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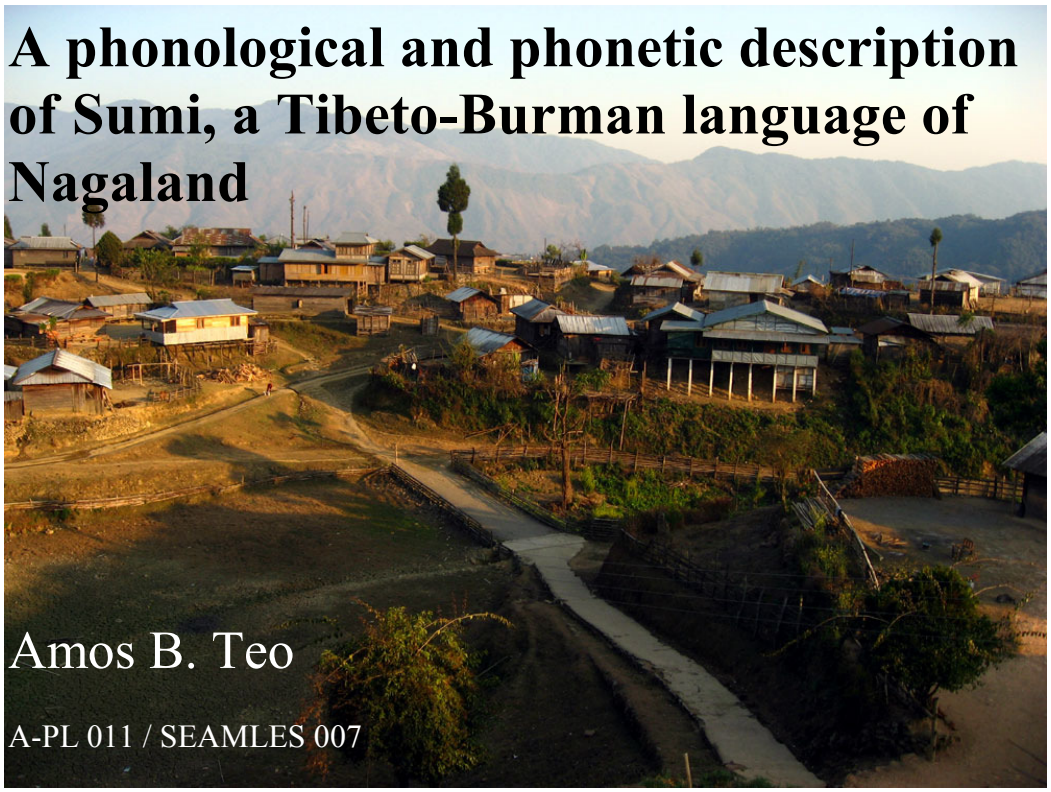

This book offers a comprehensive description of the phonetic and phonological features of Sumi, a Tibeto-Burman language of Nagaland, North-east India. It represents the first in-depth investigation of the acoustic phonetics and phonology of tone in Sumi, and is one of the first extensive acoustic descriptions of a language of Nagaland. The book describes the segmental phonology, syllable structure and tone system of Sumi. It looks at the phonetic realisation of these tones and the effects of segmental perturbations on tone realisation. It also examines morphologically conditioned tone variation in Sumi. Finally, this book offers a cross-linguistic comparison of both the segmental phonology and tonal system of Sumi with that of other Tibeto-Burman languages of Nagaland.

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Amos B. Teo
Eugene, Oregon

1 *Introduction*

1.1 Aims of study

Sumi, also known as Sema and Simi,[1] is a Tibeto-Burman language spoken in Nagaland, located in the northeast of India. Due to the geographic inaccessibility of this area and political instability that has previously hindered researchers from entering, the exact number of languages spoken in this linguistically diverse region is not known. Very little descriptive work has have been done on this languages of this area compared to other branches of the Tibeto-Burman family, such as Lolo-Burmese or Bodish. Furthermore, only a small handful of these studies (e.g. Coupe, 2003; 2007) have attempted to describe the tonal phonology and phonetics of these languages beyond the cursory remark on the number of contrastive tones. In general, very little acoustic phonetic research has been done on these languages.

The first attempts at a comprehensive phonological description of Sumi were done by Sreedhar (1976; 1980), but his work focused mainly on segmental phonology. The first aim of this book is therefore to provide the first comprehensive description of Sumi lexical tonal phonology. This book will look not just at the number of contrastive tones in Sumi, but also the nature of the tone-bearing unit, the assignment of tones to phonologically toneless morphemes, and morphologically conditioned tone variation. In addition, this work provides the first acoustic phonetic analyses of Sumi tones which investigate their phonetic realisation and the interaction between the tones and segments. A description of the segmental phonology and phonotactics will also be presented, serving as an update of Sreedhar's earlier work.

The second aim of this book will be to provide a cross-linguistic comparison of the tonal system and, to some extent, the segmental phonology and phonotactics of Sumi with that of other related Tibeto-Burman languages of Nagaland. Some preliminary observations of the historical origin and development of certain segments and tones in these languages will be made, with a view to informing our understanding of the synchronic phonological system in Sumi.

Finally, it is hoped that this descriptive work on tone will aid in the development of a standardised orthography of Sumi that marks lexical tones, setting the groundwork for data collection and transcription to aid future research on other topics in Sumi phonology, morphology and syntax. This is especially important at a time when many people in Nagaland have stopped speaking their home languages, turning instead to other languages like English and Nagamese, the lingua franca of Nagaland.

[1] Throughout this book I will be using the autonym 'Sumi'. However, when making reference to older literature, I defer to the term used by the author in question. It should be noted that the exonym 'Sema' is still commonly used in Nagaland to refer to this group.

1.2 Language background

The majority of Sumi speakers can be found in the Zunheboto district (centred around the town of Zunheboto) of Nagaland, and there are Sumi villages in all neighbouring districts. A substantial number of speakers also live in the commercial capital Dimapur and the political capital Kohima. In addition, there are a handful of Sumi villages in Tinsukia district, Assam, near the town of Margherita on the border with Nagaland (Morey, *p.c.*).[2]

According to *Ethnologue* (Lewis *et al.*, 2013), the 2001 census estimates 104,000 speakers of Sumi. Bradley (1997) gives a similar figure of 100,000. This number is likely to have dropped over the past 10 years with the increasing prevalence of Nagamese and English across Nagaland. In the Zunheboto district, Sumi still remains the main language, with many speakers also fluent in Nagamese and English. In the main cities Kohima and Dimapur, Sumi speakers still use Sumi at home, but communicate mainly in Nagamese outside. Informally, literacy levels are reported to be quite low, although there is a daily newspaper *Sümi Zümülhü* and the weekly *Izatsa*. The King James Bible has also been translated into Sumi. However, language consultants have reported that readership among the young is generally quite poor.

1.3 Dialects

The first mention of different dialects within the Sumi speaking community can be found in Sir George Grierson's *Linguistic Survey of India Vol. 3, Part 2* (1903-1928/1967). He mentioned two known dialects: 'Simi' and 'Zhimomi', with the former described as being not too different from Angami. However, no estimates for the number of speakers of each dialect were given.

In his seminal work *The Sema Nagas*, Hutton (1921/1968) looked at what he called the 'Zümomi' dialect[3] but noted the existence of another dialect, which he referred to as the 'Lazemi' dialect, which was spoken only in a few villages and was not widely understood by other tribe members. Hutton made reference to a number of dialectal differences between villages, contrasting the dialects of Lazemi and other areas in the Dayang Valley with the dialects spoken in the neighbouring Tizu Valley, which included the Zümomi dialect. He noted that speakers of the 'Yepothomi' dialect, spoken in the Upper Tizu, were more likely to drop word final vowels like /i/, although the vocabulary used was similar to that of the Zümomi. He also noted that speakers from the 'Aichi-Sagami' village tended to invert the order of words and syllables (e.g. the name *Inakhu* becomes *Ikhuna*), although he admitted that this practice, the rules of which do not appear to be fixed, could be observed in most Sumi villages (1921/1968: 266-267).[4]

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[2] The author has been told that these groups are descendents of Sumis who were brought down to the plains by the British to clear the forest for tea cultivation.

[3] It is uncertain, though likely that the Zümomi dialect mentioned by Hutton (1921/1968) is the same as the Zhimomi dialect mentioned in Grierson (1903-1928/1967), given that /ʒ/, usually transcribed as *zh*, is realised as [z] before central /ɨ/, which is usually transcribed as *ü*.

[4] Regarding lexical dialectal variation, Hutton retells the following joke:
"Seven men of different villages happened to meet by the road one evening. They asked one another what they had got with them to eat with their rice. Each mentioned a different thing – *atusheh*, *gwomishi*, *mugishi*, *amusa*, *akelho*, etc., including, as some understood it, dried fish,

In contrast, Sreedhar (1976: 4) notes four main dialects: (1) 'Western Sema' spoken around what he refers to as Lezemi (Lazami) village; (2) 'Eastern Sema' spoken in the village of Chizemi in the Khezha area; (3) the 'Chizolimi' dialect spoken around Chizolimi village; and (4) the 'Central' dialect. However, he only provides details of the Central dialect, which he describes as the 'standard' one.

In general, most speakers report only minor differences between the varieties of Sumi spoken across the Zunheboto district, as well as the Sumi spoken in the cities of Kohima and Dimapur. Preliminary findings show some minor phonological differences between the dialect of Zunheboto town and that of the Satakha area just to the south, although the situation is complicated by widespread migration, especially from rural to urban areas. Consequently, what are described as features of the 'Satakha' dialect or 'Zunheboto' dialect are not confined to these areas, and may not even occur consistently within these areas. In general, both varieties would correspond to Sreedhar's 'Central' dialect.

Speakers of this Central / 'standard' dialect report having great difficulty understanding the Sumi spoken in the Pughoboto area, located in the south-west part of Zunheboto district. This area is where the village of Lazami (Hutton's 'Lazemi' and Sreedhar's 'Lezemi') is located. On the other hand, Sumi speakers from the Pughoboto area are generally able to understand the 'standard' dialect, although it is possible that older speakers have some difficulty speaking it.[5] Preliminary reports suggest the Pughoboto variety (or varieties) may be closer to Northern Angami dialects or Rengma, but further investigation is urgently needed to determine the validity of these claims.

1.4 Language classification

Near the start of the 20th century, Grierson (1903-1928/1967) classified Sumi (referred to as Sema) as a member of the 'Western sub-group' of the Tibeto-Burman languages of Nagaland, along with Angami, Rengma and Kezhama (also known as Kezha). This was mainly a geographical grouping, with some reference made to shared vocabulary and syntactic features. Hutton (1921/1968: 4) also suggested that Sumi (referred to as Sema) was linguistically closest to Khezha (referred to as Kezāmi Angami), but noted superficial similarities between Sumi and Chokri (referred to as Chekrama). In the time since then, a number of different classifications have been proposed for these languages as more data have been collected. The most important of these classifications include that of Marrison (1967), Bradley (1997) and Burling (2003).

Marrison (1967), in his comprehensive survey of the languages of Northeast India, places Sumi (referred to as Sema) in his 'Type C-1' group with Angami, Chokri,

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meat, and various kinds of vegetables. They agreed to pool their good things and share alike and sat down prepared for a feast, each one thinking how he had scored by agreeing to share with his neighbours. When they opened their loads, they all produced chillies." (1921/1968: 267)

[5] In an interview between a language consultant from Satakha and the wife of the chief of Lazami village, an interpreter was required to translate what the chief's wife was saying into 'standard' Sumi.

Khezama (or Khezha) and Mao.[6] He notes that Sumi is much more similar to Angami in terms of phonology, vocabulary and syntax but closer to Mao and Maram in terms of morphology.

A similar classification is proposed by Bradley (1997), who groups Sumi (referred to as Sema) with Angami, Chakhesang – consisting of Chokri and Khezhama (or Khezha) – and Mao, but he places them within the 'Southern Naga' sub-group of a larger Kuki-Chin-Naga grouping.

Finally, Burling (2003), in a more conservative classification, places Sumi (referred to as Simi) in the Angami-Pochuri group, which consists of Angami and Pochuri (or southern Sangtam or eastern Rengma) as two clear nuclei, along with Rengma N. (called Ntenyi in Marrison 1967), Rengma, Chokri, Kheza (or Khezha) and Mao (see Figure 1).

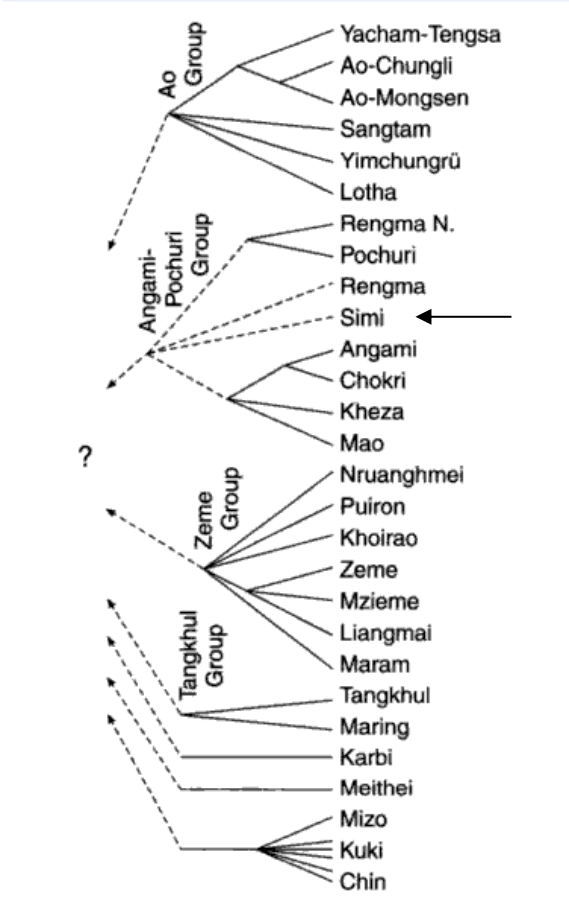

Figure 1: Genetic classification according to Burling (2003: 184)[7]

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[6] Marrison's classification was based on a comparison of: a) initial consonants; b) final consonants; c) noun prefixes; d) agentive noun suffix; e) classificatory verbal prefixes; f) 5 lexical items – 'fire', 'fish', 'house', 'road', 'stone'; g) position of the negative particle in the syntax; and h) usage of interrogative particles.

[7] 'Kheza' here is another spelling of 'Khezha'.

While Burling's more conservative classification is not simply based on geographical location, we still do not get a sense of the larger genetic groupings, mainly due to the sparse amount of linguistic work done in this region. In general, most proposed classifications thus far would show that Angami, Mao, Chokri and Khezha share a number of phonological and morphological innovations with Sumi, and are therefore among the languages most closely related to Sumi.

Figure 2 shows the geographic distribution of languages in Northeast India according to Burling's 2003 classification. One important observation to make here is that while Sumi is genetically classified as a member of the Angami-Pochuri group, it is geographically surrounded to the north, west and east by languages of the Ao group. Historical contact with these languages (to be discussed in the next section) may to some extent explain the difficulty of locating Sumi within the Angami-Pochuri group.

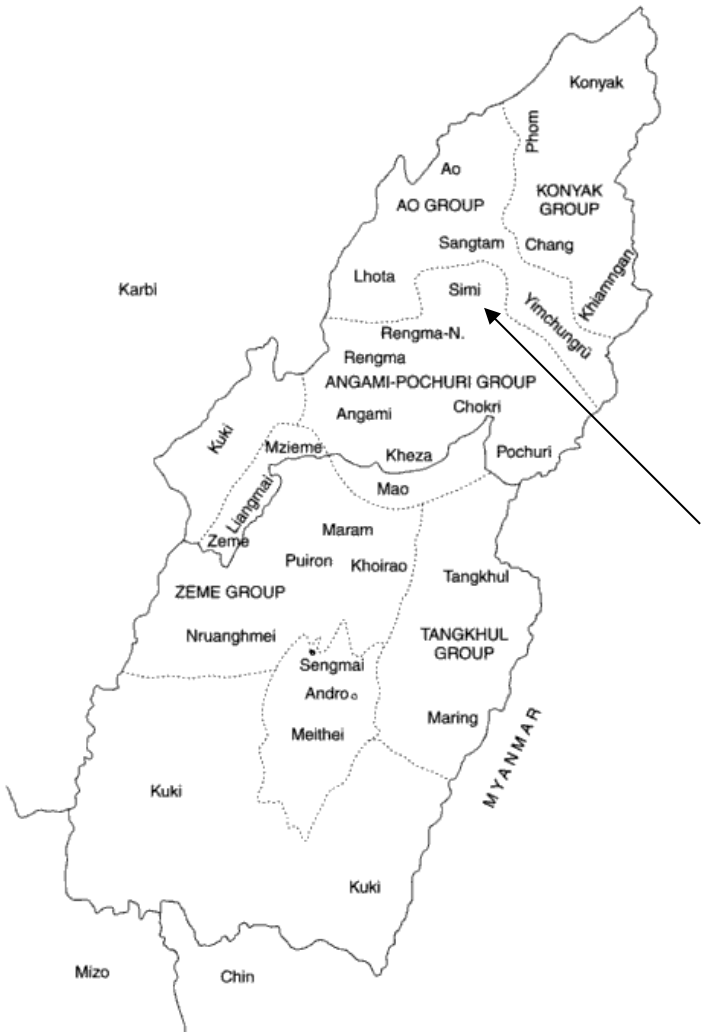

Figure 2: Map of language distribution in Nagaland and Manipur (Burling, 2003: 185)

1.5 History of language contact and migration

The Sumi language community has also been, and continues to be, associated with extensive migration: in the recent past, Sumi speakers spread north and eastwards into areas previously occupied by speakers of languages of the Ao group. Hutton (1921/1968: 7) described how the Sumis pushed the Aos further north, and cut off Sangtam groups to the east. He also claimed that the Sumis would have continued their expansion if not for British intervention. We have some linguistic evidence that supports this account of a northward expansion: many river names in the Zunheboto district end in *-ki* e.g. *Langki*, *Orki* and *Kiliki* rivers, which corresponds to *-ki* 'water' in Sangtam (see Marrison, 1967: 289). Note that the word itself for 'river' in Sumi *aghoki* /àɣòkì/ also contains *-ki*, which is not found in other Angami-Pochuri languages.[8]

Importantly, Hutton also described how the Sumi 'absorbed' Ao and Sangtam speakers – the latter have become known as 'Tukomi' Sumis (Hutton 1921/1968: 8; 123-124). He gives genealogies of some major Sumi families, who trace parts of their lineages to these groups, e.g. the Chopimi are an Ao clan from Lotisami; the Muromi clan is 'of Sangtam origin'; and some Yepthomi and Ayemi clans are of 'Sangtam origin' (1921/1968: 124-130). He also claimed that the name for Litami village appears to be derived from the Lotha name Lungtang.

From this short account of recent social history, it is more than likely that Sumi society has incorporated many speakers of other languages, primarily of the Ao group, into the speech community. It is probable that such intense language contact has influenced the languages, and in Chapter 8 we will examine how such contact may have influenced the phonology of Sumi.

1.6 Previous descriptions of Sumi

The first published work on Sumi can be found in *The Linguistic Survey of India*, Vol. 3 Part 2 edited by Sir George Griersen. In this work, he presented data collected by A. W. Davis (then Inspector General of Police in Assam), and gave a brief account of nominal and verbal affixation. He also provided three annotated texts in what he called the 'Simi' dialect. No mention of tone is given in this account, although vowel length was transcribed by placing a macron (¯) over what had been perceived as long vowels.

Hutton provided the first sketch grammar of the *language Rudimentary Grammar of the Sema Naga Language*, with Vocabulary in 1916 – a revised version of this was included in his published anthopological description *The Sema Nagas* (1921/1968), along with a revised word list. The dialect he examined was that of the Zümomi clan, spoken in the upper regions of the Kiliki river, close to present day Satakha town, the central part of the Sumi district and also in the Tizu Valley.

In *The Sema Nagas*, Hutton mentioned the presence of three tones in Sumi, which he marked only in minimal sets provided in the appendix of his book (following Sir George Grierson's transcription system for tone) e.g. ¯ka -ka ˍka for high, mid and low tones respectively. However, in his word list and in examples cited in his sketch

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[8] Compare this with Kohima Angami /kêrə̄/; Khezha /kerí/; Chokri /kəɻî/ (see Chapter 8 for the sources of these data) which all contain a nominal prefix *kV-* plus a rhotic-initial root that corresponds to the /ɣò/ in Sumi /àɣòkì/.

grammar he frequently omitted tone markings, stating in a footnote in his companion book, *The Angami Nagas* that:

> "I have not attempted to mark tones, or emphasis; these can only be learnt by ear, and the beginner can always avoid mistakes by using qualifying words to render his meaning clear." (1921/1969: 315)

The second most important work on Sumi comes from Sreedhar (1980), who provides the most comprehensive grammar of Sumi to date, with a significant portion of his book *A Sema Grammar* dedicated to the phonology of the language. This grammar incorporates much of the data already presented in his *Sema Phonetic Reader*, published earlier in 1976. His data came from a variety of sources, including villages in and around Dimapur, Kohima and Pherima (south of Zunheboto district), Zunheboto, Sakhalu and Atoizü (in Zunheboto district) and Mokokchung (north of Zunheboto district).

In his work, Sreedhar confirms Hutton's observation that Sumi has three tones, which he calls low, high and level (1976: 75-76; 1980: 19). Sreedhar makes the first attempt at transcribing these tones on all words he encountered, and provides sets of words with the same tone in his *Sema Phonetic Reader* (1976: 74-77). Phonetically, he describes the low and high tones as falling and rising respectively, but these appear to be based purely on auditory impressions and not acoustic phonetic evidence.

Of special mention is Marrison's (1969) *The Classification of the Tibeto-Burman languages of Nagaland of North-East India*. In this vast collection of data, he presents comparative word lists of most Tibeto-Burman languages of Nagaland, including Sumi. He also compares the phoneme inventories of the various languages. However, it is likely that much of his data on Sumi was derived from secondhand sources, including Hutton's work.

Table 1: Comparison of transcriptions of nine Sumi words

Grierson (1902)	Hutton (1921/1968)	Marrison (1969)	Sreedhar (1980)[9]	Author's own data	**Gloss**
lāki	laki, khe	laki, khe	lakhì	/lak^{h}í/	**one**
ti	tivelo[10]	thi, ti	thi	/t^{h}i/	**to die**
āzu	azü	azu	azi	/àʒɨ̀/ [a˩ zɨ̀˩]	**water**
ākivi	akevi	akevi	akiwi	/àkìvi/	**good**
āki	aki	aki	akì	/àkì/	**house**
āpu	apu	apu	apu	/àpù/	**father**
āmishi	amishi	amishi	amsi	/àmʃì/ ~ /àmɨ̀ʃì/	**cow**
che	chulo	chu	cu	/ʧù/	**eat**
nipfü	anipfu	anipvu	-	/ànɨ̀pù/	**wife**

[9] Sreedhar's phonological transcriptions (including tone) using the IPA are given. Where no diacritic is present, a mid level tone is assumed. Note that both his (1980) grammar and (1976) phonetic reader do not give a vocabulary list.

[10] Hutton (1921/1968) cites the imperative form of the verbs, which take the suffix *-lo*.

Table 1 provides a selection of nine words, as presented in these previous works on Sumi, along with phonetic transcriptions of my own field data. Note that Sreedhar's work is the only one to transcribe tone across the corpus, and his orthography is based on a phonemic analysis of the language, e.g. given that [ʃ] and [s] are allophones of the same phoneme, he uses the grapheme 's' to represent both, while other researchers use 'sh' and 's' respectively. He also uses 'c' and 'ch' for the unaspirated and aspirated post-alveolar affricates, where others have used 'ch' and 'chh'.

As can be seen, there are inconsistencies in the transcriptions with the marking of aspiration for stops, as in the words for 'one' and 'to die'. Another issue involves the transcription of the vowel /ɨ/, which is sometimes represented by 'u', and sometimes by 'ü', as in the word for 'water'. When the high vowels like /i/ occur word-medially following /k/, as in the word for 'good', some sources give the vowel as 'e'.

Sreedhar's transcriptions of tone appear vastly different from my own – in words which he has transcribed as bearing mid tone, I often find low tone. In the word for 'one', he has marked the second tone as being low, while I have found a high tone. There are very few examples where his tonal transcriptions match my own findings, such as the second tone in the word for 'house'. Given this lack of consistency with my own transcriptions, I have been reluctant to rely on the transcribed material in his study.

The possibility that some inconsistencies in transcription may very well be due to dialectal differences or historical change has not been discounted. One example is the word for 'wife': the labio-dental affricate /pf/ has not been found in my own study of Sumi, but is a common phoneme in Angami and other related languages (see §8.2.4). Consequently, it may either be found in certain dialects of Sumi that I have not encountered, or it may have been found in the speech of older Sumi speakers, but has since merged with the phoneme /p/.

1.7 Phonological descriptions of other Tibeto-Burman languages of Nagaland

A small number of grammars of other Tibeto-Burman languages of Nagaland exist. These generally include a phonological analysis of the language. A few noteworthy grammars are listed here, along with their authors: Kohima Angami (also known as Tenyidie) (Giridhar, 1980; Kuolie, 2006); Khezha (Kapfo, 2005); Lotha (Acharya, 1983); Mao (Giridhar, 1994); Mongsen Ao (Coupe, 2007). In addition, bilingual (English) and trilingual (English and Hindi) dictionaries that mark tone on lexical items exist for some of these languages: Angami (Giridhar, 1987) and Khezha (Kapfo, 2007).

In many of the listed grammars one usually finds the obligatory remark about the number of lexical tones in the language, while actual tonal transcriptions of the data tend to be either missing or inconsistent, limiting their usefulness for cross-linguistic comparisons of tone. In general, only a few studies have been dedicated to the tonal phonology of the Tibeto-Burman languages of Nagaland. These are summarised below.

Kapfo (1989) provides one of the first phonological studies of tone variation in a language of Nagaland, looking at compound nouns in Khezha. He identifies a number of patterns of morphologically and phonologically conditioned tone variation and provides examples of these. This work was subsequently incorporated into his (2005) grammar of Khezha.

The first experimental acoustic phonetic study of a language of Nagaland was undertaken by Blankenship *et al.* (1993) who examined tone and voiceless nasals in the

Khonoma dialect of Angami. In their study, they present an acoustic analysis of the vowels and tones of the language, providing formant plots of the acoustic vowel space, as well as giving the mean fundamental frequency (F_0), measured in hertz (Hz), of the four tones of Khonoma Angami.

Bielenberg and Nienu (2001) give the first description of the phonetics and phonology of the Phek dialect of Chokri, including an analysis of both segmental phonemes and tones.

Coupe (2003) provides the first comprehensive phonetic and phonological description of a language of Nagaland. His study of Mongsen Ao presents acoustic phonetic analyses of voice onset time of stops as well as pitch realisations of tone. In this study he includes the results of a perception test involving words distinguished only by differences in pitch. Much of this work was later updated and incorporated into his (2007) grammar of Mongsen Ao, which also includes an autosegmental account of tone sandhi.

Other work on Ao include Bruhn's (2009) classification of verbs in Chungli Ao by tonal morphology[11] and Temsunungsang's (2008) investigation of tone and word minimality in both the Mongsen and Chungli varieties of Ao.

Among recent work in more distantly related Tibeto-Burman languages of the region are grammars of Karbi (formerly Mikir) (Gruessner, 1978; Konnerth, forthcoming); and Meithei (Chelliah, 1997), which include phonological and some phonetic descriptions of tone in these languages. Konnerth and Teo (in press) also present an acoustic phonetic study and percerption study of tone in Karbi. Hyman (2007) provides an analysis of a Kuki language, Kuki-Thaadow, that highlights certain properties of its tone system, which he likens to that of an 'African tone' language.

Given the lack of decent tonal transcriptions for many of the Tibeto-Burman languages of Nagaland, there has been little comparative work on their tone systems. The only attempt at a comprehensive cross-linguistic comparison of tone in these languages can be found in Weidert's (1987) *Tibeto-Burman typology: a comparative account*. In his book, Weidert posits three historic tonal categories (referred to as TCs) for the Kuki-Naga-Chin (*sic*) languages, based on a cross-linguistic comparison of shared etyma among these languages. Unfortunately, much of the work suffers from idiosyncratic terminology. In addition, many of his conclusions have been disputed and disproved (see Matisoff, 1994). Nevertheless, Weidert's work provides a wealth of well-transcribed material on languages for which we do not have alternative sources of data.

Finally, Matisoff's (2003) *Handbook of Proto-Tibeto-Burman* is one of a few comparative studies that incorporate data from Tibeto-Burman languages of Nagaland. While some of the data were collected by Matisoff, who had previously worked with an Angami speaker and a Lotha speaker, his Sumi language data seem to largely come from Marrison (1967) who collected his data from sources that were not always reliably transcribed for tone. While the book does not attempt a reconstruction of historic tonal categories, it is still an invaluable store of information for reconstructed segments and prefixes in the Tibeto-Burman family, an understanding of which is essential for any historical work on Sumi tone in the future.

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[11] This, along with other papers, was the result of a linguistic field methods class held at UC Berkeley from 2008-2009.

1.8 Note on orthography

> "Semas believe they had once the secret of writing, but that dogs ate the skin on which it was recorded."
> (Hutton, 1921/1968: 299)

The creation of the current practical orthography based on the Latin alphabet is attributed to the missionary Rev. W. F. Dowd and Inashe Sema, who published a primer entitled *Mlali* in 1909 (Sreedhar, 1976). It has since been used in translations of the Sumi *Baibel*, as well as in publications such as the Sumi newspaper *Sümi Zümülhü* and the newsletter *Izatsa*. This script is nearly phonemic, and uses all the letters of the English alphabet. Some phonemes, such as the aspirated stops, are written using digraphs. The script has since been modified, with the addition of the letter 'ü' for the close central unrounded vowel.[12]

A recently published dictionary by the Sumi literature board (Swu & Yepthomi, 2004) uses a further modified version of the original missionary orthography. Low tones are marked by placing 'h' at the end of a syllable, while high tones are marked by doubling the preceding consonant, e.g. *apuh* 'father', *apu* 'dipper, water scoop', *appu* 'son'. However, there is still no official standard as to how and when to indicate tone. Mr H. S. Rotokha, the current Secretary of the Sumi Literature Board, informed me that these modifications should only be used to distinguish words that are potentially confusing. However, more work needs to be done to determine what words are most likely to be misinterpreted without marking tone orthographically. Literate Sumi speakers have also been slow to take up the new system, preferring to follow the orthography presented in the Sumi Bible, with only a small set of words written using the new system e.g. *apuh* 'father', *appu* 'son'.

For the purposes of this study, transcriptions in the current practical orthography will be presented in addition to phonetic and phonemic transcriptions. Transcriptions in the practical orthography are italicised e.g. *atsü* 'dog'. Tone will only be represented in the practical orthography for words that are commonly used as examples by the Sumi Literature Board – these are typically words belonging to minimal tone triplets.

In phonemic transcriptions, indicated by slash brackets / /, low pitch is marked by a grave accent (à) and high pitch by an acute accent (á). The middle pitch level is assumed when there is no accent marked on a tone-bearing segment (a). In phonetic transcriptions, indicated by square brackets [ ], Chao tone numbers are used to transcribe pitch – see §5.2 for more details.

1.9 Theoretical assumptions and structure of book

The main aim of this book is to provide a description of the phonetics and phonology of Sumi, with a focus on tone. In general, 'shallow' phonological representations that reflect surface realisations of tone are given. Only in Chapter 6 will any 'deeper' level of phonological representation be assumed, i.e. certain affixes will be posited as being underlyingly toneless, but are assigned surface tones through particular

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[12] Sreedhar (1979) attempted to introduce a purely orthographic system that used only one grapheme per phoneme, e.g. using 'c' to represent both [ʧ] and [ts], but this has not met with great success.

processes. In this chapter, an autosegmental approach, following Goldsmith (1979), will be adopted to try and account for tone alternations – details are provided in §6.2. Analyses using an autosegmental approach have been used in other recent descriptions of Tibeto-Burman languages of Nagaland, such as Coupe's (2003; 2007) analysis of Mongsen Ao and Hyman's (2007) analysis of Kuki-Thaadow. However, a critique of this autosegmental analysis of Sumi will also be presented, highlighting issues with using this approach to analyse the data.

One subject of interest in this book is tonogenesis (and tone evolution) in Sumi. The term 'tonogenesis' refers to the historical origin of tone in a language and is attributed to James Matisoff – the term 'tonogenetic' appears for the first time in a 1970 paper by Matisoff on the Lahu high-rising tone. Importantly, Haudricourt (1954) demonstrated how tones in Vietnamese developed through the loss of post-vocalic consonants and the loss of a voicing contrast in pre-vocalic consonants. Similarly, the tone split undergone by the four tones of Middle Chinese is attributed to the loss of a phonological contrast between voiced and voiceless prevocalic stops, resulting in the *yang* (lower pitch) and *yin* (higher pitch) registers (Chen, 2000). Haudricourt's theory was revised and updated by Thurgood (2002), who posited an intermediate stage where differences in consonant voicing first gave rise to differences in phonation type before the phonologisation of contrastive pitch across the entire vowel. Although this intermediate stage of contrastive phonation type appears to be attested in languages of the Bodish group (see Hildebrandt, 2007), it has not always been found in languages that appear to be currently undergoing tonogenesis, e.g. Kurtöp (Hyslop, 2009). Kingston (2011) gives a summary of these tonogenetic pathways. The interaction between consonants and pitch in Sumi will be explored further in Chapter 5, while Chapter 8 provides some comparative data that highlight the problems of reconstructing tone in the Tibeto-Burman languages of Nagaland.

The structure of the rest of the book is as follows: Chapter 2 explains the methodology used in this study; Chapter 3 provides a description of the segmental phonlogy of Sumi; Chapter 4 looks at phonotactics; Chapter 5 delves into tone phonology and phonetics; Chapter 6 considers the different types of tone melodies found in Sumi; Chapter 7 examines morphotonological processes; Chapter 8 offers a cross-linguistic comparison of key phonological features with other Tibeto-Burman languages of Nagaland; and Chapter 9 concludes the book with a summary of the main findings of this study. Researchers interested in Sumi proper, will find Chapters 3 to 7 most relevant, while Tibeto-Burmanists interested in comparative work will likely find Chapter 8 most useful.

2 *Methodology*

2.1 Introduction

The groundwork for this study was established during a linguistics field methods course at the University of Melbourne,[13] during which a basic phonological analysis of the language was produced. Minimal tone triplets were established and words in isolation were transcribed based on auditory perception using Chao tone letters, as given in the International Phonetic Alphabet. In these initial stages, digital audio recordings of words in isolation were made and analysed acoustically. Acoustic pitch traces were used to supplement the researcher's own transcriptions that were based on auditory impressions.

With the advent of portable digital sound recorders and the availability of free software to perform acoustic analyses, there is a growing expectation that fieldworkers use these tools to record language data, even in the early stages of fieldwork. Such acoustic phonetic analyses may help researchers by providing a visual representation of speech, e.g. a pitch trace can be used to visualise pitch when working on a tone language or when studying intonation (Gordon, 2003). These analyses also supply measurable acoustic data, which are now seen as indispensable to back up any conclusions about the phonetics of a language (Maddieson, 2001: 213).

However, when studying tone, caution must be taken not to rely too much on the acoustic analysis. For one thing, pitch in linguistic tone is relative and will not correspond to a single absolute F_0 value (Yip, 2002: 21). One must also be careful not to 'read too literally' into a single pitch trace, e.g interpreting a slight fall in the pitch trace to be a 'falling tone' (Hyman, 2010). Furthermore, an acoustic pitch trace may not be as useful if non-modal phonation, not pitch, is the primary phonetic correlate of one or more tones, as we find in some tone languages, e.g. the 'creaky tone' in Burmese (Okell, 1969), breathy voice with low tones in Tamang (Mazaudon, 2003). Many pitch trackers are unable to reliably estimate F_0 over stretches of such non-modal phonation (Beckman & Venditti, 2012; Gussenhoven, 2004).

These limitations however, should not detract from the overall usefulness of an acoustic pitch trace as a supplement to the researcher's auditory impressions, especially for researchers who are not as confident in their own auditory observations. It is important to remember though, that one cannot rely on absolute F_0 values when assigning tone categories. What follows in this chapter is a description of the methodology used in this study of tone in Sumi, including the development of a tone comparison chart and the procedure used to conduct an acoustic phonetic analysis of each tone category.

[13] This course was led by Nick Evans at the University of Melbourne in the second half of 2007.

2.2 Participants

Two participants, one female (IZ), aged 38, and one male (JA), aged 39, were recorded. Both are speakers of the Central dialect of Sumi, with only minor differences between their dialects – IZ is from the Satakha region of Zunheboto, while JA is a resident of Zunheboto town. The data used in this study were collected in Melbourne, Australia at fortnightly meetings with the primary language consultant IZ between March 2008 and August 2009. A second source of recordings came from JA during a meeting with him in Zunheboto, Nagaland in February 2009. Given general difficulties in gaining access to more participants at the time, only two speakers were recorded for this study.

2.3 Recording equipment

A Sony TCS-580V stereo Cassette-Corder was initially used with an external ECM-MS907 electret condenser microphone. These recordings were then digitised on an analogue digital converter at a sampling rate of 96 kHz and a bit size of 24 bits per sample using the programme Wave Lab 4.0. The cassette recorder was upgraded to a Sony PCM-D50 digital recorder at the end of 2008, and all subsequent recordings were done at a sampling rate of 44.1 kHz and a bit size of 16 bits per sample.

2.4 Carrier phrases

Minimal tone triplets were found in Sumi in order to establish the presence of three lexical tones. However, it was still difficult to transcribe new lexical items for tone, especially if they were not part of a full minimal triplet. Since, as with all tone languages, phonetic realisations of tone did not correspond to absolute pitch values, a method suggested by Pike (1948)[14] was used.

Pike highlighed the use of tone frames, hereby referred to as 'carrier phrases'.[15] The procedure involves substituting a lexical item into a carrier phrase, which then provides a context against which the pitch(es) of the investigated lexical item can be compared. In theory, multiple carrier phrases are required, in the event that a particular phrase causes a change in the tone on the investigated word.

In this study of lexical tone, the following carrier phrases were used:

(1) *Niye____ ani.*
/nìje ____ àni/[16]
'I have a ____'

(2) *Hiye____ kumo.*
/hije ____ kùmò/
'This is not a ____'

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[14] Additional exercises in pitch analysis can be found in Pike's (1947) manual.

[15] According to Pike's (1948) methodology, a tone frame could potentially consist of a single affix. Since the tone frames used in this study are whole phrases into which investigated lexical items are substituted, the term 'carrier phrase' is preferred.

[16] Note that the tones of the words in the carrier phrases themselves were only confirmed with the use of the tone comparison chart, to be described in §2.5.

(3) *Noye ____ pi pi ani.*
/nòje ____ pi pì àni/
'You said ____'

As can be deduced, carrier phrases (1) and (2) were only useful when investigating nouns, while carrier phrase (3) was able to accommodate words from all word classes.

In addition to phonetic transcriptions, which were based on the researcher's own auditory impressions, audio recordings of each token in the carrier phrase were made, with a minimum of two repetitions per investigated item. Given the lack of a reliable dictionary or extensive word list (with lexical tone already marked) at the start of this research, much of the initial work involved locating and assembling a corpus of words that was large enough to offer a general overview of the phonetic structures found in the language – a word list is given in Appendix A. As such, only a minimum of two repetitions were recorded in order to obtain a larger corpus of different words. This is in line with Gordon (2003), who recommends at least two repetitions in such an investigation, in the event that a recording is affected by sudden background noise or speaker dysfluency. The recordings were analysed in Praat (version 5.1.22) (Boersma & Weenink, 2009) to generate spectrograms and pitch traces to supplement initial segmental and tonal transcription of newly encountered lexical items.

A phrase-medial substitution position was chosen to avoid the effects of post-lexical phrase-final intonation, such as list intonation produced when speakers are asked to read off a list of items in isolation. Admittedly, there may have been some effects of focus intonation, but this would also have been an issue for items recorded in isolation. The carrier phrase was a useful guide in determining if a change in key had occurred, i.e. if the pitch on all the words in the carrier phrase went up or down, the transcription of tone on the investigated word could be adjusted accordingly. Moreover, it was found that in all three carrier phrases used in this study, the morpheme *ye*, which immediately preceded the investigated word, carries M tone (labelled M* in annotations). This made it a useful visual yardstick against which the pitch of the adjacent investigated word could be compared, i.e. it was possible to calculate the pitch on an item, measured in semi-tones relative to the carrier phrase.

The use of carriers phrases was not entirely problematic. Firstly, it took quite a bit of time and familiarity with the language to identify suitable carrier phrases and then to verify that they did not trigger a change in tone. Secondly, having to place every new lexical item into a carrier phrase became time consuming and quickly caused fatigue for both the researcher and language consultants. In view of these issues, a tone comparison was developed to group together lexical items more quickly.

2.5 Tone comparison chart

A tone comparison chart was developed and used during the course of the study. The purpose of the chart was to provide groups of words that shared the same tone patterns or melodies, so that when a new word was encountered, the speaker could place that new word within an already established tone 'group'.

The starting point for the chart was the researcher's phonetic transcriptions, with words transcribed for the same pitch grouped together. The main language consultant

IZ was then asked to reproduce the melody of each word without its segmental information (i.e. to 'hum' the word melody), and to confirm that all the words in each group shared the same melody. The language consultant was then asked to confirm that the melody of each group was different from that of all other groups. Two other language consultants, not recorded for this study, were also asked to group words based on similarities / differences in tone melody in order to verify that the original chart was not a representation of an idiosyncratic tone system unique to the first consultant. Once this was done, the tone labels L, M and H (representing Low, Mid and High tone) were assigned to each group, based on relative pitch height.

