L	L	
2	lau /lah	O	get	Y	M-lah	M-lah	L-lau	L-lau	M-la	L-lau	L-lau	L-lau	H
2	ming	O	watch	Y	H	M	L	L	M	L	L	L	HM
2	ngee	O	listen to	Y	H	M	L	L		L	L	L	HM
1	nuu /nah	O	hide	Y			L-nah	L-nah	H-nuu	L-nah	L-nah	L-nah	
1	phung	O	be buried	Y			L	L		L	L	L	
1	pih	O	explode	Y			L	L		L	L	L	
2	pii/pih	O	give	Y	M-pih	M-pih	L-pii	L-pii	M-pih	L-pii	L-pii	L-pii	H
1	pung	O	round	Y			L	L		L	L	L	
1	rang	O	be white	Y			L	L		L	L	L	
2	~~ruu~~/ruh	O	steal	Y	M-ruh	M-ruh	L-ruh	L-~~ruu~~	M-ruh	L-~~ruu~~	L-~~ruu~~	L-~~ruu~~	H
1	sah	O	hurt	Y			L	L		L	L	L	
2	sah	O	build	Y	M	M	L	L		L	L	L	HM
2	sah	O	sing	N	M		M			L			H
1	seng	O	red	Y			L	L		L	L	L	

1	sing	O	be wise	Y			L	L		L	L	L	
1	taa	O	be old	Y			L	L		L	L	L	
1	tee	O	be sharp	N			M	L		M			
1	thlung	O	sweet	Y			L	L		L	L	L	
1	thuh	O	deep	Y			L	L		L	L	L	
1	thuu	O	be tasty	Y			L	L		L	L	L	
1	tlau	O	shiny	Y			L	L		L	L	L	
1	tsah	O	to cry	Y			L	L		L	L	L	
1	tshuh	O	leave	Y			L	L		L	L	L	
1	tsih	O	break	Y			L	L		L	L	L	
2	tsuu/tsah	O	buy	Y	M-tsah	M-tsah	L-tsuu	L-tsah	M-tsa	L-tsa	L-tsah	L-tsuu	H
1	uh	O	be burnt	Y			L	L		L	L	L	
2	veng	O	guard/watch	Y	H	M	L	L	M	L	L	L	HM
1	vong	O	black	Y			L	L		L	L	L	
1	zing	O	be dark	Y			L	L		L	L	L	
2	baa	H	feed	Y	H	M	M	HM	H	M	HM	M	H
2	bong	H	help	Y	H	M	M	HM	H	M	HM	M	H
1	dee	H	be quiet	Y			M	HM		M	HM	M	
1	ding	H	straight	Y			M	HM		M	HM	M	
1	~~dii~~	H	end	Y				HM		M			
2	~~duu~~	H	want	Y	H	M	M	HM	H	M	HM	M	H
2	hmuh	H	see	Y	H	M	M	HM	M	M	HM	M	H
2	hnang	H	kiss/smell	Y	H	M	M	HM	H	M	HM	M	H
2	hnyy	H	have	Y	H	M	M	HM		M	HM	M	H

2	hruu	H	insert/eat porridge	Y	H	M	M	HM	H	M	HM	M	H
2	hyy	H	look for	Y	H	M	M	HM	H	M	HM	M	H
2	kh~~uu~~	H	cover	Y	H	M	M	HM	H	M	HM	M	H
2	khyy	H	break	Y	H	M	M	HM	H	M	HM	M	H
1	kyy	H	burst	Y			M	HM		M	HM	M	
2	phah	H	arrive	N	H		H			M	HM	M	
2	phee	H	uproot	Y	H	M	M	HM	H	M	HM	M	H
2	phii	H	slap	Y	H	M	M	HM	H	M	HM	M	H
2	pii	H	attach	Y	H	M	M	HM	H	M	HM	M	H
2	puh	H	carry (back)	Y	H	M	M	HM	M	M	HM	M	H
2	rii	H	tie up	Y	H	M	M	HM	H	M	HM	M	H
1	seng	H	run	N			H	HM		H	H	H	
1	sii	H	go	N			H	HM		H	H	H	
2	s~~ii~~	H	wash/pinch	Y	H	M	M	HM	H	M	HM	M	H
2	thau	H	kill	Y	H	M	M	HM	H	M	HM	M	H
1	thong	H	move	Y			M	HM		M	HM	M	
2	tong	H	touch	Y	H	M	M	HM		M	HM	M	H
2	tøø	H	bite	Y	H	M	M	HM	H	M	HM	M	H
1	tshah	H	good	Y			M	HM		M	HM	M	
1	tsing	H	fall down	Y			M	HM		M	HM	M	
2	tuh	H	hit	Y	H	M	M	HM	M	M	HM	M	H
2	tyo	H	do	Y	H	M	M	HM		M	HM	M	H
2	zing	H	believe	Y	H	M	M	HM	H	M	HM	M	H

2	~~ii~~ sah/ ih sah	O-O	let sleep	Y		ML-ih			MM-ih	MM-~~ii~~			HH-ih
2	pa seng	O-O	make red	Y	HM	ML	ML	ML	MM	ML	ML	ML	HM
1	pa sing	O-O	be clear	Y		ML	ML	ML		ML	ML	ML	
2	pa thlee	O-O	hang	Y	HM	ML	ML	ML	MM	ML	ML	ML	HM
2	pa thlung	O-O	sweeten	Y	HM	ML	ML	ML	MM				HM
2	pa tlang	O-O	line up	Y	HM	ML	ML	ML	MM	ML	ML	ML	HM
2	pa tlau	O-O	make shiny	Y	HM	ML	ML	ML	MM			ML	HM
2	pa tong	O-O	make touch	Y	HM	ML	ML		MM				HM
2	pa tsaa	O-O	dry	Y	HM	ML	ML		MM	ML	ML	ML	HM
2	pa vong	O-O	blacken	Y	HM	ML	ML	ML	MM	ML	ML	ML	HM
1	pa zuu	O-O	be sharp	Y		ML	ML	ML		ML	ML	ML	
2	thlung sah	O-O	sweeten	?	HH	ML							HH
2	tong sah	O-O	make touch	?		ML			MM	ML			HH
2	tsa thing	O-O	shake	Y	HM	ML	ML	ML	MM	ML	ML	ML	HM
2	tsau khyy	O-O	mourn	Y	HM	ML	ML	ML	MM	ML	ML	ML	HM
2	tshah sah	O-O	make nice	Y	MM	ML	ML	ML	MM	ML	ML	ML	MH
2	~~uu~~ sah	O-O	burn	Y	HH	ML	ML						HH
2	zaa pah	O-O	try to get	Y	HH	ML			MM	MM	ML		HH
2	dung khii	H-O	deceive	Y	HH	MM	MM	M-HM	HH	MM	M-HM	MM	H-HM
1	kau kau	H-O	return	Y			MM	M-HM		MM	M-HM	MM	
2	khong thlah	H-O	take off of	Y	HH	MM	MM	M-HM	HH	MM	M-HM	MM	H-HM

2	khung seng	H-O	continue, to skip	Y	HH	MM	MM	M-HM	HH	MM	M-HM	MH	H-HM
1	ma tsang	H-O	be elderly	Y			MM	M-HM		MM	M-HM	MM	
2	ming kheng	H-O	take care of	Y	HH	MM	MM	M-HM	HH	MM	M-HM	MM	H-HM
2	pa dau	H-O	stand	Y	H-HM	MM	MM	M-HM	MM	MM	M-HM	MM	H-HM
2	pa dee	H-O	make quiet	Y	H-HM	MM	MM	M-HM	MM	MM			H-HM
2	pa d~~ii~~	H-O	make end	?	H-HM								H-HM
1	pa hnei	H-O	be slippery	Y			MM	M-HM		MM	M-HM	MM	
2	pa zuu	H-O	suck on	Y	H-HM	MM	MM	M-HM	MM	MM	M-HM	MM	M-HM
2	phee thlah	H-O	uproot	Y	HH	MM	MM	M-HM	HH	MM	M-HM	MM	H-HM
2	thlah thlah	H-O	drop/fall	Y	MH	MH	MM	M-HM	MH	MM	M-HM	MM	H-HM
2	tsa kuo	H-O	surround	Y	H-HM	MM	MM		MM	MM	M-HM	MM	M-HM
1	tshie hr~~uu~~	H-O	be bad	Y			MM	M-HM		MM	M-HM	MM	
1	va sii	H-O	come	Y			MM	M-HM		MM	M-HM	MM	

Minor Classes													
2	ba khuu	O-H	cover	Y	MH	MH	MH	MH	MH	MH	MH	MH	M-HM
1	va sii	O-H	go	N			MH	MH		MH	MH	MH	
2	king veng	L-O	take care of	Y	H-HM	MM	LM	LM	LM	LM	LM	LM	H-HM
2	thang tshah	L-O	worship	Y	MM	MM	LM	LM	LM	LM	LM	LM	MH
2	tla sah	L-O	let boil	Y	MH	LM	LM	LM	LM	LM	LM	LM	LH
2	tsih sah	L-O	break	Y	MM	MM	LM			LM	LM		MH
2	veng kheng	L-O	guard	Y	H-HM	MM	LM	LM	LM	LM	LM	LM	M-HM
2	hrie tshøø	O-L	crack	Y	HM	ML	LM	LM	MM	LM	LM	LM	HM
2	va ming	O-L	check up on	Y	MH		LM	LM	MH	LM	LM	LM	M-HM
2	va tong	O-L	go meet	Y			LM	LM		LM			
1	ih hning	L-H	fall asleep	Y			LH	LH		LH	LH	LH	
2	va baa	L-H	go feed	Y	MH		LH	LH	MH	LH	LH	MH	MH

Three-syllable words													
1	ngee pa tshi̶i̶	L-O-O	regret	Y			L-M-M	L-M-HM	L-M-M	L-M-M	L-M-HM		
2	pa hnei sah	O-O-L	make slippery	Y	HHM	MML	MML		MML	MML	MML	MML	HHH
2	pa thlung sah	O-L-O	make someone make sweet	Y	HMM	MLM	MLM	M-L-M					H-M-H
2	tsa ka hrii	L-O-H	mix	Y	LMH	MMH	LMH	LMH	MMH	LMH	LMH	LMH	M-M-HM
1	tsong tii tii	O-H-H	be few	Y			L-H-H			LHH	LHH	LHH	
2	tyo pa tshih	O-O-O	try	Y	H-H-H	M-M-M	M-M-M	M-M-HM	HHH	MMM	M-M-HM	MMM	H-H-HM

Appendix F. Orthographic Conventions

Part I. Consonants

IPA	PKC	H. Lai	Mara	Zotung	Lutuv	TRZ	NTZ	LTZ
p	p	p	p	p	p	p	p	p
pʰ	ph	ph	ph	ph	ph	ph	ph	ph
b		b	b		b	b	b	b
ɓ	ɓ			ɓ				
t	t	t	t	t	t	t	t	t
tʰ	th	th	th	th	th	th	th	th
d		d	d		d	d	d	d
ɗ	ɗ			ɗ				
ʈ		ʈ				tt	tt	tt
ʈʰ		ʈʰ						
k	k	k	k	k	k	k	k	k
kʰ	kh	kh	kh	kh	kh	kh	kh	kh
t͡s	ts	ts	ts [t͡ɕ]	c [c]	ts	ts	ts	ts
t͡sʰ	tsh	tsh	tsh [t͡ɕʰ]	ch [cʰ]	tsh	tsh	tsh	tsh
d͡ʒ					dʒ			
t͡l		tl	tl		tl	tl	tl	tl
t͡ɬ		thl	thl		thl	thl	thl	thl
f		f	f	f		f	f	f
v		v	v	v	v	v	v	v
θ	θ			θ				
s	s	s	s	s	s	s	s	s
sʰ	sʰ							
z		z	z	z	z	z	z	z
ɕ				ɕ				
h	h	h	h	h	h	h	h	h
m	m	m	m	m	m	m	m	m
mʰ	hm	hm	hm		hm	hm	hm	hm
n	n	n	n	n	n	n	n	n
nʰ	hn	hn	hn		hn	hn	hn	hn
ɲ				ɲ				
ŋ	ng	ng	ng	ŋ	ng	ng	ng	ng
ŋʰ	hng	hng			hng			
l	l	l	l	l	l	l	l	l

Part I. Consonants cont'd

IPA	PKC	H. Lai	Mara	Zotung	Lutuv	TRZ	NTZ	LTZ
lʰ	hl	hl	hl		hl	hl	hl	hl
ɹ	r	r	r	r	r	r	r	r
ɹʰ	hr	hr	hr		hr	hr	hr	hr
w	w	w		w				
j	y	y		j		j	j	j
ʔ	ʔ	ʔ		ʔ	ʔ	*	*	*

Part II. Long and short monophthongs

IPA	PKC	H. Lai	Mara	Zotung	Lutuv	TRZ	NTZ	LTZ
i:	ii	ii	i	i	ii	ii	ii	ii
i	iʔ	iʔ		iʔ		ih	ih	ih
ĩ				ĩ				
y:					yy			yy
e:	ee	ee	e	e	ee	ee	ee	ee
e	eʔ	eʔ		eʔ		eh	eh	eh
ẽ				ẽ				
øø						øø		øø
æ:				æ				
æ				æʔ				
æ̃				æ̃				
a:	aa	aa	a	a	aa	aa	aa	aa
a	aʔ	aʔ		aʔ		ah [ə]	ah [ə]	ah [ə]
ã				ã				
ə:				ə	əə			
ə					a	a	a	a
ə̃				ə̃				
o: *or* ɔ:	oo	oo	ɔ	o	oo	oo	oo	
o *or* ɔ	oʔ	oʔ		oʔ		oh		
õ				õ				
u:	uu	uu	u	u	uu	uu	uu	uu
u	uʔ	uʔ		uʔ		uh	uh	uh
ũ				ũ				
ɯ:				ɯ	ɯɯ			
ɯ				ɯʔ				
ɯ̃				ɯ̃				
ɨ:					ɨɨ		ɨɨ	ɨɨ
ʉ:					ʉʉ		ʉʉ	ʉʉ

Part III. Diphthongs

PKC	H. Lai	Mara	Zotung	Lutuv	TRZ	NTZ	LTZ
ia	ia	ia	ia		ia [iə]	ia [iə]	
			ie	ie			ie
				yə			
		ei	eiʔ		ei		ei
			ẽĩ				
					ai [əi]	ai [əi]	
			aɯ		au [əu]		au [əu]
						oi	
			oe				
			oa				
			ouʔ				
			ui		ui	ui	
			uiʔ				
			ũĩ				
			ue				
			ueʔ				
ua	ua	ua	ua		ua [uə]	ua [uə]	
				uo			uo [uo/yo]
				ɯə			
			ɯa				

References

Alexander, A. (January 27, 2009). "We are like forgotten people": The Chin people of Burma: Unsafe in Burma, unprotected in India. Human Rights Watch. Retrieved from: https://www.hrw.org/report/2009/01/27/we-are-forgotten-people/chin-people-burma-unsafe-burma-unprotected-india/

Andersson, S., Sayeed, O., & Vaux B. (2017). *The Phonology of Language Contact*. Oxford Handbooks Online in Linguistics. Retrieved from: https://doi.org/10.1093/oxfordhb/9780199935345.013.55.

Ansre, G. (1961). *The Tonal Structure of Ewe*. Hartford, CN: The Kennedy School of Missions of The Hartford Seminary Foundation. Master's thesis.

Archangeli, D., & Pulleyblank, D. (1994). *Grounded phonology*. Cambridge, MA: MIT Press.

Arden, M. J. (2010). *A Phonetic, Phonological, and Morphosyntactic Analysis of the Mara Language*. San José State University. Master's thesis.

Baclawski, K. P., Jr. (2012). *Deictic Elements in Hyow and Kuki-Chin*. Hanover, NH: Dartmouth College. BA thesis.

Baertsch, K. (2002). *An Optimality Theoretic Approach to Syllable Structure: The Split Margin Hierarchy*. Bloomington, IN: Indiana University. PhD Dissertation.

Baertsch, K., & Davis, S. (2009). Strength relations between consonants: A syllable-based OT approach. In K. Nasukawa & P. Backley (Eds.), *Strength Relations in Phonology* (pp. 293-324). Berlin: De gruyter Mouton.

Bagnall, S. (2010). "Burma's 'forgotten' Chin people suffer abuse". BBC News http://news.bbc.co.uk/2/hi/asia-pacific/8626008.stm

Bareigts, A. (1981). *Les Lautu: Contribution à l'Etude de l'Organisation Sociale d'une Ethnie Chin de Haute-Birmanie*. Paris: Centre National de la Recherche Scientifique.