A sample of this chart is given in Table 2. The columns in the table, from left to right, give: (1) the number of syllables in a word; (2) an orthographic representation of that word; (3) an English gloss; (4) the tone melody associated with that word; and (5) the word class (or part of speech). The symbols in the tone melody column: L, M and H represent Low, Mid and High tone respectively. The full chart is provided in Appendix B. Note that all trisyllabic words are compounds of monosyllabic or disyllabic roots, though these have not been analysed morphologically in the chart.[17]

Table 2: Sample of the tone comparison chart used during elicitation sessions

Syll	Word	Gloss	Tone	POS
2	*aki*	house	LL	n
	aphu	village	LL	n
	sasü	with	LM	postp
	niye	I	LM	pron
	appu	son	LH	n
	aza	mother	LH	n
	eno	and	ML	conj
	shiphe	create	ML	v
	aje	name	MM	n
	kini	two	MM	num

Once the tone comparison chart was established, each time a new word was investigated, the language consultant would then be asked to reproduce the melody of the word without its segmental information, and to place the word in a group of words (in the chart) that shared the same melody. It was essential that the speaker consistently assigned a word to the same group each time. This was done as a way of independently confirming the researcher's own tonal transcriptions. More importantly, it attempted to tap into the tone categories in the speaker's mind without relying on phonetic output. For this reason, it is hoped that the use of this method reduces the need for a perception

[17] Some words are not lexical items, e.g. *nitsülo* 'Give (it) to us' is an inflected verb with the root *tsü* 'give', a 1st person plural prefix *ni-* '(to) us' and the imperative suffix *-lo*.

test, which is sometimes done in studies of tone to verify the existence of tone categories (Coupe, 2003).

The tone comparison chart provided a quick and convenient way to determine the tone on new words, without having to rely on a frame or multiple frames which were found to be both time-consuming and difficult to come up with. Nevertheless, it was difficult to use this method for longer words due to the large number of possible tone permutations. However, the main language consultant IZ was usually able to break up most words into separate syllables and compare them with the monosyllabic words in the chart.

It was also difficult for the language consultants to place a small number of words in any of the established categories. These words typically ended in phonetic diphthongs, e.g. *aghau* [aɣaù] 'bird', *toi* [tòi] 'resemble'. In such cases, the consultants were generally still able to hum these words but would have trouble placing them in a group in the chart. A combination of auditory and acoustic analysis was then needed to verify the identity of each tone on these phonetic diphthongs.

After the tone categories were established, an acoustic phonetic analysis was conducted to investigate the phonetic realisation of each tone category.

2.6 Acoustic phonetic analysis

The corpus used for the acoustic analysis of Sumi consisted only of the lexical items spoken in any one of the three carrier phrases mentioned in §2.4. Two freely available software programs were used to perform this analysis: Praat (version 5.1.22) (Boersma & Weenink, 2009) and EMU Speech Database System (version 2.2.3) (Cassidy & Harrington, 2001). As mentioned above, Praat was used in the initial stages to generate spectrograms and pitch traces. However, as the corpus expanded, the EMU Speech Database System was used in conjunction with the statistical program R (version 2.8.1) (Harrington, 2010) via the EMU/R package to extract and analyse data, including F_0 measurements, across the corpus. In addition to these, the freely available program 'Linguist's Toolbox' (version 1.5.3) (Hellmuth *et al.*, 2006) was used to create a database in which to record and organise lexical entries.

The acoustic analysis looked at the phonetic realisation of each tone category, measured as fundamental frequency (F_0). To do this, the 'Pitch Tool' of the EMU Speech Database System was used to generate pitch traces, while the 'forest' application was used to generate spectrograms. Annotations were done in the EMU Speech Database System using two interval tiers: 'Word' and 'Segment'; and one point tier: 'Tone'. The labels 'L', 'M' and 'H' were used in the tone tier, indicating Low, Mid and High tone respectively. Numbers were added to these tone labels to indicate which syllable in the word each tone was found on (counting from the left-edge / start of the word), and the last tone in each word was marked with '%'. In addition, an 'M0' label was placed in the part of the carrier phrase immediately preceding the investigated word – this corresponded to the *ye* morpheme found in all carrier phrases, which carried M tone. A sample annotation of the word *atoqhe* [atoqhe] 'lizard' is given in Figure 3.

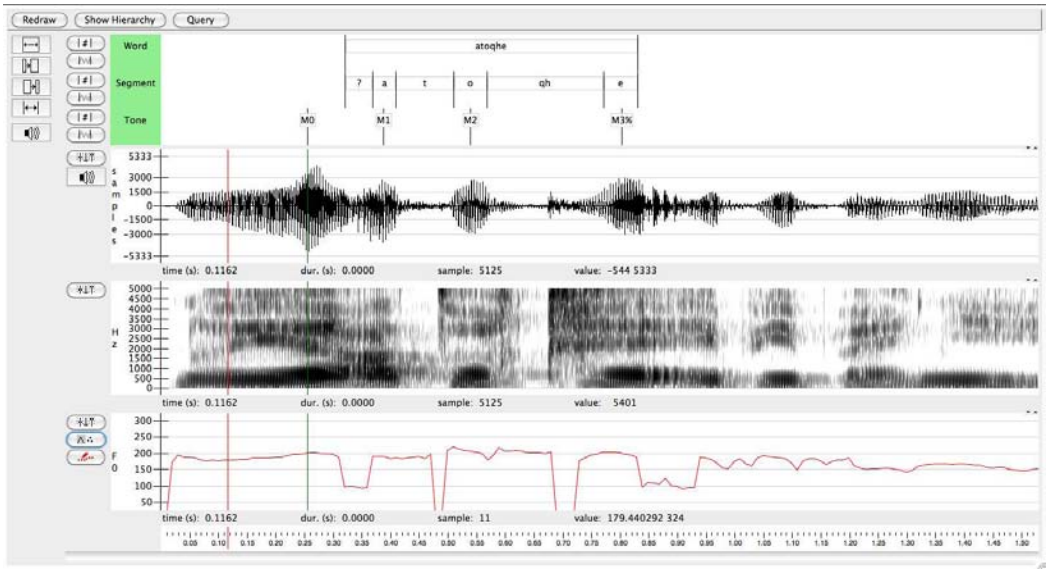

Figure 3: Sample annotation of atoqhe [a˧ to˧ qʰe˧] ‘lizard’ using the program Emu Labeler. From top to bottom, we have the three annotated tiers: Word, Segment and Tone; an acoustic waveform of the utterance; a wideband spectrogram and the pitch trace. In the Tone tier, ‘M’ marks M tone on vocalic segments within the investigated word, with the numbers 1, 2, 3 marking their position from the start of the word, and ‘%’ marking the tone on the last syllable of the word. ‘M0’ marks M tone in the part of the carrier phrase immediately preceding the investigated word.

After labelling was completed, the EMU/R package was used to extract F_0 values at 10% intervals across each tone-bearing segment. Tokens that displayed too much pitch perturbation, typically characterised by aperiodicity in the waveform, as well as pitch halving or pitch doubling, were excluded from the study. The F_0 value at the vowel mid-point was used for statistical analyses, including ANOVAs and t-tests. These values were also used to generate tone trajectory plots that show mean F_0 values for each tone across a time-normalised segment.

In addition to absolute F_0 values, F_0 relative to the carrier frame (F_{rel}), measured as semi-tones, was calculated using the same formula used by Mazaudon and Michaud in their (2008) study of Tamang tones:

$$F_{rel}=12 \times (\log(F_{target} / F_{frame}) / \log(2))$$

For this investigation of Sumi, the F_{target} value was the absolute F_0 value of each tone at the vowel mid-point, while the F_{frame} value was the value of F_0 at the point marked ‘M0’.

The results of the acoustic study of tone are given in Chapter 5. First, a description of the segmental phonology and phonotactics of Sumi will be presented.

3 *Segmental Phonology*

3.1 Introduction

Before examining the tone system of Sumi, some knowledge of the segmental phonology is required. This chapter provides a brief description of the segmental phonology of Sumi, serving as both an update to Sreedhar's (1976; 1980) analysis and an expansion of Teo's (2012) description of Sumi phonology.

3.2 Phoneme Inventory

The phoneme inventory presented in Table 3 is based on data collected by the author. The phones [ts ts^{h} s z], which are allophones of /ʧ ʧ^{h} ʃ ʒ/ respectively, are given in parentheses because they are differentiated in the current orthography (see §1.8) from the post-alveolar affricates and fricatives. Similarly, the labio-velar approximant [w] is an allophone of the labio-dental fricative /v/, but both are represented differently in the current orthography.

Table 3: Phoneme inventory of Sumi

	Labial	Labio-dental	Alveolar	Post-alveolar	Palatal	Velar	Uvular	Glottal
Stops	p p^{h} b		t t^{h} d			k k^{h} g*	q q^{h}	
Affricates			(ts ts^{h})	ʧ ʧ^{h}				
Fricatives		f* v	(s z)	ʃ ʒ		x ɣ		h
Nasals	m^{h} m		n^{h} n			ŋ		
Laterals			l^{h} l					
Approx.	(w)		ɹ*		j			

* indicates rare / marginal phoneme

	Front	Central	Back
High	i	ɨ	u
Low	e	a	o

In addition to these segments, Sumi has three suprasegmental level tones: Low (L), Mid (M) and High (H). These will be described in more detail in §5.2. In phonological representations, diacritics are used to mark the tones: /à/ for L tone, /a/ for M tone and /á/ for H tone. For phonetic transcriptions of tone, Chao tone letters (see Chao, 1930/1980) are used, i.e. [˩], [˧] and [˥] for L, M and H tone.[18]

[18] This is similar to the system used by Coupe (2003) who uses diacritics in the phonological representation, and Chao tone numbers, e.g. 11, 33 for phonetic transcriptions.

This analysis differs from Sreedhar's (1980) analysis, which treats the post-alveolar fricatives [ʃ] and [ʒ] as allophones of the dental fricatives /s/ and /z/ (alveolar in this analysis) and treats [v] as an allophone of /w/ – see §3.3.2.

More importantly, Sreedhar does not recognise the phoneme /ɹ/ as part of the phonemic inventory, despite citing examples like *khurshi* (transcribed by Sreedhar as *kursi*) 'horse'. While it is true that most words containing /ɹ/ are arguably recent borrowings into Sumi[19] most are now considered to be part of the native lexicon. For instance, the author was told that the word *khurshi* [kʰurɻ ʃiɻ] 'horse' was a compound of the noun root *-shi* 'wild animal; game' and the onomatopoeic *khur-*, representing the neighing of a horse. This suggests that some speakers consider it to have a 'native' origin, even if comparative evidence points to the root *khur-* as a borrowing.[20]

In contrast, breathy stops founds in words like *bheri* [bʱeɹi] 'sheep', *gadha* [gadʱa] 'donkey' are not included in the phoneme inventory, as speakers identify these as having been borrowed from Hindi or Nagamese.[21] Further evidence that such words lie outside what is considered 'native' vocabulary comes from the fact that speakers are able to consistently place the pitch on words like *khurshi* 'horse' into tonal categories, but often have trouble doing so for loanwords that contain breathy stops.

3.3 Consonants

3.3.1 Plosives

/p/ is a voiceless unaspirated bilabial stop. It is always realised as [p] and occurs syllable-initially, e.g. *pi* /pì/ [piɻ] 'say'. As a result of resyllabification (see §4.5) it can sometimes occur in syllable-final position word-medially, e.g. *sapüsa* /ʃà.pɨ̀.ʃà/ [sapɻ saɻ] ~ [saɻ pɨɻ saɻ] (careful speech) 'to mistreat'.

/pʰ/ is a voiceless aspirated bilabial stop. It is always realised as [pʰ] and occurs syllable-initially, e.g. *pho* /pʰò/ [pʰoɻ] 'to be smoky'. It is represented in the practical orthography by the digraph *ph*.

/b/ is a voiced bilabial stop. It is always realised as [b] and occurs syllable-initially, e.g. *ba* /bà/ [baɻ] 'to defecate'. As a result of resyllabification it can sometimes occur in syllable-final position word-medially, e.g. *lhobidi* /lʱo.bi.di/ [lʱobɬ di] ~ [lʱoɬ biɬ di] (careful speech) 'forty'.

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[19] It would appear that the original voiced and voiceless alveolar rhotics */r/ and */r̥/ (*rh*) underwent dorsalisation in Sumi and developed into voiced and voiceless velar fricatives /ɣ/ and /x/ (see §8.2.1 for more on this development).

[20] Marrison (1967: 128) gives *kuru* as the Sumi word for 'horse', which suggests that the current form *khurshi* is a compound of *kuru* 'horse' and *-shi* 'wild animal'. However, rather than an onomatopoeic origin, it is more likely that *kuru* is a reflex of the Proto Tibeto-Burman root **kor* 'horse' offered by Matisoff (2003: 385): other reflexes of this morpheme in related languages include Tangkhul Naga *si-kuy* and Lushai (Mizo) *sà-kŏr*. Acharya (1983) also gives /kúrə̀/ as the word for 'horse' in Lotha Naga. It is most likely that Sumi has borrowed this morpheme from another Tibeto-Burman language after the loss of its own alveolar rhotic.

[21] Most Sumi speakers also speak Nagamese, as well as some Hindi – languages with breathy stops in their phonemic inventories – and are able to produce these sounds without difficulty.

/t/ is a voiceless unaspirated alveolar stop. It is always realised as [t] and usually occurs syllable-initially, e.g. *ta* /tà/ [taꜘ] 'finish'. As a result of resyllabification it can sometimes occur in syllable-final position word medially, e.g. *atikha* /à.tì.kʰa/ [atꜘ kʰa꜖] ~ [aꜘ tiꜘ kʰa꜖] (careful speech) 'last' – however, due to vowel harmony (see §3.6.1; §4.5) speakers often produce [aꜘ tɨꜘ kʰa꜖] in careful speech instead.

/tʰ/ is a voiceless aspirated alveolar stop. It is always realised as [tʰ] and occurs syllable-initially, e.g. *tha* /tʰa/ [tʰa꜖] 'to ignore'. It is represented in the practical orthography by the digraph *th*.

/d/ is a voiced alveolar stop. It is always realised as [d] and occurs syllable-initially, e.g. *da* /dà/ [daꜘ] 'to paste'.

/k/ is a voiceless unaspirated velar stop. It is usually realised as [k] and occurs syllable-initially, e.g. *ka* /kà/ [kaꜘ] 'to rule'. It is sometimes realised as the palatal stop [c] before the front vowels /i/ and /e/ (see §3.4.1), e.g. *aki* /à.kì/ [aꜘ ciꜘ] ~ [aꜘ kiꜘ] 'house'. As a result of resyllabification it can sometimes occur in syllable-final position word medially, e.g. *akütsü* /à.kɨ̀.ʧɨ̀/ [akꜘ tsɨ꜖] ~ [aꜘ kɨꜘ tsɨ꜖] (careful speech) 'head'.

/kʰ/ is a voiceless aspirated velar stop. It is usually realised as [kʰ] and occurs syllable-initially, e.g. *kha* /kʰa/ [kʰa꜖] 'to shut'. It is sometimes realised as the palatal stop [cʰ] before the front vowels /i/ and /e/, e.g. *akhi* /a.kʰi/ [a꜖ cʰi꜖] ~ [a꜖ kʰi꜖] 'bee'. It is represented in the practical orthography by the digraph *kh*.

/g/ is a voiced velar stop. It is a marginal phoneme found in only one morpheme (and consequently, words containing this morpheme), where it occurs syllable-initially. It is usually realised as the palatal stop [ɟ], since the only example of it occurs before the high front vowel /i/ (see §3.4.1) e.g. *agi* /a.gí/ [a꜖ ɟiꜗ] ~ [a꜖ giꜗ] 'face'.

/q/ is a voiceless unaspirated uvular stop. It is always realised as [q] and occurs syllable-initially, e.g. *qü* /qɨ/ [qɨ꜖] 'to spread'.

/qʰ/ is a voiceless aspirated uvular stop. It is realised as [qʰ], but is usually produced with some frication as [qᵡ], and occurs syllable-initially, e.g. *qhü* /qʰɨ/ [qᵡɨ꜖] ~ [qʰɨ꜖] 'to buy'. It is represented in the practical orthography by the digraph *qh*.[22]

3.3.2 Fricatives

/f/ is a voiceless labio-dental fricative. It is a marginal phoneme that occurs in syllable-initial position in a small number of words. It is realised as [f], e.g. *fu* /fu/ [fu꜖] 'to blow'.

/v/ is a voiced labio-dental fricative. It has three variants: [v], [w] and [vʲ] that can occur in syllable-initial position. /v/ is usually realised as palatalised [vʲ] before the front vowels /i/ and /e/ (see §3.4.1), e.g. *akive* /à.kì.vé/ [aꜘ ciꜘ vʲeꜗ] ~ [aꜘ kiꜘ veꜗ] (*[aꜘ kiꜘ weꜗ]) 'stomach'. For speakers from the Zunheboto town area, [v] is in complementary distribution with the labio-velar approximant [w]. The latter occurs only before the back rounded vowels /u/ and /o/, e.g. *awu* /à.vù/ [aꜘ wuꜘ] 'chicken', *awo* /à.vò/ [aꜘ woꜘ] 'pig', while the former in front of the central vowels /a/ and /ɨ/, e.g. *avü*

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[22] A common observation among older native speakers is that many younger speakers living in the cities do not distinguish uvular stops from velar stops. While it is possible that certain Sumi dialects never did distinguish the two sets, there appears to have emerged amongst these younger speakers a certain kind of stigma associated with using the uvular stops. This is certainly an area for further sociolinguistic research.

/a.vɨ/ [a˧˩ vɨ˧˩] (*[a˧˩ wɨ˧˩]) ‘frost’. It can occur in syllable-final position, usually as a result of resyllabification, e.g. *awu* /à.vù/ [awꜜ] ~ [aꜜ wuꜜ] ‘chicken’. For speakers of the Satakha dialect, [v] can occur before all vowels, including the back rounded vowels e.g. *awo* /àvò/ [aꜜ voꜜ] ‘pig’. However, speakers of this dialect may sometimes substitute [v] with [w] before the back vowels, perhaps due to influence from the Zunheboto dialect, e.g. *awu* /à.vù/ [aꜜ wuꜜ] ~ [aꜜ vuꜜ][23] ‘chicken’. In this dialect, [v] may also occur in syllable-final position word-medially due to resyllabification, e.g. *avudu* /à.vù.dú/ [avꜜ duꜛ] ~ [aꜜ vuꜜ duꜛ][24] (careful speech) ‘rooster’. In the practical orthography, /v/ is written as *w* before the vowels *u* and *o*, and *v* elsewhere, e.g. *awu* ‘chicken’, *avi* ‘mithun (wild bison)’.

/ʃ/ is a voiceless post-alveolar fricative. It occurs in syllable-initial position and is realised as alveolar [s] before the central vowels /a/ and /ɨ/, e.g. *asa* /à.ʃà/ [aꜜ saꜜ] ‘hair’. In front of the other vowels, it is usually realised as [ʃ], but before the front vowels /i/ and /e/ it may also be realised as the alveolo-palatal [ɕ] (see §3.4.1), e.g. *ashi* /à.ʃì/ [aꜜ ɕiꜜ] ~ [aꜜ ʃiꜜ] ‘meat’. The practical orthography distinguishes the alveolar allophone from the post-alveolar, using *s* for [s] and *sh* for [ʃ] and [ɕ].

/ʒ/ is a voiced post-alveolar fricative. It occurs in syllable-initial position and is realised as alveolar [z] before the central vowels /a/ and /ɨ/, e.g. *aza* /à.ʒá/ [aꜜ zaꜛ] ‘mother’, *azü* /à.ʒɨ̀/ [aꜜ zɨꜜ] ‘water’. In front of other vowels, it is usually realised as the fricative [ʒ] or affricate [ʤ] (which are in free variation), e.g. *ju* /ʒu/ [ʒu˧˥] ~ [ʤu˧˥] ‘to look at’, but before the front vowels /i/ and /e/, it may also be realised as the alveolo-palatal [ʑ] or [dʑ] (see §3.4.1), e.g. *aji* /à.ʒì/ [aꜜ ʑiꜜ] ~ [aꜜ dʑiꜜ] ~ [aꜜ ʒiꜜ] ~ [aꜜ ʤiꜜ] ‘blood’. As a result of resyllabification it can sometimes occur in syllable-final position word medially, e.g. *ajikhu* /a.ʒi.kʰu/ [aʒ˧˩ kʰu˧˩] ~ [a˧˩ ʒi˧˩ kʰu˧˩] (careful speech) ‘cup’ – however, due to vowel harmony (see §3.6.1; §4.5) speakers often produce [a˧˩ ʒu˧˩ kʰu˧˩] in careful speech. The current practical orthography distinguishes the alveolar allophone, using *z* for [z], and *j* for [ʒ], [ʑ] and [ʤ]. The free variation between [ʒ] and [ʤ] has resulted in some confusion in the orthography, with either *j* or the digraph *zh* used to represent this phoneme, e.g. *azhi* or *aji* ‘blood’. Recent spelling reforms have started to replace *zh* with *j*, although clan names such as *Jimomi* may continue to be spelt *Zhimomi*.

/x/ is a voiceless velar fricative. It is always realised as [x] and occurs in syllable-initial position, e.g. *xo* /xo/ [xo˧˩] ‘to pick (fruit)’.

/ɣ/ is a voiced velar fricative. It is always realised as [ɣ] and occurs in syllable-initial position, e.g. *ghe* /ɣè/ [ɣeꜜ] ‘to pick (in pinching manner)’. As a result of resyllabification it can sometimes occur in syllable-final position word medially, e.g. *aghuloki* /à.ɣù.lò.kí/ [aɣꜜ loꜜ kiꜛ] ~ [aꜜ ɣuꜜ loꜜ kiꜛ] (careful speech) ‘time period’. It is represented in the practical orthography by the digraph *gh*.

/h/ is a voiceless glottal fricative. It is always realised as [h] and occurs in syllable-initial position, e.g. *he* /hè/ [heꜜ] ‘to hit’.

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[23] Some speakers of the Satakha dialect produce [aꜜ vɨꜜ] for ‘chicken’, modifying the vowel instead of the consonant.

[24] The form [aꜜ vɨꜜ duꜛ] is also produced by some speakers of the Satakha dialect.

3.3.3 Affricates

/ʧ/ is a voiceless unaspirated post-alveolar affricate. It occurs in syllable-initial position and is realised as alveolar [ts] before the central vowels /a/ and /ɨ/, e.g. *atsa* /à.ʧà/ [aꜜ tsaꜛ] 'word, language'; *akütsü* /à.kɨ̀.ʧɨ́/ [akꜜ tsɨꜗ] 'head'. In front of other vowels, it is usually realised as [ʧ], but before the front vowels /i/ and /e/ it may also be realised as the alveolo-palatal [tɕ] (see §3.4.1), e.g. *akichi* /à.kì.ʧí/ [aꜜ kiꜜ tɕi˥] ~ [aꜜ kiꜜ ʧi˥] 'mouth'. The practical orthography distinguishes the alveolar allophone, using *ts* for [ts] and *ch* for [ʧ] and [tɕ].

/ʧʰ/ is a voiceless aspirated post-alveolar affricate. It occurs in syllable-initial position and is realised as alveolar [tsʰ] before the central vowels /a/ and /ɨ/, e.g. *tshü* /ʧʰɨ́/ [tsʰɨꜗ] 'to bind'. In front of other vowels, it is usually realised as [ʧʰ], but before the front vowels /i/ and /e/ it may also be realised as the alveolo-palatal [tɕʰ] (see §3.4.1), e.g. *akichhi* /à.kì.ʧʰi/ [aꜜ kiꜜ tɕʰiꜗ] ~ [aꜜ kiꜜ ʧʰiꜗ] 'breast'. The practical orthography distinguishes the alveolar allophone, using *tsh* for [tsʰ] and *chh* for [ʧʰ] and [tɕʰ].[25]

3.3.4 Nasals and Laterals

/m/ is a voiced bilabal nasal. It is realised as [m] when it occurs in syllable-initial position, e.g. *ami* /à.mì/ [aꜜ miꜜ] 'fire'. As a result of resyllabification it can occur in syllable-final position word-medially, e.g. *amiphoki* /à.mì.pʰò.kì/ [amꜜ pʰoꜜ kiꜜ] ~ [aꜜ miꜜ pʰoꜜ kiꜜ] (careful speech) 'fireplace, hearth'. In minor syllables (see §4.3 for discussion of sesquisyllables), it is realised as a syllabic nasal [m̩], e.g. *muku* /m̀.kú/ [m̩ꜜ ku˥] 'twenty', *mlah* /m̀.là/ [m̩ꜜ laꜜ] 'to work'. In the Satakha dialect, it can sometimes occur in word-final position due to word-final high vowel deletion following sonorants (see §3.6.2), e.g. *amu* /à.mú/ [am˥] ~ [aꜜ mu˥] (careful speech) 'older brother'.

/mʱ/ is a breathy aspirated bilabial nasal. It is realised as [mʱ] and only occurs in syllable-initial position, e.g. *mho* /mʱo/ [mʱoꜗ] 'to be cloudy'. It is represented in the practical orthography by the digraph *mh*. Some speakers, including JA, interpret /mʱ/ in word-medial position as a sequence of /m/ and /h/ and will insert an epenthetic vowel between the two in 'careful speech', e.g. *amhi* /à.mʱì/ [aꜜ mʱiꜜ] 'hair (of body)' is produced by these speakers as [aꜜ miꜜ hiꜜ] ~ [aꜜ mi̤ꜜ ɦi̤ꜜ].

/n/ is a voiced alveolar nasal. It occurs in syllable-initial position and is usually realised as [n] e.g. *napa* /nà.pà/ [naꜜ paꜜ] 'aromatic plant of mint family'. It is sometimes realised as a palatalised [nʲ] before the front vowels /i/ and /e/ (see §3.4.1), e.g. *axone* /à.xó.nè/ [aꜜ xo˥ nʲeꜜ] ~ [aꜜ xo˥ neꜜ] 'fermented soya beans'. In the Satakha dialect, it can sometimes occur in word-final position due to word-final high vowel deletion following sonorants (§3.6.2), e.g. *kini* /ki.ni/ [kinʲꜗ] ~ [kiꜗ nʲiꜗ] (careful speech) 'two'.

/nʱ/ is a breathy aspirated alveolar nasal. It occurs in syllable-initial position and is usually realised as [nʱ], e.g. *nha* /nʱa/ [nʱaꜗ] 'to cover'. It is sometimes realised as palatalised [nʱʲ] before the front vowels /i/ and /e/ (see §3.4.1), e.g. *akhonhe* /à.kʰò.nʱè/ [aꜜ kʰoꜜ nʱʲeꜜ] ~ [aꜜ kʰoꜜ nʱeꜜ] 'knee'. It is represented in the practical orthography by

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[25] Members of the Sumi Literature Board have begun replacing *chh* with *tch* to represent the aspirated post-alveolar affricate.

the digraph *nh*. Some speakers, including JA, interpret /nʱ/ in word-medial position as a sequence of /n/ and /h/ and will insert an epenthetic vowel between the two in 'careful speech', e.g. *anha* /à.nʱà/ [a˩ nʱa˩] 'mucus' is produced by these speakers as [a˩ na˩ ha˩] ~ [a˩ nạ˩ ɦạ˩].

/ŋ/ is a voiced velar nasal. It is always realised as [ŋ] and occurs in syllable-initial position, e.g. *ngo* /ŋò/ [ŋo˩] 'and'. It is represented in the practical orthography by the digraph *ng*.

/l/ is a voiced alveolar lateral approximant. It occurs in syllable-initial position and is usually realised as [l] e.g. *lakhi* /la.kʰí/ [laꜜ kʰi˥] 'one'. It is sometimes realised as a palatalised [lʲ] before the front vowels /i/ and /e/ (see §3.4.1), e.g. *ale* /à.lè/ [a˩ lʲe˩] ~ [a˩ le˩] 'song'. In the Satakha dialect, it can sometimes occur in word-final position due to word-final high vowel deletion following sonorants (see §3.6.2), e.g. *kighinoli* /kì.ɣì.nó.lí/ [ki˩ ɣi˩ nol˥] ~ [ki˩ ɣi˩ no˥ li˥] (careful speech) 'intestines'.

/lʱ/ is a breathy aspirated alveolar lateral approximant. It occurs in syllable-initial position and is usually realised as [lʱ] e.g. /lʱò/ [lʱo˩] 'to be tired'. It is sometimes realised as a palatalised [lʱʲ] before the front vowels /i/ and /e/ (see §3.4.1), e.g. *alhi* /à.lʱì/ [a˩ lʱʲi˩] ~ [a˩ lʱi˩] 'business'.

Harris (2009) offers a more in-depth acoustic analysis of the breathy nasals and lateral, with a focus on the phonetic realisation of breathy phonation.

3.3.5 Approximants

/j/ is a voiced palatal approximant. It is realised as [j] and occurs in syllable-initial position before the front vowels /i/ and /e/, both word-initially and word-medially, e.g. *yipesü* /ji.pe.ʃɨ̈/ [jiꜜ peꜜ sɨ̈ꜜ] 'to sweep away', *ayeghi* /a.je.ɣí/ [aꜜ jeꜜ ɣi˥] 'earth'. While this would suggest that [j] is positionally predictable, it still contrasts with the absence of a consonant onset in words that begin with /i/ or /e/ – compare *ye* /je/ [jeꜜ] 'to drink' with *eno* /enò/ [eꜜ no˩] (*[jeꜜ no˩]) 'and'. Intervocalically, /j/ is often deleted, e.g. *amiyi* /à.mì.jì/ 'charcoal' is usually given as [a˩ mii˩] with a long vowel in normal speech, but as [a˩ mi˩ ji˩] when the speaker is presented with the orthographic representation. It can also occur in syllable-final position, usually as a result of resyllabification, e.g. *ayikhu* /à.jì.kʰú/ [aj˩ kʰu] ~ [a˩ ji˩ kʰu˥] (very careful speech) 'soya bean'. /j/ is represented in the practical orthography by the grapheme *y*.

/ɹ/ is a voiced alveolar approximant. It is a marginal phoneme that usually occurs in syllable-initial position, where it is realised as a voiced alveolar approximant [ɹ], e.g. *murasü* /mù.ɹá.ʃɨ̈/ [mu˩ ɹa˥ sɨ̈˥] ~ [m̩˩ ɹa˥ sɨ̈˥] 'snow'. It can occur syllable-finally in at least one word, where it is realised as a voiced alveolar trill [r], e.g. *khurshi* /kʰùɹ.ʃì/ [kʰur˩ ʃi˩] 'horse' – this is probably the result of the resyllabification of an underlying /kʰù.ɹù.ʃì/.[26]

For a description of the labio-velar approximant [w], see §3.3.2 for a description of the phoneme /v/.

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[26] Marrison (1967: 128) gives *kuru* as the Sumi word for 'horse'.

3.3.6 Minimal sets

Words with different tones should be treated as near-minimal sets. In the interest of economy, the gloss for the prefix *a-*, a non-relational prefix marker that occurs in the citation form (or 'unpossessed' form) of most nouns (see §6.2), will not be provided here.

/p/ ~ /pʰ/ ~ /b/

(1)	*apo*	/à.pò/	'belly'
(2)	*apho*	/à.pʰò/	'bunch'
(3)	*abo*	/a.bo/	'box'

/t/ ~ /tʰ/ ~ /d/

(4)	*ato*	/a.to/	'hill'
(5)	*atho*	/à.tʰò/	'same'
(6)	*ado*	/à.dò/	'time'

/k/ ~ /kʰ/ ~ /g/

(7)	*aki*	/à.kì/	'house'
(8)	*akhi*	/a.kʰi/	'bee'
(9)	*agi*	/a.gí/	'face'

/q/ ~ /qʰ/

(10)	*aqo*	/à.qò/	'pit'
(11)	*aqho*	/à.qʰò/	'brain'

/kʰ/ ~ /qʰ/

(12)	*akhi*	/a.kʰi/	'bee'
(13)	*aqhi*	/à.qʰì/	'moon'

/ʃ/ ~ /ʒ/

(14)	*ashi*	/àʃì/		'meat'
(15)	*aji*	/àʒì/		'blood'
(16)	*asü*	/àʃɨ̀/	[aɻ sɨɻ]	'wood'
(17)	*azü*	/àʒɨ̀/	[aɻ zɨɻ]	'water'

/ʧ/ ~ /ʧʰ/

(18)	*akichi*	/à.kì.ʧì/	'mouth'
(19)	*akichhi*	/à.kì.ʧʰi/	'breast'

/m/ ~ /mʱ/

(20)	*ami*	/àmì/	'fire'
(21)	*amhi*	/àmʱì/	'hair (of body)'

/n/ ~ /nʱ/

(22) *ana* /ànà/ ‘cooked rice’
(23) *anha* /ànʱà/ ‘mucus’

/l/ ~ /lʱ/

(24) *ala* /àlà/ ‘path, road’
(25) *alha* /àlʱà/ ‘layer’

3.4 Regular phonological processes associated with consonants

3.4.1 Palatalisation

Velar obstruents are sometimes realised as palatal obstruents before the front vowels /i/ and /e/, as in (26) and (27).

(26) *aki* /à.kì/ [a˩ ci˩] ~ [a˩ ki˩] ‘house’
(27) *agi* /a.gí/ [a˧ ɟi˥] ~ [a˧ gi˥] ‘face’

Moreover, the two front vowels often trigger palatalisation of a preceding labio-dental fricative, as in (28); post-alveolar fricatives and affricates, as in (29) – (32); and alveolar sonorants, as in (33) – (35). Note that the unpalatalised variants are also possible for all these words.

(28) *akive* /à.kì.vé/ [a˩ ki˩ vʲe˥] ‘stomach’
(29) *ashi* /à.ʃì/ [a˩ ɕi˩] ‘meat’
(30) *aji* /à.ʒì/ [a˩ ʑi˩] ~ [a˩ dʑi˩] ‘blood’
(31) *chi* /ʧì/ [tɕi˧] ‘to cultivate’
(32) *chhi* /ʧʱì/ [tɕʰi˩] ‘to be full’
(33) *axone* /à.xó.nè/ [a˩ xo˥ nʲe˩] ‘fermented soya beans’
(34) *akhonhe* /à.kʰò.nʱè/ [a˩ kʰo˩ nʱʲe˩] ‘knee’
(35) *ale* /à.lè/ [a˩ lʲe˩] ‘song’

3.5 Vowels

There are 6 monophthong vowel phonemes in Sumi. The vowel phonemes can be divided into two levels of height: high and non-high (or low) and three levels of backness: front, central and back. This is a useful way of classifying them as it helps to explain vowel harmony in Sumi, as we shall see in §3.6.1.

/i/ is a high front unrounded vowel. It is always realised as [i]. It can occur in word-initial, word-medial and word-final position, e.g. *ippu* /ì.pú/ [i˩ pu˥] ‘my son’, *akive* /à.kì.vé/ [a˩ ki˩ ve˥] ‘stomach’, *aki* /à.kì/ [a˩ ki˩] ‘house’.

/e/ is a mid front unrounded vowel. It can be realised as either close-mid [e] or open-mid [ɛ], which appear to be in free distribution. It can occur in word-initial, word-medial and word-final position, e.g. *eno* /e.nò/ [e˧ no˩] ~ [ɛ˧ no˩] ‘and’, *acheku* /à.ʧè.kù/ [a˩ ʧe˩ ku˩] ‘corner’, *ache* /a.ʧe/ [a˧ ʧe˧] ‘sunny part of a field’.

/ɨ/ is a high central unrounded vowel. It is usually realised as a high [ɨ], but is sometimes produced as low as [ə] in word-medial position, e.g. *akütsü* /à.kɨ̀.ʧɨ́/ [a˩ kə˩ tsɨ˦] ~ [a˩ kɨ˩ tsɨ˦] 'head'. It only occurs in word-medial and word-final position. The phoneme is represented in the practical orthography by the grapheme *ü*.

/a/ is a low central unrounded vowel. It is usually realised as [a], but tends to be realised as a more back [ɑ] after uvular stops, e.g. *amqa* /àm.qà/ [am˩ qɑ˩] ~ [am˩ qa˩] 'lower back'. It can occur in word-initial, word-medial and word-final position, e.g. *akhabo* /à.kʰà.bo/ [a˩ kʰa˩ bo˦] 'fish pond', *katha* /kà.tʰà/ [ka˩ tʰa˩] 'to cross'.

/u/ is a high back rounded vowel. It is always realised as [u]. It only occurs in word-medial and word-final position, e.g. *akulho* /à.kù.lʱó/ [a˩ ku˩ lʱo˥] 'curry, dish', *aphu* /à.pʰù/ [a˩ pʰu˩] 'village'.

/o/ is a mid back rounded vowel. It can be realised as either close-mid [o] and open-mid [ɔ], which appear to be in free distribution. It can occur in word-initial, word-medial and word-final position, e.g. *ona* /ò.nà/ [o˩ na˩] 'your rice', *axone* /à.xó.nè/ [a˩ xo˥ ne˩] 'fermented soya beans', *alo* /alo/ [a˦ lo˦] 'good'.[27]

The six vowel phonemes of Sumi can be illustrated by the following minimal set. Words with different tones should be treated as near-minimal pairs:

(36)	*ali*	/à.lì/	'pot'
(37)	*ale*	/à.lè/	'song'
(38)	*ala*	/à.là/	'path'
(39)	*alo*	/a.lo/	'good'
(40)	*alu*	/à.lù/	'field'
(41)	*lü*	/lɨ́/	'to be hot'

There are no diphthong phonemes in Sumi. Vowel length is also not lexically contrastive. Phonetic diphthongs and long vowels can be considered the result of syllable coalescence (see §4.2).

Figures 4 and 5 give illustrations of the acoustic vowel spaces of the female speaker (IZ) and the male speaker (JA) respectively. In these formant plots, average first formant (F_1) values (measured in Hz) were plotted on the *y*-axis against average second formant (F_2) values (measured in Hz) on the *x*-axis. All F_1 and F_2 values were taken at the mid point of each vowel. These plots illustrate the different articulatory positions of the six phonemic vowels within the vowel space. The high central vowel /ɨ/ was usually realised between high [ɨ] and mid [ə], especially for the female speaker.[28] There was also some overlap observed between the two vowels /i/ and /e/, and the two back vowels /u/ and /o/.

The acoustic vowel space of Sumi looks rather similar to those of other members of the Angami-Pochuri group, such as Khonoma Angami and Mao. Most of these languages have a six-vowel system consisting of /i/, /e/, /a/, /o/, /u/ and a sixth vowel: typically /ɨ/ or /ə/. An acoustic study by Blankenship *et al.* (1993) shows that the sixth vowel in Khonoma Angami, posited as /ə/, is indeed realised mainly as mid central [ə]. Giridhar's (1994) acoustic analysis of Mao shows that the sixth vowel, posted as /ɨ/, can

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[27] In some word-final enclitics, [o] is in free variation with [a], e.g. *no* /nò/ [no˩] ~ [na˩] 'AGT'.

[28] The data used for this acoustic study of vowel quality are listed in Appendix B, with 2-3 repetitions of each item used for the analysis.

be realised between high [ɨ] and mid [ə], much like Sumi /ɨ/. The vowel system of Sumi is also similar to a number of other Tibeto-Burman languages spoken in Northeast India, including languages of the Bodo-Garo group such as Bodo and Rabha which have six phonemic vowels (Joseph, 2007: 493).

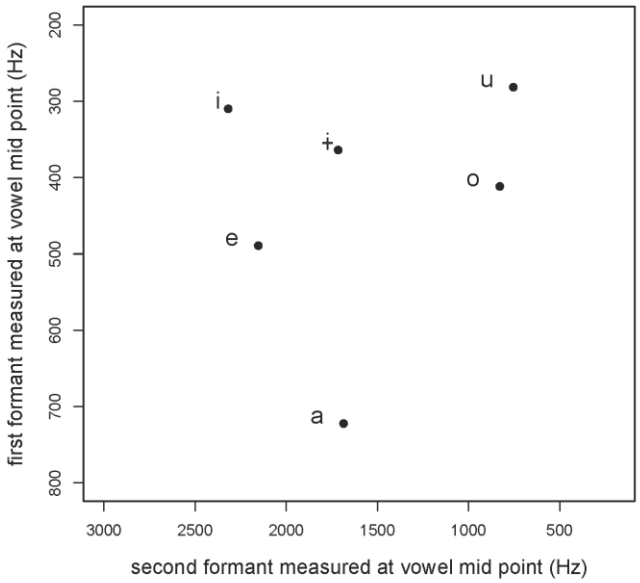

Figure 4: Acoustic vowel space plotted in the F1 and F2 dimensions (female speaker)

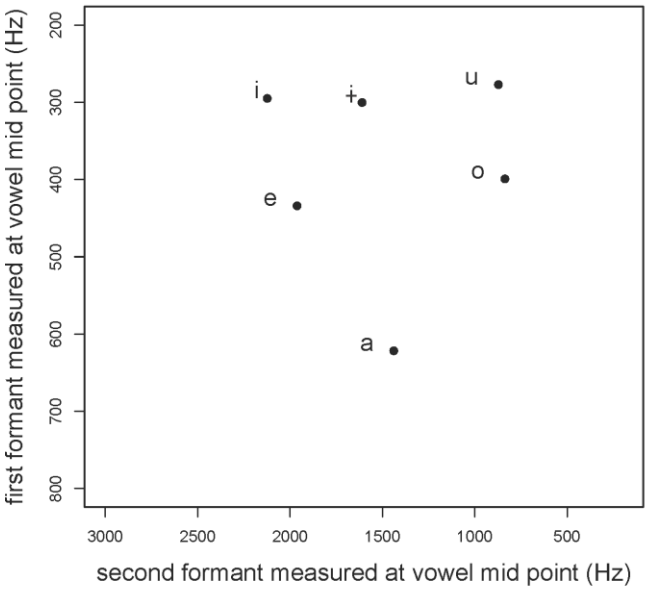

Figure 5: Acoustic vowel space plotted in the F_1 and F_2 dimensions (male speaker)

3.6 Regular phonological processes associated with vowels

3.6.1 Vowel harmony

Vowel harmony is common in Sumi and occurs in the minor syllable of sesquisyllables (see §4.3). The vowel of this minor syllable is a high vowel that typically displays harmony in terms of backness with the vowel of the full or major syllable. Such vowel harmony is also frequently associated with the deverbalising prefix *kV-*, where *V* is one of the high vowels /i/, /ɨ/ or /u/, as seen in (42) – (47). Note that the deverbal examples here also take the non-relational prefix *a-* (see §7.3 for more on verb nominalisation in Sumi).

(42)	*akipi*	/à.kì.pí/	'(act of) speaking'	(cf. *pi* /pì/ 'speak')
(43)	*akiye*	/a.ki.jé/	'(act of) writing'	(cf. *ye* /jè/ 'write')
(44)	*akütsü*	/à.kɨ.ʧɨ́/	'(act of) rotting; rotten'	(cf. *tsü* /ʧɨ/ 'rot')
(45)	*akütsa*	/à.kɨ.ʧá/	'(act of) chewing'	(cf. *tsa* /ʧa/ 'chew')
(46)	*akuchu*	/à.kù.ʧù/	'(act of) eating'	(cf. *chu* /ʧù/ 'eat')
(47)	*akupo*	/à.kù.pò/	'(act of) running'	(cf. *po* /pò/ 'run')

3.6.2 Vowel apocope

It has been observed, particularly among some speakers of the Satakha dialect, that there is a tendency towards vowel apocope, i.e. deletion of word-final high vowels. This only occurs after sonorants, as in (48) and (49).