Bawi, S. V. (2015). Chin ethnic identity and Chin politic in Myanmar. *Asia Pacific Sociological Association (APSA) Conference "Transforming Societies: Contestations and Convergences in Asia and the Pacific."* Retrieved from: http://www.burmalibrary.org/docs21/Identity/Salai-Vanni-Bawi-2015-Chin_Ethnic_Identity_and_Chin_Politic_in_Myanmar-en.pdf/

Beckwith, C. (2002). The Sino-Tibetan Problem. In C. Beckwith (Ed.), *Medieval Tibeto-Burman Languages: Proceedings of a Symposium Held in Leiden, June 26, 2000, at the Ninth Seminar of the International Association of Tibetan Studies* (pp. 113-157).

Bedell, G., Mang, K. S., Nawl, R. S., & Suantak, K. (2021 forthcoming). The Morphosyntax of Verb Stem Alternation. *Himalayan Linguistics: Issues in South Central Tibeto-Burman (Kuki-Chin) Linguistics.*

Benedict, P. K. (1972). *Sino-Tibetan: A Conspectus*. Cambridge University Press: Cambridge.

Berkson, K. (2019). Acoustic correlates of breathy sonorants in Marathi. *Journal of Phonetics, 73*, 70-90.

Bhaskararao, P. (1994). Tedim Chin verbs and their alternants. *Journal of Asian and African Studies, 46-47*, 333-360.

Bhaskararao, P., & Ladefoged, P. (1991). Two types of voiceless nasals. *Journal of the International Phonetic Association, 21*(2), 80-88.

Boersma, P., & Weenink, D. (2020). Praat: doing phonetics by computer [Computer program]. Version 6.1.36, retrieved 6 December 2020 from http://www.praat.org/

Bole-Richard, R. (1983). *Systématique Phonologique et Grammaticale d'un Parler Ewe: Le Gen-Mina du Sud-Togo et Sud-Bénin*. Paris: Editions L'Harmattan.

Bradshaw, M. (1999). *A Crosslinguistic Study of Consonant-Tone Interaction*. Columbus, OH: Ohio State University. Doctoral dissertation.

Burling, R. (1959). Proto-Bodo. *Language, 35*(3), 433-453.

Burmese American Community Institute Website. (2018, November 13). Retrieved from https://thebaci.org/about-us/overview/

Butler, B. A. (2014). *Deconstructing the Southeast Asian Sesquisyllable: A Gestural Account*. Cornell University. Doctoral dissertation.

Button, C. T. J. (2011). *Proto Northern Chin (STEDT [Sino-Tibetan Etymological Dictionary and Thesaurus] Monograph Series 10)*. Berkeley, CA: The University of California, Berkeley.

Cahill, M. (2008). More universals of tone. *SIL Electronic Working Papers 2007-007*, 1-10.

Carter, H. (1986). *Shona Language Course*. University of Wisconsin: African Studies Program.

Chao, Y.-R. (1930). A system of tone letters. *Le Maître Phonétique, 45*, 24-27.

Chhangte, L. (1986). *A Preliminary Grammar of the Mizo Language*. Arlington, Texas: University of Texas at Arlington. MA thesis.

Chistovich, L. A. (l969). Variations of the fundamental voice pitch as a discriminatory cue for consonants. *Soviet Physics-Acoustics, l4*, 372-378.

Chomsky, N., & Halle, M. (1968). *The Sound Pattern of English*. New York, Evanston, & London: Harper & Row.

Conrady, A. (1896). *Eine indochinesische Causativ-denominativ-bildung und ihr Zusammenhang mit den Tonaccenten*. Leipzig: Harrasowitz.

Craft, J., & Craft, R. (2010). *A Sociolinguistic Survey of Senthang Chin Varieties in Hakha Township, Chin State, and Gangaw Township, Magway Division, Maynmar*. Unpublished manuscript.

Dantsuji, M. (1987). An acoustic study on the distinction of place of articulation for voiceless nasals in Burmese. *Folia Linguistica, 21*(2-4), 281-292.

DeLancey, S. (2015). Morphological evidence for a Central branch of Trans-Hamalayan (Sino-Tibetan). *Cahiers de Linguistic-Asie Orientale, 44*(2), 122-149.

Downing, L. J. (2009). On pitch lowering not linked to voicing: Nguni and Shona group depressors. *Language Sciences, 31*(2), 179-198.

Downing, L. J., & Rialland, A. (Eds). (2016). *Intonation in African Tone Languages*. Berlin, Boston: De Gruyter Mouton.

Dutta Baruah, P. N., & Bapui V. L. T. (1996). *Hmar Grammar*. Manasagangotri, Mysore: Central Institute of Indian Languages.

Eberhard, D. M., Simons, G. F., & Fennig, C. D. (Eds.) (2020). *Ethnologue: Languages of the World. Twenty-third Edition*. Dallas, Texas: SIL International. Online version: http://www.ethnologue.com.

Faytak, M. (2014). High vowel fricativization and chain shift. *UC Berkeley Phonology Lab Annual Report*, 52-100.

Fishman, J. A. (Ed). (1999). *Language and Ethnic Identity*. New York/Oxford: Oxford University Press.

Forrest, K., Weismer, G., Milenkovic, P., & Dougall, R. N. (1988). Statistical analysis of word-initial voiceless obstruents: Preliminary data. *Journal of the Acoustical Society of America, 84*, 115-124.

Fryer, G. (1875). On the Khyeng People of the Sandoway District, Arakan. *Journal of the Asiatic Society of Bengal, XLIV*(1), 39-82.

Gao, M. (1999). *Tones in Whispered Chinese: Articulatory Features and Perceptual Cues*. Victoria, BC: University of Victoria. Dissertation.

Goldsmith, J. (1976). *Autosegmental Phonology*. Cambridge, MA: Massachusetts Institute of Technology. Dissertation.

Gordon, M. (2001). A typology of contour tone restrictions. *Studies in Language, 25*(3), 423-462.

Gordon, M., Barthmaier, P., & Sands, K. (2002). A cross-linguistic acoustic study of voiceless fricatives. *Journal of the International Phonetic Association, 32*(2), 141-174.

Grierson, G.A., & Konow, S. (Eds.) (1903-1928). *Linguistic Survey of India, Vol. III, Part 3, Tibeto-Burman Family*. Calcutta: Office of the Superintendent of Government Printing.

Haokip, P. (2007). *The Phonology of Thadou: A Typological and Generative Study*. North Eastern Hill University, Shillong. Doctoral dissertation.

Haokip, P. (2014). Word formation in Thadou. *Himalayan Linguistics, 13*(2), 58-82.

Haudricourt, A-G. (1954). De l'origine des tons en Viêtnamien. *Journal Asiatique 242*, 68-82.

Hayes, B. (2009). *Introductory phonology.* Malden, MA: Wiley-Blackwell.

Haza, J., & Wagner, A. (2020). Adpositions in Lutuv. *Indiana Working Papers in South Asian Languages and Cultures, 2*(1), 12-17.

Henderson, E. J. A. (1952). The main features of Cambodian pronunciation. *Bulletin of the School of Oriental and African Studies, University of London, 14*(1), 149-174.

Henderson, E. J A. (1967). Grammar and Tone in South East Asian Languages. *Wissenschaftliche Zeitschrift der Karl-Marx Universität Leipzig, 16*(1-2), 171-178.

Herr, K. E. (2011). *The Phonological Interpretation of Minor Syllables, Applied to Lemi Chin*. Payap University. MA thesis.

Hodgson, B. H. (1847). Comparative vocabulary of the several languages or dialects of the Eastern Sub-Himalayas, from The Kali or Ghogra to The Dhansri, with the written and spoken Tibetan comparison. *Journal of the Asiatic Society, XVI*, 1245-1246.

Hoffman, M. (2018). *Speaking and Being Chin in America: A Linguistic and Anthropological Look at a Refugee Community from Burma (Myanmar)*. Tucson, Arizona: University of Arizona. Doctoral dissertation.

Hombert, J-M., Ohala, J. J., & Ewan, W. G. (1979). Phonetic explanations for the development of tones. *Language, 55*(1), 37-58.

Houghton, B. C. S. (1892). *Essay on the Language of the Southern Chins and Its Affinities*. Rangoon: Superintendent Government Printing.

Hussein, F. (March 18, 2017). “From Burmese to American: Profiles in assimilation”. From: https://www.indystar.com/story/news/2017/03/18/burmese-american-profiles-assimilation/97107262/

Hyman, L. M. (1975). *Phonology: Theory and Analysis*. New York: Holt, Rinehart, & Winston.

Hyman, L. M. (2007). Elicitation as Experimental Phonology. In M-J. Solé, P. S. Beddor, & M. Ohala (Eds.), *Experimental Approaches to Phonology* (pp. 7-24). Oxford: Oxford University Press.

Hyman, L. M. (2009). Universals of tone rules: 30 years later. In T. Riad & C. Gussenhoven (Eds.), *Tones and Tunes Vol. 1: Typological Studies in Word and Sentence Prosody* (pp. 1-34). Berlin, New York: De Gruyter Mouton.

Hyman, L. M. (2010). Kuki-Thaadow: An African tone system in Southeast Asia. In F. Floricic (Ed.), *Essais de Typologie et de Linguistique Générale* (pp. 31-51). Lyon, France: Les Presses de l’Ecole Normale Supérieure.

Hyman, L. M. (2013). Enlarging the scope of phonologization. In A. Yu (Ed.), *Origins of sound change: Approaches to phonologization* (pp. 3-28). Oxford: Oxford University Press.

Hyman, L. M. (2014). Coda constraints on tone. In S. Bendjaballah, N. Faust, M. Lahrouchi, Mohamed, & N. Lampitelli (Eds.), *The Form of Structure, the Structure of Form: Essays in honor of Jean Lowenstamm* (pp. 103-122). Amsterdam/Philadelphia: John Benjamins Publishing Company

Hyman, L. M. (2021). Allomorphy and tonal opacity at the phrase level in Kuki-Thaadow. *Princeton Phonology Forum 2021*. Online.

Hyman, L. M., & Schuh, R. G. (1974). Universals of tone rules: Evidence from West Africa. *Linguistic Inquiry 5*(1), 81-115.

Hyman, L. M., & Van Bik, K. (2002a). Tone and syllable structure in Hakha-Lai. *Proceedings of the Twenty-Eighth Annual Meeting of the Berkeley Linguistics Society [BLS]: Special Session on Tibeto-Burman and Southeast Asian Linguistics*, 13-28.

Hyman, L. M., & Van Bik, K. (2002b). Tone and stem2-formation in Hakha Lai. *Linguistics of the Tibeto-Burman Area, 25*(1), 113-121.

Hyman, L. M., & Van Bik, K. (2004). Directional rule application and output problems in Hakha Lai tone. *Language and Linguistics, 5*(4). 821-861.

Jongman, A., Wayland, R., & Wong, S. (2000). Acoustic characteristics of English fricatives. *Journal of the Acoustical Society of America, 108*, 1252-1263.

Jordan, M. (1969). *Chin (Cho) Dictionary and Grammar: Southern Chin Hills People's language, Mindat District, Burma*. Unpublished Manuscript.

Kaye, J. (1985). On the syllable structure of certain West African languages. African Linguistics. In D. L. Goyvaerts (Ed.), *Essays in Memory of MWK Semikenke* (pp. 285-308). John Benjamins: Amsterdam/Philadelphia, PA.

Kaye, J., & Lowenstamm, J. (1981). Syllable structure and markedness theory. In A. Belletti, L. Brandi, & L. Rizzi (Eds.), *Theory of Markedness in Generative Grammar: Proceedings of the 1979 GLOW Conference* (pp. 287-316). Pisa: Scuola Normale Superiore.

Khoi Lam Thang. (2001). *A Phonological Reconstruction of Proto Chin*. Payap University. Master's thesis.

King, D. (2009). Structural and pragmatic functions Of Kuki-Chin verbal stem alternations. *Journal of the Southeast Asian Linguistics Society, 1*, 141-157.

Konnerth, L. (2018). The historical phonology of Monsang (Northwestern South-Central/"Kuki-Chin"): A case of reduction in phonological complexity. *Himalayan Linguistics, 17*(1), 19-49.

Krishan, S. (1980). *Thadou: A Grammatical Sketch*. Calcutta, India: Gupta Press.

Labov, W. (1994). *Principles of Linguistic Change, Volume 1: Internal Factors*. Oxford Blackwell.

Labov, W. (2001). *Principles of Linguistic Change Volume 2: Social Factors*. Oxford Blackwell

Labov, W. (2010). *Principles of Linguistic Change Volume 3: Cognitive and Cultural Factors*. Oxford Blackwell

Labov, W., Yaeger, M., & Steiner, R. (1972). A quantitative study of sound change in progress. Report on NSF Contract NSF-GS-3287.

Ladefoged, P. (1971). *Preliminaries to Linguistic Phonetics*. Chicago: University of Chicago Press.

Lalhminghlui, W., & Sarmah, P. (2020). Interaction of tone and voicing in Mizo. *INTERSPEECH 2020*, 1903-1907.

Lalremzami, C. (2011). Analysis of the sound segments of Lai. *Language In India, 11*(10), 419-426.

Language and Social Development Organization. (2019). Main Languages of Chin State. map.

Lea, W. A. (1973). Segmental and suprasegmental influences on fundamental frequency contours. *Consonant Types and Tone, 1*, 15-70.

Leben, W. (1973). *Suprasegmental Phonology*. Massachusetts Institute of Technology. Dissertation.

Lee-Kim, S-I., Kawahara, S., & Lee, S. J. (2014). The 'whistled' fricative in Xitsonga: Its articulation and acoustics. *Phonetica, 71*, 50-81.

Lehman, F. K. (1963). *The Structure of Chin Society*. Urbana: Illinois University Press.

Lehman, F. K. (1973). Tibeto-Burman syllable structure, tone, and the theory of phonological conspiracies. In B. B. Kachru, R. B. Lees, Y. Malkiel, A. Pietrangeli, and S. Saporta (Eds.), *Issues in Linguistics: Papers in Honor of Henry and Renée Kahane* (pp. 515-547). Urbana, IL: University of Illinois Press.

Lin, H-S. (2005). Identity preservation in Hakha-Lai tone sandhi. *Taiwan Journal of Linguistics, 3*(2), 1-44.

Lisker, L., & Abramson, A. (1964). A cross-language study of voicing initial stops: acoustical measurements. *Word*, *20*(3), 384-422.

Löffler, L. G. (1972). Pitch and tone in Bawm. *Ethnologische Zeitschrift Zürich*, 285-289.

Löffler, L. G. (1973). Bawm verbal forms and the tonal system of Central Chin. Unpublished Manuscript.

Löffler, L. G. (2002). Some notes on Maraa. *Linguistics of the Tibeto-Burman Area, 25*(1), 123-136.

Löffler, L. G. (2004). Some notes on Maraa: II. *Linguistics of the Tibeto-Burman Area, 27*(1), 61-87.

Logan, J. R. (1858) The West-Himalaic or Tibetan tribes of Assam, Burma and Pegu. *Journal of the Indian Archipelago and Eastern Asia, 2*(1), 68–114.

Lorrain, R. A. (1951). *Grammar and Dictionary of the Lakher or Mara Language*. Gauhati: Government of Assam, Dept. of Historical and Antiquarian Studies.

Lotven, S. (2020a) Some diachronic phonological changes from Proto-Kuki-Chin to Lutuv. *Indiana Working Papers in South Asian Languages and Cultures, 2*(1), 18-30.

Lotven, S. (2020b) Lexical correspondences between Proto-Kuki-Chin, Hakha Lai, and six Maraic varieties. *Indiana Working Papers in South Asian Languages and Cultures, 2*(1), 31-39.

Lotven, S., & Berkson, K. (2019a) A vowel space comparison of Tlawngrang Zophei and Lawngtlang Zophei. *Indiana Working Papers in South Asian Languages and Cultures, 1*(1).

Lotven, S., & Berkson, K. (2019b). The phonetics and phonology of depressor consonants in Gengbe. In E. Clem, P. Jenks, & H. Sande (Eds.), *Theory and Description in African Linguistics: Selected Papers from the 47th Annual Conference on African Linguistics* (pp. 249–268). Berlin: Language Science Press.

Lotven, S., Berkson, K., Wamsley, J. C., Danaher, J., Van Bik, K., and Davis, S. (2019a). The syllable in Kuki-Chin. *Journal of South Asian Languages and Linguistics*, *6*(2), 1-28.

Lotven, S., Par, S. H., Wamsley, J. C., & Berkson, K. (2019b). Hnaring Lutuv Swadesh list. *Indiana Working Papers in South Asian Languages and Cultures*, *1*(1).

Luce, G. H. (1959a). Chin Hills linguistic tour. *Journal of Burma Research Society*, *42*(1), 19-31.

Luce, G. H. (1959b). Old Kyaukse and the coming of the Burman. *Journal of Burma Research Society*, *42*(1), 75-109.

Luce, G. H. (1985). *Phases of pre-pagan Burma: Language and History, Vol. 1*. Oxford/New York: Oxford University Press.