(48)	*kini*	/ki.ni/	[ki˧ nʲi˧] ~ [kinʲ˧]	'two'
(49)	*kighinoli*	/kì.ɣì.nó.lí/	[ki˩ ɣi˩ no˥ li˥] ~ [ki˩ ɣi˩ nol˥]	'intestines'

The tone on the final vowel is not lost but realised on the sonorant, as shown in (50) – (52).

(50)	*ani*	/à.ni/	[a˩ nʲi˧] ~ [anʲ˦]	'have'
(51)	*amu*	/à.mú/	[a˩ mu˥] ~ [am˦]	'older brother'
(52)	*pamu*	/pa.mú/	[pa˧ mu˥] ~ [pam˦]	'his/her older brother'

Vowel syncope, i.e. deletion of word-medial vowels, also occurs commonly in Sumi, including the Zunheboto dialect, and will be discussed in relation to syllable structure and resyllabification in §4.5.

3.7 Glottal stop

A glottal stop is usually inserted before a word-initial vowel that follows another word, which, given the phonotactic constraints of Sumi, will typically end with a vowel. The male speaker JA would typically produce this with full glottal closure (originally interpreted as a simple pause), as can be seen in given in Figure 6, which shows a

spectrogram of the utterance *hiye appu kumo* [hiꜜ jeꜜ ʔaꜛ puꜛ kuꜛ moꜛ] ‘This is not a son’.

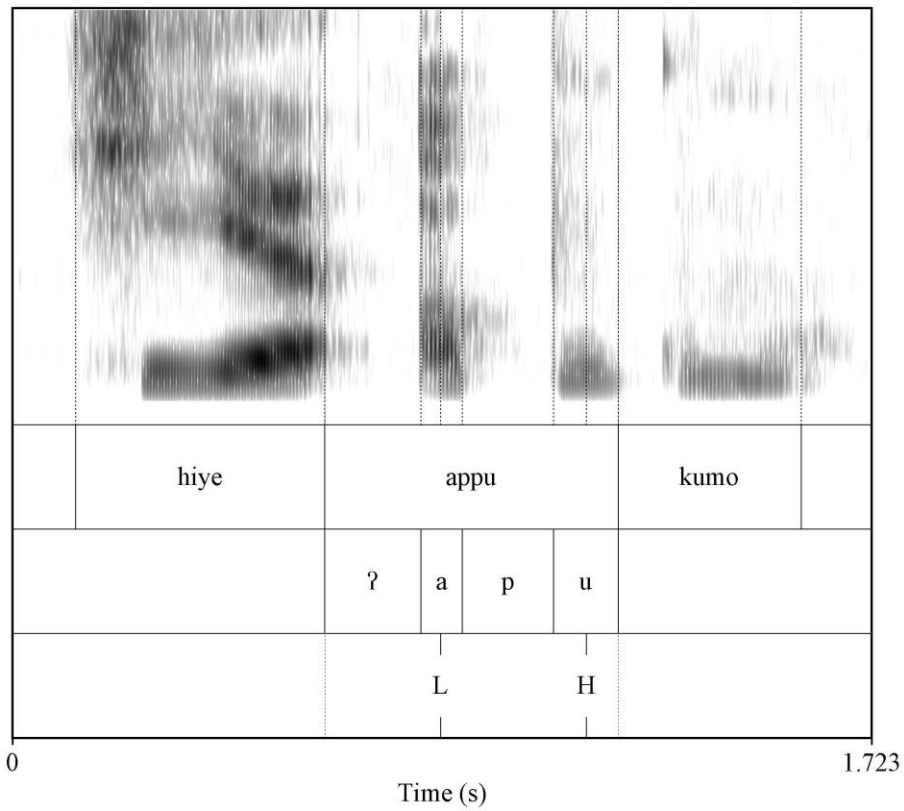

Figure 6: Spectrogram of *hiye appu* [ʔàꜛ puꜛ] *kumo* ‘This is not a son’ (male speaker)

The spectrogram here illustrates the initial glottal stop [ʔ] in *appu* /àpú/ ‘son’. Note that double consonants in the current practical orthography represent high tone. This stop was initially treated as a simple pause, but was found to correspond to creaky voice in the female speaker’s utterances.

In contrast, the female speaker IZ usually produced word-initial vowels with no preceding pause, but with creaky phonation over the word-initial vowel, followed eventually by modal voicing. Figure 7 provides the spectrogram for *niye appu ani* [niꜛ jeꜜ a̰ꜛ puꜛ a̰ꜛ niꜜ] ‘I have a son’, illustrating such creaky phonation.

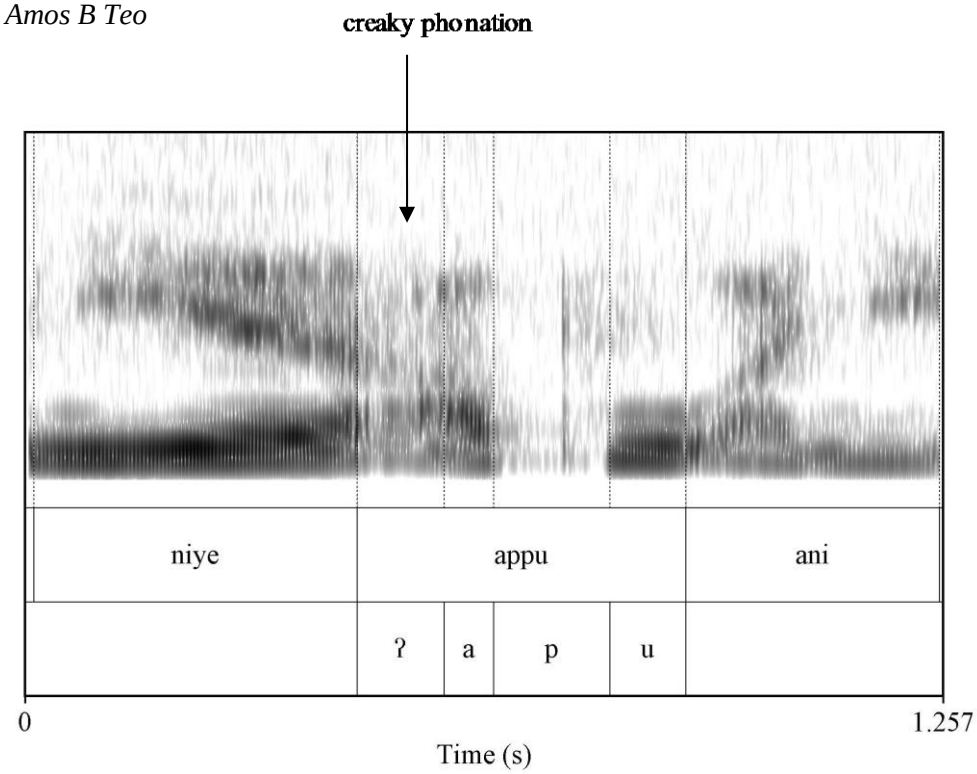

Figure 7: Spectrogram of *niye appu* [a̰ɻ puˀ] *ani* 'I have a son' (female speaker)

The spectrogram illustrates creaky voice on the initial portion of the vowel [a̰] which enters modal phonation before the end of the vowel. (Note also creaky phonation in the initial portion of the non-past existential verb *ani* /à.ni/.)

This creaky phonation was originally believed to be a strategy adopted by the female speaker to achieve a low tone target, since the occurrence of creaky voice has been shown to coincide with low F_0 (Monsen & Engebretson, 1977). However, this was not found to be the case since the female speaker would also produce creaky phonation with other vowel-initial words that carry either M tone on the word-initial vowel, e.g. *akhosa* /a-k^{h}osa/ [a̰ɬ k^{h}oɬ saɬ] 'cat' ('NRL-cat'), or H tone, e.g. *afo* /á-fò/ [a̰ˀ foɻ] 'older sister' ('NRL-older.sister'). Rather, creaky phonation for the female speaker appears to be a phonetic feature optionally associated with all word-initial /a-/ regardless of tone. Moreover, creaky phonation is not confined to the start of the *a-* prefix but also occurs at the start of other vowel-initial words, e.g. *imla* /ìmlà/ [ḭmɻ laɻ] 'my chest' ('1SG-chest') and *omla* /òmlà/ [o̰mɻ laɻ] ''your chest' ('2SG-chest').

A glottal stop is also sometimes inserted to prevent diphthongisation from occurring across nominal morpheme boundaries, such as between possessive prefixes and noun roots. This is sometimes represented by a hyphen in the orthography. This optional 'glottal stop' may be realised either with full glottal closure or as creaky voice over the initial portion of the second vowel e.g. *a-a* /à-à/ [aɻ ʔaɻ] ~ [aa̰ɻ] ~ [aaɻ] 'place' ('NRL-place'); *a-i* /à-ì/ [aɻ ʔiɻ] ~ [aḭɻ] ~ [aḭɻ] 'arum lily' ('NRL-arum.lily').

It can be seen that a syllable-initial glottal stop, realised either with full glottal closure or as creaky phonation, can potentially occur before all word or morpheme-initial vowels, regardless of vowel quality or tone. Given that it also does not contrast

with the absence of one in word or morpheme-initial position, it would be preferable to treat it as a prosodic element that is optionally inserted at a vowel-initial morpheme boundary, rather than treating it as a separate phoneme.

However, it is still important to note the phonetic realisation of such syllable-initial glottal stops, particularly when making cross-linguistic comparisons with other languages of the region – Matisoff even proposes a Proto Tibeto-Burman **ʔa-* prefix with a syllable-initial glottal stop (2003: 104), which the Sumi nominal prefix *a-* is most likely derived from.

Finally, there is also word-final glottalisation that sometimes accompanies word-final H tones. This will be discussed later in §5.5.3.

3.8 Final remarks on segmental inventory

This chapter gave an overview of the segmental inventory of Sumi, serving as an update to Sreedhar's (1980) description, and expanding on the more recent description presented by Teo (2012). It presented the consonant and vowel inventories and described common phonological processes associated with consonants and vowels. An account of the glottal stop in Sumi was also offered.

It should be noted that the two most salient features of the Sumi segmental inventory that set it apart from other Tibeto-Burman languages of Nagaland are its series of uvular stops and velar fricatives. Furthermore, when compared with other languages in the Angami-Pochuri group, Sumi is unusual in lacking a phonemic contrast between alveolar and post-alveolars, as well as lacking a series of labio-dental affricates. We will revisit some of the features mentioned in this chapter later in Chapter 8, where a cross-linguistic comparison between Sumi and other Tibeto-Burman languages of Nagaland will be presented.

4 *Phonotactics*

4.1 Introduction

The notion of the syllable is important in the study of many Tibeto-Burman languages, particularly as the domain of tone. Matisoff (2003) highlights the significance of the Proto Tibeto-Burman syllable in the development of tone, which he contends developed independently at different points in the histories of various Tibeto-Burman languages. Coupe's (2003) description of Ao phonetics and phonology even begins with a description of phonotactics, including a quote from Matisoff, who asserts in his grammar of Lahu that "the most fruitful point of departure for phonological analysis is the syllable" (1973a: 1). This chapter therefore presents an analysis of Sumi phonotactics, as well as an account of word minimality in Sumi and the process of vowel syncope and resyllabification commonly found in Sumi.

4.2 Syllable structure

The canonical syllable in Sumi is open and minimally consists of a vowel nucleus. It can be represented linearly as:

σ	=	(C) V	
where	C	=	[–syll]
	V	=	[+syll]

Alternatively, the Sumi syllable can be represented as having the hierarchical structure shown in Figure 8, where T represents tone.

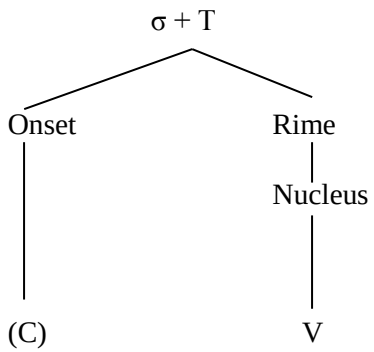

Figure 8: Prosodic structure of the Sumi syllable

Table 4 shows the distribution of potential syllabic constituents within a syllable.

Table 4: Phonotactic distribution of syllable constituents

C	V	T
p p^h b t t^h d k k^h g q q^h ʧ ʧʰ f v ʃ ʒ x ɣ h m $m^ɦ$ n $n^ɦ$ ŋ l $l^ɦ$ j ɹ	i ɨ u e a o	High (H) σ́ Mid (M) σ Low (L) σ̀

As mentioned in §3.5, Sumi does not have contrastive vowel length or diphthong vowel phonemes. However, long vowels and diphthongs can surface phonetically through morphological concatenation, as shown in (53) – (57). Note that the high vowels /i/ and /u/ are prone to losing their syllabic feature when combined with low vowels.

(53)	*a-a*	/à-à/	[aaɻ] ~ [aɻ ʔaɻ][29]	‘place’ (‘NRL-place’)
(54)	*pau*	/pa-ù/	[pau̯ɬ] ~ [paɬ ʔuɻ]	‘his/her hand’ (‘3SG-hand')
(55)	*ou*	/ò-ù/	[ou̯ɻ] ~ [oɻ ʔuɻ]	‘your hand’ (‘2SG-hand’)
(56)	*iu*	/ì-ù/	[iu̯ɻ] ~ [iɻ ʔuɻ]	‘my hand’ (‘1SG-hand’)
(57)	*pi ani*	/pì à-ni/	[pi̯aɻ niɬ] ~ [piɻ ʔaɻ niɬ]	‘be speaking’ (‘to.speak PROG-PRS’)

The high central vowel /ɨ/ is usually deleted entirely, as in (58) and (59).

(58)	*azü-a*	/à-ʒɨ-à/	[aɻ zaɻ] ~ [aɻ zɨɻ ʔaɻ]	‘bed’ (‘NRL-sleep-place’)
(59)	*tsü ani*	/ʧɨ à-ni/	[tsaɻ niɬ] ~ [tsɨɻ ʔaɻ niɬ]	‘be giving’[30] (‘to.give PROG-PRS’)

Table 5 provides a summary of the observed phonetic output when phonological vowels are combined through morphological concatenation. This is by no means an exhaustive list of permissible vowel outputs. Blank cells simply indicate that no examples of these combinations have been found so far.

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[29] An explanation of the insertion of the glottal stop is given in §3.7.

[30] *Tsü ani!* /ʧɨ à-ni/ is also used an exclamation with the meaning of something like ‘Fantastic!’ Here, it is nearly always realised as [tsaɻ niɬ].

Table 5: Phonetic realisation of phonological vowel combinations in Sumi

V_1 \ V_2	/i/	/ɨ/[#]	/u/	/e/	/a/	/o/
/i/	[ii]	-	[iu̯]		[i̯a]	
/ɨ/		-			[a]	
/u/		-			[u̯a]	
/e/		-			[e̯a] ~ [i̯a]	
/a/	[ai̯]	-	[au̯]		[aa]	
/o/	[oi̯]	-	[ou̯]		[o̯a]	

[#]No morphemes begin with /ɨ/ which would allow it to occur as the second element in a sequence of V_1-V_2

It can be seen that the vowel /a/ is the most stable vowel in such sequences. Furthermore, while most phonetic diphthongs and long vowels that occur in Sumi are the result of morphological concatenation, there are a handful of examples that cannot be easily analysed morphologically from a synchronic perspective. Examples include: *toi* /tòi/ [toi̯˩] 'to resemble'; *vejoi* /ve.ʒoi/ [ve˦ ʒoi̯˦] 'straight ahead'; *ajeu* /à.ʒèu/ [a˩ ʒeu̯˩] 'right (side)'; *aghau* /a-ɣaù/ [a˦ ɣau̯˥] 'bird' ('NRL-bird'); *kiu* /kiù/ [ki̯u˥] 'what'; and *khuu* /kʰúù/ [kʰuu˥] 'who'. Note that in most of these diphthongs, the final element is a non-syllabic [i̯] or [u̯]. Consequently, an alternative analysis might posit that Sumi allows the glides /j/ and /v/ (realised as [w][31]) in syllable-coda position. However, as can be seen in the examples above, many of these diphthongs are also accompanied by two tone targets, unlike syllables consisting of single monophthong vowels, which only take one tone target. This strongly indicates that such 'diphthongs' are better analysed as sequences of two syllabic vowels.

Phonetic long vowels and diphthongs can also occur with the deletion of an intervocalic glide, e.g. *aghiyi* /à-ɣì.jí/ [a˩ ɣii˩] ~ [a˩ ɣi˩ ji˥] 'thatch' ('NRL-thatch'). A similar loss of the intervocalic glide can be seen when the attributive / possessive morpheme *-wu* /-vu/ 'ATTR' is added to personal pronouns, e.g. /pa-vu/ [pau̯˦] ~ [pa˦ wu˦] 'his' ('3SG-ATTR') and /i-vu/ [iu̯˦] ~ [i˦ wu˦] 'my; mine' ('1SG-ATTR').[32] Note that the consonant of the attributive morpheme is always preserved by some speakers of the Satakha dialect who produce [v] in [pa˦ vu˦] ~ [pa˦ v̩˦] for 'his' and [i˦ vu˦] ~ [i˦ v̩˦] for 'my; mine'.[33]

Finally, syllable-initial consonant clusters and syllable-coda consonants are not generally permitted in Sumi. However, as noted in §3.6.2, some speakers of the Satakha dialect often delete word-final high vowels that follow sonorants, resulting in sonorant-final syllables. In careful speech however, they will still produce these high vowels. In

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[31] See §3.3.2 for an analysis of the phoneme /v/.

[32] In Swu & Yepthomi's (2004) Anglo-Sumi dictionary, these are now orthographically represented as *paw* 'his' and *iw* 'my; mine'. However, 'my; mine' is given as *iwu* in Lozhevi Sema's (1993) Sumi-Anglo dictionary.

[33] This is evidence that the underlying form of the attributive morpheme is specified for the consonant /v/, unlike the morpheme for 'hand' /-ù/, shown earlier in (54) – (56), which has no consonant onset.

addition, consonant clusters and syllable-final obstruents can also surface phonetically through resyllabification, which will be examined in the next few sections.

4.3 Sesquisyllables

In addition to monosyllabic roots, Sumi also has a number of words, as well as nominal roots, that are best described as 'sesquisyllabic'.[34] The term, coined by Matisoff (1973b), describes an iambic structure comprising a short unstressed (minor) syllable followed by a long (major) syllable. The vowel of the minor syllable is typically a schwa or displays harmony with the vowel of the main syllable. Although a much more salient feature in the Mon-Khmer languages, Matisoff (2003) reconstructs sesquisyllabicity as a feature of Proto Tibeto-Burman, stating that old consonantal prefixes attached to the syllable of the proto language were "undoubtedly vocalized by an epenthetic schwa for ease of pronunciation" (11). Sesquisyllabicity has been noted across the Tibeto-Burman family in languages such as Lahu (Matisoff, 1973a) and Turung, a variety of Jingpho (Morey, 2005).[35]

A sesquisyllable in Sumi typically consists of a full or major syllable preceded by a minor syllable. It can be represented linearly as:

$\sigma_{min}\sigma$ = $(C_{min})\ V_{min}\ C\ V$
where C = [–syll]
V = [+syll]

The full or major syllable is almost identical in structure to a monosyllable (see §4.2), except for an obligatory consonantal onset. A prosodic representation of the minor syllable portion is given in Figure 9, along with a list of possible syllable constituents in Table 6. Note that a consonant onset is obligatory if the nucleus does not consist of a syllabic nasal.

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[34] In Teo (2013), it is demonstrated that monosyllabic, sesquisyllabic and disyllabic verbs behave differently when prefixed with the nominaliser *kV-*. This lends support to an analysis that distinguishes sesquisyllabic words from disyllabic words. Some of this evidence will also be presented in §7.3.2.

[35] Coupe (2003) does not posit a class of sesquisyllabic words that is separate from other disyllabic words in Mongsen Ao, although he does note that the vowel in certain nominal prefixes such as /tə-/ glossed 'NPF' is usually phonetically realised as a schwa but can sometimes be 'coloured' by the vowel of the root, as in /tə̄-kūlūk/ 'NPF-brain' which can be realised as [$tu^{33}ku^{33}luk^{33}$].

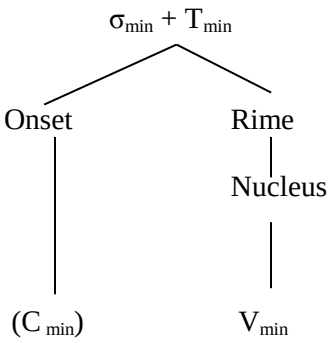

Figure 9: Prosodic structure of the minor syllable portion of sesquisyllable in Sumi

Table 6: Phonotactic distribution of minor syllable constituents

C_{min}	V_{min}	T_{min}
p t k m[36]	i ɨ u m̩	Mid σ Low σ̀

A few points need to be made here. Firstly, the onset and nucleus demonstrate a much more restricted segmental inventory compared to full syllables: only the high vowels or a syllabic bilabial nasal are allowed to occupy the nucleus position and only a few obstruents can occupy syllable onset position. Secondly, minor syllables do not demonstrate the full contrastive potential for tone – they are only realised with L or M tone, never H tone.[37] These two observations of minor syllables in Sumi – a restricted segmental inventory and a reduced tonal contrast – have been noted in descriptions of minor syllables in other languages that have been analysed as having sesquisyllables (Kiparsky, 2002).

Table 7 gives examples of sesquisyllabic words in Sumi. These can be phonetically realised in three ways: (i) as a sesquisyllable with the vowel of the minor syllable in harmony[38] with that of the full syllable, e.g. [pɨlˌ ɣɨɬ] and [kɨlˌ laˌ]; (ii) as a single syllable with an initial consonant cluster, typically when the onset of the full syllable is a sonorant e.g. [klaˌ] and [kloˌ]; or (iii) as a full syllable preceded by a syllabic nasal, e.g. [m̩ɬ la˥].

[36] No clear examples of /t/ initial sesquisyllables have been found, though it is suspected they exist.

[37] The lack of tone-bearing potential for these minor syllables will be discussed in §5.3.

[38] See §3.6.1 for a description of vowel harmony in Sumi.

Table 7: Sesquisyllabic words in Sumi

Gloss	Written form	Phonemic representation	Phonetic realisation
to plan	*püghü*	**/pɨ̀.ɣɨ́/**	[pɨ˩ ɣɨ˦]
to marry	*küla*	**/kɨ̀.là/**	[kla˩] ~ [kɨ˩ la˩]
to wave (e.g. dao)	*kulo*	**/kù.lò/**	[klo˩] ~ [ku˩ lo˩]
to be easy	*mlla*	**/m.lá/**	[m̩˦ la˥]

Harmony between the vowel of the minor syllable and that of the full syllable is usually reflected in the orthographic form, even if the vowel is not phonetically realised, e.g. *küla* 'to marry'. When the minor syllable slot is occupied by a syllabic nasal, as in *mlla* 'to be easy', there is usually no orthographic vowel inserted between the nasal and the full syllable, with the exception of the grapheme *i* (see below).

Sesquisyllabic nouns in citation form are not free morphemes and must be preceded by a prefix, typically the non-relational *a-* 'NRL' prefix.[39] Table 8 gives examples of such sesquisyllabic roots, highlighted in bold typeface. Here we see that the minor syllable is often reanalysed as a syllable coda, e.g. *akütsü* /à.kɨ̀.ʧɨ́/ [a˩ kɨ˩ tsɨ˦] ~ [ak˩ tsɨ˦] 'head' – only in very careful speech is the epenthetic vowel produced.

Table 8: Resyllabified sesquisyllabic roots

Gloss	Written form	Phonemic representation	Phonetic realisation
head	*akütsü*	/à-**kɨ̀.ʧɨ́**/	[ak˩ tsɨ˦] ~ [a˩ kɨ˩ tsɨ˦]
breast	*akichhi*	/à-**kì.ʧʰí**/	[ak˩ ʧʰi˦] ~ [a˩ ki˩ ʧʰi˦]
forehead	*akishe*	/a-**ki.ʃé**/	[ak˦ ʃe˦] ~ [a˦ ki˦ ʃe˦]

Finally, the examples in Table 9 show that with nasals in minor syllable position, an epenthetic /i/ is inserted in careful speech when the vowel of the main syllable is /i/, e.g. *amiti* /à-mì.ti/ 'salt' is realised as [a˩ mi˩ ti˦] in careful speech. Such vowel epenthesis does not occur with any of the other vowels, e.g. *amla* /à-m̀.là/ 'chest' is realised as [am˩ la˩], never as *[a˩ mɨ˩ la˩]. It is possible that some speakers insert /i/ in careful speech for words like *amiti* 'salt' and *amili* 'tongue' simply because of the orthographic bias to include the grapheme *i* (representing the high front vowel) in these words.

Table 9: Sesquisyllabic roots with nasal minor syllables

Gloss	Written form	Phonemic representation	Phonetic realisation
salt	*amiti*	/à-**mì.ti**/	[am˩ ti˦] ~ [a˩ mi˩ ti˦]
tongue	*amili*	/à-**mì.lí**/	[am˩ li˥] ~ [a˩ mi˩ li˥]
year	*ampe*	/à-**m̀.pè**/	[am˩ pe˩] (*[a˩ mi˩ pe˩])
chest	*amla*	/à-**m̀.là**/	[am˩ la˩] (*[a˩ mɨ˩ la˩])
heart	*amlo*	/à-**m̀.ló**/	[am˩ lo˥] (*[a˩ mu˩ lo˥]

[39] While the term 'sesquisyllable' typically refers to a type of word, I continue to use the term even with noun roots. It will be shown in §4.4 that nouns in Sumi are minimally disyllabic, and sesquisyllabic noun roots in citation form must take a prefix such as the non-relational *a-* (see §6.2 for a description of the function of this prefix).

More evidence for the validity of sesquisyllables as a syllable type in Sumi can be found by examining word minimality in nouns and verbs.

4.4 Word minimality requirements

Other Tibeto-Burman languages have been noted to have different syllable requirements for nouns and verbs (see §8.3.3). Sumi is not exceptional in this regard – in citation form, verbs in Sumi are minimally monosyllabic, while nouns are minimally disyllabic, as can be seen in (60) and (61).

(60)	*sü*	/ʃɨ̀/	[sɨ̀ɻ]	‘to hurt; to ache’
(61)	*asü*	/à-ʃɨ̀/ (*/ʃɨ̀/)	[aɻ sɨ̀ɻ]	‘wood’ (‘NRL-wood’)

Here, the monosyllabic verb root *sü* /ʃɨ̀/ ‘to hurt’ is a free morpheme and can appear in isolation, while the noun root *-sü* /-ʃɨ̀/ ‘wood’ must take the non-relational prefix *a-* (or another possessive prefix) or be cliticised to another noun in a compound in order to meet the minimal requirement of disyllabicity in nouns.

Sesquisyllabic verb roots, like monosyllabic ones, can appear in isolation, as shown in (62). However, sesquisyllabic nouns in citation form still need to take the non-relational prefix *a-*, as shown in (63).

(62)	*küsü*	/kɨ̀.ʃɨ̀/	[kɨ̀ɬ sɨ̀ɬ]	‘to hide (something)’
(63)	*aküsü*	/à-kɨ̀-ʃɨ̀/	[akɻ sɨ̀ɻ] ~	‘pain; sickness’
		(*/kɨ̀.ʃɨ̀/)	[aɻ kɨ̀ɻ sɨ̀ɻ]	(‘NRL-NZP-hurt’)

Here, the verb *küsü* /kɨ̀.ʃɨ̀/ ‘to hide (something)’ is a free morpheme, having satisfied the minimal monosyllabic requirement for verbs. In contrast, the noun *aküsü* /à-kɨ̀-ʃɨ̀/ ‘pain; sickness’, derived from the verb *sü* /ʃɨ̀/ ‘to hurt’ by the addition of the deverbal prefix *kV-* (where V is a high vowel that displays harmony with the vowel of the main syllable),[40] reveals that the deverbal prefix is not a full syllable: **küsü* /kɨ̀-ʃɨ̀/ does not satisfy the requirement of disyllabicity in nouns and still requires the prefix *a-*.[41] That the prefix *kV-* is a minor syllable is further supported by the fact that in normal speech, the vowel in the prefix is often deleted: *aküsü* /à.kɨ̀.ʃɨ̀/ is usually phonetically realised as disyllabic [akɻ sɨ̀ɻ].

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[40] See §7.3 for more on verb nominalisation in Sumi.

[41] One might argue that the addition of *a-* here is a morphological, not phonological requirement, given that there are trisyllabic nouns in Sumi such as *akhosa* /a-k^{h}o.sa/ ‘cat’ and *axone* /à-xó.nè/ ‘fermented soya beans’ that consist of a disyllabic noun root preceded by the non-relational prefix *a-*. However, the *a-* prefix becomes optional in longer words, e.g. *kighinoli* /kì.ɣì.nó.lí/ ‘intestines’ (*akighinoli* /à.kì.ɣì.nó.lí/ is acceptable but rare). Furthermore, there is evidence that a sequence of two minor syllables plus one full syllable satisfies the requirement for disyllabicity in nouns, with no need for an additional prefix: e.g. *kügha* /kɨ̀.ɣà/ ‘catch’ (v.) → *kükügha* /kɨ̀.kɨ̀.ɣà/ ‘(act of) catching’ (*akükügha* /à.kɨ̀.kɨ̀.ɣà/ is also acceptable, but *a-* is now optional).

4.5 Vowel syncope and resyllabification

It was shown that some sesquisyllables can be realised as monosyllables with a consonant cluster in onset position, e.g. *küla* /kɨ̀.là/ [kla˩] 'to marry'. In addition, sesquisyllabic noun roots preceded by a full syllable are usually resyllabified into disyllabic words, e.g. *akütsü* /à-kɨ̀.ʧɨ́/ [ak˩ tsɨ˦] 'head' ('NRL-head') after word-medial vowel syncope. This results in the initial syllable ending in a stop consonant or a bilabial nasal.

Word-medial vowel syncope and resyllabification also occur frequently in words comprising 3 full syllables, i.e. with the structure (C)VCVCV. Examples are given here:

(64)	*apuh khu*	/à-pù=k^{h}u/	[ap˩ k^{h}u˦] ~ [a˩ pu˩ k^{h}u˦]	'father's plate' ('NRL-father=plate')
(65)	*Sümitsa*	/ʃɨ.mì=ʧà/	[sɨm˨ tsa˩] ~ [sɨ˦ mi˩ tsa˩]	'Sumi language'[42] ('Sumi=word')
(66)	*azübo*	/à-ʒɨ̀=bo/	[az˩ bo˦] ~ [a˩ zɨ˩ bo˦]	'water bottle' ('NRL-water=box')
(67)	*asübo*	/à-ʃɨ̀=bò/	[as˩ bo˩] ~ [a˩ sɨ˩ bo˩]	'tree' ('NRL-wood=plant')
(68)	*aghina*	/à-ɣì=nà/ /à-ɣɨ̀=nà/[43]	[aɣ˩ na˩] ~ [a˩ ɣi˩ na˩] or [a˩ ɣɨ˩ na˩]	'paddy (grain)' ('NRL-paddy=grain')
(69)	*awudu*	/à-vù=dú/	[aw˩ du˥] ~ [a˩ wu˩ du˥] or [av˩ du˥] ~ [a˩ vu˩ du˥][44]	'rooster' ('NRL-chicken=male.bird')
(70)	*apuh khu*	/à-pù=k^{h}u/	[ap˩ k^{h}u˦] ~ [a˩ pu˩ k^{h}u˦]	'father's plate' ('NRL-father=plate')

In such cases of resyllabification, the syncopated vowel is always one of the high vowels /i ɨ u/. Unlike the resyllabification of sesquisyllabic roots, the syncopated vowel does not necessarily display harmony with the vowel of the following syllable, as demonstrated by examples (65) – (68). The consonant slot preceding the syncopated vowel also need not be filled by /p t k m/, as per the sesquisyllable template, but can be filled by any of the fricative phonemes, as in examples (66) – (69).[45]

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[42] In the past few years, the Sumi Literature Board has decided to make *Sütsa* the officially designated name for the Sumi language. However, many speakers continue to use the term *Sümitsa*.

[43] It should be noted that /à-ɣɨ̀-nà/ is the variant produced by some speakers from the Satakha region.

[44] The forms with [v] are more typical of some speakers from the Satakha region.

[45] On a related note, one older speaker lamented the fact that younger speakers 'mispronounced' the name of an area of Zunheboto town known as *Amiphoto* /à-mì-p^{h}ò-to/, literally 'hill where a smoky fire burns' (a compound of *mi* /mì/ 'fire', *pho* /p^{h}ò/ 'to smoke' (v.) and *to* /to/ 'hill') as [am˩ p^{h}o˩ to˦]. It was his view that by omitting the /i/ in the second

Vowel syncope does not occur when the vowel of the second syllable is a non-high vowel, e.g. *awoshi* /à-vò-ʃì/ 'pork' ('NRL-pig-meat') is always realised as [a˩ wo˩ ʃi˩] or [a˩ vo˩ ʃi˩] (Satakha dialect) and not *[aw˩ ʃi˩] or *[av˩ ʃi˩]. Speakers hearing [aw˩ ʃi˩] or [av˩ ʃi˩] would interpret this as *awushi* /à-vù-ʃì/ 'chicken (meat)'.

One interesting observation is that although the deleted vowel and the vowel of the following syllable do not always display vowel harmony, speakers may later insert a high vowel that does display harmony, in an attempt to 'recover' the full word. An example that is commonly cited by members of the Sumi Literature Board is the word *ajikhu* /a-ʒi-kʰu/ 'cup', literally, 'rice beer plate' ('NRL-rice.beer-plate'). In normal speech, the word is typically realised as [aʒꜜ kʰuꜜ]. When speakers try to recover the full word, they insert a high back vowel, since this displays harmony with the vowel in /kʰu/. Consequently, many speakers now consider the word for 'cup' in Sumi to be the morphologically opaque *ajukhu* /a-ʒu.kʰu/ [aꜜ ʒuꜜ kʰuꜜ].[46]

It should be noted though that this process of vowel syncope and 'incorrect' high vowel insertion does not occur when the consonant preceding the syncopated vowel is an alveolar fricative or affricate. In other words, there is never any confusion with words like *asübo* [as˩ bo˩] 'tree' and *azübo* [az˩ boꜜ] 'water bottle', since both [s] and [z], as allophones of /ʃ/ and /ʒ/, always precede a central vowel.[47]

Another observation is that in all cases of resyllabification, the deleted vowel only bears L or M tone. The tone is either carried on the preceding sonorant, as in *Sümitsa* [sɨm꜖ tsa˩] 'Sumi language' or simply deleted, though in such cases, it is not completely 'lost' since the preceding *a-* prefix takes the same tone, e.g. *apu khu* /àpù kʰu/ [ap˩ kʰuꜜ] ~ [a˩ pu˩ kʰuꜜ] 'father's plate'.[48] In contrast, vowels bearing H tone do not appear to be deleted, e.g. *totimi* /to.tí.mì/ 'woman' (containing /-mì/ 'person') is always realised as [toꜛ tiꜛ miꜛ], never *[totꜛ miꜛ].[49] If it does turn out that vowels bearing H tones do not undergo syncope, this would support an analysis of H tone as the marked one in Sumi, vis-à-vis the L and M tones – an argument for this will be presented in §6.4.

This process of resyllabification in Sumi is important to note because it results in phonetic syllables that have consonant codas. At the moment, these are restricted to word-medial position and are the result of vowel syncope. However, it is possible that some of these consonant-final syllables may eventually become phonologised. We may already be witnessing this change happening in long compound words such as *akichhizü* /à-kì.ʧʰi-ʒɨ́/ 'milk' ('NRL-breast-water') and *akichhiqo* /à-kì.ʧʰi-qó/ 'armpit'

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syllable /mì/, speakers would eventually be unable to work out the etymology of the place name.

[46] Similarly, this accounts for why one language consultant's father, the Reverend Yevito, often receives letters addressed to '*Rev. Yevuto'*.

[47] See §3.3.2 for a description of the allophonic variants of /ʃ/ and /ʒ/.

[48] There are instances when the tone may be completed deleted. For example, initial auditory impressions suggest that *papuh khu* /pa-pù=kʰu/ 'his father's plate' is produced as [papꜜ kʰuꜜ], with no perceptible falling pitch contour on the initial syllable, although this will need to be studied in more detail later.

[49] For the compound noun *appu khu* /à-pú-kʰu/ 'son's plate' ('NRL-son-plate'), the researcher's attempts at producing this as [ap˩ kʰuꜜ] (homophonous with 'father's plate') and [apˀ kʰuꜜ] were not accepted. However, this was only tested with a single speaker and it is unclear whether it was rejected simply because this speaker found it unusual that a younger member of the family would have their own plate.

('NRL-breast-pit'). These are almost always realised as [akꜜ ʧʰiꜛ zɨꜛ] and [akꜜ ʧʰiꜛ qoꜛ] respectively – some speakers do not accept the forms [aꜜ kiꜜ ʧʰiꜛ zɨꜛ] or [aꜜ kiꜜ ʧʰiꜛ qoꜛ] even in careful speech. Similarly, one language consultant would produce [sapꜜ saꜜ] for the verb 'to mistreat' and would not accept [saꜜ pɨꜜ saꜜ] even in careful speech – however, the Lozhevi Sema dictionary lists this as *sapüsa* 'to mistreat', reflecting an underlying word-medial vowel.

4.6 Summary of phonotactic constraints

This chapter provided a description of syllable structure of Sumi and posited sesquisyllables – iambic structures comprising a minor syllable followed by a full syllable – as a valid syllable type in Sumi. It also examined word minimality requirements and described the process of resyllabification as a result of vowel syncope.

To summarise, the main phonotactic constraints in Sumi include: open syllables, with phonetic closed syllables only permitted in word-medial position due to vowel syncope; the lack of syllable onset consonant clusters; and sesquisyllables. In Chapter 8, we will look again at these features and compare them with phonotactic constraints in other Tibeto-Burman languages of Nagaland.

5 *Tonal Phonology and Phonetics*

5.1 Introduction

This chapter describes the tonal phonology of Sumi, looking first at contrastive lexical tones and the tone-bearing unit. An acoustic phonetic analysis provides graphical illustrations of tone realisation and examines variations within the phonetic realisation of the three tones. Finally, the results of three preliminary acoustic studies investigating variations in F_0 will be presented.

5.2 Number of contrastive tones

An analysis of data collected by the author confirms three contrastive level tones in Sumi: Low, Mid and High (L, M and H). This finding agrees with previous descriptions of tone in Sumi by Hutton (1921/1968) and Sreedhar (1976; 1980). The lexical tone contrast is demonstrated by the following minimal set (syllables to be compared are underlined):[50]

(71)	L	*akütsü*	/à.kɨ̀.ʧɨ̰̀/	[akꜜ tsɨꜜ] ~ [aꜜ kɨꜜ tsɨꜜ]	‘black’
(72)	M	*akütsü*	/à.kɨ̀.ʧɨ̰/	[akꜜ tsɨꜛ] ~ [aꜜ kɨꜜ tsɨꜛ]	‘head’
(73)	H	*akütsü*	/à.kɨ̀.ʧɨ̰́/	[akꜜ tsɨ˥] ~ [aꜜ kɨꜜ tsɨ˥]	‘rotten’

Note that in phonological representations, diacritics are used to mark the tones: /à/ for L tone, /a/ for M tone and /á/ for High tone. Chao tone letters (see Chao, 1930/1980), which have also been adopted into the International Phonetic Alphabet, are used for the phonetic transcription of tone: [ꜜ], [ꜛ] and [˥]. This is similar to work by other authors such as Coupe, who in his (2003) description of Ao uses diacritics in phonological representations, but tone numbers for phonetic transcriptions of tone, e.g. /tə́-màŋ/ [tə^{55}maŋ^{11}] ‘NPF-dark’ (‘NPF’ refers to a ‘nominal prefix’), where [^{55}] represents the phonetic realisation of the High tone and [^{11}] that of the Low tone. For the sake of descriptive economy, he assumes a single allotone per tone (2003: 91). Likewise, in this description of Sumi a single allotone is posited for each tone category as listed here:

L	/à/	→	[aꜜ]	alternatively,	[a^{11}]
M	/a/	→	[aꜛ]		[a^{33}]
H	/á/	→	[a˥]		[a^{55}]

[50] In the interest of economy, the gloss for the prefix *a-*, a non-relational prefix marker that occurs in the citation form or ‘unpossessed’ form of most nouns and modifiers derived from stative verbs, will not be provided in this chapter.

In this work, a 'surface' phonological representation is provided, where all syllables are specified for one of the three tones.

It is also possible to posit a 'deeper' phonological analysis where some syllables (including the nominal prefix *a-*) are inherently toneless, but are assigned a tone through a language-specific process of tone spreading. Such an analysis is only assumed in §6.2, and will be critiqued, since it appears to represent historical processes of tone assignment, as opposed to a synchronic tonal analysis.

5.3 Tone-bearing unit

The tone-bearing unit (TBU) in Sumi is the syllable. Full or major syllables can display the full tonal contrast between L, M and H tones (syllables to be compared are underlined):

(74)	L	*apuh*	/à-pù/	[aꜜ puꜜ]	'father'
(75)	M	*apu*	/a-pu/	[aꜛ puꜛ]	'dipper, water scoop'
(76)	H	*appu*	/à-pú/	[aꜜ puꜛ]	'son'

In contrast, minor syllables (including syllabic nasals) in sesquisyllabic structures have only been found to take L or M tone, as demonstrated in (77) – (81). It is interesting to note that in these minimal sets, the tone on the minor syllable is never the only source of contrast in the sesquisyllable, but is always accompanied by a contrastive tone on the full syllable, cf. (78) and (79). For instance, we do not find LM or HM contrasting with MM on sesquisyllables in the same minimal set. Furthermore, as noted in §4.3, H tone is never found on minor syllables.

(77)	LL	*mlah*	/m̀.là/	[m̩ꜜ laꜜ]	'to work'
(78)	LM	*mla*	/m̀.la/	[m̩ꜜ laꜛ]	'to foam'
(79)	MH	*mlla*	/m.lá/	[m̩ꜛ laꜛ]	'to be easy'
(80)	MM	*piti*	/pi.ti/	[piꜛ tiꜛ]	'to burn'
(81)	MH	*piti*	/pi.tí/	[piꜛ tiꜛ]	'to bear animal offspring'

Sumi has no phonemic contour tones, i.e contour tones do not contrast paradigmatically with the three level tones. However, there are few examples of phonetic contour tones, e.g. *toi* /tò.i/ [toi↘] 'resemble' and *aghau* /a.ɣa.ù/ [aꜛ ɣau↘] 'bird'. Given the analysis of syllable structure in Sumi presented in Chapter 4, and the fact that such phonetic contours only occur with long vowels and phonetic diphthongs, these tonal contours would be best treated as sequences of two level tones.

5.4 Distribution of tones with segments

The distribution of tones with regards to segments is relatively unrestricted in Sumi. All three tones can occur on any of the six phonemic vowel phonemes in a full syllable, as shown in Table 10.

Table 10: Distribution of tones on vowels

	L	M	H
/i/	*aki* /àkì/ 'house'	*akichhi* /àkìʧʰi/ 'breast'	*akichi* /àkìʧĩ/ 'mouth'
/e/	*acheku* /àʧèkù/ 'corner'	*ayeghi* /ajeɣí/ 'earth'	*alhache* /alʱaʧé/ 'ant'
/i/	*asü* /àʃɨ/ ([a˩ sɨ˩]) 'wood'	*asü* /aʃɨ/ ([a˦ sɨ˦]) 'millet'	*asü* /àʃɨ́/ ([a˩ sɨ˥]) 'grandfather'
/a/	*asa* /àʃà/ ([a˩ sa˩]) 'hair (of head)'	*asa* /aʃa/ ([a˦ sa˦]) 'nose bridge'	*asa* /àʃá/ ([a˩ sa˥]) 'suburb; colony'
/u/	*apuh* /àpù/ 'father'	*apu* /apu/ 'dipper, water scoop'	*appu* /àpú/ 'son'
/o/	*axo* /àxò/ 'smell'	*ato* /ato/ 'hill'	*amlo* /àm̀ló/ 'heart'

Table 11: Distribution of tones following stops

	L	M	H
/p/	*apuh* /àpù/ 'father'	*apu* /apu/ 'dipper, water scoop'	*appu* /àpú/ 'son'
/pʰ/	*aphu* /àpʰù/ 'village'	*achhophe* /aʧʰopʰe/ 'broom'	*alekiphe* /àlèkìpʰé/ 'singing'
/b/	*abi* /àbì/ 'shoulder'	*akhabo* /àkʰàbo/ 'fish pond'	*aghiba* /àɣìbá/ 'rattan'
/t/	*ati* /àtì/ 'offspring'	*amiti* /àmìti/ 'salt'	*amitti* /àmìtí/ 'saliva'
/tʰ/	*athikishi* /àtʰìkiʃi/ 'uncooked rice'	*anathi* /ànátʰi/ 'banana'	*küthü* /kɨtʰɨ́/ 'three'
/d/	*ado* /àdò/ 'time'		*awudu* /àvùdú/ 'rooster'
/k/	*kaku* /kàkú/ 'book'	*ka* /ka/ 'to rule'	*aghuloki* /àɣùlòkí/ 'time period'
/kʰ/	*akha* /àkʰà/ 'fish'	*khü* /kʰɨ/ 'to challenge'	*lakhi* /lakʰí/ 'one'
/g/			*agi* /agí/ 'face'
/q/	*amqa* /àmqà/ 'lower back'	*qü* /qɨ/ 'to spread'	*akichhiqo* /àkìʧʰiqó/ 'armpit'
/qʰ/	*aqho* /àqʰò/ 'brain'	*inaqhe* /ìnàqʰe/ 'morning'	*amqha* /àmqʰá/ 'loft'

Table 12: Distribution of tones following fricatives and affricates

	L	M	H
/f/	*afo* /áfò/ 'elder sister'		
/v/	*awu* /àvù/ 'chicken'	*awucho* /avuʧo/ 'banana'	*vilo* /vílo/ 'to'
/ʃ/	*ashi* /àʃì/ 'meat' *asa* /àʃà/ ([a˩ sa˩]) 'hair (of head)'	*shi* /ʃi/ 'do' *asa* /aʃa/ ([a˦ sa˦]) 'nose bridge'	*mishithi* /mìʃítʰi/ 'lemon' *asa* /àʃá/ ([a˩ sa˥]) 'suburb; colony'
/ʒ/	*kije* /kìʒè/ 'big' *aza* /àʒà/ ([a˩ za˩]) 'order'	*ju* /ʒu/ 'to see' *aküzü* /akɨʒɨ/ ([a˦ kɨ˦ zɨ˦]) 'suitable'	*kije* /kìʒé/ 'to divide' *aza* /àʒá/ ([a˩ za˥]) 'mother'
/x/	*axo* /àxò/ 'smell'	*xo* /xo/ 'to pluck (e.g. fruit)'	*axone* /àxónè/ 'fermented soya beans'
/ɣ/	*aghi* /àɣì/ 'bone'	*aküghü* /àkɨɣɨ/ 'big leaf"	*khaghi* /kʰaɣí/ 'long time ago'
/h/	*ahu* /àhù/ 'unhusked grains'	*ahu* /ahu/ 'tooth'	*ahu* /àhú/ 'measure of weight'
/ʧ/	*acheku* /àʧèkù/ 'corner'	*ache* /aʧe/ 'sunny part of field'	*akichi* /àkìʧí/ 'mouth'
/ʧʰ/	*chhe* /ʧʰè/ 'to slide in'	*akichhi* /àkìʧʰi/ 'breast'	*akichhi* /akiʧʰí/ 'full'

Table 13: Distribution of tones following sonorants

	L	M	H
/m/	*akimi* /àkìmì/ 'husband'	*müma* /mɨma/ 'to kiss'	*küma* /kɨmá/ 'they both' ('3DU')
/mʱ/	*imho* /ìmʱò/ 'ferment'	*alimhi* /àlìmʱi/ 'soot'	
/n/	*niye* /nì=je/ 'I' ('1SG=TOP')	*ningu* /niŋù/ 'we' ('1PL')	*anathi* /ànátʰi/ 'banana'
/nʱ/	*khetsünhe* /kʰèʧɨnʱè/ 'sun'	*akünha* /àkɨnʱa/ 'lid'	*minhe* /mìnʱé/ 'gnaw'
/ŋ/	*ngo* /ŋò/ 'and'	*ngo* /ŋo/ 'to stay'	*anga* /aŋá/ 'child'
/l/	*ali* /àlì/ 'pot'	*lakhi* /lakʰí/ 'one'	*liye* /lí=je/ 'she' ('3SG.F=TOP')
/lʱ/	*akulho* /àkùlʱò/ 'fatigue'	*alhache* /alʱaʧe/ 'ant'	*akulho* /àkùlʱó/ 'curry'
/r/			*murasü* /mùɹáʃɨ/ 'snow'

Similarly, all three tones can occur: (a) after all stops regardless of voice onset time (see Table 11); (b) after all fricatives and affricates, regardless of voicing (see Table 12); and (c) after all sonorants, regardless of phonation (see Table 13). Gaps in the data merely indicate that the authour has not come across such combinations in his own fieldwork – although in some cases, these gaps are the result of the very low frequency of certain phonemes, such as /f/, /g/ and /r/.

5.5 Phonetic realisation of tone

In this first acoustic phonetic description of tones in Sumi, two parameters were examined: pitch and duration.

5.5.1 Pitch

Of the three parameters, pitch (measured as F_0) was found to be the main acoustic correlate of tone in Sumi. An acoustic study confirmed the initial auditory analysis that Sumi has three roughly equidistant level tones. Figures 10 and 11 provide illustrations of the phonetic realisation of each tone across a time-normalised segment, using mean absolute F_0 values taken at intervals of 10% across the tone-bearing segment for the female and male speaker.

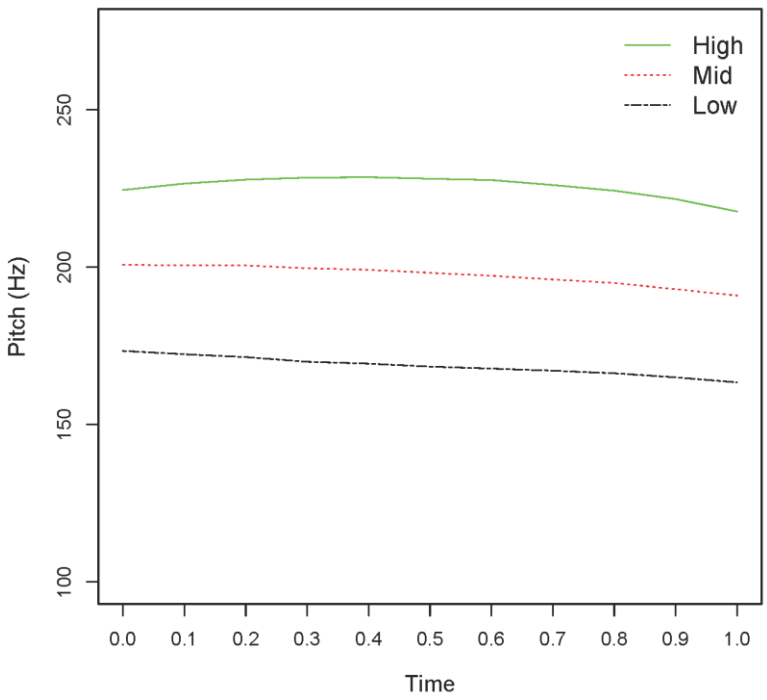

Figure 10: Mean absolute F_0 values for L, M and H tones across a time-normalised segment (female speaker)

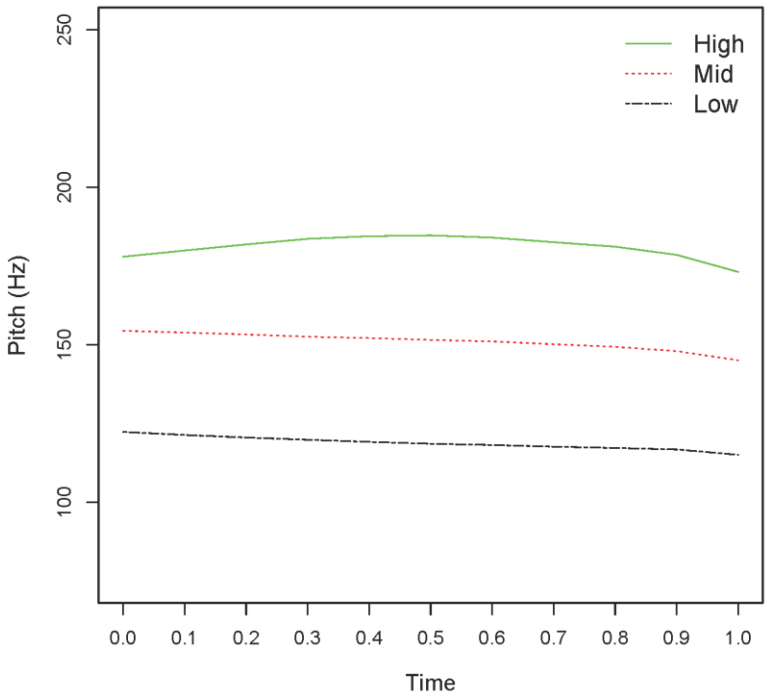

Figure 11: Mean absolute F_0 values for L, M and H tones across a time-normalised segment (male speaker)

Table 14 gives the mean pitch values and standard deviations of the three tones L, M and H for both speakers. Pitch values, measured as F_0 in Hertz (Hz) were taken at the midpoint of each tone-bearing segment. For all tones, the male speaker's pitch was on average about 40-50 Hz lower than that of the female speaker's. This is unsurprising given that the average adult male voice is typically an octave lower in pitch than the average adult female voice: an adult male typically has larger vocal folds and a lower larynx compared to an adult female (Monsen & Engebretson, 1977; Ohala, 1983).

Table 14: Mean absolute F_0 values for each tone by speaker

Tone	Female speaker			Male speaker		
	Mean F_0 (Hz)	Standard deviation	No. of tokens	Mean F_0 (Hz)	Standard deviation	No. of tokens
L	**169**	12.2	885	**119**	9.3	210
M	**198**	15.6	499	**151**	8.8	117
H	**228**	18.8	268	**185**	15.8	72

The results of a one-way ANOVA showed that pitch varied significantly according to tone category for both the female speaker: $F(2,1649) = 1949.9$, $p < 0.001$; and the male speaker, $F(2,396) = 1134.6$, $p < 0.001$. Tukey post-hoc comparisons confirmed that for both speakers, each of the three tones differed significantly in terms of pitch.

The distance between the L and M tones and between the M and H tones was typically about 30 Hz for both speakers. All three tones were also mainly level,

indicating that tones in Sumi contrast in terms of pitch height, not pitch movement. The intervals described here are comparable to those found in the Khonoma dialect of Angami by Blankenship *et al.* (1993), who show that the four level tones are separated by intervals of between 20 to 30 Hz. In contrast, Coupe (2003) finds much smaller intervals of 10 to 20 Hz for Mongsen Ao, which like Sumi has three contrastive level tones.

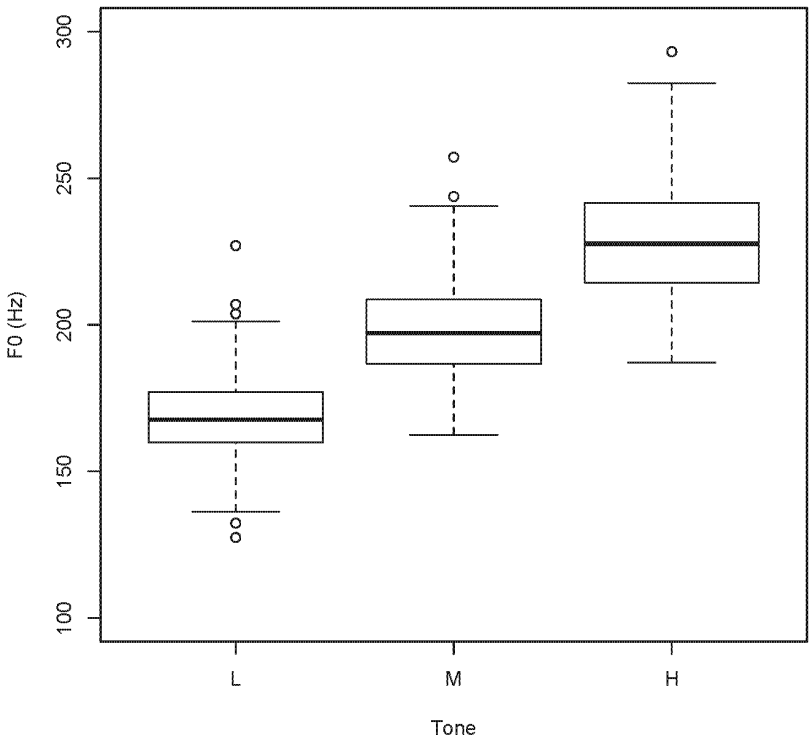

Figure 12: Box-and-whisker plot showing variation in absolute F_0 values for each tone (female speaker)

Nevertheless, as noted in §2.4, linguistic tones do not correspond to absolute pitch values but to a range of F_0 values, relative to the speaker's own pitch range and to the pitch of surrounding tones. Such variability in F_0 for each Sumi tone category is illustrated by the box-and-whisker plots in Figures 12 and 13. The thick horizontal black lines in the boxes indicate the median F_0 value for each tone. The edges of the boxes represent the upper and lower quartiles for the data, while the top and bottom whiskers represent the maximum and minimum F_0 values for each tone, excluding outliers. Outliers are indicated by white circles and are more than 1.5 times the upper quartile or less than 1.5 times the lower quartile.

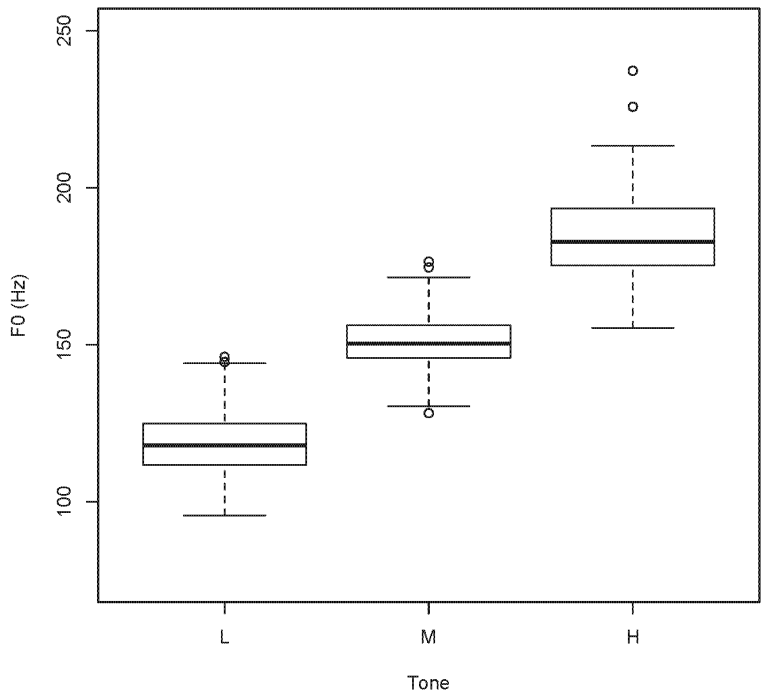

Figure 13: Box-and-whisker plot showing variation in absolute F_0 values for each tone (male speaker)

These box-and-whisker plots give a better idea of the amount of variation in the phonetic realisation of each tone, as well as the amount of overlap between the L and M tones, and between the M and H tones. Even so, in order to describe the tones in relation to each speaker's pitch range and to also make inter-speaker comparisons, it is necessary to normalise the F_0 values. While this is typically done through a z-score normalisation of the data (see Rose, 1987), it was decided to normalise the F_0 values from the Sumi data set in relation to the carrier phrase they occurred in. It was possible to do this because all investigated tokens had been produced in carrier phrases. Even when different phrases were used, the investigated item was always preceded by the topic marker *ye* /je/, which always carries M tone. This M tone provided a useful yardstick against which the tones on the investigated item could then be compared.

The formula that was used to calculate the pitch of an investigated item in semi-tones relative to M tone in the carrier phrase followed that used by Mazaudon and Michaud (2008) in an acoustic study of tones in Tamang (see §2.6 for the formula). Figures 14 and 15 provide illustrations of the phonetic realisation of each tone, measured in semi-tones relative to the carrier phrase across a time-normalised segment for the female and male speaker. Measurements were taken at intervals of 10% across each tone-bearing segment.

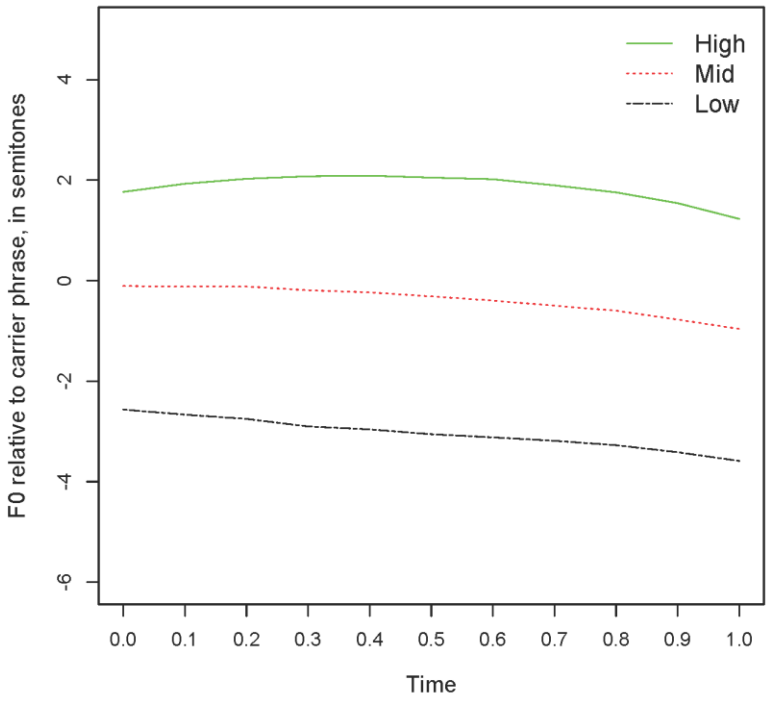

Figure 14: Mean F_0 values relative to carrier phrase for L, M and H tones across a time-normalised segment (female speaker)

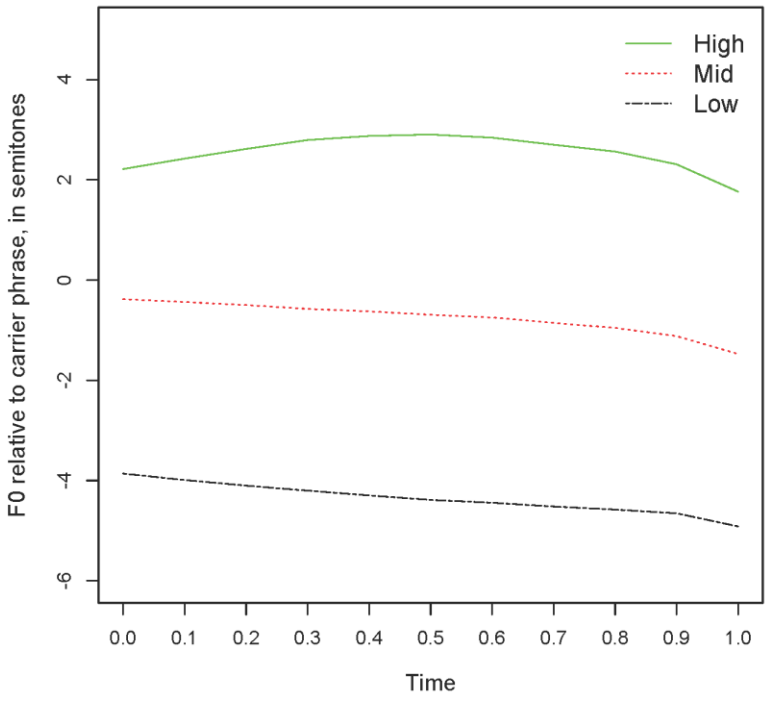

Figure 15: Mean F_0 values relative to carrier phrase for L, M and H tones across a time-normalised segment (male speaker)

Table 15 gives the mean pitch values and standard deviations of the three tones L, M and H for both speakers. These pitch values, measured in semi-tones relative to the carrier phrase, were taken at the midpoint of each tone-bearing segment.

Table 15: Mean F_0 for each tone relative to the carrier phrase, measured in semi-tones, by speaker

Tone	Female speaker			Male speaker		
	Mean F_0 (semi-tones)	Standard deviation	No. of tokens	Mean F_0 (semi-tones)	Standard deviation	No. of tokens
L	**-3.05**	1.034	885	**-4.37**	1.342	210
M	**-0.30**	0.871	499	**-0.69**	0.909	117
H	**2.07**	0.944	268	**2.89**	1.173	72

The results of a one-way ANOVA showed that pitch height relative to the carrier phrase varied significantly according to tone category for the female speaker: $F(2,1649) = 3292.6$, $p < 0.001$; as well as for the male speaker, $F(2,396) = 1078$, $p < 0.001$. Tukey post-hoc comparisons showed that for both speakers, each of the three tones differed significantly from each other in terms of pitch.

The female speaker was found to produce L tones about 3 semi-tones lower than the carrier phrase M, and H tones about 2 semi-tones higher. In contrast, the male speaker produced L tones more than 4 semi-tones lower than M in the carrier phrase and H tone almost 3 semi-tones higher. It is quite possible that the male speaker was hyperarticulating the tones for the purposes of the recording, while the female speaker, who had been working with the author over a few years, was less prone to such hyperarticulation. Recordings with the same speaker taken over an extended period of time, as well as recordings from other male speakers in future may help to confirm that the large differences between L, M and H tones found in this study were simply the result of hyperarticulation by this male speaker at the time of recording.

In general, the findings for Sumi are not typologically unusual among tone languages. Klatt (1973) notes that for sounds with level F_0, the human ear is able to detect just noticeable differences (JNDs) of merely 0.3 Hz. However, most register tone languages where pitch is the primary phonetic correlate of tone tend to have intervals much larger than that. For instance, Rietveld and Gussenhoven's (1985) findings show that pitch differences of 1.5 semi-tones (approximately 10 Hz) or more are reliably interpreted as prominence distinctions, i.e. an interval of 10 Hz is sufficiently able to distinguish two tonal categories.

5.5.2 Duration

Initial auditory impressions did not suggest that the three tones were distinguished by duration. Table 16 gives the mean duration time and standard deviation for each tone for both speakers.

Table 16: Mean duration times for each tone by speaker

Tone	Female speaker			Male speaker		
	Mean duration (ms)	Standard deviation	No. of tokens	Mean duration (ms)	Standard deviation	No. of tokens
L	**70**	28.5	885	**78**	29.3	210
M	**72**	26.6	499	**90**	29.8	117
H	**73**	23.8	268	**85**	32.7	72

The results of a one-way ANOVA confirmed that for both speakers, tones did not differ significantly in terms of duration – female speaker: $F(2,1649) = 2.33$, $p = 0.098$; male speaker: $F(2,396) = 6.28$, $p = 0.002$.

On the other hand, it was found that position in a word was a significant predictor of tone duration. Table 17 gives the mean duration time and standard deviation for L and M tones in word-initial and word-final position. H tones were excluded from this study because they rarely occur in word-initial position. T-tests confirm that for both L and M tones, word-final tones are significantly longer than word-initial ones – L tone: $t(511) = -4.49$, $p < 0.001$; M tone: $t(316) = -5.68$, $p < 0.001$.

Table 17: Comparison of duration of L and M tones in word-initial and word-final position (female speaker)

Position of syllable	L tone duration			M tone duration		
	Mean (ms)	S.D.	No. of tokens	Mean (ms)	S.D.	No. of tokens
Word-initial	**68**	24.6	412	**68**	24.3	205
Word-final	**78**	28.9	271	**83**	25.9	153

This finding seems to confirm the author's auditory impressions that word-final syllables tend to sound more prominent compared to word-initial ones.[51]

5.5.3 Phonation type

Non-modal phonation types such as breathy or creaky voice were also not found to correlate with any specific tone.[52] However, word-final H tones were sometimes accompanied by glottalisation at the end of the final vowel, visible in the spectrogram for the word *amlo* /à-m̀ló/ [amɹ loʔl] 'heart' ('NRL-heart'), spoken in isolation, given in Figure 16.

[51] Note that another acoustic study looking at intensity failed to find a significant difference in intensity between word-initial L tone and word-final L tone or between word-initial M tone and word-final M tone.

[52] As noted in §3.7, syllable-initial creaky voice (or glottal stop) was often found on onset-less syllables, but it was not found to correspond to any one of the three tone categories.

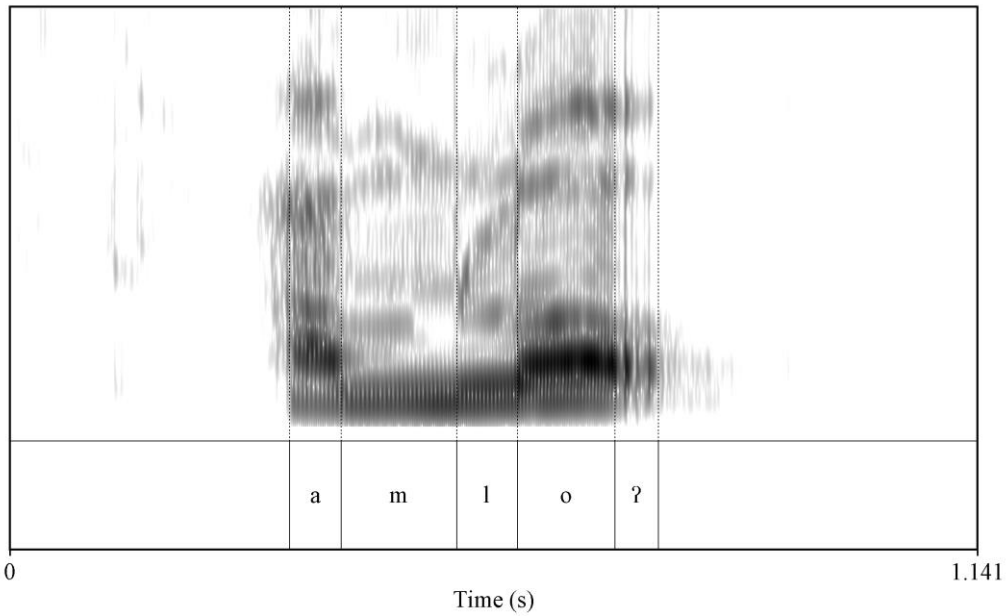

Figure 16: Spectrogram of *amlo* /àm̀ló/ 'heart' (female speaker). This illustrates the word-end glottalisation, represented by [ʔ], that sometimes accompanies word-final H tones.

Such syllable-final glottalisation was not found with H tones in word-initial or word-medial position, as illustrated by Figure 17, which gives the spectrogram for the word *ifo* /í-fò/ [ʔi˥ foɹ] 'my elder sister' ('1SG-elder.sister').

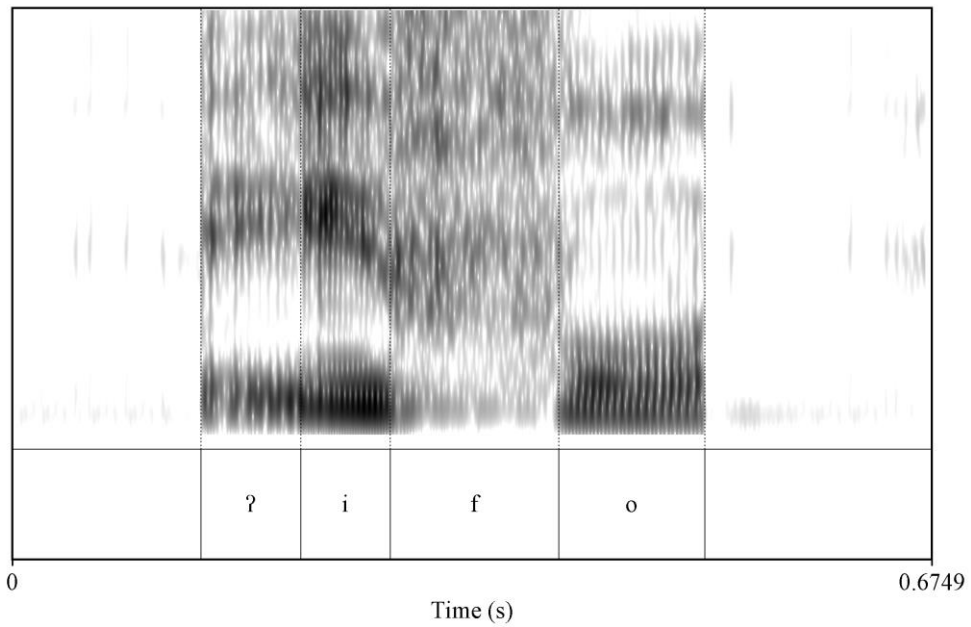

Figure 17: Spectrogram of *ifo* /ífò/ 'my elder sister' (female speaker)

The glottalisation accompanying word-final H tones was not consistently produced. It is currently unknown whether it indicates a historic word-final glottal stop that has been lost or is in the process of being lost in Sumi – syllable-final glottal stops are not generally permitted in the languages of the Angami-Pochuri group, but they are found in languages of the Ao group, including Chungli and Mongsen Ao.

5.6 Preliminary acoustic experiments on tone production

A number of preliminary acoustic experiments were performed in order to examine within-speaker variation in tone production. Xu & Wang (2001) summarise four important articulatory constraints that may contribute to F_0 variations in tone production: (1) vowel intrinsic F_0; (2) perturbations caused by initial consonants; (3) F_0 declination; and (4) tonal coarticulation. Of these, the first three factors were selected for testing in preliminary acoustic experiments. As noted in §1.9, some of these factors have also been known to play various roles in tonogenesis and tone evolution, e.g. a voiced initial consonant depresses pitch on the following vowel and may eventually lead to the development of low tone on the vowel if the voicing contrast is lost on the initial consonant – see Kingston (2011) for a summary of these tonogenetic pathways.

This section reports the results of these experiments. It should be noted that the purpose of these experiments was to simply examine data that had already been collected in order to identify worthwhile areas for further acoustic research. Consequently, only data from the female speaker were used here, since an insufficient number of tokens had been recorded for the male speaker which could then be tested.

5.6.1 Tone realisation and vowel intrinsic F_0

Intrinsic F_0 (IF_0) refers to the tendency for high vowels such as /i/ and /u/ to be realised with higher fundamental frequency than low vowels like /a/. Whalen and Levitt (1995) surveyed a large number of languages and found that IF_0 occurred almost universally. One interesting finding was that in tone languages, low tones failed to display this tendency, suggesting that IF_0 was neutralised by low tones. Connell (2002) summarises the literature on IF_0 control during singing vis-à-vis speaking, but notes that there is little consensus on the mechanics behind such control.

Connell (2002) investigated the effect of tone inventory on IF_0 in a number of African register tone languages, which he viewed as typologically distinct from most of the tone languages that Whalen and Levitt had included in their survey: the former group of languages were viewed as relying primarily on contrastive pitch height to distinguish tones, while the latter group, including many tone languages of Asia, were seen as relying more on pitch movement. His results concurred with most previous observations of IF_0 in tone languages, with the exception of Mambila, which did not appear to display IF_0 at all.

This first experiment sought to see if Sumi conformed to Whalen and Levitt's findings for other tone languages, which displayed IF_0 with M and H tone, but neutralised it in L tone. The experiment followed Whalen & Levitt's method of combining the high vowels /i/ and /u/ into a single group, and comparing this group to

the low vowel /a/.[53] This finding was in line with previous observations that the front / back dimension of vowels does not influence IF_0. F_0 values were then taken at 10% intervals across /i u/ and /a/, and converted to semi-tones relative to M tone in the carrier phrase using the formula described in §2.6.

Figures 18, 19 and 20 show the mean values of L, M and H tone on the high vowels /i u/ and on the low vowel /a/, relative to the carrier phrase and plotted as a function of time.

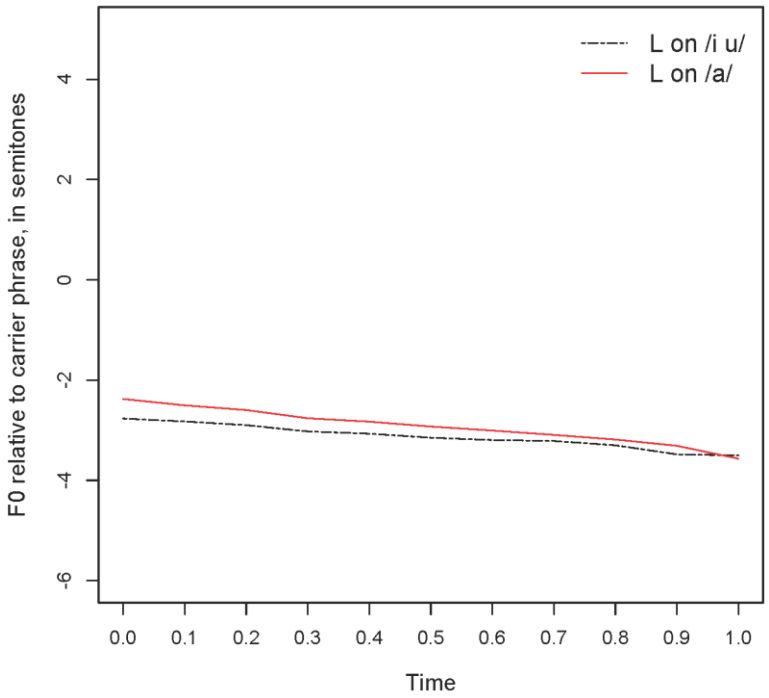

Figure 18: Mean F_0 values relative to carrier phrase for L tones on the high vowels /i u/ and on the low vowel /a/ across a time-normalised segment (female speaker)

[53] This method was possible for the Sumi data after t-tests showed no significant difference between F_0 on /i/ and /u/ for any of the three tones.

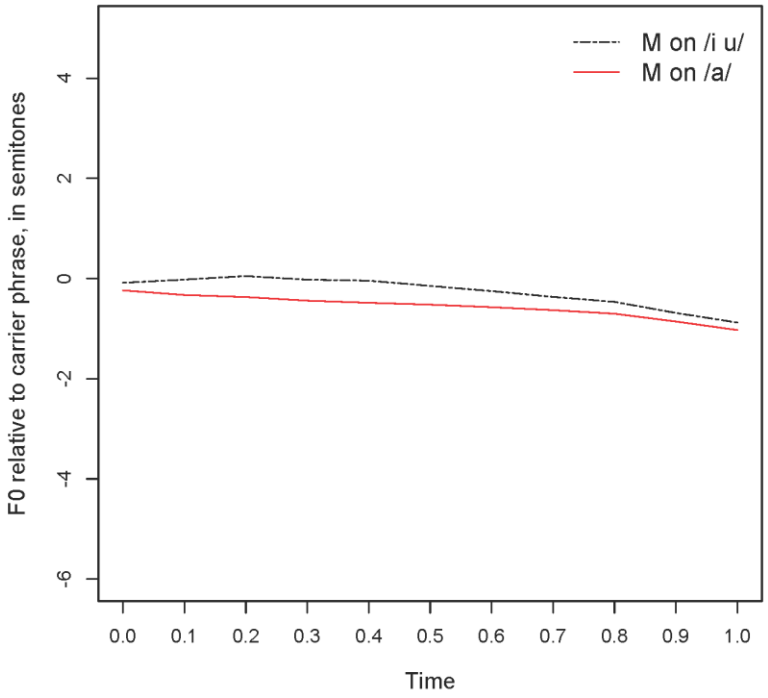

Figure 19: Mean F_0 values relative to carrier phrase for M tones on the high vowels /i u/ and on the low vowel /a/ across a time-normalised segment (female speaker)

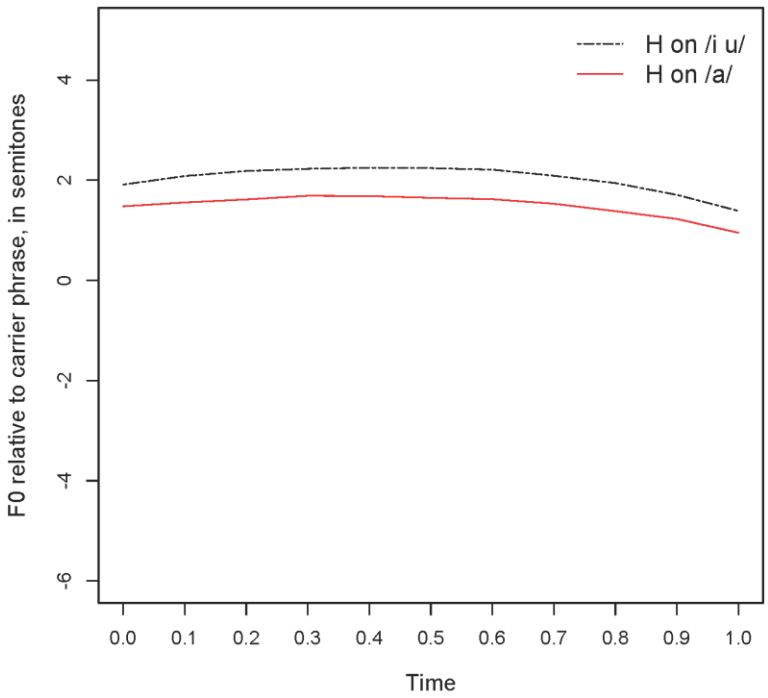

Figure 20: Mean F_0 values relative to carrier phrase for H tones on the high vowels /i u/ and on the low vowel /a/ across a time-normalised segment (female speaker)

Table 18 gives the mean pitch values and standard deviations for all three tones on the high vowels /i u/ and the low vowel /a/. These pitch values, measured in semi-tones relative to the carrier phrase, were taken at the midpoint of each tone-bearing vowel.

Table 18: Comparison of F_0 at vowel midpoint relative to carrier phrase for /i u/ vs. /a/ (female speaker)

Tone	L tone			M tone			H tone		
	Mean	S.D.	No. of tokens	Mean	S.D.	No. of tokens	Mean	S.D.	No. of tokens
/i u/	**-3.14**	1.07	256	**-0.15**	0.89	189	**2.25**	0.91	143
/a/	**-2.92**	1.01	441	**-0.51**	0.79	193	**1.67**	0.85	40

T-tests showed that there was a small but significant difference in pitch between the high vowels /i u/ and the low vowel /a/ for M and H tone, with the former displaying slightly higher pitch than the latter – M tone: $t(373) = 4.16$, $p < 0.001$; H tone: $t(66) = 3.77$, $p < 0.001$. For L tone, the mean F_0 value was slightly higher on /a/ than on /i u/, but this difference in F_0 was not found to be statisically significant: $t(508) = -2.69$, $p = 0.007$. In other words, IF_0 was found for M and H tone, but not for L tone.

These results match Whalen and Levitt's (1995) findings that IF_0 did not occur with low tones, suggesting that IF_0 was either not present for L tones in Sumi or – if we accept the proposition that it is universal but subject to phonological constraints – that IF_0 was constrained by L tone production.

It will be interesting to see in future experiments if IF_0 is present only on M and H tones in Sumi for other speakers, including male speakers. Nonetheless, for the moment, the results of this preliminary experiment do help to account for some of the F_0 variation observed in the phonetic realisation of Sumi tones.

5.6.2 Effects of initial consonant on tone realisation

The interaction between consonants (both prevocalic and postvocalic) and pitch over historical time has been discussed in the literature. Haudricourt (1954) demonstrated how tones in Vietnamese developed through the loss of post-vocalic consonants and the loss of a voicing contrast in pre-vocalic consonants. Similarly, the tone split undergone by the four tones of Middle Chinese is attributed to the loss of a phonological contrast between voiced and voiceless prevocalic stops, resulting in the yang (lower pitch) and yin (higher pitch) registers (Chen, 2000). Haudricourt's theory was revised and updated by Thurgood (2002), who posited an intermediate stage where differences in consonant voicing first gave rise to differences in phonation type before the phonologisation of contrastive pitch across the entire vowel. Although this intermediate stage of contrastive phonation type appears to be attested in languages of the Bodish group (see Hildebrandt, 2007), it has not always been found in languages that appear to be currently undergoing tonogenesis, e.g. Kurtöp (Hyslop, 2009). Even when no such intermediate phonation stage has been found, it has been suggested that prevocalic consonants can still play a role in the development of tones. Pittayaporn (2007) demonstrates that prevocalic consonants in Thai have historically affected pitch more at

the vowel onset than over the entire vowel. Yang (2010) adopts the same model of tone change to account for contour tone development in some varieties of Lalo.