Maddieson, I. (1991). Articulatory phonology and Sukuma "Aspirated Nasals." In K. Hubbard (Ed.), *Proceedings of the Seventeenth Annual Meeting of the Berkeley Linguistics Society: Special Session on African Language Structures* (pp.145-154). Berkeley, CA: Berkeley Linguistics Society.

Maddieson, I., & Van Bik, K. (2004). Apical and laminal articulations in Hakha Lai. In M. Ettlinger, N. Fleisher, & M. Park-Doob (Eds.), *Proceedings of the Thirtieth Annual Meeting of the Berkeley Linguistics Society* (pp. 232-243). Berkeley, CA: Berkeley Linguistics Society.

Maran, L. (1973). On becoming a tone language: A Tibeto-Burman model of tonogenisis. *Consonant Types and Tone,* 1, 97-114.

Matisoff, J. A. (1973). Tonogenesis in Southeast Asia. *Consonant Types and Tone,* 1, 71-95.

Matisoff, J. A. (1989). The bulging syllable, or the mora the merrier: Echo-vowel adverbialization in Lahu. In J.H.C.S. Davidson (Ed.), *Southeast Asian Linguistics: Essays in Honour of Eugénie J.A. Henderson* (pp. 163-197). London, UK: School of Oriental and African Studies.

Matisoff, J. A. (1991). Sino-Tibetan linguistics: Present state and future prospects. *Annual Review of Anthropology, 20,* 469-504.

Matisoff, J. A. (1999). In defense of *Kamarupan*. *Linguistics of the Tibeto-Burman Area, 22*(2), 173-182.

Matisoff, J. A. (2003). *Handbook of Proto-Tibeto-Burman: System and Philosophy of Sino-Tibetan Reconstruction*. UC Publications in Linguistics

Matthews, A., & Wamsley. J. C. (2020). A brief report on the demonstrative system of Hnaring Lutuv. *Indiana Working Papers in South Asian Languages and Cultures*, 2(1), 1-11.

McCloy, D., & McGrath, A. (2012). Semi-auto formant extractor [Praat Script]. Version 0.3, retrieved 13 September 2018 from https://github.com/drammock/praat-semiauto/blob/master/SemiAutoFormantExtractor.praat/

McCloy, D. (2016). phonR: Tools for phoneticians and phonologists [R Package]. Version 1.0.7, retrieved 13 September 2018 from https://cran.r-project.org/package=phonR/

Melnik, N. (1997). The sound system of Lai. *Linguistics of the Tibeto-Burman Area, 20*(2), 9-19.

Mortensen, D. (2021 forthcoming). Kuki-Chin phonology: An overview. *Himalayan Linguistics: Issues in South Central Tibeto-Burman (Kuki-Chin) Linguistics.*

Mortensen, D., & Keogh, J. (2011). Sorbung, an undocumented language of Manipur: Its phonology and place in Tibeto-Burman. *Journal of the Southeast Asian Linguistics Society*, *4*(1), 64-114.

Ngaihmun, N. C., Holliday, J., & Berkson K. (2020). A phonetic investigation of some temporal properties of Paite obstruents. *음성음운형태론연구*, *26*(2), 341-363.

Ngun Tin Par (2016). *Agreement and Verb Stem Alternation in Senthang Chin*. Payap University. Master's thesis.

Obeng, S. G., & Adegbija, E. (1999). Sub Saharan Africa. In J. A. Fishman (Ed.), *Language and Ethnic Identity* (pp.353-367). New York/Oxford: Oxford University Press.

Odden, D. (1986). On the role of the obligatory contour principle in phonological theory. *Language 62*. 353-383.

Oglesbee, E. N. (2008). *Multidimensional stop categorization in English, Spanish, Korean, Japanese, and Canadian French.* Indiana University, Bloomington. Doctoral dissertation.

Ohala, J. (1973). The physiology of tone. *Consonant Types and Tone*, 1, 1-14.

Ohala, J., & Ohala, M. (1993) The phonetics of nasal phonology: Theorems and data. In M.K. Huffman & R.A. Krakow (Eds.), *Nasals, Nasalization, and the Velum* (pp. 225-249). San Diego, CA: Academic Press

Osburne, A. G. (1975). *A Transformational Analysis of Tone in the Verb System of Zahao (Laizo) Chin*. Cornell University. Doctoral dissertation.

Ostapirat, W. (1998). Tiddim Chin tones in historical perspective. *Linguistics of the Tibeto-Burman Area 21*(1), 235-248.

Ozerov, P. (2018). Tone assignment and grammatical tone in Anal (Tibeto-Burman). *Studies in Language*, *42*(3), 708-733.

Par, S., Berkson, K., & Lotven, S. (2019). Literacy efforts in Lutuv. *Engaged Summer Research Poster Session*, July 25, 2019. Bloomington, IN.

Parry, N. E. (1932). *The Lakhers*. London: Macmillan.

Pearce, M. (2005). Kera tone and voicing. *Lingua, 119*(6), 61-82.

Perkins, J. (2011). Consonant-tone interaction and laryngealization in Thai. Oral presentation at the *21st Annual Conference of the Southeast Asian Linguistics Society (SEALS 21)*, 11-13.

Peterson, D. (2014). Khumi Tone. Oral Presentation at the *24th Annual Meeting of the Southeast Asian Linguistics Society*, May 29, 2014, Yangon, Myanmar.

Peterson, D. A. (2017a). Hakha Lai. In G. Thurgood & R. J. LaPolla, (Eds.), *The Sino-Tibetan Languages (Second Edition)* (pp. 258-276). London, Routledge.

Peterson, D. A. (2017b). On Kuki-Chin Subgrouping. In P.S. Ding & J. Pelkey (Eds.), *Sociohistorical Linguistics in Southeast Asia* (pp. 189-209). Leiden, The Netherlands: Brill.

Peterson, D. A. (2019). Bangladesh Khumi. In A. Vittrant & J. Watkins (Eds.), *The Mainland Southeast Asia Linguistic Are*a (pp. 12-55). Berlin, Boston: De Gruyter Mouton.

Pulleyblank, D. (2004). A note on tonal markedness in Yoruba. *Phonology, 21*(3), 409-425.

R Core Team. (2013). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria, retrieved from http://www.R-project.org/

Refugee Processing Center. (September 30, 2020). Refugee admissions report. Retrieved from: http://www.wrapsnet.org/admissions-and-arrivals/

Reichle, V. (1981). *Bawm Language and Lore*. Bern, Switzerland and Frankfurt am Main, Germany: Peter Lang.

Rolle, N. (2018). *Grammatical Tone: Typology and Theory*. University of California, Berkeley. Dissertation.

Sagart, L. Blench, R., & Sanchez-Mazas, A. (2005). Introduction. In R. Blench, L. Sagart, & A. Sanchez-Mazas (Eds.), *The Peopling of East Asia: Putting Together Archaeology, Linguistics and Genetics* (pp. 1-14). London and New York: Routledge Curzon.

Sakhong, L. H. (2003). *In Search of Chin Identity: A Study in Religion, Politics and Ethnic Identity in Burma*. Nordic Institute of Asian Studies Monograph Series, No. 91: Thailand. Retrieved from: http://www.burmalibrary.org/docs08/In_Search_of_Chin_Identity.pdf/

Sarangthem, B. (2010). *Sizang (Siyin) Grammar*. Canchipur, India: Manipur University. Dissertation.
Sarma, B. D., Sarmah, P., Lalhminghlui, W., & Prasanna, S. R. Mahadeva. (2015). Detection of Mizo tones. *INTERSPEECH 2015*, 934-937.

Sarmah, P., & Wiltshire, C. R. (2010). A preliminary acoustic study of Mizo vowels and tone. *Journal of the Acoustical Society of India, 37*(3), 121-129.

Savidge, F. W. (1908). *A Grammar and Dictionary of the Lakher Language*. The Pioneer Press: Allahabad, India.

Shadle, C. H. (1983). Experiments on the acoustics of whistling. *The Physics Teacher, 21*, 148-154.

Shafer, R. (1955). Classification of the Sino-Tibetan Languages. *Word, 11*, 94-111.

Shafer, R. (1974). *Introduction to Sino-Tibetan*. Otto Harrassowitz: Wiesbaden, Germany.

Shimizu, K. (1989). A cross-language study of voicing contrasts of stops. *Studia Phonologica, 23*, 1-12.

Shintani, T. L. A. (2015). *The Zotung Language*. Tokyo: Research Institute for Languages and Cultures of Asia and Africa.