Acoustic phonetic research has shown that a voiced obstruent lowers the pitch of a following vowel, while voiceless obstruents may raise (or simply not lower) the pitch of a following vowel (Hombert, 1978). However, there is less consensus as to the effects of stop aspiration on F_0. Pittayaporn (2007) reports that in some cases, consonant aspiration in Thai has depressed pitch at the onset of a mid tone, resulting in a low rising tone. In other cases, it has raised pitch at the onset, resulting in a high falling tone. In their investigation the effects of aspiration on Mandarin tone production, Xu & Xu (2003) found that aspiration depressed pitch at the syllable onset, but the effect was greater for the low and (low) rising tones than for the high and (high) falling tones.

Sumi is ideal for studying the interaction between level tones and voicing / aspiration, given that it has both voiced and voiceless obstruents, as well as a series of aspirated and unaspirated stops. In addition, the three tones can occur freely after all stops regardless of voice-onset time (VOT), unlike the more distantly related Bodish languages, where the distribution of certain tones correlates with certain types of VOT on preceding consonants (see Hildebrandt, 2007).

For this experiment, only the effect of stop VOT on tone realisation was examined. F_0 values were taken at 10% intervals across vowel segments following stops and converted to semi-tones relative to M tone in the carrier phrase using the formula described in §2.6. It was also expected that pitch perturbations would be greatest at the start of the vowel and comparisons were made at the 10% mark of the tone-bearing segment. The expectation was that F_0 would be lower after voiced stops and higher after voiceless unaspirated stops. However, it was unclear how F_0 would be affected by aspiration.

Figures 21, 22 and 23 show the mean values of L, M and H tone following voiced stops (Vstop), voiceless unaspirated stops (V0stop) and voiceless aspirated stops (V0hstop), relative to the carrier phrase and plotted as a function of time.

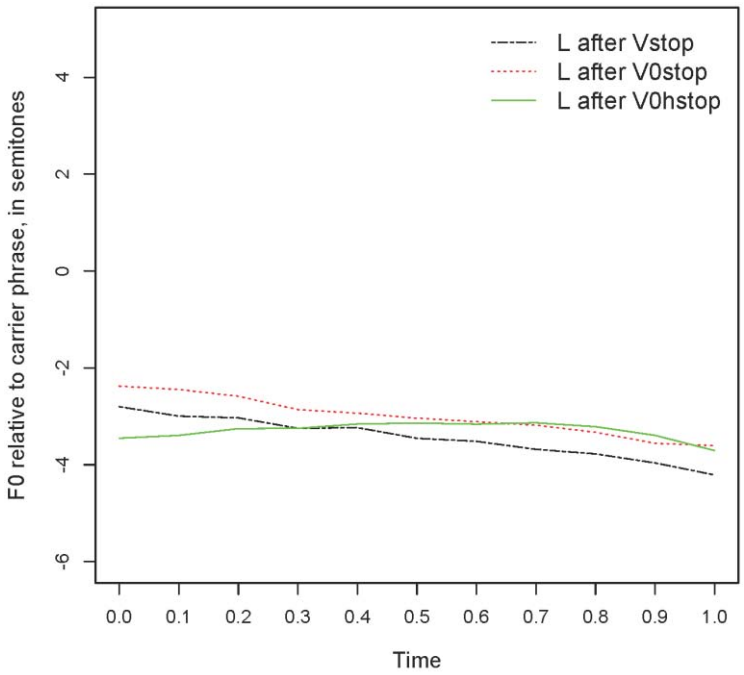

Figure 21: Mean F_0 values relative to carrier phrase for L tones after voiced stops (Vstop), voiceless unaspirated stops (V0stop) and voiceless aspirated stops (V0hstop) across a time-normalised segment (female speaker)

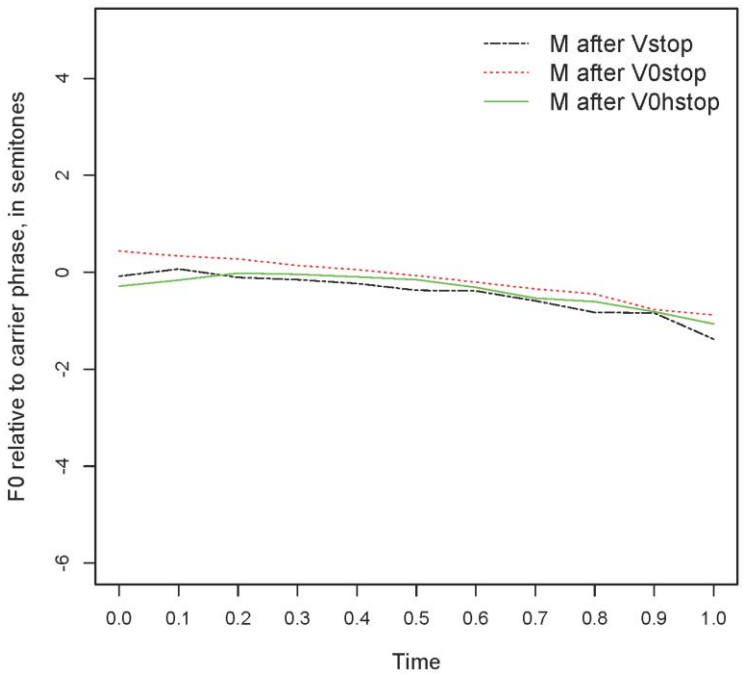

Figure 22: Mean F_0 values relative to carrier phrase for M tones after voiced stops (Vstop), voiceless unaspirated stops (V0stop) and voiceless aspirated stops (V0hstop) across a time-normalised segment (female speaker)

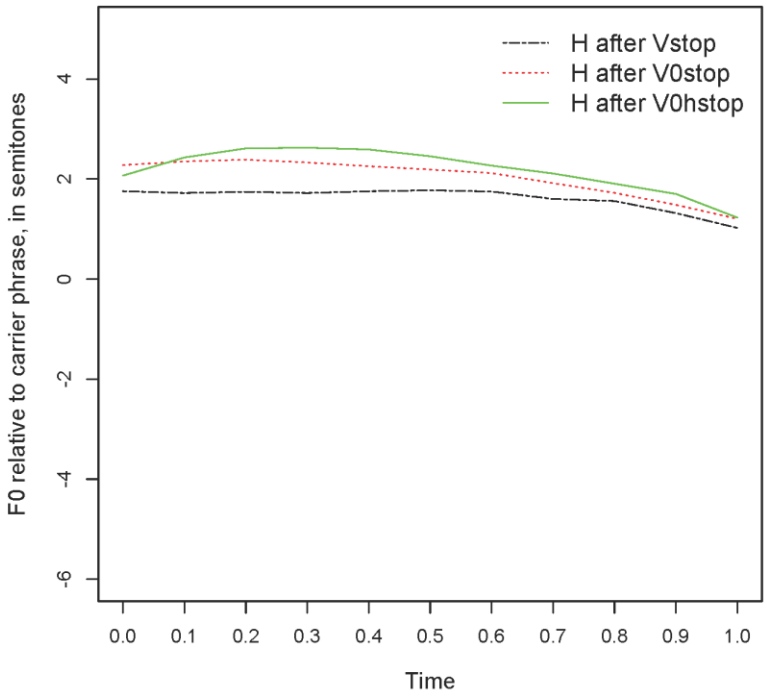

Figure 23: Mean F_0 values relative to carrier phrase for H tones after voiced stops (Vstop), voiceless unaspirated stops (V0stop) and voiceless aspirated stops (V0hstop) across a time-normalised segment (female speaker)

Table 19 gives the mean pitch values and standard deviations for all three tones following voiced stops (Vstop), voiceless unaspirated stops (V0stop) and voiceless aspirated stops (V0hstop). These pitch values, measured in semi-tones relative to the carrier phrase, were taken at the 10% mark of each tone-bearing vowel.

Table 19: Comparison of F_0 at 10% of vowel segment after voiced, voiceless unaspirated & voiceless aspirated stops (female speaker)

VOT category	L tone			M tone			H tone		
	Mean	S.D.	No. of tokens	Mean	S.D.	No. of tokens	Mean	S.D.	No. of tokens
Vstop	**-4.21**	1.14	20	**-1.38**	1.00	7	**1.02**	1.10	13
V0stop	**-3.60**	1.35	156	**-0.88**	1.28	91	**1.21**	1.10	43
V0hstop	**-3.71**	1.61	40	**-1.07**	0.86	40	**1.23**	1.46	18

A one-way ANOVA showed that VOT significantly affected the pitch, relative to the carrier phrase, at the 10% mark for both L and M tone, but not H tone – L tone: $F(2,213) = 13.21$, $p < 0.001$; M tone: $F(2,135) = 12.04$, $p < 0.001$. However, Tukey post-hoc comparisons showed that there were only significant differences between voiceless unaspirated and voiceless aspirated stops for L and M tone.

Although mean F_0 was found to be lower immediately after voiced stops than after voiceless unaspirated stops, this difference could not be counted as significant, given the very small sample size for voiced stops. More importantly, this experiment showed that aspirated stops had a significant depressor effect on F_0 close to the vowel onset for L and M tone, but not H tone. This is similar to Xu & Xu's (2003) observation that the pitch lowering effect of consonant aspiration was greater for the low tones in Mandarin. However, no phonetic explanation can be offered at the present time.

Future acoustic experiments will need to include more tokens of voiced stops. Unfortunately, these were scarce in the collected data due to the overall rarity of voiced stops in Sumi. It will also be interesting to see if voiced stops lowered pitch not just at the vowel onset, but across the entire vowel segment, even though voiced stops are not accompanied by non-modal phonation (e.g. breathy voice) in Sumi. In addition, it will be important to look at the effect of the breathy sonorants /m̤ n̤ l̤/ on pitch.[54] It will be useful to see if aspiration has the same pitch depressor effect for other speakers, and if it only affects L and M tone. Studying these effects will not simply help us understand synchronic variations in F_0 but may also help explain any future tone changes in Sumi.

5.6.3 Effects of declination on tone realisation

A final experiment looked at the possible effects of declination on tone realisation. 'Declination' refers to the general downward trend of F_0 across an intonational unit.[55] It has been noted across many languages, including tone languages such as Mongsen Ao (Coupe, 2003: 92), and is thought to be a universal phonetic phenomenon in declarative utterances, unlike more language-specific 'downstep' (see Connell, 2001). Much research has also gone into understanding the underlying physiological mechanism behind it, looking at factors such as laryngeal muscle activity and subglottal pressure (e.g. Collier, 1974). Despite being thought of as a 'universal' phenomenon, its effect has been found to be controlled or suspended in particular circumstances, such as when tonal constrasts are endangered (Hombert, 1974). Hombert also proposes a hierarchy whereby declination affects higher tones only if it also affects lower tones in a register tone language. Similarly, Laniran (1993) notes tone-specific declination in Yoruba, which is referred to as 'downdrift' in a later (2003) study by Laniran and Clements.

The purpose of this experiment was to check for the existence of declination in Sumi by comparing pitch on word-initial and word-final syllables and to investigate its effect on tone realisation. F_0 values were taken at 10% intervals across vowel segments for the first and last syllables in each word (excluding any monosyllables) and converted to semi-tones relative to M tone in the carrier phrase using the formula described in §2.6. H tones were not counted, given an insufficient number of word-initial tokens. It was expected that word-final syllables would have lower pitch than word-initial pitch.

Figures 24 and 25 show the mean values of L and M tone on the 1st syllable and the last syllable of each word, relative to the carrier phrase and plotted as a function of time.

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[54] Harris (2009) looked at the rate of airflow in the modally voiced sonorants and breathy sonorants, but unfortunately did not look at F_0.

[55] Connell (2001) attributes this use of the term to Cohen and t'Hart in their 1967 *Lingua* paper on Dutch intonation.

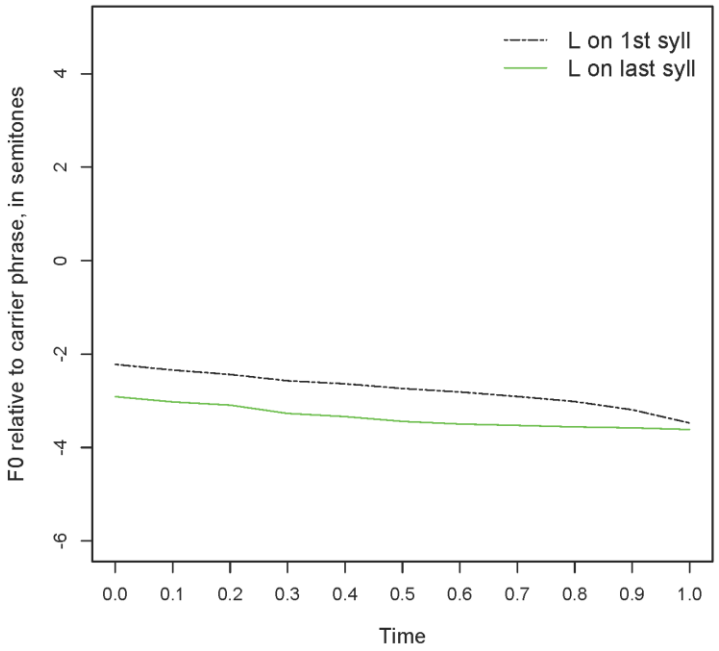

Figure 24: Mean F_0 values relative to carrier phrase for L tones in word-initial position (1st syll) and in word-final position (last syll) across a time-normalised segment (female speaker)

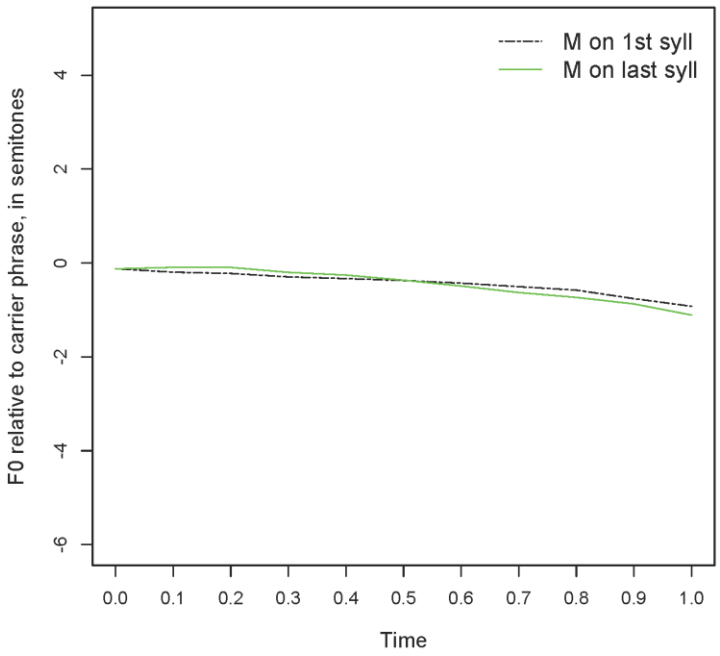

Figure 25: Mean F_0 values relative to carrier phrase for M tones in word-initial position (1st syll) and in word-final position (last syll) across a time-normalised segment (female speaker)

Table 20 gives the mean pitch values and standard deviations for L and M tone in word-initial and word-final position. These pitch values, measured in semi-tones relative to the carrier phrase, were taken at the vowel midpoint.

Table 20: Comparison of F_0 in word-initial and word-final position (female speaker)

Position of syllable	L tone			M tone		
	Mean	S.D.	No. of tokens	Mean	S.D.	No. of tokens
Word-initial	**-2.73**	0.93	412	**-0.36**	0.78	205
Word-final	**-3.44**	1.03	271	**-0.38**	0.93	153

The results of a t-test show that only for L tone was there a significantly lower pitch on word-final syllables than word-initial ones – L tone: $t(535) = 9.18$, $p < 0.001$. In the case of M tone, there was no significant difference in pitch.

One way of interpreting the result would be to suggest that this is an example of tone-specific declination, with only the L tone being affected by declination. If we accept that declination is a universal phenomenon, we might also say that pitch declination is controlled for M tones.

A future study will plan to look at H tone, which occurs very rarely in word-initial position. Its restricted distribution, which makes it the most 'marked' out of the three tones, will be dealt with in greater detail in §6.4.

5.7 Summary of tone phonology and phonetics

In this chapter, we showed that Sumi has three contrastive tones, which contrast on full syllables and are freely distributed on vowel segments and after consonants. An analysis of tone was then presented which examined pitch, the main acoustic correlate of lexical tone in Sumi. This was followed by a number of preliminary experiments that looked at factors that might affect pitch realisation, including prevocalic consonant, vowel intrinsic F_0 and declination. The results from these preliminary experiments showed that vowel intrinsic F_0 had some effect on M and H tone, while declination appeared to affect only L tone, but not M tone. A comparison of the tone system of Sumi with that of other Tibeto-Burman languages of the area will be made in Chapter 8.

6 *Tone Assignment and Tone Melodies*

6.1 Introduction

In the previous chapter it was shown that Sumi has three lexical tones that contrast paradigmatically on full syllables. It was also noted that all tones may occur freely on any of the vowel phonemes, as well as after any of the consonant phonemes of Sumi. This chapter will further investigate the distribution of tones within a phonological word, i.e. their syntagmatic relationship to each other.

Table 21 gives examples of the possible permutations of L, M and H tones on disyllabic words. T_1 indicates the tone on the first syllable, while T_2 indicates tone on the second.

Table 21: Nine possible permutations for tones on disyllabic words

T_1 \ T_2	L	M	H
L	*ipuh* /ì.pù/ [i˩ pu˩] ‘my father’	*sasü* /ʃà.ʃɨ/ [sa˩ sɨ˦] ‘with’	*ippu* /ì.pú/ [i˩ pu˥] ‘my son’
M	*papuh* /pa.pù/ [pa˦ pu˩] ‘his / her father’	*papu* /pa.pu/ [pa˦ pu˦] ‘his / her dipper’	*pappu* /pa.pú/ [pa˦ pu˥] ‘his / her son’
H	*pafo* /pá.fò/ [pa˥ fo˩] ‘his / her elder sister’	*lipu* /lí.pu/ [li˥ pu˦] ‘her dipper’	*lippu* /lí.pú/ [li˥ pu˥] ‘her son’

The data presented here illustrate how disyllabic words in Sumi can take any one of the nine possible permutations of L, M and H tone. The fact that all three tones may occur anywhere within a phonological word suggests that Sumi is an ‘unrestricted’ tone language (following Voorhoeve, 1973). In other words, tones are assigned to individual syllables regardless of their position in a word.

The analysis is not quite as simple though. Some ‘tone melodies’ i.e. sequences of tones across words, are very common while others are only possible by concatenating specific morphemes. For instance, in this chapter, we start by looking at tone melodies in the possessive prefix paradigm of Sumi. An autosegmental analysis of tone variations in the paradigm will then be presented and critiqued. This will be followed by a discussion of the various tone melodies permissible for noun and verbs. Finally, constraints on the distribution of H tone will be presented, highlighting its status as the marked tone vis-à-vis the L and M tones. There will be some discussion about the relationship between tone and rhythm in Sumi from both a synchronic and diachronic

perspective and how this might inform our understanding of tonogenesis and tone evolution in Sumi.

6.2 Autosegmental analysis of tone in possessive prefix paradigm

In this autosegmental analysis, we will initially assume that some prefixes in Sumi are 'underlyingly toneless' but are assigned surface tones through association rules. However, the validity and usefulness of the autosegmental analysis will then be critiqued.

In order to represent tone, an autosegmental framework, as per Goldsmith (1979) and others, is adopted. The basic tenet of an autosegmental framework is that tones and segmental features lie on separate 'tiers' and are linked to each other using association lines. Tones do not link directly to segments, but to an intervening prosodic entity, i.e. a tone-bearing unit (TBU), such as the syllable or mora. Autosegmental representations of tone have been used to explain certain tonal phenomena in other Tibeto-Burman languages, including Mongsen Ao (Coupe, 2007) and Chungli Ao (Bruhn, 2009). Hyman (2007) also provides an autosegmental analysis of tone in Kuki-Thaadow (alternatively, Thadou), another Tibeto-Burman language spoken in Northeast India and Myanmar.

One common motivation for adopting an autosegmental analysis is to account for tone stability, i.e. original tones remain even after segments have been shifted or are deleted. We find such 'tone stability' in a particular play on words in Sumi that inverts the order of syllables. For example, *lakhi* /la.k^{h}í/ 'one' becomes *khila* /k^{h}i.lá/, *küthü* /kɨ̀.t^{h}ɨ́/ 'three' becomes *thükü* /t^{h}ɨ̀.kɨ́/, etc. Nevertheless, it is important to consider the possibility that an autosegmental framework may not be the most suitable to describe the behaviour of tone on certain possessive prefixes.

6.2.1 Nominal prefixes in Sumi

Most Sumi nouns in citation form take the non-relational ('NRL') prefix *a-*.[56] For example:

(82)	*asa*	/à-ʃà/	[a˩ sa˩]	'(head) hair' ('NRL-head.hair')
(83)	*apuh*	/à-pù/	[a˩ pu˩]	'father' ('NRL-father')
(84)	*ana*	/à-nà/	[a˩ na˩]	'cooked rice' ('NRL-cooked.rice')

As we saw in §4.4, the prefix is obligatory with monosyllabic noun roots in citation form. One of the main functions of this prefix is to mark the lack of a possessor – hence the choice to gloss it as a 'non-relational' marker.[57] However, there are a number of

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[56] This is the term used by Coupe in his (2007) grammar of Mongsen Ao to describe a similar prefix. An equivalent term might be 'indefinite possessive prefix', used by Jacques (2012) to describe a prefix with a similar function in Japhug.

[57] Among the Tibeto-Burman languages of Nagaland, the Sumi prefix *a-* appears to be cognate with Khezha *e-*, and Mongsen Ao *a-*. Matisoff (2003) reconstructs this prefix as having the basic form **ʔa-*, with other variants including: **(ʔ)ə-* / **ʔə̃-* / **ʔaŋ-* / **ʔak-*. The semantic functions of the reflexes of this prefix include: marking kinship terms and the third person possessive. It can also function as a verb nominaliser (see §7.3.1 for examples), but its

nouns in Sumi that do not take this prefix. These are typically recent borrowings and coinages e.g. *kaku* /kàkú/ 'book', *khurshi* /kʰùɹʃì/ 'horse', *sünizü* /ʃɨnìʒɨ̀/ 'tea'.[58] Prefixation is also optional for some nouns in citation form, usually if the noun stem is three or more syllables in length e.g. *kighinoli* 'innards' (*akighinoli* is accepted, but is not as common).

When nouns are marked for possession, the prefix *a-* is dropped and replaced with a pronominal prefix.[59] For instance, we have:

(85)	*isa*	/ì-ʃà/	[iɻ saɻ]	'my (head) hair' ('1SG-head.hair')
(86)	*opuh*	/ò-pù/	[oɻ puɻ]	'your (sg) father' ('2SG-father')
(87)	*pana*	/pa-nà/	[paɬ naɻ]	'his rice' ('3SG-cooked.rice')

With nouns and proper nouns, the *a-* prefix is again dropped and the 'possessed' noun root compounded with the 'possessor', e.g. *Hekato sa* /hèkato=ʃà/ 'Hekato's hair', *Hekato na* /hèkato=nà/ 'Hekato's rice'. However, when the head (or possessed) noun denotes a senior family member, the head noun is prefixed with *pa-* 'his / her' and placed in apposition to the possessor noun e.g. *Hekato papuh* /hèkato pa-pù/ 'Hekato's father' ('Hekato 3SG-father'). This does not apply when the head noun denotes non-senior family members, e.g. *Hekato ppu* /hèkato=pú/ 'Hekato's son'.[60] Note that for the purposes of this work, the symbol for clitics '=' is used in the glosses to indicate that the head of a presumably unlexicalised noun-noun compound cannot stand as an independent word without an additional nominal prefix.

Table 22 gives the possessive prefix paradigm for monosyllabic and sesquisyllabic noun roots, illustrating all such tone alternations. It should be noted that the *a-* prefix of nouns in citation form typically copies the tone of the noun root when the root has L or M tone, but not when it has H tone. While some possessive prefixes follow this pattern, others appear to be consistently marked for the same tone, irrespective of the noun root.

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purpose may be to simply provide noun roots with "a bit more phonological bulk, providing them with the salience to serve as constituents in larger constructions" (Matisoff 2003: 107). Similarly, LaPolla *(p.c.)* notes that in many East and Southeast Asian languages, syllables that do not add meaning are ofen added in certain contexts in order to satisfy a particular sense of rhythm.

[58] This appears to be a recent coinage – in fact, most fluent speakers will use the word *cha* /ʧa/ (borrowed from either Hindi or Bengali) for 'tea'.

[59] When the noun does not have an *a-* prefix, possession is expressed using a periphrastic construction, e.g. *iwu / iw kaku* /i-vu kàkú/ 'my book' ('1SG-ATTR book').

[60] Although *Hekato ppu* is acceptable, the more common form would be *Hekatono ppu* /hèkato-nó-pú/, literally 'Hekato and others' son', with the associate plural *-no* /-nó/ – children are related to more than one parent by default. (Note that the associative plural marker in independent noun phrases is *-noqo*, which also contains the additive plural marker *-qo*, e.g. *Hekatonoqo* 'Hekato and others').

Table 22: Possessive prefix paradigm for monosyllabic and sesquisyllabic noun roots

	/a̲-/[61] 'NRL'	/i̲-/ '1SG'	/o̲-/ '2SG'	/pa-/ '3SG'	/lí-/ '3SG.FEM'	/ni-/ '1PL'	/no-/ '2PL'	/panó-/ '3PL'
'father' *apuh*	à.pù	ì.pù	ò.pù	pa.pù	lí.pù or lí pa.pù[62]	ni.pù	no.pù	pa.nó pa.pù[63]
'dipper' *apu*	a.pu	i.pu	o.pu	pa.pu	lí.pu	ni.pu	no.pu	pa.nó.pu
'son' *appu*	à.pú	ì.pú	ò.pú	pa.pú	lí.pú	ni.pú	no.pú	pa.nó.pú
'chest' *amla*	à.m̀.là	ì.m̀.là	ò.m̀.là	pa.m̀.là	lí.m̀.là	ni.m̀.là	no.m̀.là	pa.nó.m̀.là
'salt' *amiti*[64]	à.mì.ti	ì.mì.ti	ò.mì.ti	pa.mì.ti	lí.mì.ti	ni.mì.ti	no.mì.ti	pa.nó.mì.ti
'heart' *amlo*	à.m̀.ló	ì.m̀.ló	ò.m̀.ló	pa.m̀.ló	lí.m̀.ló	ni.m̀.ló	no.m̀.ló	pa.nó.m̀.ló
'forehead' *akishe*	a.ki.ʃe	i.ki.ʃe	o.ki.ʃe	pa.ki.ʃe	lí.ki.ʃe	ni.ki.ʃe	no.ki.ʃe	pa.nó.ki.ʃe
'leg' *apukhu*	a.pu.k^{h}ú	i.pu.k^{h}ú	o.pu.k^{h}ú	pa.pu.k^{h}ú	lí.pu.k^{h}ú	ni.pu.k^{h}ú	no.pu.k^{h}ú	pa.nó.pu.k^{h}ú

Looking at the data, we find that the pronominal prefixes can be grouped based on their pattern of tone variation:

Group 1: *a-* 'non-relational' ('NRL'); *i-* 'my'; *o-* 'your (sg)'
Group 2: *pa-* 'his / her'; *ni-* 'our'; *no-* 'your (pl)'
Group 3: *li-* 'her'; *pano-* 'their'

Starting from the bottom, the two items in Group 3 do not display any tonal variations. The H tone on both *li-* 'her' and *pano-* 'their' remains stable when combined all noun roots. It is therefore reasonable to posit that *li-* and *pano-* are both specified for H and MH tone, i.e. /lí-/ and /panó-/.[65] However, it should be noted that these two are also the least 'prefix-like' within the paradigm: the forms /lí pa-pù/ 'her father' and /pa.nó pa-pù/ 'their father' are comparable to forms like /hèkato pa-pù/ 'Hekato's

[61] The non-relational, 'my' and 'your (sg)' prefixes are underlined here to show that prior to affixation, it is unclear if they are specified for a particular tone.

[62] Literally, 'she her father'.

[63] Literally, 'they his father'.

[64] A short explanation on why /i/ is included in the phonological form of words like *amiti* 'salt' is given in §4.3.

[65] The prefix *pano-* /panó-/ appears to be a combination of /pa-/ 'his / her' and /-nó/, the associative plural marker.

father', which suggests that *li* (to some speakers at least) and *pano* are treated more like nouns in apposition, and not prefixes.[66]

The pronominal prefixes in Group 2 also do not display variations in tone.[67] It is therefore reasonable to posit that the prefixes *pa-* 'his / her'; *ni-* 'our'; and *no-* 'your (pl)' are all specified for M tone, i.e. /pa-/, /ni-/ and /no-/.

This leaves the Group 1 prefixes, which vary in tone between L and M depending on the noun root. An analysis of these prefixes will be presented in §6.2.3.

6.2.2 Possessive prefixes specified for M and H tone

In Sumi, all noun roots are specified for lexical tone. In general, monosyllabic noun roots are specified for one tone, which is pre-linked to the noun root. Similarly, the tones specified for possessive prefixes in Group 2 and 3 are pre-linked to their morphemes. (88) – (90) show sample analyses of prefixation on the three noun roots -*puh* /pù/ 'father'; -*pu* /pu/ 'dipper'; and -*ppu* /pú/ 'son', using *pa-* /pa-/ 'his / her' and *li-* /lí-/ 'her' to represent prefixes from Groups 2 and 3 respectively.

(88) Noun root: /-pù/ 'father' (L)

M	L	H	L
|	|	|	|
σ	σ	σ	σ
|	|	|	|
pa	pu	li	pu
/pa.pù/ 'his / her father'		/lí.pù/ 'her father'	

(89) Noun root: /-pu/ 'dipper' (M)

M	M	H	M
|	|	|	|
σ	σ	σ	σ
|	|	|	|
pa	pu	li	pu
/pa.pu/ 'his / her dipper'		/lí.pu/ 'her dipper'	

[66] They will still be treated as prefixes in this analysis, since some speakers accept the form /lí.pù/ 'her father. Note that the 3rd person plural pronoun in Sumi is *panongu* /pa.nó.ŋù/, and not simply /pa.nó/.

[67] One exception to this, the noun root -*fo* 'older sister', will be mentioned later.

(90) Noun root: /-pú/ ‘son’ (H)

M	H		H	H	
|	|		|	|	
σ	σ		σ	σ	
|	|		|	|	
pa	pu		li	pu	

/pa.pú/ ‘his / her son’ /lí.pú/ ‘her son’

Sesquisyllabic noun roots are specified for two tones, which are pre-linked to the noun root. Sample analyses are given in (91) – (95).

(91) Noun root: /-m̀.là/ ‘chest’ (LL)[68]

M	L	L		H	L	L	
|	|	|		|	|	|	
σ	σ	σ		σ	σ	σ	
|	|	|		|	|	|	
pa	m	la		li	m	la	

/pa.m̀.là/ ‘his / her chest’ /lí.m̀.là/ ‘her chest’

(92) Noun root: /-mì.ti/ ‘salt’ (LM)

M	L	M		H	L	M	
|	|	|		|	|	|	
σ	σ	σ		σ	σ	σ	
|	|	|		|	|	|	
pa	mi	ti		li	mi	ti	

/pa.mì.ti/ ‘his / her salt’ /lí.mì.ti/ ‘her salt’

[68] According to the Obligatory Contour Principle (OCP), only the main syllable should be pre-linked for L tone. The tone then spreads leftward onto the minor syllable. However, since it has been shown that the OCP can be violated (Yip 2002), and given that other sesquisyllabic roots are specified for two tones: LM, LH etc, it seems reasonable to assume two L tones here.

(93) Noun root: /-m̀.ló/ ‘heart’ (LH)

M	L	H	H	L	H
|	|	|	|	|	|
σ	σ	σ	σ	σ	σ
|	|	|	|	|	|
pa	m	lo	li	m	lo
/pa.m̀.ló/ ‘his / her heart’			/lí.m̀.ló/ ‘her heart’		

(94) Noun root: /-ki.ʃe/ ‘forehead’ (MM)

M	M	M	H	M	M
|	|	|	|	|	|
σ	σ	σ	σ	σ	σ
|	|	|	|	|	|
pa	ki	ʃe	li	ki	ʃe
/pa.ki.ʃe/ ‘his / her forehead’			/lí.ki.ʃe/ ‘her forehead’		

(95) Noun root: /-pu.k^{h}ú/ ‘leg’ (MH)

M	M	H	H	M	H
|	|	|	|	|	|
σ	σ	σ	σ	σ	σ
|	|	|	|	|	|
pa	pu	k^{h}u	li	pu	k^{h}u
/pa.pu.k^{h}ú/ ‘his / her leg’			/lí.pu.k^{h}ú / ‘her leg’		

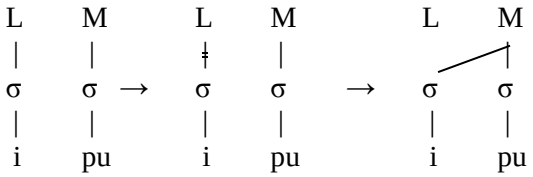
Up till this point, the analysis has remained relatively simple. For roots and prefixes specified for tone, we have a simple rule: Tones are linked to the TBU(s) in the morpheme they belong to.

6.2.3 ‘Toneless’ possessive prefixes

Turning our attention to the prefixes in Group 1, we notice that *a-* ‘non-relational’, *i-* ‘my’ and *o-* ‘your (sg)’ usually take the same tone as the leftmost tone specified on a noun root, e.g. *ipuh* /ì.pù/ ‘my father’ and *ipu* /i.pu/ ‘my dipper’. The only exception to this is when a monosyllabic noun root has H tone, as in *ippu* /ì.pú/ ‘son’, where we find a surface L tone on the prefix.

One possible analysis is that these Group 1 prefixes are all specified for L tone. However, in order to account for forms like *ipu* /i.pu/ ‘my dipper’, *ikishe* /i.ki.ʃe/ ‘my forehead’, *opukhu* /o.pu.k^{h}ú/ ‘your leg’ etc, the analysis requires that after the tones are linked to their respective TBUs, L tone is delinked from the possessive prefix and M tone on the noun root subsequently reassociated leftwards. This is demonstrated here in (96):

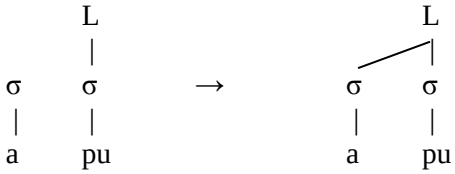
(96) Noun root: /-pu/ ‘dipper’ (M)



/i.pu/ ‘my dipper’

This is not an elegant solution, since it requires a rule that first delinks L tone and another to reassociate M tone. A simpler solution would be to assume that the possessive prefixes in Group 1 are phonologically toneless, and that the tone of the noun root spreads leftward, as in (97) and (98).

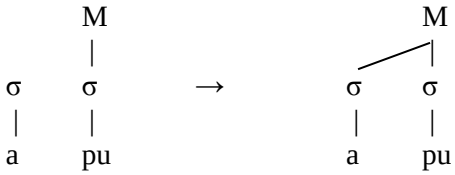
(97) Noun root: /-pù/ ‘father’ (L)



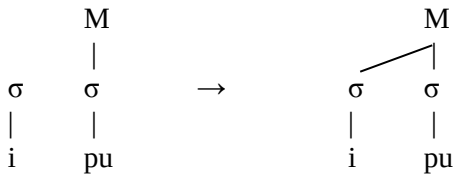
/à.pù/ ‘father’

/ì.pù/ ‘my father’

(98) Noun root: /-pu/ ‘dipper’ (M)



/a.pu/ ‘dipper’

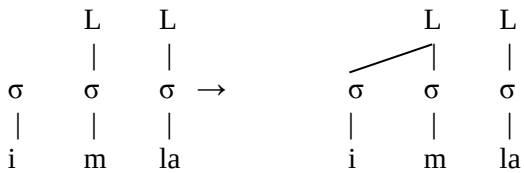


/i.pu/ ‘my dipper’

As with monosyllabic noun roots, when the possessive prefix is unspecified for tone, the leftmost tone of the sesquisyllabic noun root spreads leftward, as shown in (99) – (103).

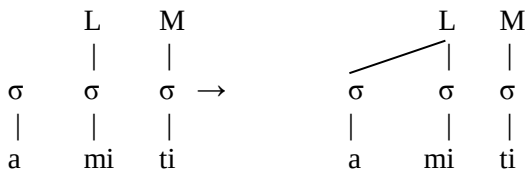
(99) Noun root: /-m̀.là/ ‘chest’ (LL)

/à.m̀.là/ ‘chest’

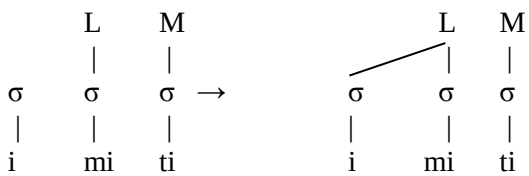


/ì.m̀.là/ ‘my chest’

(100) Noun root: /-mì.ti/ ‘salt’ (LM)

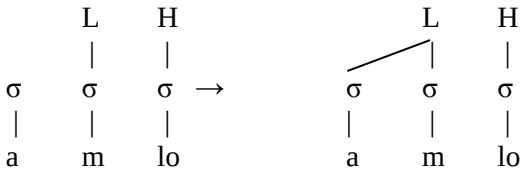


/à.mì.tì/ ‘salt’

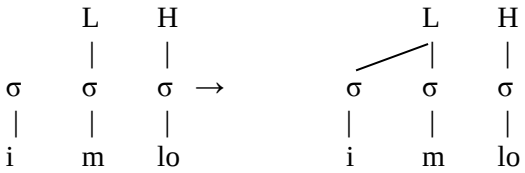


/ì.mì.ti/ ‘my salt’

(101) Noun root: /-m̀.ló/ ‘heart’ (LH)

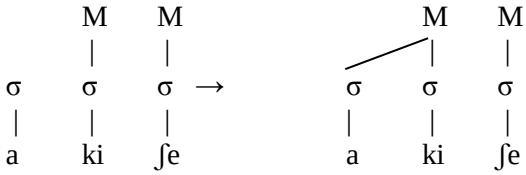


/à.m̀.ló/ ‘heart’

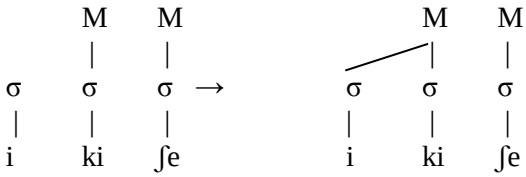


/ì.m̀.ló/ ‘my heart’

(102) Noun root: /-ki.ʃe/ ‘forehead’ (MM)

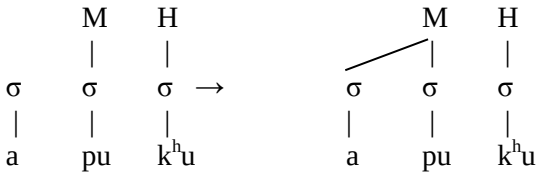


/a.ki.ʃe/ ‘forehead’

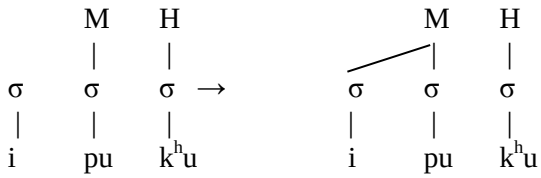


/i.ki.ʃe/ ‘my forehead’

(103) Noun root: /-pu.k^{h}ú/ ‘leg’ (MH)



/a.pu.k^{h}ú/ ‘leg’



/i.pu.k^{h}ú/ ‘my leg’

A quick summary of the tone association rules in this analysis gives:

(1) Tones are linked to the TBU in the morpheme they belong to.

(2) L and M tones spread leftwards onto TBUs that are unspecified for tone.

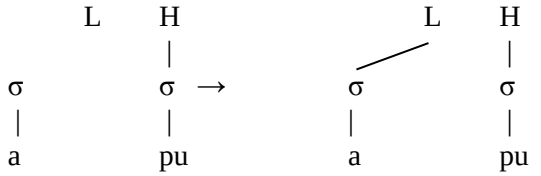
Although this analysis is simpler than one which assumes that the prefixes are specified for L tone, it still does not account for why prefixes in words like *appu* /à.pú/ ‘son’ and *ippu* /ì.pú/ ‘my son’ are realised with L tone. To deal with this, two analyses are plausible:

Option 1: Noun roots like *-ppu* ‘son’ are specified for two tones: LH /-`pú/ ; or

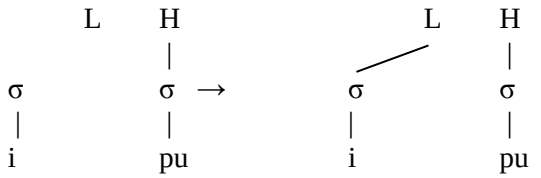
Option 2: Noun roots like *-ppu* ‘son’ are specified only for H tone /-pú/, with the tone on the ‘toneless’ prefixes assigned by other means.

If we take up the first assumption, i.e. the noun root is specified for LH, we arrive at the analysis presented here in (104):

(104) *Option 1* – Noun root: /-`pú/ ‘son’ (LH?)



/à.pú/ ‘son’



/ì.pú/ ‘my son’

While this analysis is plausible, one problem that arises here is that in order to account for forms with Group 2 and 3 prefixes like *pappu* /pa.pú/ ‘his / her son’ and *lippu* /lí.pú/ ‘her son’, we now end up with an extra (floating) L tone that does not get associated to a TBU:

M	L	H		H	L	H
|		|		|		|
σ		σ		σ		σ
|		|		|		|
pa		pu		li		pu

/pa.pú/ ‘his/her son’ /lí.pú/ ‘her son’

Furthermore, almost all monosyllabic noun roots analysed thus far are specified for a single tone, while only sesquisyllabic roots are specified for two tones. There are some monosyllabic noun roots that do not fit the patterns described above and are possibly specified for two tones, but these are extremely rare and are more than likely lexicalised forms. In contrast, nouns with a LH melody like *appu* /àpú/ ‘son’ are very common. There is therefore little reason to posit a ‘floating L’ tone for all these noun roots, which should in theory correspond to some historic segmental material that has been lost, unless we assume that this segmental material was lost in *all* such roots. Consequently, it does not seem reasonable to posit anything more than a single H tone for noun roots like *-ppu* /-pú/ ‘son’.

Therefore, the second and more plausible option assumes that noun roots like *-ppu* ‘son’ are specified only for H tone. Unlike L and M tone, H tone does not spread leftwards. In order to account for L tone on the phonologically toneless prefix, we then need a default rule that assigns L tone to all toneless TBUs, as shown in (105).[69]

(105) *Option 2* – Noun root: /-pú/ ‘son’ (H)

	H			L	H
	|			|	|
σ	σ	→		σ	σ
|	|			|	|
a	pu			a	pu

/à.pú/ ‘son’

	H			L	H
	|			|	|
σ	σ	→		σ	σ
|	|			|	|
i	pu			i	pu

/ì.pú/ ‘son’

[69] Note that polarity (see Yip, 2002:159) is rejected here on the grounds that a toneless TBU preceding a TBU carrying L tone does not receive H tone, e.g. we have /à.pù/ ‘father’ and not */á.pù/. An analysis that invokes tonal polarity would have to explain why polarity only affects roots with H tone and not L tone.

'Default' rules like this one are not uncommon in analyses of tone in African languages. For example, Pulleyblank (1986) argues for a default rule assigning L tone in Tiv, which has two surface tones, and a default rule assigning M tone in Yoruba, which has three surface tones. The constraint against the leftward spread of H tone is consistent with other observations about the marked nature of H tone in Sumi, which will be discussed in the next section.

Therefore, a summary of the amended tone rules is as follows:

(1) Tones are linked to the TBU in the morpheme they belong to.
(2) L and M tones spread leftwards onto TBUs that are unspecified for tone.
(3) L tone is assigned to any remaining TBUs that are unspecified for tone.

Within an autosegmental framework, this is the most elegant solution to account for all the forms in the possessive prefix paradigm presented earlier in Table 22.

6.2.4 Critique of autosegmental analysis

An underlying assumption of this analysis is that since possessive prefixes are inflectional, such tone assignment should be a synchronic process. The autosegmental analysis therefore attempts to describe the assignment of tone to these prefixes as a synchronic process. In fact, there is evidence which suggests that *a-* prefixation is not or is no longer a productive process in Sumi: new borrowed nouns such as *kaku* /kàkú/ 'book' are not prefixed with *a-*, unless the borrowed word already begins with *a-*, e.g. *alu* /àlú/ 'potato' (probably from Assamese আলু *alu*[70] or Hindi आलू *ālū*[71]). Rather, it appears that the majority of nouns in Sumi are synchronically lexically specified for the prefix *a-*, which seems to have been 'added' at some point in the language's history. For instance, a few examples like *azü* /à-ʒɨ̀/ 'sleep (n.)' (cf. *zü* /ʒɨ̀/ 'to sleep') and *aba* /à.bà/ 'excrement' (cf. *ba* /ba/ 'to defecate') suggest that it may have once been a verb nominaliser, but this process is no longer productive (see §7.3.1 for more examples).

Some possessive prefixes also appear to be more recent than others. For instance, the prefixes specified for tone (either M or H) look like later developments in the language. The 3rd person feminine prefix is clearly the most recent: as noted earlier in this section, it shares the same phonological form as the independent 3rd person feminine pronoun *li* /lí/; and some speakers still do not fully accept it as a prefix, as reflected by the form *li papuh* 'her father' (lit. 'she his/her-father'). The current 3rd person prefix *pa-* /pa-/ also looks like a recent development – although it is probably not as recent as *li-* – since it shares the same form and tone as the independent 3rd person singular pronoun *pa* /pa/.

On the other hand, the 'toneless' prefixes *a-*, *i-* and *o-* are likely to be the oldest in the paradigm: the 1st and 2nd person prefixes *i-* and *o-* look more like reduced forms of the independent 1st and 2nd person singular pronouns, which are *ni* /nì/ and *no* /nò/ respectively. The prefix *a-* may quite possible have been an older 3rd person possessive prefix in Sumi, which was subsequently reanalysed as a non-relational nominal prefix. Matisoff (2003: 105-106) gives examples of cognate prefixes that still mark 3rd person

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[70] The term can refer to 'tubers' in general, not just 'potatoes'.
[71] The macron used in this transliteration marks a long vowel.

possession in some Chin and Himalayish languages. In Karbi, genitive constructions place a 3rd person posssessive prefix *a-* on the head noun, but speakers have begun to analyse the prefix as part of the noun (Konnerth, *p.c.*).

If we accept the possibility that these 'toneless' prefixes were earlier developments in the language, with the prefixes specified for tone only appearing later, the autosegmental analysis presented above becomes problematic. Even if one were to argue that the autosegmental rules which 'pre-link' tones to certain prefixes or assign a 'default L tone' to others can and do reflect historical processes of tone assignment in Sumi, the analysis as a whole cannot effectively capture the various historical stages of prefixation and tone assignment in Sumi. There would be further concerns that the abstract nature of an autosegmental analysis may obscure certain important interactions between tone and segments, as well as between tone and rhythm, both of which have important consequences for tonogenesis and tone evolution. Indeed, a level of caution must be taken when producing such autosegmental analyses for phonological processes that may not in fact be synchronic.

From a synchronic point of view, it would therefore be more reasonable to say that there is no rule that causes L or M tone to spread from the noun root to the *a-* prefix, and that nouns are simply lexically specified for a tone pattern or melody across the entire *a-* prefixed noun.[72] Assuming that words are lexically specified for a number of tone melodies would also help to account for a handful of monosyllabic noun roots in Sumi that do not fit the patterns described above, and which were thus omitted from the paradigm due to their rarity. These nouns include: *agi* /a.gí/ 'face' with a MH tone pattern in citation form; and *afo* /á.fò/ 'older sister' with HL. Their possessed forms display identical tone patterns to their citation forms: *igi* /i.gí/ 'my face' and *pagi* /pa.gí/ 'his / her face' (MH); *ifo* /í.fò/ 'my older sister' and *pafo* /pá.fò/ 'his / her older sister' (HL) – in the case of the latter, the effect of the word melody is so strong that M tone on *pa-* is replaced by H. In these examples at least, it does not make sense to look at the tone on the individual syllables, but rather at the tone melody across the entire word. The next section will therefore examine the different possible tone melodies found with verbs and nouns in Sumi.

6.3 Tone melodies

The 'unrestricted' distribution of tones at the word level (in morphologically derived words) described at the start of the chapter obscures any potential constraints on tone permutations in morphologically underived words. A closer examination of Sumi verb and noun roots in this section will reveal that a certain number of 'tone melodies' i.e. sequences of tones across words, are more common than others, and in fact, not all possible sequences are tolerated on root morphemes. The use of the term 'tone melody' here follows its use in work on other tone languages, including Skou (Donohue, 2003) and East Kewa (Ross, 2010) – in these languages, melodies are said to be assigned at the word level. The most common melodies in Sumi typically place the tone with the higher or highest pitch at the right-edge of the morpheme – these will be referred to as

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[72] One might still argue that tones on the 1st and 2nd singular possessive prefixes cannot all be lexicalised, but it is entirely possible that speakers are able to produce them by analogy with the lexicalised *a-* prefixed forms.

'rising melodies', as opposed to melodies that have the tone with the highest pitch placed at the left-edge of the morpheme – these will be referred to as a 'falling melodies'.

6.3.1 Monosyllabic and sesquisyllabic verb and noun roots

Verb roots in Sumi are minimally monosyllabic. Monosyllabic verbs usually carry L or M tone in citation form:[73]

(106)	L	*lho*	/lʰò/	[lʰo˩]	'to be tired'
(107)	M	*lho*	/lʰo/	[lʰo˧]	'to cook'

There is only one example of a monosyllabic verb root that was found to have H tone: *sü* /ʃɨ̀/ [sɨ˥] 'to put'. In fact, in a sample of 141 monosyllabic verb roots, 69 carried L tone, 71 carried M but only *sü* carried H tone.

Sesquisyllabic verbs are associated with the following tone melodies:

(108)	LL	*mlah*	/m̀.là/	[m̩˩ la˩]	'to work'
(109)	LM	*mla*	/m̀.la/	[m̩˩ la˧]	'to foam'
(110)	LH	*mlo*	/m̀.ló/	[m̩˩ lo˥]	'to mourn'
(111)	MM	*piti*	/pi.ti/	[pi˧ ti˧]	'to burn'
(112)	MH	*piti*	/pi.tí/	[pi˧ ti˥]	'to bear animal offspring'

Unlike monosyllabic verbs, sesquisyllabic verbs can take H tone on the main syllable, but only L or M tone on the minor syllable, as mentioned in §4.3. Consequently, no sesquisyllabic verb can have the melody HL, HM or HH. Since sesquisyllabic verbs also never display the melody ML, this means that sesquisyllabic verbs never permit a falling melody: the highest tone is always found on the main syllable on the right-edge of the morpheme. This main syllable is also the primary location for tonal contrasts, as mentioned in §5.3.

In contrast to verbs, Sumi nouns are minimally disyllabic (as noted in §4.4), and monosyllabic and sesquisyllabic noun roots must take the non-relational prefix *a-* in citation form. In general, monosyllabic noun roots with the prefix *a-* may have any one of the three tone melodies:[74]

(113)	LL	*apuh*	/à-pù/	[a˩ pu˩]	'father' ('NRL-father')
(114)	MM	*apu*	/a-pu/	[a˧ pu˧]	'dipper, water scoop' ('NRL-dipper')
(115)	LH	*appu*	/à-pú/	[a˩ pu˥]	'son' ('NRL-son')

[73] Unsuffixed verbs in a clause can also be interpreted as referring to a past event. This is similar to Coupe's (2007) finding for verbs in Mongsen Ao.

[74] Given that the majority of noun roots are lexically specified with the *a-* prefix, it makes more sense to talk about a particular melody across a prefixed root than on a root in isolation.

In addition to these three tone melodies, there is a rarer melody MH which has been found on only two nouns: *agi* /agí/ 'face' and *anga* /aŋá/ 'baby'. There is also a single example of the melody HL: *afo* /áfò/ 'older sister'.

Sesquisyllabic noun roots with the prefix *a-* have the following melodies:

(116)	LLL	*amlo*	/à-m̀.lò/	[am˩ lo˩]	'small change' (lit. 'NRL-shreds')
(117)	LLM	*amiti*	/à-mì.ti/	[am˩ ti˦] ~ [a˩ mi˩ ti˦]	'salt' ('NRL-salt')
(118)	LLH	*amitti*	/à-mì.tí/	[am˩ ti˥] ~ [a˩ mi˩ ti˥]	'saliva' ('NRL-saliva')
(119)	MMM	*akishe*	/a-ki.ʃe/	[ak˦ ʃe˦] ~ [a˦ ki˦ ʃe˦]	'forehead' ('NRL-forehead')
(120)	MMH	*apukhu*	/a-pu.k^{h}ú/	[ap˦ k^{h}u˥] ~ [a˦ pu˦ k^{h}u˥]	'leg' ('NRL-leg')

In all cases, the *a-* prefix copies the first tone of the sesquisyllabic noun root. Unlike in sesquisyllabic verbs, the minor syllable (and the *a-* prefix by extension), can be the location for a tonal contrast, as exemplified by (121) and (122). However, there are very few minimal sets where the tonal contrast occurs on a non-final syllable.

(121)	LLH	*akuhu*	/à-kù.hú/	[ak˩ hu˥] ~ [a˩ ku˩ hu˥]	'plant root' ('NRL-plant.root')
(122)	MMH	*akuhu*	/a-ku.hú/	[ak˦ hu˥] ~ [a˦ ku˦ hu˥]	'bed bug' ('NRL-bed.bug')

One key observation here is that, like sesquisyllabic verbs, no falling melodies are permitted on sesquisyllabic noun roots in Sumi, and there is a very strong tendency towards either level or rising melodies, with the tone contrast mainly on the final syllable.

6.3.2 Disyllabic verb and noun stems

The sesquisyllabic verb and noun roots presented above are synchronically monomorphemic, but are most likely historically derived from semantically transparent bilabial nasal and velar stop prefixes, as proposed by Matisoff (2003:117-126, 134-138) for various Tibeto-Burman languages.[75] These sesquisyllabic roots in Sumi contrast with disyllabic bimorphemic verb and noun stems which: (a) do not necessarily display vowel harmony between the first syllable and the second; and (b) are much more

[75] While most minor syllables that were originally prefixes are now morphologically opaque, there is still at least one velar stop prefix that is morphologically transparent: the deverbal prefix *kV-* 'NZP', found in nominals like *akishe* /à-kì-ʃé/ [ak˩ ʃe˥] 'praise (n.)' ('NRL-NZP-praise'), derived from the verb root *she* /ʃe/ [ʃe˦] 'to praise' with the addition of the deverbal prefix and the *a-* prefix 'NRL'. This process of deverbalisation will be dealt with in greater detail in §7.3.2.

morphologically transparent.[76] Many of these disyllabic bimorphemic stems appear to be head-final compounds, although there are some morphologically opaque disyllabic noun stems that could be: derived from historic compounds that have lost their transparency over time (i.e. one or more of their elements no longer occur as independent morphemes) as a result of phonological and semantic shift; derived from some historical affixation process that is no longer productive; or borrowings from other languages. Examining the historical origins of such noun stems would go well beyond the scope of this work, and they will be mentioned here only to exemplify the relatively 'free' distribution of tones on them.

Disyllabic verb and noun stems have a less restricted set of tone permutations, when compared to monosyllabic and sesquisyllabic roots. Disyllabic verb stems display at least 6 different tone melodies, including the falling melody ML. Examples are presented in (123) – (128). Many of these represent compounds of monosyllabic verb roots, with no change in tone from that on the monosyllabic roots.

(123)	LL	*saphe*	/ʃà-pʰè/	[saꜜ pʰeꜜ]	'to lead' (contains the directional *-phe*)[77]
(124)	LM	*heqhi*	/hè-qʰi/	[heꜜ qʰiꜛ]	'to kill' ('hit-kill')
(125)	LH	*chhesü*	/ʧʰè-ʃɨ̌/	[ʧʰeꜜ sɨ̌˥]	'to slide (something) in' ('slide.in-put')
(126)	ML	*botha*	/bo-tʰà/	[boꜛ tʰàꜜ]	'to enclose' ('box-cut')
(127)	MM	*chheju*	/ʧʰe-ʒu/	[ʧʰeꜛ ʒuꜛ]	'to re-examine' (contains *ju* 'to see')
(128)	MH	*chosü*	/ʧo-ʃɨ̌/	[ʧoꜛ sɨ̌˥]	'to put in' (contains *sü* 'to put')

In theory, disyllabic verb stems could allow all 9 (3x3) permutations of L, M and H tone on each syllable. However, stem-initial H has not been found thus far, although there may be disyllabic verb stems containing *sü* /ʃɨ̌/ 'to put' in stem-initial position that are yet to be encountered by the author.[78]

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[76] One test to show a verb is a bimorphemic compound is to see how its deverbal nominal is formed. In monomorphemic sesquisyllabic verbs like *püghü* /pɨ̀.ɣɨ́/ [pɨ̀ɣɨ́] 'to plan', the deverbal prefix *kV-* is added before the entire sesquisyllabic verb root to obtain the form *aküpüghü* /à-kɨ̀-pɨ̀.ɣɨ́/ [àkɨ̀pɨ̀ɣɨ́] '(act of) planning; programme'. If a verb is bimorphemic, the deverbal prefix *kV-* will come right before the second morpheme, as in *heqhi* /hèqʰi/ /hè-qʰi/ 'kill' (lit. 'hit-kill') and *hekiqhi* /hè-kì-qʰi/ [hèkìqʰi] 'killing; murder' (n.) (**akiheqhi* is not permitted). Verb nominalisation will be discussed in more detail in §7.3.2.

[77] Lozhevi Sema (1993) gives verbs of transitive motion (in which the patient is the one that moves) containing *-phe*, e.g. *haphe* 'evict, exile, banish' (cf. *ha* 'to chase'), *inaphe* 'press out' and *xaphe* 'retrieve, rescue'. There are also verbs containing *sa-* which suggest it has a comitative function, e.g. *sache* 'go along, take along' (cf. *che* 'to walk'), *salu* 'take along, bring along' (cf. *lu* 'to take'), and *sasü* 'come or go along with'.

[78] Verbs longer than two syllables have also been found, but there are too few examples to observe any general patterns. A few are listed here:

LLL	*sapüsa* /ʃàpɨ̀ʃà/	[sapꜜ saꜜ] ~ [saꜜ pɨ̀ꜜ saꜜ]	'to mistreat'	(full syllable + sesquisyllable)
LLM	*kimiye* /kìmìje/	[kimꜜ jeꜛ] ~ [kiꜜ miꜜ jeꜛ]	'to love'	(two minor syllables? + one full syllable)
LML	*ithulu* /ìtʰulù/	[iꜜ tʰuꜛ luꜜ]	'to see'	(three full syllables)

Similar to disyllabic verb stems, *a-* prefixed disyllabic noun stems permit a larger number of melodies than sesquisyllabic noun roots, including the falling melody MML. Some examples of permitted melodies are given in (129) – (136). Morpheme glosses are not provided for all examples, as it is unclear whether some of these are monomorphemic disyllabic roots or bimorphemic compounds.[79]

(129)	LLL	*akimi*	/à-kì-mì/	[a˩ ki˩ mi˩]	‘husband’ (‘NRL-house-person’)[80]
(130)	LLM	*awukhu*	/à-vù-k^{h}u/	[a˩ wu˩ k^{h}u˦] ~ [aw˩ k^{h}u˦]	‘egg’ (‘NRL-chicken-egg’)
(131)	LHL	*axone*	/à-xónè/	[a˩ xo˥ ne˩]	‘fermented soya beans’
(132)	LHM	*anathi*	/à-ná-t^{h}i/	[a˩ na˥ t^{h}i˦]	‘banana’ (probably ‘NRL-cooked.rice-fruit’)
(133)	MML	*aloshi*	/a-lo-ʃì/	[a˦ lo˦ ʃi˩]	‘liver’ (probably ‘NRL-good-meat’)
(134)	MMM	*akhosa*	/a-k^{h}o.ʃa/	[a˦ k^{h}o˦ sa˦]	‘cat’
(135)	MMH	*alhache*	/a-l^{ɦ}a.ʧé/	[a˦ l^{ɦ}a˦ ʧe˥]	‘ant’
(136)	MHH	*amimi*	/a-mí-mí/	[a˦ mi˥ mi˥]	‘butterfly’ (probably ‘NRL-house.fly-REDUP’)

Some examples of disyllabic noun stems with H tone found in word-medial position appear to be bimorphemic compounds or perhaps historic compounds that have since lost their morphological transparency. For instance, *anathi* /à-ná-t^{h}i/ ‘banana’ in (132), which has the melody LHM, appears to be a compound with the meaning of ‘NRL-cooked.rice-fruit’ (cf. *ana* /à-nà/ ‘cooked rice’). Note the change in tone on *-na* from L to H tone – such changes do not generally accompany nominal compounding in Sumi, but they can sometimes occur, cf. *azü* /à-ʒɨ́/ ‘water’ (‘NRL-water’) and *akichhizü* /à-kìʧ^{h}i-ʒɨ́/ ‘milk’ (‘NRL-breast-water’) – more examples of these are given in §7.2.

The noun *axone* /à-xónè/ ‘fermented soya beans’ in (131), which has the melody LHL, does not seem to be morphologically analysable, but it may be a historic compound that contains the noun root **xo*, possibly cognate with Khezha /èrhɔ̀/ ‘soya bean’ and Lotha /ōr^{h}ò/ ‘local beans’.[81] Finally, *amimi* ‘butterfly’ /a-mí-mí/ in (136), is

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[79] There are also trisyllabic nouns that do not take the prefix *a-*, e.g. *sünizü* /ʃɨ̈nìʒɨ́/ ‘tea’ (LLL), *ghajuku* /ɣàʒukù/ ‘yam leaf’ (LML), /mùɹáʃɨ́/ ‘snow’ (LHH). However, these nouns are much rarer and some appear to be recent borrowings or coinages – for instance, the /ɹ/ in /mùɹáʃɨ́/ suggests it is a recent borrowing, since historically, **r* became /ɣ/ in Sumi (see §8.2.1 for more on this sound change).

[80] This gloss is supported by Hutton’s (1921/1968:138) observation that there was a flip in the terms for the words for husband and wife in Angami. He compares Sumi *akimi* ‘husband’, translated literally by Hutton as ‘house man’ or ‘house men’, and *anipfu* ‘wife’ (*anipu* in author’s own data). In Angami, *’nupfo* is ‘husband’, while *’kima* is ‘wife’, which also means ‘house person’. Evidence for the switch in Angami comes from the observation that *-pfo* is a feminine marker in Angami and Hutton suggests that *’nupfo* might be analysed as ‘child-bearer’ (cf. Sumi *anu* /a-nu/ ‘NRL-child’).

[81] See §8.2.1 for more on the correspondence between /x/ in Sumi and either a voiceless coronal rhotic /r^{h}/ in other Tibeto-Burman languages of Nagaland.

the only example of MHH melody, and one of a very few words containing a sequence of HH. It seems to be the result of a reduplicative process, cf. *ami* /àmí/ 'house fly'.[82] Note that HH sequences can arise following reduplication in Sumi since reduplicated morphemes copy the tone on the original morpheme, e.g. *lakhikhi* /lakʰí-kʰí/ 'one by one' (cf. *lakhi* /lakʰí/ 'one'). More examples of partial reduplication are given in §7.5.1.

In theory, if we count the prefix *a-* in these nouns, we should expect to find up to 27 (3x3x3) permutations of L, M and H tones across three syllables. In reality, we very rarely find instances of word-initial H tone, except in compounds containing the only lexical item with a word-initial H tone: *afo* /á.fò/ 'older sister', e.g. *afo khu* /á.fò.kʰu/ 'older sister's plate'.

6.3.3 Tone melody summary

Looking at this survey of tone melodies, we notice a trend towards **level and rising** melodies on words in Sumi, especially in morphologically underived words. This is evident from the types of permutations permitted on monosyllabic and sesquisyllabic roots. Although disyllabic verb stems and prefixed disyllabic noun stems allow a wider number of tone permutations (including the falling melody ML for verbs and MML for nouns), certain tone permutations occur more frequently than others, while examples of hypothetically possible permutations are still yet to be found.[83]

This trend can be explained by taking into account two main observations. Firstly, tonal contrasts in minimal sets are typically found on the final syllable of each word. Secondly, there appear to be more syntagmatic constraints on H tone than on L or M tone. For instance, with only a small handful of exceptions, H tone does not occur in word-initial position. HH tone sequences are also possible, but they occur very rarely and usually through morphological concatenation. It should also be noted that only one monosyllabic verb root was found to be specified for H tone: *sü* /ʃɨ̃/ 'to put'.

These syntagmatic constraints on H tone deserve special mention and will be explored in the following section, along with other properties of H tone that set it as the 'marked' tone in Sumi.

6.4 Marked nature of H tone

This section presents a summary of the properties that set H tone apart from L and M in Sumi. It expands on observations made in the previous section about the syntagmatic constraints placed on H tone and also presents data that highlight other distinctive properties of H tone in Sumi.

1) H tones rarely occur word-initially.

As noted in §6.3, H tone is generally not found in word-initial position for nouns and verbs, unlike L and M tone. However, there are a few interesting exceptions,

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[82] It is unclear at present how the L tone on the *a-* prefix in *ami* 'house fly' has become M in *amimi* 'butterfly'.

[83] Similar findings for Ao have prompted Coupe's (2003) suggestion that Ao may have both a 'syllable tone' and 'word tone' system, where individual syllables may take any of the 3 tones, but have a more constrained distribution at the word level.

including the noun *afo* /áfò/ 'older sister', as well as its possessed forms: *ifo* /ífò/ 'my older sister'; *ofo* /ófò/ 'your (sg) older sister'; *pafo* /páfò/ 'his / her older sister' etc.[84] Also, since verb inflections in Sumi are generally done through suffixation, the fact that the verb *sü* /ʃɨ̃/ 'to put' is the only monosyllabic verb root specified for H tone means that it and its inflected forms are the only examples of word-initial H tone in verbs.

In addition to these two lexical items, all nouns marked with the 3rd person feminine prefix *li-* /lí/ 'her' have word-initial H tone, along with the 3rd person feminine pronoun *li* /lí/ 'she', which is the only monosyllabic pronoun specified for H tone. However, the use of the feminine pronoun and pronominal prefixes is highly marked in itself. In daily speech and in written works such as the Bible, *li-* almost never occurs – most speakers would use the 3rd person pronoun *pa* 'he / she', which is unmarked for gender. As mentioned in §6.2.4, the 3rd person feminine pronoun is also a fairly recent innovation in Sumi[85] and some speakers still treat *li* more as an independent morpheme and not a possessive prefix, as reflected by forms like *li papuh* 'her father' (lit. 'she her father').

One class of words where word-initial H tone does occur frequently are interrogative pronouns, e.g. *khijehi* /kʰíʒehi/ 'how much'; *khuu* /kʰúù/ 'who' (realised with falling pitch). Arguably, interrogative utterances, and by extension interrogative pronouns, are themselves more marked than declarative ones.

2) Sequences of HH tones are extremely rare.

Although possible, sequences of HH tones are very rare in Sumi, especially when compared to LL and MM sequences. Such sequences seem to be the result of morphological concatenation. Examples include *amimi* /a-mí-mí/ 'butterfly', which appears to be the result of reduplication, as well as distributive numerals like *lakhikhi* /lakʰí-kʰí/ 'one by one'. Sequences of HH are also possible by adding the pronominal prefix /lí-/ 'her' to noun roots with H tone, e.g. *lippu* /lí-pú/ 'her son' ('3SG.F-son'). Again, this is likely a recent development in Sumi – in normal conversation most speakers typically use the 3rd person pronoun *pa-* 'his / her'. Finally, HH has also been found in the noun *murasü* /mùɹáʃɨ̃/ 'snow', although this is likely to be a recent borrowing into Sumi, given that this noun does not take the non-relational prefix *a-* and also contains the phoneme /ɹ/ (see §8.2.1 for more on the development of /ɣ/ from **r* in Sumi).

3) Only L and M tones spread to 'toneless' possessive prefixes.

In the previous section, it was observed that the tone on the *a-* prefix takes the same tone of a monosyllabic noun root when the root has L or M tone, but not H tone. The

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[84] This is very likely a borrowing from Sangtam. Compare:

Gloss	Sumi	Kohima Angami (Kuolie, 2006)	Khezha (Kapfo, 2007)	Mongsen Ao (Coupe, 2007)	Sangtam (Bouchery & Sangtam, 2012)
'older sister'	áfò	âyô	jükeripi	ati	afü (tones not given)

[85] Coupe (*p.c.*) suggests that a third person singular feminine pronoun is a recent development in many Tibeto-Burman languages of Nagaland under the influence of English, which has third person singular pronouns that specify male and female gender. The feminine pronoun in Sumi appears to be derived from a suffix *-li* found in women's names like *Inotoli* /ìnotoli/ and *Nikhüli* /nìkʰɨ̀li/ where interestingly, the suffix itself does not carry H tone.

autosegmental analysis of tone argued that this is because H tones do not spread leftwards onto toneless prefixes. Although the analysis is problematic from a synchronic perspective, it is possible that this rule reflects a historical process whereby nominal prefixes copied the tone of the noun root, except when the tone on the root was H.

4) Syllables bearing H tone are not usually subject to vowel deletion.

We saw in §4.3 that minor syllables in sesquisyllabic structures are often subject to vowel deletion and resyllabification. However, H tones are never found on such minor syllables (see §5.3). Furthermore, in trisyllabic words, a high vowel in second syllable position typically undergoes syncope and the word is resyllabified (see §4.5), but high vowels bearing H tone have not been found to undergo syncope, e.g. *totimi* /to.tí.mì/ [toꜗ tiꜘ mi꜖] 'woman', never *[totꜗ mi꜖].

However, word-final vowels bearing H tone that follow a nasal consonant are still subject to apocope by some speakers of the Satakha dialect, e.g. *amu* /à.mú/ [amꜗ] 'older brother' (see §3.6.2). In such cases though, H tone is still realised on the preceding sonorant.

5) H tone can sometimes 'shift' onto an adjacent syllable.

Although verb nominalisation and agent noun formation will be dealt with in more detail in the next chapter, it should be noted here that there are two examples where H tone appears to 'shift' from a nominal stem to the right-edge of a word when the morpheme /-mì/ 'person' is added:

(137)	*akithi* /à.kì.t^{h}í/	'death' (LLH)	+	*-mi* /-mì/	'person' (L)	→	*(a)kithimi* /à.kì.t^{h}ì.mí/ or /kì.t^{h}ì.mí/	'dead person; deceased' (LLLH / LLH)
(138)	*aküka* /à.kɨ́.ká/	'power' (LLH)	+	*-mi* /-mì/	'person' (L)	→	(*a)kükami* /à.kɨ́.kà.mí/ or /kɨ́.kà.mí/	'chief; ruler' (LLLH / LLH)

Such H tone shift does not occur for any other H-final nominal stems – for instance, we find /a.ki.pí.mì/ 'speaker', from /a.ki.pí/ 'speech'. The two words presented here are almost certainly lexicalised older derivations, and may represent vestiges of an older phonological process that shifted H tone to the right-edge of the word.

6) H tones in some borrowed words correspond to accent in the donor language(s).

A final observation about H tone concerns two loanwords borrowed into Sumi: *alu* /àlú/ 'potato' (probably from Assamese আলু *alu*[86] or Hindi आलू *ālū*[87]) and *kaku* /kàkú/ 'book' from Assamese কাকত *kakôt* /kakɔt/ 'paper'.[88] In both words, the location of H

[86] The term can refer to tubers in general, not just potatoes.

[87] The macron used in this transliteration marks a long vowel.

[88] Coupe (2007) proposes Hindi *kāgaz* as the source of the Mongsen Ao word for 'book' *kákɔ̀t*, although the final syllable of *kaku* in Sumi points to Assamese কাকত *kakôt* 'paper' as a more likely source.

tone in the borrowed words corresponds to an accent on the last syllable of these words in Assamese.[89] Note that even if *alu* was borrowed directly from Hindi, the last heavy syllable – containing a long vowel or a short vowel with a consonant coda – is precisely where one would expect to find an accent (Hussain, 1997).

The evidence presented in this section points to H tone as being the 'marked' tone in Sumi. In most three-tone systems comprising L, M and H tone, the marked tone is typically one of the extremes: either L or H (Maddieson, 1978: 341). From a typological point of view, marked H tone in Sumi is therefore not unusual.

The distribution of H tone at the right edge of words may correspond to a historic word-final glottal stop which in some languages is thought to have developed into creaky voice and eventually high tone (see Kingston, 2011).

Alternatively, looking at the last two points presented above, one may be tempted to treat H tone as a non-stress accent or 'pitch accent', for want of a better term. However, pitch accent with lexical tone is an unlikely combination – Remijsen (2002b) discounts the possibility that a language would have both lexical tone and lexical pitch accent, since F_0 is the main acoustic cue for both. More importantly, it is not possible to treat H tone as a kind of word-level prominence marker since it does not always display culminativity – sequences of HH tone, although rare, are still allowed at the word level.[90] Therefore, a simpler analysis would treat H tone in Sumi as a tone that is simply more constrained in terms of the location where it can contrast with the other two lexical tones.

Nevertheless, it does appear that sequences of HH are relatively new developments in the language and there may have been an older preference in Sumi for a single H peak in a word. In general, accounting for the marked distribution of H tone in Sumi will require more comparative data from related languages – in §8.4.1, a first attempt at comparing tones across some Tibeto-Burman languages of Nagaland will be presented.

6.5 Summary of tone assignment and tone melodies

The observations made in this section regarding: (a) the assignment of tone to 'toneless' prefixes; (b) the prevalence of certain tone melodies on morphemes; and (c) the constrained distribution of H tone at the word level, are not trivial remarks. For instance, by comparing the constraints on possible tone melodies at the morpheme level with the relatively free combinations at the word level, we might hypothesise that Sumi developed tones when words were mainly monosyllabic or sesquisyllabic, as has been proposed for languages like Vietnamese (see Haudricourt, 1954; Thurgood, 2002). If Sumi had been polysyllabic when tones developed, we might expect a 'word-tone' system with fewer tone melodies allowed on disyllabic nouns and verbs, similar to what

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[89] Thanks to Priyankoo Sharma at IIT North Guwahati for confirming this.

[90] Culminativity, or the limit of one accent per word, is a common criterion used to distinguish 'pitch accent' / 'lexical accent' from 'lexical tone', e.g. Beckman 1986: 21; Remijsen, 2002a: 40; Donohue, 2005: 40. However, Hyman (2006, 2009) rejects culminativity as a defining property of the 'pitch accent' languages and rejects the very notion of 'pitch accent language' as a coherent category. However, the claim made here by the author is that in a synchronic analysis of Sumi, H tone cannot be treated as an accent that marks a single syllable within a word, given that H tones can occur adjacent to one another.

we find in languages like Tibetan, which Mazaudon (1977) proposes was already polysyllabic when tonogenesis began.

Another area worth exploring here is the relationship between tone and rhythm in Sumi. It may be useful to consider Donegan and Stampe's (2004) proposal that different rhythm patterns in Munda languages and Mon-Khmer languages have resulted in completely opposite structural features for the two groups. In particular, an iambic or 'rising' rhythm at the word level is associated with: mainly monosyllabic or sesquisyllabic words; reduced vowels in non-final syllables; the development of tone or register; and a preference for prefixing strategies with little or no suffixing. In contrast, a trochaic or 'falling' rhythm at the word level is associated with: polysyllabic words; vowel harmony; and a preference for suffixing strategies.

Looking at Sumi, we find a predominantly iambic pattern, especially in sesquisyllabic noun roots and verbs. The iambic pattern is also reflected by the fact that most tonal contrasts are found on the right edge of words and morphemes. Furthermore, we see a tendency for the most marked tone in Sumi, H tone, to be located at the right edge of words / morphemes. Finally, additional acoustic evidence presented in §5.5.2 shows that word-final L and M tones have longer duration than word-initial ones.

What is interesting about Sumi is that there appears to be a shift from a rising / iambic rhythm pattern to a falling / trochaic one. We have segmental and syllabic evidence for this: the prevalence of vowel syncope and resyllabification that results in a stopped syllable in word-initial position, which is phonologically heavier than the open syllable in word-final position, *apuh khu* /à.pù.k^{h}u/ [apɻ k^{h}uɬ] 'father's plate'(see §4.5). In addition, vowel apocope has been noted for some speakers of the Satakha dialect (see §3.6.2). Recall also that the minor syllable in a sesquisyllable is typically not realised as a reduced schwa, but as a full vowel that displays harmony with the following vowel (see §4.3). The vowel of the minor syllable is also not phonologically toneless, but specified for a tone, albeit from a reduced tone inventory (L or M only). In some nominals, we even find some tonal contrasts being realised on this syllable, cf. *akuhu* /à.kù.hú/ [akɻ hu˥] ~ [aɻ kuɻ hu˥] 'plant root' and *akuhu* /a.ku.hú/ [akɬ hu˥] ~ [aɬ kuɬ hu˥] 'bed bug'.

Finally, this gradual shift in rhythm may be reflected by the tone assignment rules presented in §6.2. The spreading of L and M tones from roots to the 'toneless' prefixes *a-* 'non-relational', *i-* 'my' and *o-* 'your (sg)' may indicate a historic shift in rhythm: compare this with a more strongly iambic Tibeto-Burman language such as Burmese where the minor syllable is realised as a schwa with no phonlogical tone category assigned to it, e.g. *pə.lwè* 'flute' (Green, 2005).

Although no firm conclusions can be drawn about Sumi tonogenesis and tone development at this stage, it is hoped that the some of these observations highlight the need to consider the interactions between tone and rhythm, even if a language is unambiguously 'tonal', i.e. each syllable carries a tone which is realised by contrastive pitch. Often, little attention is paid to the relationship between rhythm and tone or to (stress / non-stress) accent in these languages unless the language is found to have both lexically contrastive stress and lexically contrastive tone, e.g. Ma'ya (Remijsen, 2002b), Curaçao Papiamentu (Remijsen & van Heuven, 2005). Understanding this relationship is vital to understanding tonogenesis and tone evolution, and will also help us move beyond the simple dichotomy of 'tone' vs. 'stress accent' languages, a dichotomy which continues to be challenged (see for instance, Hyman, 2006).

7 *Morphotonemics*

7.1 Introduction

This chapter continues to examine morphophonemic tone variation in Sumi by looking at the following processes: nominal compounding; verb nominalisation; and agent noun formation. Such tone variation will be referred to as 'tone sandhi' here, following Coupe's (2007) use of the term in his grammar of Mongsen Ao to describe similar morphotonological processes. Bear in mind that the term 'tone sandhi' has been used by different authors to refer to a variety of phenomena, including allotonic variation, as well as tone variation caused by intonation and morphological / syntactic processes (Chen 2000). For the purposes of this work, the term is used in reference to a change in tone (usually on a morpheme) when occurring next to another tone or morpheme. As such, 'tone sandhi' as it is used here can be considered to be either a phonological or morphophonological process.[91] Importantly, it involves the replacement of one phonological tone category with another, e.g. /à/ is replaced by /á/ and is not simply /à/ realised with high pitch.[92]

7.2 Nominal compounds

This section looks at the interaction between morpheme concatenation in nominal compounding and tone in Sumi. As mentioned in §6.2.1, nominal compounds and genitival constructions in Sumi are formed by the juxtaposition of two nominals. The modifier noun comes before the head noun, which loses its *a-* prefix. In many cases, the orthography usually represents them as single words, as in (139) and (140). Some compounds are written as one word, while others, especially genitival constructions, are generally written as two, as in (141) and (142).

(139)	*awu*	'chicken'	+	*ashi*	'meat'	→	*awushi*	'chicken (meat)'
(140)	*akha*	'fish'	+	*abo*	'box'	→	*akhabo*	'fish pond'
(141)	*apuh*	'father'	+	*akhu*	'plate'	→	*apuh khu*	'father's plate'
(142)	*Kiviho*	(name)	+	*apu*	'dipper'	→	*Kiviho pu*	'Kiviho's dipper'

The transparent nature of the morphology often makes it difficult to know if a compound is lexical or formed by productive means. Even for compounds that appear to be 'lexicalised', speakers are still able to analyse the constituent noun root

[91] Note that in Chinese linguistics, the term 变调 *biàndiào* 'tone sandhi' is usually reserved for phonologically conditioned tone changes, while morphologically conditioned tone is called 变音 *biànyīn* 'tone change' (Chen, 2000: 31).

[92] That the changes are phonological can be somewhat confirmed by the fact that Sumi speakers are able to place a new output tone in a different tonal group from the original one when using the tone comparison chart (see §2.5 for the method).

morphemes. For the purposes of this work, the symbol for clitics '=' is used in the glosses to indicate that the head of a noun-noun compound cannot stand as an independent word without an additional nominal prefix, i.e. it cliticises onto the preceding noun.

Most nominal compounds and genitive constructions in Sumi encountered thus far do not display tone change: the tones on both the modifier and head noun root remain the same even after compounding. (143) – (150) provide a few examples. The morpheme boundaries between the nominal prefix *a-* and the root are given in the phonological transcriptions to aid the reader.

(143)	*awo* /à-vò/	'pig'	+	*ashi* /à-ʃì/	'meat'	→	*awoshi* /à-vò=ʃì/	'pork' LL + L → LLL
(144)	*amishi* /à-mìʃì/	'cow'	+	*aki* /à-kì/	'house'	→	*amishiki* /à-mìʃì=kì/	'cow shed' LLL + L → LLLL
(145)	*akha* /à-k^{h}à/	'fish'	+	*abo* /a-bo/	'box'	→	*akhabo* /à-k^{h}à=bo/	'fish pond' LL + M → LLM
(146)	*apuh* /à-pù/	'father'	+	*akhu* /a-k^{h}u/	'plate'	→	*apuh khu* /à-pù=k^{h}u/	'father's plate' LL + M → LLM
(147)	*hekiqhi* /hè-kì-q^{h}i/	'murder' (hit-NZP-kill)	+	*aki* /à-kì/	'house'	→	*hekiqhiki* /hè-kì-q^{h}i=kì/	'abattoir' LLM + L → LLML
(148)	*pukhothi* /puk^{h}ot^{h}i/	'apple'	+	*azü* /à-ʒɨ/	'water'	→	*pukhothizü* /puk^{h}ot^{h}i=ʒɨ/	'apple juice' MMM + L → MMML
(149)	*akhosa* /a-k^{h}oʃa/	'cat'	+	*akinni* /à-kìní/	'ear'	→	*akhosa kinni* /a-k^{h}oʃa=kìní/	'cat's ear' MMM + LH → MMMLH
(150)	*Kiviho* /kìviho/	(name)	+	*apu* /a-pu/	'dipper'	→	*Kiviho pu* /kìviho=pu/	'Kiviho's dipper' LMM + M → LMMM

However, a small number of compounds display tone sandhi. Two such examples contain the modifier noun root *-kichhi* /-kìʧ^{h}i/ 'breast', in which L tone on the head noun of the compound becomes H tone:

(151)	*akichhi* /à-kìʧʰi/	‘breast’	+	*azü* /à-ʒɨ̀/	‘water’	→	*akichhizü* /à-kìʧʰi=ʒɨ́/	‘milk’ LLM + L → LLMH
(152)	*akichhi* /à-kìʧʰi/	‘breast’	+	*aqo* /à-qò/	‘pit’	→	*akichhiqo* /à-kìʧʰi=qó/	‘armpit’ LLM + L → LLMH

Another two examples are the names for two types of of mushroom: *chepopu* /ʧepopu/ ‘mushroom sp.’ and *chijipu* /ʧîʒìpu/ ‘mushroom sp.’, with M tone on the head noun *-pu* ‘mushroom’.[93] In contrast, the word for ‘mushroom’ in citation form has L tone, i.e. *apuh* /à-pù/.[94]

However, given the infrequency of such examples, it seems unlikely that this type of tone sandhi is part of a productive process of nominal compounding. These forms are most likely lexicalised compounds, though given their morphological transparency, speakers will still consistently report that *-zü* in *akichhizü* ‘milk’ means ‘water’ and *-pu* in *chijipu* means ‘mushroom’.

Although these may seem like uninteresting observations, a comparison with nominal compounding Khezha and Ao in §8.5.1 will show that Sumi is somewhat unusual compared to neighbouring languages in displaying so little tone sandhi that accompanies nominal compounding.