Shintani, T. L. A. (2016). *The Matu Language*. Tokyo: Research Institute for Languages and Cultures of Asia and Africa.

Shosted, R. K. (2011). Articulatory and Acoustic Characteristics of Whistled Fricatives in Changana. In E. G. Bokamba, R. K. Shosted, & B. T. Ayalew (Eds.), *Selected Proceedings of the 40th Annual Conference on African Linguistics*. Somerville, MA: Cascadilla Proceedings Project (pp.119-129).

Singh, C. Y. (2002). *Tarao Grammar*. New Delhi: Akansha Publishing House.

Singh, N. S. (2006). *A Grammar of Paite*. New Delhi: Krishan Mittal Publications.

Singh, H. B. (2008). *Chothe Grammar*. New Delhi: Akansha Publishing House.

Sitoe, B. (1996). *Dicionário Changana-Português*. Maputo: Instituto Nacional do Desenvolvimento da Educação.

Smith, J., Flego, S., & Berkson, K. (2018). Articulatory and acoustic investigation of coronals in Hakha Chin. *The Journal of the Acoustical Society of America, 143*(3), 1755-1755.

Snider, K. (2018). *Tone Analysis for Field Linguists*. Dallas, TX: SIL International Publications.

So-Hartmann, H. (1988). Notes on the Southern Chin languages. *Linguistics of the Tibeto-Burman Area, 11*(2), 98-119.

So-Hartmann, H. (2009). *A Descriptive Grammar of Daai Chin*. (STEDT [Sino-Tibetan Etymological Dictionary and Thesaurus] Series Monograph 7. University of California, Berkeley.

Solé, M-J. (2018). Articulatory adjustments in initial voiced stops in Spanish, French and English. *Journal of Phonetics, 66*, 217-241.

Starosta, S. (2005). Proto-East-Asian and the origin and dispersal of languages of East and Southeast Asia and the Pacific. In Sagart, L., Blench, R., and Sanchez-Mazas, A. (Eds.), *The Peopling of East Asia: Putting Together Archaeology, Linguistics and Genetics* (pp.182-197). London: Routledge Curzon.

Stilson, L. (1866). Brief notice of the Kemī language. *Journal of the American Oriental Society, 8*, 213-226.

Suantak, K. (2013). *Vaiphei Phonetics, Phonology and Morphology: A Descriptive Study*. North-Eastern Hill University-Shillong. Doctoral dissertation.

Tang, K. E. (2008). The phonology and phonetics of consonant-tone interaction. University of California-Los Angeles. Doctoral dissertation.

Thomas, D. (1992). On sesquisyllabic structure. *The Mon-Khmer Studies Journal, 21*, 206-210.

Thounaojam, H., & Chelliah, S. (2007). The Lamkang language: Grammatical sketch, texts, and lexicon. *Linguistics of the Tibeto-Burman Area, 30*(1), 1-224.

Thuan, K. (2008). *A Phonological Description of Falam*. Chiang Mai, Thailand: Payap University. Master's thesis.

Van Bik, K. (2009). *Proto-Kuki-Chin: A Reconstructed Ancestor of the Kuki-Chin Languages*. STEDT Monograph Series, Vol. 8.: University of California, Berkeley.

van Driem, G. (2002). Tibeto-Burman phylogeny and prehistory: Languages, material culture and genes. In Bellwood, P., & Renfrew, C. (Eds.), *Examining the Farming/Language Dispersal Hypothesis* (pp. 233-249). Cambridge: McDonald Institute for Archaeological Research.

van Driem, G. (2006). The prehistory of Tibeto-Burman and Austroasiatic in light of emergent population genetic studies. *Mother Tongue, 11*, 160-211.

van Driem, G. (2007). The diversity of the Tibeto-Burman language family and the linguistic ancestry of Chinese. *Bulletin of Chinese Linguistics, 1*(2), 211–270.

Wang, W. S-Y. (1967). Phonological Features of Tone. *International Journal of American Linguistics, 33*(2), 93-105.

Watkins, J. (2013). A first account of tone in Myebon Sumtu Chin. *Linguistics of the Tibeto-Burman Area*, *36*(2), 97-127.

Watson, J. (2019). *Participant Reference Patterns in Senthang Narrative*. Payap University. Master's thesis.

Wee, S-L. (2021). Thousands flee Myanmar for India amid fears of a growing refugee crisis. (October 19, 2021. Retrieved from: https://www.nytimes.com/2021/10/19/world/asia/myanmar-refugees-india.html.

World Food Programme Myanmar (2015). Chin Operational Brief. Retrieved from: https://www.wfp.org/sites/default/files/Chin%20Operational%20Brief.pdf/

Yip, M. (2002). *Tone*. Cambridge University Press.

Yip, M. (2004). Phonological markedness and allomorph selection in Zahao. *Language and Linguistics*, *5*(4), 969-1001.

Yoon, K. (2002). A production and perception experiment of Korean alveolar fricatives. *음성과학 [Speech Sciences]*, *9*(3), 169-184.

Zakaria, M. (2017). *A Grammar of Hyow*. Singapore: Nanyang Technological University. Doctoral dissertation.

Zhang, J. (2002). *The Effects of Duration and Sonority on Contour Tone Distribution—A Typological Survey and Formal Analysis.* Routledge, New York.

Zsiga, E. (1993). *Features, gestures, and the temporal aspects of phonological organization*. New Haven, CT. Doctoral dissertation.

Samson Alexander Lotven

slotven@indiana.edu

EDUCATION

2021: PhD Linguistics, Indiana University Bloomington
2017: MA in Linguistics, Indiana University Bloomington
2010: TESOL Certification, 120 hour course, Phuket, Thailand
2007: B.A. in French, University of Missouri-Columbia, *magna cum laude*

RESEARCH INTERESTS

- Linguistic Fieldwork (phonology, phonetics, morphology, syntax)
- Community engagement in research
- Kuki-Chin Languages (Zophei, Lutuv, Hakha Lai)
- Language variation and change
- Syllable structure, tone

JOURNAL ARTICLES

Lotven, S. (2021a, forthcoming). Tone in South Central Tibeto-Burman. Issues in South Central Tibeto-Burman (Kuki-Chin) Linguistics. *Himalayan Linguistics*.

Lotven, S., Berkson, K., Wamsley, J. C., Danaher, J., Van Bik, K., and Davis, S. (2019). The syllable in Kuki-Chin. *Journal of South Asian Languages and Linguistics, 6*(2). 1-28.

OTHER PUBLICATIONS

Chelliah, S. & **Lotven S.** (2022, forthcoming). From Source to Analysis: A Language Documenter's Guide to Annotatating Text. UNT Digital Libraries.

Lotven, S. (2021b). The Sound Systems of Zophei dialects and other Maraic languages. Indiana University Bloomington. Doctoral Dissertation.

Lotven, S. & Sung, Z. (2021, forthcoming) The Lawngtlang Zophei verbal complex. *Formal Approaches to South Asian Languages Vol. 4*.

Berkson, K., Wamsley, J.C., **Lotven, S.**, Chelliah, S., Van Bik, K., Champlin, S., & Sakhong, K. (2021, forthcoming). A developing community of collaboration in Indiana. In *Migration, Displacement, and Higher Education: Now What?* Palgrave McMillan.

Lotven, S. (2020a). Sound System Sketch of a Gengbe Speaker from Batonou. *IULC Working Papers 20*(1). 1-27.

Lotven, S. (2020b) Some diachronic phonological changes from Proto-Kuki-Chin to Lutuv. *Indiana Working Papers in South Asian Languages and Cultures 2*(1).

Lotven, S. (2020c) Lexical correspondences between Proto-Kuki-Chin, Hakha Lai, and six Maraic varieties. *Indiana Working Papers in South Asian Languages and Cultures 2*(1).

Wamsley, J., Sakhong, K., **& Lotven, S.** (2020) Nuitah Zophei Swadesh list. *Indiana Working Papers in South Asian Languages and Cultures 2*(1).

Lotven, S., & de Jong, K. J. (2020) Ultrasound Imaging of Gengbe Labial-Velar Stops. *Indiana Working Papers in Speech Sound Articulation 1*(1).

Berkson, K., **S. Lotven**, P.H. Thang, T. Thawngza, Z. Sung, J. Wamsley, F. Tyers, K. Van Bik, S. Kübler, D. Williamson, and M. Anderson. (2019). Building a Common Voice Corpus for Laiholh (Hakha Chin). *Proceedings of the 3rd Workshop on Computational Methods for Endangered Languages*: Vol. 2, Article 2. Available at: https://scholar.colorado.edu/scil-cmel/vol2/iss1/2.