7.3 Verb nominalisation

Another important morphological process in Sumi involves the derivation of nominals from verb roots via a nominalising prefix *kV-* ‘NZP’ (where V is a high vowel) to a noun root. In the majority of cases, there is accompanying tone sandhi. Teo (2013) discusses tone changes associated with the various nominalising strategies in Sumi and compares them with other Tibeto-Burman languages of Nagaland. Some of the findings offered in that paper will be presented again in this section and in Chapter 8.

7.3.1 Nominalisation by a- *prefixation*

A small number of nouns have been derived historically by simply prefixing *a-* to a verb root, sometimes with no change to tone, as in (153) and sometimes with an unpredictable pattern of tone sandhi, as in (154) and (155):

(153)	*zü*	/ʒɨ̀/ [zɨ˩]	‘to sleep’	→	*azü*	/à.ʒɨ̀/ [a˩ zɨ˩]	‘sleep (n.)’
(154)	*ba*	/ba/	‘to defecate’	→	*aba*	/à.bà/	‘excrement’
(155)	*mülhü*	/mɨ̀.lʱɨ́/	‘to blow’	→	*amülhü*	/a.mɨ.lʱɨ́/	‘wind’

[93] It is unclear at present if *chepo-* and *chiji-* are morphologically analysable.

[94] This is homophonous with the Sumi word for ‘father’.

Given the rarity of these forms, they are probably nothing more than vestigial relics of an older morphological process. However, a similar morphological process is still productive in a number of other Tibeto-Burman languages, including Rawang (LaPolla, 2008), as well as Lahu and Jingpho, presented in Matisoff's (2003) reconstruction of this prefix as **ʔa-*. Kapfo (2005) also provides a list of nominals derived by adding the nominal prefix *e-* (cognate with Sumi *a-*), suggesting that it may still be productive in Khezha.

7.3.2 Nominalisation by kV- *prefixation*

Deverbal nominals are formed by adding the nominalising prefix *kV-* (glossed 'NZP') to a verb root, where *V* is a vowel that displays harmony in backness with the vowel of the verb root when it does appear in careful speech (see §3.6.1 for an explanation of vowel harmony in Sumi). If the verb is monosyllabic, the non-relational *a-* prefix is also added to the nominalising prefix *kV-*, as in:

(156) *chu* /ʧù/ 'to eat' → *akuchu* /à.kù.ʧù/ '(act of) eating'

If the verb is sesquisyllabic, the non-relational prefix *a-* is also typically added to the nominalising prefix *kV-*, as in:

(157) *püghü* /pɨɣɨ/ 'to plan' → *aküpüghü* /à.kɨ.pɨ.ɣɨ / '(act of) planning; programme'

If the verb is disyllabic, the prefix *kV-* is added immediately before the verb root located to the right, and there is no *a-* prefixation, as in:

(158) *heqhi* /hèqʰi/ 'to kill' → *hekiqhi* /hè.kì.qʰi/ '(act of) killing; murder (n.)'

Disyllabic verbs are typically bimorphemic and usually head-final compounds (as noted in §6.3.2).

Finally, Sumi also has compound verbs that specify a noun complement. These will be referred to as 'collocational verbs'. They typically consist of a monosyllabic verb root preceded by a disyllabic noun, e.g. *ale phe* /à-lè pʰè/ 'to sing' ('NRL-song sing') and *azü gha* /à-ʒɨ ɣà/ 'to swim' ('NRL-water swim').[95] In such verbs, the nominalising prefix *kV-* is added right before the verb root, with no *a-* prefixation, as in:

(159) *ale phe* /àlè pʰè/ 'to sing' → *alekiphe* /à.lè.kì.pʰé/ '(act of) singing'

[95] This is a similar to Mandarin 唱歌 *chàng-gē* 'sing' (lit. 'sing-song') and 游水 *yǒu-shuǐ* 'swim' (lit. 'swim-water') and Burmese ရေ ကူး *ye kú* 'swim' (lit. 'water-swim'), သီ ချင်း ဆို *tachín-so* 'sing' (lit. 'song-sing').

The formation of most of these nominalised forms is often accompanied by tone sandhi, particularly in monosyllabic verbs. Table 23 gives examples of regularly occurring tone sandhi in the derivation of nominalised forms from monosyllabic verbs.

Note that the verb roots in this table have been classified according to their original tone and the tone melody of their corresponding nominalised form.

Table 23: Monosyllabic verb roots and nominalised forms

Verb class	Tone	**Verb**		Gloss	Tone	**Nominal**		Gloss
1	L	*che*	**ʧè**	walk	LLL	*akiche*	**àkɨʧè**	walking
	L	*chu*	**ʧù**	eat	LLL	*akuchu*	**àkùʧù**	eating
	L	*lho*	**lʱò**	be tired	LLL	*akulho*	**àkùlʱò**	fatigue
	L	*po*	**pò**	run	LLL	*akupo*	**àkùpò**	running
	L	*sho*	**ʃò**	drink	LLL	*akusho*	**àkùʃò**	drinking
	L	*sü*	**ʃɨ**	hurt	LLL	*aküsü*	**àkɨʃɨ**	pain
2	L	*ba*	**bà**	defecate	MMH	*aküba*	**akɨbá**	defecating
	L	*phu*	**pʰù**	search	MMH	*akuphu*	**akupʰú**	searching
	L	*pi*	**pì**	speak	MMH	*akipi*	**akipí**	speaking
	L	*thu*	**tʰù**	grow	MMH	*akuthu*	**akutʰú**	growth
	L	*ye*	**jè**	write	MMH	*akiye*	**akijé**	writing
3	M	*ha*	**ha**	chase	MMH	*aküha*	**akɨhá**[96]	chasing
	M	*hu*	**hu**	go (away)	MMH	*akuhu*	**akuhú**	going (away)
	M	*ye*	**je**	drink (water)	MMH	*akiye*	**akijé**	drinking
4	M	*ka*	**ka**	rule	LLH	*aküka*	**àkɨká**	power
	M	*lho*	**lʱo**	cook	LLH	*akulho*	**àkùlʱó**	curry; dish
	M	*nu*	**nu**	laugh	LLH	*akunu*	**àkùnú**	laughing
	M	*phi*	**pʰi**	read	LLH	*akiphi*	**àkìpʰí**	reading
	M	*she*	**ʃe**	praise	LLH	*akishe*	**àkìʃé**	praise (n.)
	M	*thi*	**tʰi**	die	LLH	*akithi*	**àkìtʰí**	death

Looking at the examples, we see that tones on verb roots undergo changes that cannot be accounted for by processes of tone spreading or deletion. There is also little evidence to suggest that either the prefixes *a-* or *kV-* are lexically specified for some underlying tone. Based on these shifts, 4 verb classes can be identified which exhibit the following tone sandhi (the tone on *a-* is identical to that on the following syllable and is given in parentheses):

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[96] Another variant of *aküha* 'chasing' is /àkɨhá/, though it remains unclear when each variant is used.

Verb class 1:	L	>	(L)LL
Verb class 2:	L	>	(M)MH
Verb class 3:	M	>	(M)MH
Verb class 4:	M	>	(L)LH

In the addition to the verbs presented in Table 23, the only verb root specified for H tone, *sü* /ʃɨ́/ 'to put' has the nominalised form *aküsü* /akɨʃɨ́/ 'putting', following the MMH output of verb roots in classes 2 and 3. It can be seen that neutralisation occurs with these two verb classes: for example, *akiye* /akijé/ can mean both 'writing' and 'drinking' even though their verb roots are specified for L and M tone respectively.

An additional form is the noun *akünha* /àkɨ̀nʱa/ 'lid', with the LLM tone melody, from the verb root *nha* /nʱa/ 'to cover', which has M tone. It is unknown at this stage if this should be treated as a separate class of verb, or if *akünha* is simply an irregular verb. Other examples from disyllabic and collocational verbs, to be presented below, do suggest that this is a class of verb specified for M tone that corresponds to nominalised verbs with LLM tone, but more examples of similar monosyllabic verb roots will need to be identified before this group can be posited.

Table 24 provides examples of nominalised sesquisyllabic verb roots.[97] Unlike monosyllabic verb roots, these verb roots never undergo tone sandhi in their nominalised forms, and the prefixes *a-* and *kV-* simply copy the tone of the minor syllable of the verb root. In some forms, the prefix *a-* appears to be optional.

Table 24: Sesquisyllabic verb roots and nominalised forms

Tone	**Verb**		Gloss	Tone	**Nominal**		Gloss
LL	*kulo*	**kùlò**	wave	LLLL	*akukulo*	**àkùkùlò**	waving
LL	*küla*	**kɨ̀là**	marry	LLLL	*aküküla*	**àkɨ̀kɨ̀là**	wedding
LL	*mlah*	**m̀là**	work	LLLL	*akümla*	**àkɨ̀m̀là**	work (n.)
LL	*kügha*	**kɨ̀ɣà**	catch	(L)LLL	*(a)küküga*	**(à)kɨ̀kɨ̀ɣà**	catching
LM	*küthü*	**kɨ́tʰɨ́**	gnaw	LLLM	*aküküthü*	**àkɨ̀kɨ̀tʰɨ́**	gnawing
LM	*mla*	**m̀la**	foam	LLLM	*akümla*	**àkɨ̀m̀la**	bubble
LM	*müma*	**mɨ́ma**	kiss	LLLM	*akümüma*	**àkɨ̀mɨ́ma**	kissing
LM	*püghü*	**pɨ̀ɣɨ́**	plan	LLLM	*aküpüghü*	**àkɨ̀pɨ̀ɣɨ́**	program
LH	*mlo*	**m̀ló**	mourn	LLLH	*akumlo*	**àkùm̀ló**	mourning
MM	*püka*	**pɨka**	steal	MMMM	*aküpüka*	**akɨpɨka**	theft
MH	*mlla*	**mlá**	be easy	MMMH	*akümla*	**akɨmlá**	easy
MH	*küha*	**kɨhá**	lack	(M)MMH	*(a)küküha*	**(a)kɨkɨhá**	not having

[97] This also includes verb roots consisting of a minor syllable added to a sesquisyllable e.g. *kumsü* /kɨ̀.m̀.ʃɨ́/ 'think'.

In addition to the examples in this table, the nominal *akighithi* /àkìɣìtʰi/ 'knowledge' appears to be derived from the root *ithi* /ìtʰi/ 'to know', and displays the same lack of tone sandhi as sesquisyllabic verb roots with LM tone, but with the insertion of an epenthetic /ɣ/. It is possible that this epenthetic /ɣ/ is the vestige of an older conosnant phoneme that has been lost in the verb root.[98]

Table 25 gives examples of nominalised disyllabic verbs.

Table 25: Disyllabic verbs and nominalised forms

Tone	**Verb**		Gloss	Tone	**Nominal**		Gloss
LL	*saphe*	**ʃàpʰè**	lead	LMH	*sakiphe*	**ʃàkipʰé**	leading
LL	*katha*	**kàtʰà**	cross	LMH	*kakütha*	**kàkɨtʰá**	crossing
ML	*botha*	**botʰà**	enclose; surround	MMH	*bokütha*	**bokɨtʰá**	enclosure
ML	*haphe*	**hapʰè**	evict; exile	MMH	*hakiphe*	**hakipʰé**	driving out; eviction
ML	*huthu*	**hutʰù**	begin	MMH	*hukuthu*	**hukutʰú**	origin
LM	*heqhi*	**hèqʰi**	kill	LLM	*hekiqhi*	**hèkìqʰi**	killing

These verbs behave differently from sesquisyllabic verbs, in that the *kV-* prefix is added before the final syllable. However, like monosyllabic verbs, tone sandhi occurs on the final syllable (while the tone on the first syllable of the verb remains the same in the deverbal nominal). The observed tone sandhi is similar to that observed in monosyllabic verbs. The pattern of tone sandhi can be summarised thus, with the tone on the first syllable of the verb, which does not undergo tone sandhi, given in parentheses:

(L)L	>	(L)MH	The L tone verb roots here display the same tone sandhi (L > MH)
(M)L	>	(M)MH	
(L)M	>	(L)LM	

The final group of verbs consists of collocational verbs that specify their noun complements. Table 26 gives a few examples of such verbs and their nominalised forms.

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[98] A possible candidate is a historic **g* – compare with Northern Rengma *[1]gi [2]tšɯ* 'know' (Weidert, 1987).

Table 26: Collocational verbs and nominalised forms

Tone	**Verb**		Gloss	Tone	**Nominal**		Gloss
L	*ale phe*	**àlè p^{h}è**	sing (song sing)	MH	*alekiphe*	**àlèkip^{h}é**	singing
L	*azü gha*	**àʒɨ̀ ɣà**	swim (water swim)	MH	*azükügha*	**àʒɨ̀kɨ́ɣá**	swimming
M	*azü sü*	**àʒɨ̀ ʃɨ́**	swim (water swim)	LM	*azüküsü*	**àʒɨ̀kɨ̀ʃɨ́**	swimming
M	*kaku phi*	**kàkú p^{h}i**	study (book read)	LH	*kakukiphi*	**kàkúkìp^{h}í**	study (n.)
M	*aki khu*	**àkì k^{h}u**	sweep (house sweep)	MH	*akikukhu*	**àkìkuk^{h}ú**	sweeping

Like in disyllabic verbs, only the final monosyllabic verb root undergoes tone sandhi (and not the noun). The tone sandhi undergone by verb roots can be summarised thus:

L > MH
M > LM
M > LH
M > MH

While it has been demonstrated that sesquisyllabic verb roots do not undergo tone sandhi in their nominalised forms, an examination of monosyllabic verb roots (Table 23); disyllabic verbs (Table 25); and collocational verbs (Table 26) shows a set number of tone sandhi patterns that occur with verb nominalisation. In total, six possible patterns of tone sandhi have been found:

Tone on verb root		Tone on nominalising prefix + verb root	
L	>	LL	(no tone sandhi)
L	>	MH	
M	>	LM	(rare)
M	>	LH	
M	>	MH	
H	>	MH	(one example)

L, M and H tones on verb roots are all potentially neutralised to MH, the most common tonal output. It is interesting to note that when tone sandhi does occur, there is always one 'peak' – either M tone (vs. L tone) or H tone (vs. L or M tone) – that is always found on the final syllable. As with sesquisyllabic noun and verb roots (see §6.3.1), the melody ML is not a possible output. In Teo (2013), it was suggested that the very common shift in Sumi from L or M on the verb to H tone in word-final

position of the nominalised verb may have been due to the loss of an old nominalising suffix.

Finally, it is important to note that a younger language consultant in his late 20s was unable to produce some of the prefixed forms that older language consultants gave, including *akuphu* /akup^{h}ú/ 'searching', preferring instead to give the form with the nominalising / relativising enclitic *-keu: phukeu* /p^{h}u=keù/ (with no tone sandhi on the verb root). Both older and younger speakers use these encliticised forms, which appear to be semantically equivalent to the prefixed ones. For example, in Lozhevi Sema's (1993) Sumi-Anglo dictionary, a number of prefixed forms are defined in Sumi using their encliticised forms, e.g. *akipi* 'speech' is defined as *pikeu* 'that which is spoken' (from the verb root *pi* 'to speak').[99] However, it appears that for younger speakers, many of the prefixed forms may now simply be lexicalised, while the use of the enclitic has become the more productive way of deriving nominals from verbs.

7.4 Agent nominalisation

Agent nouns in Sumi are formed by adding the noun root *-mi* 'person' to a nominalised verb, (cf. *timi* /tìmì/ 'person'). For instance:

(160) *akümla* /àkɨ̀mlà/ 'work (n.)' → *akümlami* /àkɨ̀mlà=mì/ 'worker'

Table 27 gives a list of examples of agent nouns derived from nominalised verbs. No tone sandhi appears in these examples, and the noun root *-mi* is consistently realised with L tone, suggesting that it is lexically specified for L tone, i.e. /=mì/.

However, a few agent nouns do not follow this pattern. For instance, the agent noun *akishemi* /akiʃémì/ 'praiser' has MMHL tone, even though it is derived from the nominalised verb *akishe* /àkìʃé/ 'praise (n.)' which has LLH tone. Another exception to the pattern is the agent noun *akushomi* /àkùʃómì/ 'drinker', which has LLHL tone, derived from the nominalised verb *akusho* /àkùʃò/ 'drinking', which has LLL tone. What is interesting here is that the H tone is present in the agent noun where none existed before.

[99] The equivalent in English would be to define *speech* as 'that which is spoken'.

Table 27: Nominalised verbs and agent nouns

Tone	**Nominalised verb**		Gloss
LLL	*akupo*	**àkùpò**	running
LLL	*aküsü*	**àkɨʃɨ**	pain
LLLL	*akümla*	**àkɨm̀là**	work
(L)LLL	*(a)kükügha*	**(à)kɨkɨɣà**	catching
LLLH	*akumlo*	**àkùm̀ló**	mourning
LMH	*sakiphe*	**ʃàkip^{h}é**	leading
LLMH	*alekiphe*	**àlèkip^{h}é**	singing
LLMH	*azükügha*	**àʒɨkɨɣá**	swimming
LLMH	*akikukhu*	**àkìkuk^{h}ú**	sweeping
LMLL	*ithukulu*	**ìt^{h}ukùlù**	seeing
MMMM	*aküpüka*	**akɨpɨka**	theft
MMH	*akipi*	**akipí**	speaking
MMH	*akiye*	**akijé**	writing
MMH	*akuphu*	**akup^{h}ú**	searching
MMH	*aküha*	**akɨhá**	chasing
MMH	*hakiphe*	**hakip^{h}é**	eviction
(M)MMH	*aküküha*	**akɨkɨhá**	lacking
Tone	**Agent noun**		Gloss
LLLL	*akupomi*	**àkùpòmì**	runner
LLLL	*aküsümi*	**àkɨʃɨmì**	patient
LLLLL	*akümlami*	**àkɨm̀làmì**	worker
(L)LLLL	*(a)küküghami*	**(à)kɨkɨɣàmì**	kidnapper
LLLHL	*akumlomi*	**àkùm̀lómì**	mourner
LMHL	*sakiphemi*	**ʃàkip^{h}émì**	leader
LLMHL	*alekiphemi*	**àlèkip^{h}émì**	singer
LLMHL	*azüküghami*	**àʒɨkɨɣámì**	swimmer
LLMHL	*akikukhumi*	**àkìkuk^{h}úmì**	sweeper
LMLLL	*ithukulumi*	**ìt^{h}ukùlùmì**	visionary
MMMML	*(a)küpükami*	**(a)kɨpɨkamì**	thief
MMHL	*akipimi*	**akipímì**	speaker
MMHL	*akiyemi*	**akijémì**	writer
MMHL	*akuphumi*	**akup^{h}úmì**	searcher
MMHL	*akühami*	**akɨhámì**	chaser[100]
MMHL	*hakiphemi*	**hakip^{h}émì**	evictor
(M)MMHL	*(a)kükühami*	**(a)kɨkɨhámì**	destitute person

[100] Note that *ashihami* /à-ʃì-hà-mì/ 'NRL-meat-chase-person' 'hunter' has LLLL tone.

In addition, two nominalised verbs seem to cause tone sandhi on the noun root *-mi* /=mì/: *hekiqhi* ‘murder’ and *azüküsü* ‘swimming’. In these two cases, the tone on *-mi* changes from L to H:

(161)	*hekiqhi* /hèkìq^{h}i/	‘murder’	+	*-mi* /mì/	‘person’	→	*hekiqhimi* /hèkìq^{h}i=mí/	‘murderer’ LLM + L → LLMH
(162)	*azüküsü* /àʒɨ̀kɨ̀ʃɨ́/	‘swimming’	+	*-mi* /mì/	‘person’	→	*azüküsümi* /àʒɨ̀kɨ̀ʃɨ̀=mí/	‘swimmer’ LLLM + L → LLLMH

These examples are similar to the few other observed instances of tone sandhi in Sumi nominal compounding, presented in §7.2, where L tone on a noun root becomes H tone after the noun root *-kichhi* ‘breast’, e.g. *akichhizü* /à-kìʧ^{h}i=ʒɨ́/ ‘milk’. Again, it seems that *hekiqhimi* ‘murderer’ and *azüküsümi* ‘swimmer’ are simply lexicalised items specified for their particular tones – for instance, we have another example of compound containing *hekiqhi* ‘murder’: *hekiqhiki* /hè-kì-q^{h}i=kì/ ‘abattoir’, from *hekiqhi* /hè-kì-q^{h}i/ ‘murder’ (‘hit-NZP-kill’) and *aki* /à-kì/ ‘house, where no tone sandhi occurs on the head noun *-ki*.

One cannot help but wonder if the appearance of H tone in these forms is the result of a similar process that produced H tones in nominalised verbs from L and M tone verb roots, which we saw earlier in this section. To complicate matters, there are also two examples where word-final H tone appears to move from the deverbal stem onto the /-mì/ suffix:

(163)	*akithi* /àkìt^{h}í/	‘death’	+	*-mi* /mì/	‘person’	→	*(a)kithimi* /àkìt^{h}ì=mí/ or /kìt^{h}ì=mí/	‘dead person; deceased’
(164)	*aküka* /àkɨ́ká/	‘power’	+	*-mi* /mì/	‘person’	→	*(a)kükami* /àkɨ́kà=mí/ or /kɨ́kà=mí/	‘chief; ruler’

As mentioned in §6.4, the two words presented here are almost certainly lexicalised forms, but they perhaps represent vestiges of an older phonological process in Sumi that shifted accent to the right-edge of the word.

7.5 Miscellaneous morphotonological processes

7.5.1 Formation of distributive numerals by partial reduplication

One example of reduplication is found in distributive numerals, where the final syllable of a cardinal numeral is reduplicated, as given here:

(165)	*lakhi*	/lak^{h}í/	‘one’	→	*lakhikhi*	/lak^{h}í-k^{h}í/	‘one by one’
(166)	*kini*	/kini/	‘two’	→	*kinini*	/kini-ni/	‘two by two’
(167)	*küthü*	/kɨ̀t^{h}ɨ́/	‘three’	→	*küthüthü*	/kɨ̀t^{h}ɨ́-t^{h}ɨ́/	‘three by three’

In all cases, the partially reduplicated morpheme copies both the segment and tone of the final syllable of the numeral. Note that a similar reduplicative process to obtain distributive numerals is reported for Mongsen Ao (Coupe, 2007: 275-277).

7.6 Final remarks on morphotonology

The examples of tone sandhi in Sumi presented in this chapter and the chapter before should by no means be viewed as an exhaustive list. Further work on Sumi morphology will undoubtedly reveal more examples of tone sandhi.

One key observation here is the lack of tone sandhi with nominal compounding in Sumi, which we will see is quite common among other languages of Nagaland. Another is the extensive tone sandhi with verb nominalistion, with the exception of sesquisyllabic verb roots. In addition, it was noted that younger speakers are shifting towards an encliticising strategy – this is an important finding given the discussion in the previous chapter about the shift to a falling rhythm in Sumi.

Finally, it is worth noting that we find word-final H tones appearing in many nouns derived from monosyllabic verb roots, and to a lesser extent, in compound nouns and agent nouns. One potential source for H tone may have been an old nominalising suffix. However, this alone cannot account for all instances of H tone developing in word-final position and suggests the need for more comparative work with other Angami-Pochuri languages.

8 *Comparison with other Tibeto-Burman languages of Nagaland*

8.1 Introduction

This chapter summarises some of the important phonological features of Sumi presented in the preceding chapters of this book and compares them with those of other Tibeto-Burman languages of Nagaland. This comparison will draw attention to some phonological features that, among the languages of the area, are unique to Sumi. Although this is not the first phonological comparison of the Tibeto-Burman languages of Nagaland (see Marrison, 1967; Bradley, 1997; and Burling, 2003), it draws on linguistic data that have only recently become available. The languages used for comparison and their respective data sources are as follows: Khezha (Kapfo, 2005; 2007); Kohima Angami (Kuolie, 2006; Giridhar, 1980; 1987); Chokri (Bielenberg & Nienu, 2001; Weidert, 1987); Mao (Giridhar, 1994); Mongsen Ao (Coupe, 2007); Chungli Ao (Bruhn, 2009); and Lotha (Acharya, 1983).

For the sake of comparison, the various transcription systems used by the authors have been converted to contemporary IPA. Table 28 gives the orthographic characters used by these authors and the contemporary IPA equivalents which will be used in this chapter. The various transcription systems for tones will be explained in §8.4.

Special consideration will be paid to similarities and differences between the phonology of Sumi and that of other languages of the Angami-Pochuri and Ao groups, following Burling's (2003) classification. As summarised earlier in §1.5, there has been in recent history a rapid expansion of Sumi speakers into areas previously occupied by speakers of the Ao group of languages (Hutton, 1921/1968: 5-8), with the subsequent incorporation of speakers of these languages, including Ao and Sangtam, into the Sumi speech community (Hutton, 1921/1968: 123-124). Although limited data on Sangtam prevents us from determining the full extent of lexical borrowing into Sumi, it has been noted that many of the names for rivers in areas now occupied by Sumi speakers have etymological origins in Sangtam. For instance, the names of the *Langki*, *Orki* and *Kiliki* rivers all contain *-ki*, which means 'water' in Sangtam (Marrison, 1967: 289).[101] It would be therefore interesting to see if and how such contact with these Ao languages has influenced the phonology of Sumi.

[101] The word for river in Sumi is *aghoki* /àɣòkì/, which also contains *-ki*.

Table 28: Chart showing transcription systems with contemporary IPA equivalents

Khezha (Kapfo, 2005; 2007)	**IPA**	**Kohima Angami (Kuolie, 2006)**	**IPA**	**Mao (Giridhar, 1994)**	**IPA**
ph	p^h	ph	p^h	ph	p^h
th	t^h	th	t^h	th	t^h
kh	k^h	kh	k^h		
pfh	pf^h	pfh	pf^h		
tsh	ts^h	tsh	ts^h		
c	ʧ	c	ʧ	c	ʧ
č	$ʧ^h$	ch	$ʧ^h$	ch	$ʧ^h$
j	ʤ	j	ʤ	j	ʤ
š	ʃ	S	ʃ	š	ʃ
ž	ʒ	Z	ʒ	ž	ʒ
mh	$m^ɦ$	mh	$m^ɦ$		
nh	$n^ɦ$	nh	$n^ɦ$		
ng	ŋ				
r	r	r	r	r	r
rh	r^h	rh	r^h	hr[102]	r^h
y	j	y	j	y	j
ü / ɵ[103]	ə	ə / ü[104]	ə	ü	i

Table 29 lists the various phonological features that will be used to compare Sumi with the two language groups. Each of these features will be discussed in more detail in the following sections of this chapter. Some of these features will be shown to be Sumi-specific innovations and comparative data from other languages will allow us to suggest historical origins for these innovations.

[102] Giridhar (1994) describes this as voiceless, but Kapfo (2005) and Kuolie (2006) simply describe the Khezha and Kohima Angami equivalents as 'aspirated trills' – as such, it is difficult to determine whether they are voiced or voiceless.

[103] Kapfo (2005) analyses both these vowels as separate phonemes, but describes them both as 'central lower-mid' vowels (77). The IPA schwa symbol /ə/ has been chosen to represent them for the purposes of comparison.

[104] Kuolie (2006) describes /ə/ as a 'central close-mid vowel' and /ü/ as an 'open mid central vowel' (23) but given the data presented, the complementary distribution of [ü] (word-initially and as the second vowel in a vowel sequence) and [ə] (elsewhere) suggests that they are allophones of the same vowel phoneme.

Table 29: Cross-linguistic comparison of Sumi phonology with languages of the Angami-Pochuri group and Ao group

		Sumi	**Angami-Pochuri group**	**Ao group**	**Reference**
1	Velar fricatives	present	not found typically; but voiced ones occur (Rengma)	not found	§8.2.1
2	Uvular stops	present	not found	not found	§8.2.2
3	Alveolar and postalveolar fricatives and affricates	allophonic variation conditioned by central vowels	phonemic contrast (Angami); allophonic variation conditioned by front vowels (Chokri)	allophonic variation conditioned by front vowels (Chungli & Mongsen)	§8.2.3
4	Labio-dental affricates	not found	present	not found, except in Lotha	§8.2.4
5	Vowel inventory	6 vowels, monophthongs; vowel sequences permitted	typically 6 vowels, monophthongs; diphthongs possible (Angami, Khezha)	6 vowels, monophthongs	§8.2.5
6	Stem-outward vowel harmony	present	not found typically, but found to some extent in Mao	present to some extent (Chungli)	§8.2.6
7	Permissible syllable types	mainly open, but stop-final and sonorant-final possible through resyllabification	mainly open, sonorant-final sometimes allowed (Angami)	open, stop-final and sonorant-final common	§8.3.1
8	Consonant clusters in syllable onset	not found, except through resyllabification of sesquisyllables	consonant clusters with /r/ allowed (Angami, Khezha, Chokri & Mao)	not found	§8.3.2
9	Word minimality requirements	nouns: disyllabic, verbs: monosyllabic	nouns: disyllabic, verbs: monosyllabic (Khezha, Mao); nouns and verbs: monosyllabic (Angami, Chokri)	nouns: disyllabic, verbs: monosyllabic (Mongsen); nouns: monosyllabic, verbs: disyllabic (Chungli)	§8.3.3
10	No. of tones & phonetic correlates	3 tones, level, pitch is main correlate	3-5 tones, level with some contours, pitch is main correlate	3 tones, level with some contours, pitch is main correlate	§8.4.1
11	Tone melodies and tone assignment on prefixes	generally rising: H on last syllable; prefix copies tone of root, 'default' L tone before H tone roots	generally rising, but falling permitted (Khezha); 'default' L tone on prefixes (Khezha, Angami)	generally falling: H on first syllable (Chungli); prefix copies tone of root (Mongsen)	§8.4.2

12	Tone sandhi with nominal compounding	rare, usually L > H	common (Khezha), usually L > H	common (Mongsen), sometimes H > L	§8.5.1
13	Tone sandhi with verb nominalisation	tone sandhi with prefixation, no tone sandhi with suffixation	tone sandhi with prefixation (Khezha)	no tone sandhi with prefixation, tone sandhi with suffixation (Chungli, Mongsen)	§8.5.2

8.2 Segmental inventory

8.2.1 Velar fricatives

Sumi is notable among the Tibeto-Burman languages of Nagaland for having both a voiced velar fricative /ɣ/ and a voiceless velar fricative /x/, represented in the orthography as *gh* and *x* respectively.[105] The correspondence between /r/ in other Angami-Pochuri languages and /ɣ/ in Sumi was noted as early as Hutton (1921/1968), who wrote that "Angami R becomes Sema GH" (192),[106] and again by Marrison (1967: 33). Comparative evidence presented in Table 30 shows clear correspondences between /ɣ/ in Sumi and coronal rhotics in other Tibeto-Burman languages of Nagaland. In addition, we find correspondences between the voiceless velar fricative /x/ and voiceless or 'aspirated' dorsal rhotics.

[105] When trying to reproduce certain Sumi words, speakers of other Tibeto-Burman languages in Nagaland will usually approximate /x/ as /k^{h}/, e.g. the Sumi dish *axone* /àxónè/ 'fermented soya beans', a favourite in the region, is often borrowed into other languages as [ak^{h}uni].

[106] Hutton likened the sound represented by 'gh' to Arabic *ghain* (1921: 270).

Table 30: Comparison of Sumi /ɣ/ and /x/ with cognates in other Tibeto-Burman languages of Nagaland

Gloss	Sumi (author's notes)	Khezha (Kapfo, 2007)	Kohima Angami (Kuolie, 2006)	Mao (Giridhar, 1994)	Mongsen Ao (Coupe, 2007)	Proto TB (Matisoff, 2003)
bone	àɣ̲ì	èr̲u	tʰêr̲ū	ōr̲iē [ōrɛ̄]	tə-ɹ̲ət	**rus; *rew*
six	ʧ̲ɨɣ̲ò [tsɨ˩ ɣo˩]	sàr̲ə	sòr̲û	ʧ̲or̲o#	təɹ̲uk	**d-ruk*
ten	ʧ̲ìɣ̲í	cir̲á	kēr̲	ʧ̲ìr̲ō	thəɹ̲a	*(*g-yip)*
rain (n.)	ʧ̲ɨʧ̲ɨɣ̲ɨ́[107] [tsɨ˦ tsɨ˦ ɣɨ˥]	tʰèr̲ə	tîr̲ə̌	ʧ̲ìr̲ī	tsəŋi	**rwa*
to pick; cut wood	ɣè	rè 'to pluck; cut'	rè 'to cut'			**ra*
rope	akiɣ̲í	-rʰó	kêr̲ó	or̲i#		**rey; *rwi(y)*
poison	tɨɣ̲ɨ	kèr̲ʰu	tʰêr̲î	ōkr̲ĭ	məzəm	
head louse	àx̲ɨ	èr̲ʰi	tèr̲ʰî (Giridhar, 1987)		a-tshək	**r(y)ik & *s-rik*
to be alive	xɨ	rʰì	rʰî	rʰi#́	li	**kruŋ; *r(y)aŋ & *riŋ*
to pluck (e.g. fruit, flowers)	xo	rʰo	rʰò	rʰá [ʂá]		

tones not provided

From this sample, we can see clear correspondences between the Sumi velar fricatives /x/ and /ɣ/ and the 'unaspirated' and 'aspirated' alveolar trills /r/ and /rh/ in Kohima Angami, Khezha and Mao, although there are a few exceptions where /rh/ in Khezha corresponds to /ɣ/ in Sumi: compare cognates for 'rope' and 'poison'. The correspondence with Mongsen Ao /ɹ/ and /hɹ/ is less clear, although the proposed Proto Tibeto-Burman reconstructions indicate that the velar fricatives of Sumi developed from an original coronal rhotic. This process of rhotic dorsalisation mirrors that of some

[107] Can be analysed as /ʧ̲ɨʧ̲ɨ-ɣ̲ɨ́/ 'sky-rain'.

Lolo-Burmese and Karenic languages (Matisoff, 2003),[108] as well as that of some Germanic and Romance languages (such as French) where a uvular rhotic /ʁ/ developed from a historic alveolar trill **r* (see Haden, 1955; Chambers & Trudgill, 1998: 170).

The development of both voiceless and voiced velar fricatives looks like a Sumi-specific innovation, at least among the languages of Nagaland.[109] Bielenberg and Nienu (2001) note that the Chokri speaker whom they worked with would sometimes replace retroflex approximants with voiced velar fricatives because he felt they sounded closer to 'deeper' Chokri, which he associated with the speech of villagers and which he considered more 'authentic'. However, it is very possible that this particular dialect of Chokri has been heavily influenced by Sumi – Hutton himself claims the existence of a number of Chokri (Chĕkrăma Angami) villages that were mainly of Sumi origin, i.e. the Sumis in these villages had adopted Chokri customs, dress and language (1921/1968: 4-5).

Finally, it should be note that after the shift from coronal to dorsal rhotic, the coronal rhotic /ɹ/ has re-entered the phonemic inventory of Sumi via loanwords, including *mirishi* 'chilli' (cf. Hindi मिर्ची *mirchi* 'chilli'). In the names of some villages in the northern part of the Zunheboto district – most of which were previously occupied by speakers of other languages until fairly recently – it is also possible to encounter coronal rhotics, e.g. *Rotomi*.

8.2.2 Uvular stops

Among the Tibeto-Burman languages of Nagaland, Sumi is also unusual in having the uvular stops /q/ and /q^h/.[110] Table 31 shows the correspondences between the Sumi uvular stops /q/ and /q^h/ and the Angami and Mao consonant clusters /kr/ and /k^hr/, as well as Khezha /tr/ and /t^hr/. Matisoff (2003) does not reconstruct uvular stops for Proto Tibeto-Burman and suggests that uvular stops in other Tibeto-Burman languages like Black Lahu are descended from velar stops.

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[108] Matisoff, relying on Marrison's (1967) data, only suggests the sound change *r- > ɣ- (2003: 43-44), but does not suggest a historical origin for the voiceless velar fricative /x/.

[109] Weidert (1987) notes the form *^{1}a ^{1}ɣɯ ^{3}li* 'buffalo', with a voiced velar fricative, in Northern Rengma (cf. Kohima Angami *râlī* 'buffalo'), though it is unclear whether this is an independent development or the result of contact influence from Sumi, spoken to the east of the area where Rengma is spoken. Phonemic voiceless velar fricatives have not been reported for Rengma.

[110] Earlier cross-linguistic comparisons, including work by Marrison (1967), have made no comment on this series of stops in Sumi, as the data that were available at the time had the uvular stops transcribed as a velar stops.

Table 31: Comparison of Sumi /q/ and /q^{h}/ with cognates in other Tibeto-Burman languages of Nagaland

Gloss	Sumi (author's notes)	Khezha (Kapfo, 2007)	Kohima Angami (Kuolie, 2006)	Mao (Giridhar, 1994)	Mongsen Ao (Coupe, 2007)	Proto TB (Matisoff, 2003)
to cry; weep	qà	tre	krà	kra[#]		**krap*
mother animal	àqù	ètrə̀	-krə́	-krĭ (cf. ríkrĭ 'female bird')		
porcupine	aʧequ		ʧ^{h}iêkrū			
moon	àq^{h}ì	èt^{h}rə	k^{h}rə̌	ō-k^{h}ró	làtà	**krəy; *s-la*
brain	àq^{h}ò	èt^{h}rə́	úk^{h}rû (Giridhar, 1987)	ō-k^{h}riĕ	tə-kuluk	**kl(y)aŋ*
to kill	-q^{h}i[111]	-t^{h}ru	-k^{h}rî			
hundred	aq^{h}e	ètri	kriĕ	kri[#]	nuklàŋ	**gya*

[#] tones not provided

It is likely that Sumi uvulars developed from historic Proto Angami-Pochuri velar stop clusters (**kr* and **khr*), although it is not clear why Sumi sometimes has an aspirated stop corresponding to unaspirated clusters in other Angami-Pochuri languages: see 'hundred'. The velar clusters are still found in Angami-Pochuri languages like Angami and Mao, but not in Khezha where they have developed into the alveolar clusters /tr/ and /t^{h}r/.[112] Importantly, we do not find evidence of such clusters in the languages of the Ao group, although there may be a common historic origin shared by the lateral /l/ in Mongsen Ao and /r/ in Angami-Pochuri: compare cognates for 'brain'.

While rare among the languages of Nagaland, Matisoff (2003) notes that postvelar stops do occur in other branches of the Tibeto-Burman family, including the Loloish languages which tend to only contrast unaspirated /q/ and aspirated /q^{h}/. Uvular stops (and fricatives) are also common among the Qiangic languages. Qiang, for instance, contrasts /q/ and /q^{h}/, but all other oral stops display a three-way voice-onset time contrast, i.e. voiceless unaspirated, voiceless aspirated and voiced (LaPolla & Huang,

[111] Cf. *heqhi* /hè-q^{h}i/ 'hit-kill'

[112] Note that Kapfo's (2007) Khezha dictionary gives *thrismas* and *thrisanmi* for 'Christmas' and 'Christian' respectively.

2003). Sumi is similar in this regard, in that the uvular stops only contrast in terms of aspiration and not voicing.[113]

Like velar fricatives, uvular stops appear to be a Sumi-specific innovation among the languages of Nagaland. Note that Bielenberg and Nienu (2001) find that the uvular stops [q] and [q^{h}] occur as allophones in free variation with [kʟ] and [k^{h}ʟ] in the dialect of Chokri they examined.[114] As is the case with the velar fricatives, their Chokri consultant typically associates uvular stops with the 'deep' Chokri spoken by people still living in the village. Given the presence of *both* velar fricatives and uvular stops in this dialect of Chokri, it seems more likely that these are not independent developments in this dialect but more possibly the result of a Sumi substrate or extended contact with Sumi.

8.2.3 Alveolar and post-alveolar fricatives and affricates

As mentioned in §3.3.2, we find no phonemic contrast between alveolar and post-alveolar fricatives and affricates in Sumi. Instead, Sumi appears to have merged its alveolar and post-alveolar fricatives and affricates in favour of the latter, with the alveolars [s], [z], [ts] and [ts^{h}] only appearing as allophones of /ʃ ʒ ʧ ʧ^{h}/ before the central vowels /ɨ/ and /a/. In addition, in Sumi we find free variation between the post-alveolar fricative [ʒ] and post-alveolar affricate [dʒ], which have been analysed as allophones of /ʒ/.

A similar development is reported to have occurred in Lahu (Matisoff, 2003), where phonetic alveolar / dental fricatives and affricates only occur as allophones of their palatal counterparts before the high central vowel /ɨ/.[115] However, among the Tibeto-Burman languages of Nagaland, Sumi is unusual in this regard. Within the Angami-Pochuri group we generally do find a phonemic contrast between the alveolars / dentals and post-alveolars: Khezha, Kohima Angami and Mao all have phonemic /s z ts ts^{h}/ (as well as voiced /dz/) contrasting with /ʃ ʒ ʧ ʧ^{h}/. Where the contrast is not found, as in Chokri, the conditioning environment is not the central vowels, but the front vowels /i e/ – that is, we find the fricative [ʃ], or sometimes [ɕ], occuring as an allophone of /s/ before front vowels. Similarly, in Ao languages like Chungli and Mongsen, we find [ʃ] occuring as an allophone of /s/ before the front vowel /i/.[116]

Attempting to reconstruct alveolar and post-alveolar fricatives in Proto Angami-Pochuri is not an uncomplicated task, with historic shifts in place of articulation for these fricatives closely tied to historic shifts in vowel quality in these languages. In addition, transcriptions of these sibilants are often quite inconsistent, potentially

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[113] Maddieson (2005) cites articulatory difficulties in maintaining voicing in velar (and by extension, post-velar) stops as a possible reason for their rarity cross-linguistically.

[114] Bielenberg and Nienu (2001) actually state that [q] and [q^{h}] are in free variation with [k] and [k^{h}], but all their examples show that the uvular stops are in free variation with velar consonant clusters. Note that one phonetic transcription they give for 'brain' is [k^{h}ʟi].

[115] LaPolla (*p.c.)* mentions that the merging of alveolar and palatal fricatives and affricates is something of an areal feature, found in Burmese and other languages.

[116] In Mongsen Ao, /z/ before a front vowel can be realised as: consistently [ʒ]; either [z] or [ʒ] in free variation; or always [z] – this appears to be speaker-dependent (Coupe, 2007: 31).

reflecting influence from the researchers' first languages, especially given that a number of Indic languages do not contrast /s/ with /ʃ/, including Assamese and Bengali.[117]

The situation is further complicated by the fortition of certain fricatives to alveolar stops and affricates across the language group, as shown in Table 32. One possible source for these stops is a historic prefix **k-* that has assimilated the following consonant before being lost e.g. *ks > *kt^{h} > t^{h}. In some words, this prefix has remained and been reanalysed as the onset of another syllable, e.g. Sumi *küthü* /kìt^{h}ɨ́/ 'three'. However, such instances of fortition are not restricted to one language or cluster of languages, and occur with no clear pattern across the group: compare, for instance, 'to die', 'fruit' and 'hair (of head)' in the following table.