Grano, T. & **Lotven, S.** (2019). Control of logophoric pronouns in Gengbe. In S. Lotven, S. Bongiovanni, P. Weirich, R. Botne, & S. G. Obeng (Eds.), *African Linguistics across the Disciplines: Selected Papers from the 48th Annual Conference on African Linguistics* (pp. 325–337). Berlin: Language Science Press.

Lotven, S. & Berkson, K. (2019a). The phonetics and phonology of depressor consonants in Gengbe. In E. Clem, P. Jenks, & H. Sande (Eds.), *Theory and Description in African Linguistics: Selected Papers from the 47th Annual Conference on African Linguistics*, (pp. 249–268). Berlin: Language Science Press.

Lotven, S. & Berkson, K. (2019b) A vowel space comparison of Tlawngrang Zophei and Lawngtlang Zophei. *Indiana Working Papers in South Asian Languages and Cultures 1*(1).

Lotven, S., Par, S. H., Wamsley, J. C., & Berkson, K. (2019). Hnaring Lutuv Swadesh list. *Indiana Working Papers in South Asian Languages and Cultures, 1*(1).

Lotven, S., Sung, Z., Wamsley, J. C., & Berkson, K. (2019). Lawngtlang Zophei Swadesh list. *Indiana Working Papers in South Asian Languages and Cultures, 1*(1).

Lotven, S., & Obeng, S. G. (2018) Nasality and the Gengbe syllable. In S. G. Obeng & C. R. Green (Eds.), *African Linguistics in the 21st Century: Essays in Honor of Paul Newman* (pp.33-46). Köln: Rüdiger Köppe Verlag.

Grano, T., & **Lotven, S.** (2018). Control, logophoricity, and harmonic modality in Gengbe desire reports. In R. Truswell, C. Cummins, C. Heycock, B. Rabern, and H. *Rohde Proceedings of Sinn und Bedeutung 21* (pp.481-498). Edinburgh: Edinburgh Research Explorer.

PRESENTATIONS

Lotven, S. Vowel shift in Zophei. Oral presentation at *Indiana University Linguistics Department Round Robin Research Profiles*. October 2, 2020. Bloomington, IN.

Berkson, K., **Lotven, S.**, & Flego, S. (2019). Typologically rare phonetic and phonological phenomena in undocumented languages in…Indiana? Oral Presentation at the 21st Annual Midwest Phonetics and Phonology Conference, October 4, 2019, Milwaukee, WI.

Lotven, S. & Obeng, S. G. (2019). Nasality and the Gengbe Syllable. Oral Presentation at the 50th Annual Conference on African Linguistics, May 24, 2019, Victoria, BC.

Berkson, K., **Lotven, S.**, Thawngza, T., Sung, Z., Wamsley, J., Tyers, F., Van Bik, K., Williamson, D., Anderson, M., Thang, P. H., & Kuebler, S. Building a Common Voice corpus for Laiholh (Hakha Chin). Oral Presentation at the 3rd Workshop on Computational Methods for Endangered Languages, February 26, 2019. Honolulu, HI.

Haley, R., **Lotven, S.**, Wamsley, J., & Berkson, K. (2019). Quantity, quality, both or neither? Vowel contrasts in Hakha Chin monophthongs. *The Journal of the Acoustical Society of America*, *145*(3), 1928-1928.

Par, S., Berkson, K., & **Lotven, S.** Literacy efforts in Lutuv. Poster presented at IU's *Summer 2019 Undergraduate Research Symposium*, IU Bloomington.

Sung, Z., **Lotven, S.**, & Berkson, K. The verbal complex in Zophei. Poster presented at IU's *Summer 2019 Undergraduate Research Symposium,* IU Bloomington.

Hwang, Y., **Lotven, S.**, and Berkson, K. Pitch accent and the three-way laryngeal contrast in North Kyungsang Korean. 177th Meeting of the ASA. May 2019. Louisville, KY. *Journal of the Acoustical Society of America, 145*(3), 1928-1928.)

Lotven, S. & Berkson, K. A vowel space comparison of Tlawngrang Zophei and Lawngtlang Zophei. Poster presentation at the 176th Meeting of the Acoustical Society of America, November 8, 2018. Victoria, British Columbia.

Berkson, K., **Lotven, S.**, Wamsley, J., Sung, Z., Thang, P. H., Thawngza, T., de Jong, K. J., Kuebler, S., & Lulich, S. Kuki-Chin languages in Indiana: Investigating typologically rare sounds in a developing communmity of collaboration. Oral presentation at the 176th Meeting of the Acoustical Society of America. November 8, 2018. Victoria, British Columbia.

Hwang, Y., **Lotven S.**, & Berkson K. (2018) Pitch accent and the three-way laryngeal contrast in North Kyungsang Korean. Poster Presentation at the 23rd Annual Mid-Continental Phonetics & Phonology Conference, October 5-6, 2018. Evanston, IL.

Lotven, S., & de Jong, K. J. Ultrasound imaging of labial-velar stops in Gengbe. Poster presentation at the 49th Annual Conference on African Linguistics, March 24, 2018. East Lansing, MI.

Grano, T., & **Lotven, S.** Logophoricity and coreference constraints in Gengbe attitude reports. Oral Presentation at the 48th Annual Conference on African Linguistics. March 31, 2017. Bloomington, IN.

Lotven, S., & Berkson K. Ultrasound imaging of [d], [ɗ] and [g͡b] in Gengbe. Poster Presentation at the 48th Annual Conference on African Linguistics. April 1, 2017. Bloomington, IN.

Grano, T., & **Lotven S.** Control, logophoricity, and harmonic modality in Gengbe desire reports. Oral presentation at Sinn und Bedeutung 21. September 2016. Edinburgh, Scotland.

Lotven, S., & Berkson K. Depressor consonants in Gengbe: A phonological and phonetic survey. Oral Presentation at the 47th Annual Conference on African Linguistics. March 24, 2016. Berkeley, CA.

Lotven, S., & Berkson, K. The consonant-tone connection in Mina: Do voiced consonants trigger lower tone?. Poster Presentation at the Mid-Continental Phonetics & Phonology Conference (MidPhon). September 11, 2015. Bloomington, IN.

Lotven, S. The split margin in Mina loanwords and reduplication. Oral presentation at *IU Linguistics Department Advanced Phonology Presentations*. April 28, 2015. Bloomington, IN.

Nelson, M., Berkson, K., & **Lotven, S**. Phonotactic Frequencies in Marathi: Data from the EMILLE Corpus. 20thMid-Continental Workshop on Phonetics & Phonology. September 2015. Bloomington, IN.

Lotven, S. Tone sandhi as a diagnostic for the morphological status of reduplication in Mina. Oral Presentation at the 46th Annual Conference on African Linguistics. March 26, 2015. Eugene, OR.

Lotven, S. Morphemic fission: The case of Korean *sai-siot*. Poster Presentation at the IU Linguistics Department Alumni Weekend. October 10, 2014. Bloomington, IN.

INVITED TALKS

Lotven, S. Developing annotation conventions for Hakha Lai corpora. Invited oral presentation at the *Society for Endangered and Lesser Known Languages*, November 17, 2021.

Lotven, S. Doing field research on tone. Invited oral presentation at *Indiana University-Field Methods*, November 4, 2021. Bloomington, IN.

Berkson, K. & **Lotven, S.** The Chin Languages Research Project: Linguistic diversity in Indiana. Invited oral colloquium presentation at *The Ohio State University*, October 22, 2021

Lotven, S. Vowel Shift in Zophei. Invited oral presentation at *California State University, Fullerton-Historical Linguistics*, October 27, 2020

Lotven, S. Some diachronic phonological changes from Proto-Kuki-Chin to Lutuv (Lautu). Invited oral presentation at *Indiana University-Field Methods*, April 23, 2020. Bloomington, IN.

EDITING

In prep: Associate Editor Indiana Working Papers in South Asian Languages and Linguistics Vol. 2(1), with K. Berkson (Ed.) and J. Wamsley

2019: Associate Editor Indiana Working Papers in South Asian Languages and Linguistics Vol. 1(1), with K. Berkson (Ed.) and J. Wamsley

2019: Editor African linguistics across the disciplines: Selected papers from the 48th Annual Conference on African Linguistics, with S. Bongiovanni, P. Weirich, R. Botne, & S. G. Obeng

2017: Editor IULC Working Papers Vol. 17(1), with K. de Jong (Ed.), P. Weirich, Y. Zhang, & S. Bongiovanni

2017: Associate Editor IULC Working Papers Special Volume 17(6): Reissue of Innovations in Linguistic Education, Volume 5, with A. Bunger (Ed.) P. Weirich, Y. Zhang, E. Raynor, A. Parker, and S. Bongiovanni

2017: Associate Editor IULC Working Papers Special Volume 17(5): Reissue of Innovations in Linguistic Education, Volume 4, with A. Bunger (Ed.) P. Weirich, Y. Zhang, E. Raynor, A. Parker, and S. Bongiovanni

2017: Associate Editor IULC Working Papers Special Volume 17(4): Reissue of Innovations in Linguistic Education, Volume 3, with A. Bunger (Ed.) P. Weirich, Y. Zhang, E. Raynor, A. Parker, and S. Bongiovanni

2017: Associate Editor IULC Working Papers Special Volume 17(3): Reissue of Innovations in Linguistic Education, Volume 2, with A. Bunger (Ed.) P. Weirich, Y. Zhang, E. Raynor, A. Parker, and S. Bongiovanni

2017: Associate Editor IULC Working Papers Special Volume 17(2): Reissue of Innovations in Linguistic Education, Volume 1, with A. Bunger (Ed.) P. Weirich, Y. Zhang, E. Raynor, A. Parker, and S. Bongiovanni

2016: Associate Editor IULC Working Papers Vol. 16(1), with S. Bongiovanni (Ed.), K. de Jong (Ed.), V. Filimonova, P. Weirich, J. Washington, & Y. Zhang.

CONTRIBUTIONS TO ELECTRONIC RESOURCES

2020: **COVID-19 informational materials in Hakha Lai.** Ongoing effort to translate COVID-19-related materials into Hakha Lai. Community organizations pass requests for information on to our team. All materials are hosted online at https://www.chinlanguages.org and are disseminated via social media.

2018: Laiholh component of Mozilla's *Common Voice Project*. Available at https://voice.mozilla.org/cnh.

2017**:** Berkson, K. H., Lotven, S., de Jong, K., & Lulich, S. 3D/4D Ultrasound Imaging of Labial Velars. *Open Science Framework resource.* Available at http://doi.org/10.17605/OSF.IO/XS547.

TEACHING EXPERIENCE

LING-308 Morphology (Assistant Instructor, Indiana University)

- Instructor of Record, responsible for syllabus, assignments, exams, and lecture materials.
- Online, synchronous/asynchronous.
- Contracted: Spring 2021

APLN-504 Graduate Syntax (Adjunct Instructor, Montclair State University)

- Instructor of Record, responsible for syllabus, assignments, exams, and lecture materials.
- Online, synchronous.
- Semester taught: Fall 2020

CLLC-L120 Linguistics of Rap (Assistant Instructor, Indiana University)

- Instructor of Record, responsible for syllabus, assignments, exams, and lecture materials
- Course designed and proposed for Collins Living Learning Center's *Politics, Identity, and Resistance* series.
- Semester taught: Fall 2019

COLL-C103 Language and Religion (Assistant Instructor, Indiana University)

- Focus on pragmatics and religious discourse analysis.
- Responsible for two discussion sections, maintained Canvas site
- Semester taught: Spring 2019

LING-L654 Field Methods in Linguistics 2 (Instructor's aid, Indiana University)

- Mentored students, working with them closely on individual projects (in Phonetics, Phonology, Morphology, and Syntax) on Hakha Chin and Lautu, which is currently undescribed.
- Semester taught: Spring 2018

LING-L653 Field Methods in Linguistics 1 (Instructor's aid, Indiana University)

- Responsible for discussion and elicitation in one of the two sections. Instructed students on proper elicitation, data management, and analysis of an under-described language (Hakha Chin)
- Semester taught: Spring 2018

COLL-P155 Public Oral Communication (Assistant Instructor, Indiana University)

- Focus on rhetoric, hermeneutics, and public speaking
- Discussion section instructor of record, responsible for discussions, activities, grading, and all in-person communications with students (lectures and assignments presented to students online)
- Semesters taught (3): Fall 2016, Spring 2017, Summer 2017 (6 weeks):

COLL-C103 Language and Religion (Instructor's aid, Indiana University)

- Focus on pragmatics and religious discourse analysis.
- Responsible for curating Canvas site, including assignments, scheduling, and test proctoring; hosted in-class discussions with students.
- Semester taught: Summer 2016 (6 weeks)

LING-L203 Intro to Linguistic Analysis (Assistant Instructor, Indiana University)

- Instructor of Record, responsible for syllabus, assignments, exams, and lecture materials
- Course covers linguistic analysis techniques in phonetics, phonology, morphology, syntax, lexicography, sociolinguistics, and historical linguistics.
- Semesters taught (4): Fall 2015, Spring 2016, Summer 2016 (4 weeks), Fall 2017

2011-2013: English Language Teacher, Hoecheon Elementary, Boseong, S. Korea

- Native English Teacher, responsible for curriculum development and implementation for Kindergarten through Elementary School programs.

2010-2011: English Language Teacher, Fisher's SuperKids, Danang, Vietnam

- Native English Teacher, responsible for curriculum development and implementation for elementary learners of English

2008-2010: Native English Teacher Program Coordinator, E. Bo-Young's Talking Club, Changwon, S. Korea

- Native English teacher, responsible for developing curriculum for native English teachers and implementing activities for elementary through adult learners of English, including English pronunciation courses and practical English workshops.

2004-2005: English Language Assistant, Lycée J.B. Delambre, Amiens, France

- Assistant to High School English teachers, responsible for developing discussion and application materials and assisting in English teaching classrooms.

OTHER RELEVANT WORK EXPERIENCE

2021-Present: Hakha Lai Lingustic Consultant for the LUCAH Project (NSF Funded)
2021 Summer/Fall: Stoney Nakota Scribe for the Language Conservancy
2018 Summer: Hakha Chin Research Assistant for Dr. Kelly Berkson
2014-2018: IU East Asian Studies Center, Program Assistant, Bloomington, IN
2015, 2016 Summer: IU Phonetics & Phonology Lab, Graduate Student Lab Manager

AWARDS & SCHOLARSHIPS

Spring 2019: College of Arts and Sciences Grant-in-Aid for doctoral research
Fall 2018: College Arts and Humanities Institute Travel Award
Fall 2018: College of Arts and Sciences Travel Award
Fall 2018: Research assistantship with Dr. Kenneth J. de Jong (Chair of Linguistics)
Spring 2018: Research assistantship with Dr. Kelly Berkson
Spring 2015 & Spring 2016: Linguistics Department Travel Award
Spring 2015: COAS Travel Award
2014-2015: SOFOKS Fellowship for Korean Studies (Indiana University)
2013-2014: Foreign Language and Area Studies Fellowship, Korean (Indiana University)
2002-2007: Excellence Award (University of Missouri-Columbia)
2006: Duane Weise Scholarship (University of Missouri-Columbia)

SERVICE

2021:	Linguistics AI Workshop: "Instructors and Students as Resources: Defining Your Role in the Classroom"
2020-present:	Pathways to Cross-Cultural Understanding, Advisory Council
2019-present:	Indiana Working Papers in South Asian Languages and Cultures, Associate Editor
2020:	Classroom Climate Workshop "Cultivating Active Learning Environments in On-Campus and Online Classrooms"
2019 (Spring):	Graduate Student Professionalization Workshop "Building Posters for Academic Conferences"
2019:	Proceedings of the 48th Annual Conference on African Linguistics, Editor
2018:	Science Sprouts: Speech science for Pre-K, (4 sessions at the Wonder Lab)

2018:	Classroom Climate Workshop "Becoming Comfortable with our Instructor Role"
2018:	Linguistics AI Workshop "Becoming Comfortable with our Instructor Role"
2017:	Classroom Climate Workshop "AIs and Students as Co-Learners"
2017:	Linguistics AI Workshop "A Student-Centered Approach to Linguistic Pedagogy"
2017:	Linguistics AI Workshop (with Ann Bunger) "Designing a Syllabus"
2017:	48th Annual Conference on African Linguistics Conference Organizer
2016-2017:	IULC Working Papers, Editor
2015-2016:	IULC Working Papers, Associate Editor and Secretary

LANGUAGES

Spoken: English, French, Korean
Studied: Thantlang/Hakha Lai, Zophei (Tlawngrang, Lawngtlang, & Nuitah), Hnaring Lutuv (Lautu), Gengbe, Dompo, Vietnamese, Stoney Nakota, Thai, Italian