Table 32: Comparison of Sumi alveolar obstruents with cognates in other Angami-Pochuri languages

Gloss	Sumi (author's notes)	Khezha (Kapfo, 2007)	Kohima Angami (Kuolie, 2006)	Chokri Bielenberg & Nienu, 2001)	Mao (Giridhar, 1994)	Proto TB (Matisoff, 2003)
to die	t^{h}i	ɣ^{h}ì	siê		t^{h}i$^{\#}$	**səy*
to know; to hear	ìt^{h}i[118]	ɣ^{h}è 'to be artistic, skillful'[119]	sǐ	sî	si$^{\#}$	**syey*
fruit	àxàt^{h}i[120]	èɣ^{h}e	n^{ɦ}ásǐ		-ʃǐ	**sey*
three	kɨt^{h}ɨ́	kets^{h}ə́	sē	sî	kosi$^{\#}$	**g-sum*
hair (of head)	àʃà [aɹ saɹ]	èt^{h}è	út^{h}á	pít^{h}â	pí-ʃŭ ('head-hair')	**sam*

$^{\#}$ tones not provided

[117] For instance, in his transcriptions of Kohima Angami, Giridhar (1983) gives *shī* for 'to know' and *shiê* 'to die', while Kuolie (2006) gives *sǐ* and *siê* respectively. It is unclear if the differences in transcription can be attributed to dialectal difference, language change, or simply errors in the transcriptions.

[118] The deverbal form of *ithi* 'to know' is *akighithi* /àkìɣìt^{h}i/ 'knowledge' – the velar /ɣ/ between the deverbal prefix *kV-* and the verb root hints at the existence of an old velar consonant at the start of the verb root.

[119] Cf. Khezha *čèze* 'to misunderstand'

[120] This can be analysed as /à-xà-t^{h}i/ 'NRL-crops-fruit'.

8.2.4 Labio-dental affricates

Most Angami-Pochuri languages have a series of labio-dental affricates: /pf/, /pf^{h}/ and sometimes /bv/.[121] In contrast, labio-dental affricates are generally absent in the Ao group of languages, although /pf/ is attested in Lotha (Marrison, 1967).[122]

Like many languages in the Ao group, Sumi lacks a labio-dental affricate series altogether. However, caution must be taken before one attributes this 'loss' of labio-dentals to contact with Ao languages. As can be seen in Table 33, labio-dental affricates occur throughout Angami-Pochuri, but do not appear consistently across cognates. In Kohima Angami, we even find labio-dental affricates that have developed from velar stops: compare the cognates for 'nine', 'twenty' and 'chin' in the table.[123] Bielenberg & Nienu (2001) also report [pf] only as an allophone of /p^{h}/ before the high central vowel.

Table 33: Comparison of labio-dental affricates across Angami-Pochuri languages

Gloss	Sumi (author's notes)	Khezha (Kapfo, 2007)	Kohima Angami (Kuolie, 2006)	Mao (Giridhar, 1994)	Proto TB (Matisoff, 2003)
father	àp̲ù	èp̲fə̲	âp̲fù; âp̲uô	ōp̲è; ōp̲fŏ	**pa*
lung	àp^{h}̲è	èpf^{h}̲ò	úp^{h}̲ié (Giridhar 1987)	ōfũ̲	**p-wap*
clothes; cloth	àp^{h}̲ì		pf^{h}è		**kwa*
to search	p^{h}ù	pf^{h}ə̀	pf^{h}ə́	p^{h}o$^{\#}$	**pa; *pup*
box; container; cage	ab̲o	èb̲o	(bô 'to cage')	ōb̲vì	
nine	tok̲ú	tek̲ə̀ ~ tak̲ə̀	t^{h}êp̲fə́	cok̲u$^{\#}$	**kəw; *kwa*
twenty	mùk̲ú	mek̲í	mêp̲fə̄		**m-kul*
chin	à-m̀k^{h}̲ɨ̀	mèk^{h}̲ə	úmêpf^{h}̲ə̀	bòk^{h}̲ò ~ bòk^{h}̲ŏ	**m-ka*

$^{\#}$ tones not provided

While it is therefore possible that some dialects of Sumi never developed labio-dentals in the first place, it should be noted that Hutton (1921/1968) did transcribe *pf* in a number of Sumi words, including *anipfu* 'wife' and *o-pfulo* 'in your village'. No trace of this affricate has been found in the main Sumi dialect as it is currently spoken in the

[121] Hajek (2006) summarises various proposals that some of these labio-dental affricates developed from historic labial off-gliding of labials and velars.

[122] Acharya (1983) reports both the labio-dental affricates /pf/ and /pv/ (*sic*) in Lotha, but the existence of a voiced affricate has not been corroborated by other work on Lotha.

[123] Matisoff (2003: 23-24), initially discussed in Matisoff (1980), proposes a number of different sources for labio-dental affricates in Angami.

Zunheboto area, cf. *anipu* /à-nìpù/ [a˩ ni˩ pu˩] 'wife'; *ophu lo* /ò-pʰù=lo/ [o˩ pʰu˩ lo˦] 'in your village' ('2SG-village=LOC') (author's notes). Importantly, Hutton (1921/1968: 266) notes that in the northern villages along the Tizu Valley, labio-dental affricates are realised as labial stops[124] – these villages border areas that are / were inhabited by speakers of languages of the Ao group (excluding Lotha). It is therefore quite possible that this feature has since spread southwards to the Zunheboto and Satakha regions.

8.2.5 Vowel inventory

The six vowel system of Sumi comprising the monophthongs /i e a o u ɨ/ is quite typical of Tibeto-Burman languages in Northeast India. While vowel sequences are permitted, phonemic diphthongs are not present. Similar vowel systems are found in languages of the Angami-Pochuri group, including Khonoma Angami (Blankenship *et al.*, 1993) and Mao (Giridhar, 1994), as well as in languages of the Bodo-Garo group, including Bodo and Rabha (Joseph, 2007: 493). The 'sixth' vowel is typically a high central unrounded vowel /ɨ/ or mid central vowel /ə/.[125] However, Chungli and Mongsen Ao do not follow this trend, having only four modal voice vowel phonemes /i a u ə/ – Mongsen also has a low creaky voice vowel phoneme /a̰/.

Although the vowel system Sumi is unremarkable for Northeast India, it should be noted that phonemic diphthongs have been described for some Angami-Pochuri languages, including Khezha (Kapfo, 2005);[126] and Kohima Angami (Giridhar, 1980; Kuolie, 2006), which has at least two in-gliding (centring) diphthongs /ie/ and /uo/ e.g. *diē* 'four'; *âpuô* 'father' – compare these with Sumi /bìdí/ 'four' and /à-pù/ 'father'.[127]

8.2.6 Vowel harmony originating from stem / root

Vowel harmony is common in Sumi, with high vowels in certain prefixes and minor syllables (which were likely historically prefixes as well) displaying backness harmony with the vowel of the root or following syllable. We find some vowel harmony in Mao, e.g. *kakha* 'bitterness' (cf. *kha* 'be bitter'); *kodo* 'distance' (cf. *do* 'be far'), as well as in Chungli Ao, e.g. *tu²-ku³luk¹* 'brain'; *mu²lu²* 'boil (vt.)'; *tə²-mə²li²* 'tongue' (Bruhn, 2010). Coupe (2007: 53) also reports 'sporadic vowel harmony' in Mongsen Ao.

In the case of Kohima Angami and Khezha, we find a default /e/ corresponding to instances of vowel harmony in Sumi cognates, as shown in Table 34. With the

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[124] Hutton's description reads: "the *f* in *pf* is dropped entirely" (1921/1968: 266).

[125] In some descriptions of Bodo, the sixth vowel is considered to be a high back unrounded vowel /ɯ/, written orthographically as *w* (Basumatary, 2005: 16).

[126] Kapfo (2005: 89-90) lists out a number of 'diphthongs', but it is possible some of these could be analysed as vowel sequences.

[127] The presence of phonemic diphthongs in Kohima Angami and Khezha may reflect a strong iambic pattern in these languages – as noted in §6.5, Donegan and Stampe (2004) show a correlation between diphthongisation and such word-final prominence.

exception of the nominalising prefix *ki-* (underlying *kV-*) in 'good' (see §7.3.2), the underlined syllables in the table are now morphologically opaque, at least in Sumi.[128]

Table 34: Comparison of word-medial vowels across Angami-Pochuri languages

Gloss	Sumi (author's notes)	Khezha (Kapfo, 2007)	Kohima Angami (Kuolie, 2006)	Proto TB (Matisoff, 2003)
salt	àmìti	metʃi	mêtʃīē (Giridhar, 1980)	**m-t(s)i*
to kiss	mɨma	meme	mêbò (Giridhar, 1986)	
good	akivi	kewe	kêvĭ	
two	kini	kèn^{ɦ}i	kêniê	**g-nis*
three	kɨt^{hɺ}ɨ	kets^{h}ə́	sē	

8.3 Phonotactic constraints

8.3.1 Permissible syllable types

As described in §4.2, Sumi prefers open syllables. In this regard, it is similar to other Angami-Pochuri languages like Khezha, Kohima Angami, Chokri and Mao, which all favour open syllables. Kohima Angami also allows some /r/-final syllables e.g. *vor* 'to come', although these are restricted to a small subset of directional verbs (see Kuolie 2006: 125), and transcriptions of Kohima Angami given by Marrison (1967), e.g. *vorü* 'come', suggest that such syllables are a recent development involving the loss of a word-final schwa.

On the other hand, it was shown in §4.5 that stop-final syllables in word-medial position are possible in Sumi as a result of resyllabification. This typically follows word-medial vowel syncope, e.g. *akütsü* /à.kɨ̀.ʧɨ́/ [akɹ̀ tsɨ́ɬ] 'head'. Vowel apocope can also result in sonorant-final syllables in word-final position, e.g. *amu* /à.mú/ [amʌ́] 'older brother' (Satakha dialect).[129] However, in careful speech, speakers will generally re-insert the deleted vowel and only produce open syllables.

It remains to be seen if such stop and sonorant-final syllables will become phonologised in Sumi. It also remains to be seen if this is the result of contact with languages of the Ao group, which generally allow stop-final and sonorant-final syllables in addition to open syllables.

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[128] Matisoff (2003: 87-156) proposes that similar forms in other Tibeto-Burman languages are descended from historic consonantal prefixes and discusses at length the potential semantic meanings of these prefixes.

[129] Hutton (1921/1968: 266) associates the 'clipping' of such word-final vowels with the Sumi dialects spoken in the northern villages of the Tizü Valley. It is possible that this feature has spread southwards to the Satakha region, which lies further south along the Tizu.

8.3.2 Consonant clusters in syllable onset

A number of Angami-Pochuri languages allow consonant clusters in syllable-onset position, though these are restricted to the following clusters: /pr p^hr kr k^hr/ in Kohima Angami and Mao; or /pr p^hr tr t^hr/ in Khezha. Sumi stands apart from these languages in that it does not permit consonant clusters in syllable onset position, except after the resyllabification of certain sesquisyllables, e.g. *küla* /kɨ̀.là/ [klaɻ]; 'to marry'.

As we saw in §8.2.2, there is evidence from comparative data that the Sumi velar stop clusters **kr* and **khr* were replaced by the uvular stops /q q^h/. In addition to the loss of these velar stop clusters, there is evidence that Sumi has also simplified bilabial stop clusters, as shown by the examples given in Table 35. It is worth noting that in this regard, Sumi is similar to the Ao group, including Chungli, Mongsen and Lotha, which do not permit syllable-initial consonant clusters.

Table 35: Comparison of bilabial stop clusters in Angami-Pochuri languages

Gloss	Sumi (author's notes)	Khezha (Kapfo, 2007)	Kohima Angami (Kuolie, 2006)	Mao (Giridhar, 1994)
field hut	à.xà.pì.kì[130]	pri.kíe[131]	prŭ	ō-prĕ
to emerge, come out	ì.pè	pre	pâr[132]	pra#
to read; to study	p^hi	p^hrə̀	p^hrê 'to count; to read'	p^hro#

[#] tones not provided

8.3.3 Word minimality requirements

In §4.4, it was shown that nouns in Sumi are minimally disyllabic while verbs are minimally monosyllabic. Having different minimal syllabic / moraic requirements for nouns and verbs is not unusual among the Tibeto-Burman languages of Nagaland. Temsunungsang (2008) analyses verbs in Chungli Ao as being minimally bimoraic and nouns monomoraic, while verbs in Mongsen Ao are minimally monomoraic and nouns bimoraic. For Khezha, Kapfo (1989) states that nouns are minimally disyllabic[133] and suggests that the nominal prefix *e-* (cognate with Sumi *a-*) is added to monosyllabic noun roots in Khezha to fulfill the requirement that words be minimally disyllabic. To

[130] This is probably /à-xà-pì-kì/ 'NRL-crops-field.hut-house'.

[131] It might be possible to analyse this as /pri-kíe/ 'field.hut-house'.

[132] It is uncertain if this should be treated as a cognate. According to Kuolie (2006: 125), syllable-final /-r/ here functions as a 'reversive marker' in Kohima Angami – to this author, it looks like a marker of direction towards a speaker-based origo, cf. *vo* 'to go' and *vor* 'to come'; *pa* 'to go up (proximate)', *par* 'to come up (proximate)'.

[133] Lexical entries presented in Kapfo's (2007) Khezha-English dictionary show that verbs are minimally monosyllabic.

demonstrate this, he gives examples where *e-* is dropped from both monosyllabic noun roots once the roots are compounded, as in:

(168) è-tso ‘stone’ + è-kè ‘house’ → tso-ké ‘stone house’

Table 36 shows examples of minimal syllable requirements for nouns and verbs within the Angami-Pochuri group, the preference seems to be for minimally disyllabic nouns and monosyllabic verbs, although Kohima Angami and Chokri allow both monosyllabic nouns and verbs. At first glance, the lack of prefixes in some languages, e.g. Kohima Angami and Chokri, and the different vowels found in the nominal prefixes of Sumi, Khezha and Mao (*a-*, *e-* and *o-* respectively) suggest that the disyllabic requirement for nouns was only a later development within the Angami-Pochuri group.

Table 36: Comparison of minimal syllable requirements for nouns and verbs in Angami-Pochuri languages

Gloss	Sumi (author’s notes)	Khezha (Kapfo, 2007)	Kohima Angami (Kuolie, 2006)	Chokri (Bielenberg & Nienu, 2001	Mao (Giridhar, 1994)
fire (n.)	à.mì (2)	è.mìe ~ è.mè (2)	mí (1)	mê (1)	ō.mī (2)
house (n.)	à.kì (2)	è.kìe (2)	kí (1)		ō.cɨ́ (2)
water (n.)	à.ʒɨ̀ [aɻ zɨɻ] (2)	è.ʤù (2)	dzə́ (1)	dzɨ̂ (1)	ō.dzɨ́ (2)
to speak (v.)	pì (1)	pù (1)	pú (1)	pô (1)	pe[#] (1)
to die (v.)	t^{h}ì (1)	ʧ^{h}ì (1)	siê (1)		t^{h}ì[#] (1)

[#] tones not provided

It should also be noted that sesquisyllabic noun roots in Sumi generally correspond to disyllabic nouns in other languages like Khezha and Kohima Angami, which take a default /e/ in the first syllable. In contrast, Sumi will typically insert a vowel that displays backness harmony with the vowel of the following syllable, unless it is a syllabic nasal that occupies the minor syllable slot – see Table 37.

Table 37: Comparison of sesquisyllabic noun roots in Sumi with nouns in other Angami-Pochuri languages

Gloss	Sumi (author's notes)	Khezha (Kapfo, 2007)	Kohima Angami (Kuolie, 2006)	Mao (Giridhar, 1994)
head	à.kɨ̀.ʧɨ̀ [aꜘ kɨꜘ tsɨɬ] ~ [akꜘ tsɨɬ]	ke.tsə	ú.tsə̌	
chin	à.m̀.kʰɨ̀	mè.kʰə	mê.pfʰə̀ or ú.mê.pfʰə̀	bò.kʰò ~ bò.kʰǒ
heart	à.m̀.ló	me.lí	mê.lū	
salt	à.mì.ti	me.ʧĩ	mê.ʧĩē (Giridhar, 1980)	

8.4 Tone system

8.4.1 Number of tones and phonetic realisation of tone

Burling (2003) notes that all the languages that he has encountered from the 'eastern border' region between India and Burma have at least three contrastive tones. Sumi, with its three level tones: High, Mid and Low, is no exception to this. Among the languages of the Angami-Pochuri group, we generally find three to five lexical tones, while among languages of the Ao group, three-tone systems are most common.

Table 38 summarises the main features of tone systems found in languages of these two groups, looking at the number of contrastive tones and the phonetic realisation of these tones.

Table 38: Comparison of tone systems in the languages of the Angami-Pochuri and Ao groups

	Angami-Pochuri group						Ao group		
	Sumi	Khezha	Chokri	Mao	Angami (Khonoma)	Angami (Kohima)	Ao (Chungli)	Ao (Mongsen)	Lotha
no. of contrastive tones	3	3	4	4	4	5	3	3	3
pitch as main phonetic correlate	yes	yes?	yes	yes	yes, but breathy on low	yes?	yes	yes	yes?
phonemic contours	no	?	all falling	some falling	no	?	no	no	?

The following is a description of the tone systems found in each language, with examples of the orthographic transcription conventions used by the respective researcher(s) for each language.

Khezha

Kapfo (2005: 94) reports three contrastive tones for Khezha: High, Mid and Low, as exemplified here:

High	dí	'to claim'
Mid	di	'to make dish with leaf'
Low	dì	'to lay down the container'

These three tones are said to contrast by relative pitch height. Unfortunately, Kapfo does not describe their shape or provide an acoustic analysis of the tones.

Kohima Angami

The Kohima dialect of Angami is generally described as having five contrastive tones. Giridhar (1980) refers to them as High, Mid, Mid Falling, Low Falling and Low. Kuolie (2006) also finds five tones, which he refers to as High, High-low, Mid, Low-high and Low. A comparison of these two descriptions and transcription systems is given in Table 39.

Table 39: Comparison of transcription systems and descriptions of Kohima Angami tones by Giridhar (1980) and Kuolie (2006)

Gloss	Transcription & description according to Giridhar (1980)		Transcription & description according to Kuolie (2006)	
'to incline'	pé	High	pé	High
'to be fat'; 'fatty'	pē	Mid	pĕ	High-low
'bridge'	pe̅	Mid Falling	pē	Mid
'to tremble'	pê	Low Falling	pê	Low-high
'to hit; shoot'	pè	Low	pè	Low

While Giridhar finds two falling tones and three level tones, Kuolie describes five level tones, but notes that the difference in height between the 'high-low' and 'mid' tones is very small, while the difference between the 'high-low' and 'high' is much greater. Unfortunately, neither author provides an acoustic analysis of the tones. The majority of comparisons made in this section rely on Kuolie's transcriptions, with the addition of some transcriptions by Giridhar where there are missing data from Kuolie.

Khonoma Angami

For the Khonoma dialect of Angami, Blankenship *et al.* (1993) find four level tones:

1 (highest)	ke^3ba^1	'snare'
2	ke^3ba^2	'time'
3	ke^3ba^3	'to place on top of each other'
4 (lowest)	ke^3ba^4	'to play, mess about in mud'

The average interval between each tone is reported to be about 30 Hz. In addition to lower F_0, the lowest tone is also found to correlate with breathy voice.

Chokri

Bielenberg and Nienu (2001) find four contrastive tones in the Phek dialect of Chokri:

High (́)	/pú/	'fat'
High-mid (^)	/pû/	'bridge'
Low-mid (~)	/pũ/	's/he'
Low (̀)	/pù/	'one'

According to their findings, all four tones correspond to falling pitch:[134] using the Chao number system, the High tone corresponds to 53 or 42 and the Low to 21. The High-mid and Low-mid are interesting because they both correspond to either 32 or 31 – the crucial difference seems to be that the fall in pitch for the High-mid tone occurs only in the second half of the vowel, while the Low-mid tone correlates with a gradual fall in pitch across the whole vowel.

Mao

Giridhar (1994) reports four tones in Mao:

High	ōdó	'art, techniques of politeness'
Lower High	ōdŏ	'show, splurge'; 'trick'
Mid	ōdō	'paddy field'; 'notch'
Low	ōdò	'field ridge'

The four tones are described as being relatively level, although all are found to fall slightly near the end of the syllable, with the higher tones exhibiting a slightly steeper fall. According to the F_0 values presented by Giridhar, High tone is realised at a much higher pitch than Lower High tone, while the Low tone is realised at a much lower pitch than the Mid tone. However, there appears to be a smaller difference in pitch height between the Lower High and Mid tones.

[134] It is possible that the falling gradient of some of these pitch contours is the result of declination.

It is possible that the Lower High tone differs from the Mid by having a sharper fall in pitch only near the end of the syllable, while the Mid tone is realised with a gradual fall throughout the syllable, similar to what was described for Chokri.

Mongsen Ao

For Mongsen Ao, Coupe (2007) describes three contrastive level tones:

High	á-lí	[a^{55}li^{55}]	(NRL-ground) ‘ground’
Mid	li	[li^{33}]	‘be’
Low	lì	[li^{11}]	(bake.PST) ‘baked’

In his (2003) study, which looks at a speaker of the Waromung dialect of Mongsen, Coupe reports intervals of only 10 to 15 Hz between each tone (considerably smaller than what was found for Sumi). He notes this as typologically unusual for a three-tone system.

Chungli Ao

Rhodes (2009) and Bruhn (2009) describe three contrastive level tones for Chungli Ao. In contrast to Mongsen, Rhodes finds intervals of about 20 Hz between each tone. Bruhn indicates surfaces tones using superscripted tone numbers, with the High (H) tone indicated by 3; the Mid (M) tone by 2; and the Low (L) tone by 1; e.g. *rep^{2} rep^{2}rang^{2}-tar^{31}* (M.M-HL) ‘is now watching’. Phonetic falling tones, consisting of a sequence of H and L are also allowed on monosyllables.

Lotha

Acharya (1983) gives three contrastive tones for Lotha: Rising, Falling and Level (presumably a mid tone).

Rising	lá	‘vomit (Imp)’
Falling	là	‘cheap price’
Level	lā	‘cut flesh (Imp)’

Unfortunately, it is difficult to verify the accuracy of these findings, since no acoustic data is presented to support the description.

In general, the languages of the Angami-Pochuri group have a higher number of lexical tones, ranging from three to five, compared to the languages of the Ao group which typically only have three. Pitch appears to be the primary phonetic correlate of tone in all these languages, with breathy phonation found to coincide with a low tone in at least one language: Khonoma Angami. However, since we do not have good acoustic data for a number of these languages, it is difficult to say if non-modal phonation in Khonoma Angami is unusual or not.

Looking simply at the number of tones in each language, it is tempting to state that Sumi, with three level tones, is more similar to the Ao group than the Angami-Pochuri group. However, this would be a superficial assessment. At present, we do not know enough about the historical phonology of these languages to be able to come to any

meaningful conclusions about the effects of language contact. For instance, did Proto Angami-Pochuri already have tones, and if so, how many? Is the three tone system of Sumi a direct consequence of contact with Ao languages – and if so, was this the result of a merger of tone categories (i.e. from four to three) in Sumi, or did it 'begin' with a three-tone system? Furthermore, how do we account for the three-tone system in Khezha, given the lack of contact between speakers of Khezha and speakers of Ao languages in the recent past?

To answer these questions, much more reconstruction work also needs to be done on the segmental phonology of these languages. For instance, one common feature of Angami-Pochuri languages is the general lack of syllable-final consonants in any of the modern languages. Such consonants, and their subsequent loss, are usually instrumental in the process of tonogenesis, at least in the model posited by Haudricourt (1954). We may get some idea of the nature of these syllable-final consonants by considering the two 'middle' tones in Chokri and Mao: although both tones in each language have been described as 'falling', they tend to differ phonetically mainly in the timing of the fall in pitch. This may be indicative of recent perturbation from consonantal segments either at the start or at the end of the syllable. The collection of more comparative data will be crucial in determining the nature of these historic syllable-final consonants that have since been lost in the Angami-Pochuri group.

A quick look at some cognates might point to future avenues for research. Table 40 provides a sample of cognates from six languages: Sumi, Khezha, Kohima Angami, Mao, Chungli Ao and Mongsen Ao, as well as Proto Tibeto-Burman reconstructions proposed by Matisoff (2003).[135] The method of tonal transcription follows that of the original researchers, as described above. The accuracy of all tonal transcriptions is taken for granted here. Underlined segments have been added by the author to indicate the portions of the word used for comparison.

This short list of 20 cognates highlights some interesting correspondences in tone between Sumi and other languages of the Angami-Pochuri group, with the correspondences between Sumi and the Ao languages less clear.

[135] This author makes no inherent assumption that the forms in the modern languages are directly descended from these proposed protoforms. Rather, the reason for presenting these reconstructions is to give the reader a rough idea of the form of cognates found in other Tibeto-Burman languages.

Table 40: Comparative word list with other Tibeto-Burman languages of Nagaland

	Gloss	Sumi (author's notes)	Khezha (Kapfo, 2007)	Kohima Angami (Kuolie, 2006)	Mao (Giridhar, 1994)	Chungli Ao (Bruhn, 2010b)	Mongsen Ao (Coupe, 2007)	Proto TB (Matisoff, 2003)
1	wood	àʃɨ̱ [aɹ sɨɹ]	ètsʰə̀	sí	ōsɨ̱	səŋ^{1}	á-sə́ŋ	**siŋ ~ *sik*
2	field	àlù	èlò	lié	ōdǒ	a^{3}lu^{1}	á-hlú	**low*
3	blood	àʒì	èʒì	tʰêzié		a^{3}zəʔ^{1}	á-jíʔ	**hywəy*
4	water	àʒɨ̱ [aɹ zɨɹ]	èdʒə̀	dzə́	ōdzɨ̱	tsə^{1}	a-tsə	**t(w)i(y)*
5	house	àkì	èkìe	kí	ōʧɨ̱	ki^{1}	a-ki	**kyim*
6	fire	àmì	èmìe ~ èmè	mí	ōmī	miʔ^{1}	mi ; məzəʔ	**mey*
7	meat/flesh	àʃì	ètsʰə́	ʧʰə̀	ōsǒ^{136}	si^{1}ʔ [ʃĭʔ^{1}]	á-sáʔ	**sya*
8	rat	àʒì	èʒú	tʰêzù	ōʒě			**yəw*
9	smoke^{137}	àmìʧʰì ~ àmìkʰì (Satakha)	màkʰú	mîkʰù	mikʰě	mu^{2}ku^{2}zə^{2}	mukhuli	**kəw*
10	brain	àqʰò	ètʰrə́	úkʰrû^{138}	ōkʰrič	tu^{2}-ku^{3}luk^{1}	tə-kuluk	**kl(y)aŋ*
11	feces/stool	àbà	èbə	tʰêbuǒ	ōbó			**ba:l*
12	moon	àqʰì	ètʰrə	kʰrə̌	ōkʰró			**krəy / *s-gla*
13	three	kɨ̀tʰɨ́	ketsʰə́	sē	kōsɨ̱^{139}	a^{1}səm^{2}	asəm	**g-sum*
14	four	bìdí	pedí	diē	pādēi^{140}	pə^{1}zə^{2}	phəli	**b-liy*
15	five	pùŋú	paŋə́	pēŋū	pōŋō^{141}	pu^{1}ŋu^{2}	phaŋa	**b-ŋa*
16	twenty	mùkú	mekí	mêpfə̄	mākēi^{142}		məki	**m-kul*
17	heart	àm̀ló	melí	mêlū		tə^{2}-mə^{2}luŋ^{2} ʧaŋ^{2}	tə-məluŋ-ʧaŋ	**m-luŋ*
18	saliva	àmìtí	meʧĭ	úmʱîtsē		mə^{2}tsə^{2}	mətsə	**m-til*
19	to sleep	ʒɨ́ [zɨɹ]	zə̀	zè	ōʒì^{143}	a^{3}-jəp^{1}	jip	**dzim*
20	nine	tokú	tekó	thêpfə̄		tu^{2}ku^{2}	thuku	**kəw*

[136] From Weidert (1987) – original transcription is ^{2}o^{4}so.

[137] Although the Sumi form looks like a compound containing the morpheme for 'fire' /à-mì/ ('NRL-fire'), the vowels that follow the bilabial nasal in cognates suggest that the bilabial nasal here is a historic nominal prefix **m-* in these languages. This may have been a nominalising prefix (cf. Angami *khù* 'to smoke').

[138] From Giridhar (1987).

[139] From Weidert (1987) – original transcription is ^{2}ko^{2}sɯ.

[140] From Weidert (1987) – original transcription is ^{2}pa^{2}dei.

[141] From Weidert (1987) – original transcription is ^{2}po^{2}ŋo.

[142] From Weidert (1987) – original transcription is ^{2}ma^{2}kei.

[143] Strangely, this verb appears to come with the *o-* prefix, which is typically associated with nouns in Mao.

One common observation we find is the 'mirroring' of low and high tones for many cognates across different languages within the Angami-Pochuri group. For instance, in (1) – (6), 'Low' tones in Sumi and Khezha correspond to 'High' tone in Kohima Angami 'High' tone and 'Lower High' tone in Mao. In (7) – (10), 'Low' tones in Sumi and Kohima Angami correspond to 'High' tone in Khezha and 'Lower High' tone in Mao. In (11) – (12), Sumi 'Low' corresponds to Khezha 'Mid', Kohima Angami 'High-low' (the second highest tone in the language) and Mao 'High'. Finally, in (13) – (18), 'High' tones in Sumi and Khezha correspond to 'Mid' tones in Kohima and Angami and Mao. Very rarely do we find low tone across cognates within the Angami-Pochuri group, or high tone throughout – we have only one example of low tone across cognates in (19), and one example of high tone across cognates in (20).

One source that has been suggested for such correspondences between low and high tones is a historic syllable-final glottal stop. For instance, Kingston (2005) proposes that the reason why some Athabaskan languages developed low tone where others developed high tone was due to the influence of a word-final glottal stop – glottalisation of the preceding vowel led to tense voice and eventually high tone in some languages, but creaky voice and eventually low tone in others.

Certainly, while a historic syllable-final glottal stop may be one source for such widespread 'tone mirroring' within the Angami-Pochuri group, it cannot account for all examples of mirroring. In the Ao group, we still find instances of such tone mirroring, as in (1) – (3) & (7), even though both Chungli and Mongsen Ao have syllable-final glottal stops, alongside other stop-final syllables.

These are not the only tonal correspondences found across cognates in these languages, but the examples presented should serve as a starting point for such comparative work on tone in these languages. The amount of available data at present does not allow us to posit historic tonal categories for the Tibeto-Burman languages of Nagaland yet,[144] but it does highlight the complex nature of tone development in these languages. Comparative work on these languages is at present hampered not just by the lack of good phonological transcriptions of tone for these languages, but by the lack of good *phonetic* descriptions of tone. There is therefore an urgent need for more accurate tone transcriptions for a lot more languages of the area, as well as better acoustic data on these languages.

8.4.2 Tone melodies and tone assignment to 'toneless' prefixes

In §6.3, it was noted that there is a trend towards level and rising melodies such as LL, MM and LH in Sumi words, especially nouns, with a general avoidance of falling melodies that place H tone near the start of a word.

However, it is difficult to compare tone melodies in Sumi with those of other languages, simply because little has been written about them. One exception to this, is work on Chungli Ao, with Rhodes (2009) noting that in a sample of 329 nouns and verbs, the vast majority have the melody MM, while none display a rising LH melody. Verbs, which are minimally disyllabic in Chungli, also show a strong tendency towards

[144] Weidert's (1987) attempts at positing historic tonal categories for all the Tibeto-Burman languages of Nagaland have been heavily criticised by Matisoff (1994).

the falling HL melody. Similarly, Temsunungsang (*p.c.*) reports that only three tone melodies are permitted in 'non-derived' disyllabic verbs in Chungli: HH, MM and HL.

The problem with comparison here is that Chungli Ao has different syllabic requirements for nouns and verbs as Sumi. We would therefore be mainly comparing tone melodies on nouns in Sumi with tone melodies on verbs in Chungli Ao. Nevertheless, it is still worth noting the preference for MM tone on verbs in Chungli Ao, and the preference for HH, MM and HL on nouns where Sumi prefers LL, MM and LH.

Perhaps a better point of comparison would be to look at the assignment of tone to 'toneless' prefixes. The autosegmental analysis in §6.2 posited that some Sumi nominal prefixes are unspecified for an underlying tone and take the tone of the noun root. The exception here is when the noun root has H tone, and a default L tone is assigned to the prefix. It was then noted that this analysis could actually be reflecting a historical process or historical processes of tone assignment to these prefixes, and not a synchronic process.

Kapfo (1989) notes that the Khezha *e-* nominal prefix (with a similar function to Sumi *a-*) usually carries L tone, regardless of the tone on the noun root, e.g. *èkè* 'house'; *èvo* 'pig'; and *èžú* 'rat'. M tone occurs in some rare examples, including: *eso* 'jungle rat' and *elí* 'buffalo', while H tone never appears on the prefix. It therefore seems reasonable to posit an underlying L tone for the prefix.

Coupe (2007) notes at least two nominal prefixes in Mongsen Ao that can be described as tonally unspecified: the non-relational (NRL) prefix *a-*, used with noun roots denoting cultural artefacts and entities associated with the biosphere; and the relational (RL) prefix *tə-*, used with noun roots denoting body parts and kinship terms. Both these prefixes take the same tone as that of the following noun root, e.g. *á-sáʔ* (NRL-meat) 'meat' and *tə́-khə́t* (RL-hand/arm) 'hand, arm'; but *a-zu* (NRL-hail) 'hail' and *tə-hrə* (RL-intestines) 'intestines'. Coupe notes that these prefixes never take L tone simply because none of the noun roots belonging to these semantic classes are specified for L tone. Given that in his analysis, it is the noun root which assigns tone to the prefix, Coupe (2003: 114) also proposes the existence of two systems in Ao: a system of 'word tone' for such words consisting of a nominal prefix and root co-existing with a system of 'syllable tone' for all syllables lexically specified for tone.

Comparing the three languages, Sumi *a-* is similar to Khezha *e-* in that it usually takes L tone, but only before a noun root with L or H tone. However, when the noun root is specified for M tone, Sumi is similar to Mongsen Ao, in that the prefix copies the tone of the noun root. One possible scenario is that in Sumi, prefixes like *a-* 'NRL' and *i-* '1SG' were originally phonologically toneless but subsequently received a default L tone, like we find in Khezha. Over time (and perhaps under the influence of languages like Mongsen Ao), prefixes preceding M tone started to copy the tone of the noun root.[145]

[145] The copying of M tone onto the prefix may correspond to a change in rhythm – default L tone on prefixes reflects an older iambic pattern, while tone spreading onto the prefix may reflect a shift to a trochaic pattern – see §6.5 and §8.6 for further discussion on a potential rhythm shift in Sumi.

8.5 Morphotonology

Given the paucity of studies on tone sandhi in other Tibeto-Burman languages of Nagaland only two languages are used for comparative purposes here: Khezha and Mongsen Ao. Both are similar to Sumi in that they have three contrastive level tones: Low, Mid and High. The Khezha data used here come from Kapfo (1989, 2005) and the Mongsen Ao data come from Coupe (2007). Morpheme boundaries between nominal prefixes and noun roots / stems have been added to the Khezha and Mongsen Ao data to aid the reader. For more on verb nominalisation / deverbal formation in the Angami-Pochuri group, Teo (2013) looks at examples from Kohima Angami and Mao, in addition to the Khezha data presented here.

8.5.1 Tone sandhi with nominal compounding

It was shown in §7.2 that nominal compounding in Sumi is rarely accompanied by tone sandhi, except in a few lexicalised compounds. However, a comparison with Khezha and Mongsen Ao actually shows that this very lack of tone sandhi marks Sumi as unusual.

Kapfo (1989) gives numerous examples of tone sandhi in Khezha noun constructions. Tone sandhi is very common in such nominal compounding. One common change is L tone on a noun root becoming H tone when it becomes the head noun of a compound. For instance, when the head noun root of a compound is monosyllabic and carries L tone (e.g. *-kè* 'house') this changes to H tone when the modifier (prepound) noun root is monosyllabic and carries L or M tone, as seen in (169) – (171).

(169)	è-tsè	'cattle'	+	è-kè	'house'	→	tsè-ké	'cow shed'
(170)	è-ts^{h}ə̀	'wood'	+	è-ʤə̀	'water'	→	ts^{h}ə̀-ʤə́	'tree sap'
(171)	è-t^{h}e	'deer'	+	è-ʧə̀	'baby animal'	→	t^{h}e-ʧə́	'baby deer'

The rule does not apply when the modifier noun root carries H tone: the tone on the head noun remains as L tone, as in (172) and (173).

(172)	è-ts^{h}ə́	'meat'	+	è-ʤə̀	'water'	→	ts^{h}ə́-ʤə̀	'meat soup'
(173)	è-ʒú	'rat'	+	è-ʧə̀	'baby animal'	→	ʒú-ʧə̀	'baby / small rat'

The rule also does not apply when the modifer noun is disyllabic, as in (174).

(174)	kədò	'kind of bird'	+	è-ʧə̀	'baby animal'	→	kədò-ʧə̀	'baby of kødo'

When the head noun root is monosyllabic and specified for M tone, its tone changes to L after M or H tone, as in (175) and (176), but remains M after L tone, as in (177).

There are also cases where M tone does not undergo tone sandhi after M or H, though Kapfo (1989) does not specify the circumstances for these.

(175)	è-ts^{h}ə	'dog'	+	è-p^{h}e	'leg'	→	ts^{h}ə-p^{h}è	'dog's leg'
(176)	è-lí	'buffalo'	+	è-p^{h}e	'leg'	→	lí-p^{h}è	'buffalo's leg'
(177)	è-ʤə̀	'water'	+	è-bu	'pocket'	→	ʤə̀-bu	'space for water'

We can see that tone sandhi is prevalent in Khezha nominal compounding. The main patterns of tone sandhi associated with nominal compounding in Khezha can be summarised thus:

L + L	→	LH
M + L	→	MH
H + L	→	HL (no sandhi)
L + M	→	LM (no sandhi)
M + M	→	ML (sometimes MM – no sandhi)
H + M	→	HL (sometimes HM – no sandhi)

However, no tone sandhi occurs when the head noun root has H tone. It should be noted that just as in Sumi, there is a general avoidance of the tone sequence HH in Khezha.

Coupe (2007) reports that tone sandhi in Mongsen Ao nominal compounds is both extensive and complex (2007: 72-73). He offers a few examples whereby the tone on *-sáʔ* 'meat', which is specified for H tone, usually takes L tone (or sometimes M) in compounds such as the following:

(178)	á-úk	'pig'	+	á-sáʔ	'meat'	→	áwk-sàʔ	'pork'
(179)	màsàʔ	'cow'	+	á-sáʔ	'meat'	→	màsà-sàʔ	'beef'
(180)	a-hən	'fowl'	+	á-sáʔ	'meat'	→	ahən-sàʔ	'chicken'
				(alternative)		→	ahən-saʔ	'chicken'
(181)	a-khu	'tiger'	+	á-sáʔ	'meat'	→	akhu-sàʔ	'tiger meat'
				(alternative)		→	akhu-saʔ	'tiger meat'
(182)	mətshə	'deer'	+	á-sáʔ	'meat'	→	mətshə-sàʔ	'venison'
				(alternative)		→	mətshə-saʔ	'venison'

Here, the nature of tone sandhi on the head noun is very different from that found in Khezha. Apart from the shift from H tone to L, the alternative forms in (180) – (182) indicate that in some compounds in Mongsen Ao, tone appears to be spreading from the prepound onto the head noun *-sáʔ*.[146]. Importantly, tone sandhi in Khezhe involves tone dissimilation, while tone sandhi in Mongsen Ao results in tone assimilation.

Comparing Sumi to Khezha and Mongsen Ao, the lack of extensive tone sandhi in most Sumi nominal compounds is therefore quite striking. When it does occur in Sumi, with L tone becoming H in lexicalised compounds like *akichhizü* /à-kìʧ^{h}i-ʒɨ́/ 'milk'

[146] Coupe (2007) adds that, given the right tone sandhi environment within the same clause, forms like *mətshə-sáʔ* 'venison', with H tone on the head noun, are also possible.

('NRL-breast-water'), it appears more similar to Khezha than Mongsen Ao. Additional data from Kohima Angami, e.g. *sîmiē* 'tree root' from *sí* 'wood' and *puômiē* 'root' (Kuolie 2006: 77) suggest that similar 'dissimilatory' tone sandhi is quite common among Angami-Pochuri languages, although the change in tone is not confined to the final syllable.

One hypothesis worth considering is that the absence of tone sandhi in Sumi is a later development in the language, possibly linked to the recent absorption of non-Sumi speakers into the language community (see §1.5). However, far more comparative data and analysis is required to determine if this is the case.

8.5.2 Tone sandhi with verb nominalisation

It was shown in §7.3.2 that nominalised verbs in Sumi are typically formed by prefixing *kV-* to a verb root, sometimes with the prefix *a-* prefix as well. This process is usually accompanied by tone sandhi on the verb root. Similar patterns of tone sandhi can be found in Khezha, which uses the prefix *ke-* to derive abstract nouns. (183) – (187) give examples of verb roots prefixed with *ke-*.

(183)	tè	'run'	ke + tè	→	keté	'race'
(184)	r^{h}è	'draw'	ke + r^{h}è	→	ker^{h}é	'drawing'
(185)	to	'eat'	ke + to	→	kèto	'food'
(186)	so	'drink'	ke + so	→	kèso	'drink (n.)'
(187)	we	'good'	ke + we	→	kewe	'goodness'

The patterns of tone sandhi on these verb roots can be summarised thus:

L > MH
M > LM
M > MM

Stative verbs in Mongsen Ao take the nominalising prefix *tə-* 'NZP', which is comparable to Sumi *kV-* and Khezha *ke-*. Unlike these two languages though, the verb root in Mongsen Ao does not undergo tone sandhi. Instead, the phonologically toneless prefix simply copies the same tone on the first syllable of the verb root, to give the output seen in (188) – (192):

(188)	tə́-khaʔ	(NZP-be.bitter)	'bitter'
(189)	tə́-ʧə̌n	(NZP-be.old)	'old'
(190)	tə-ɹaɹaʔ	(NZP-be.rough)	'rough'
(191)	tə-səsə	(NZP-be.smooth)	'smooth'
(192)	tə̀-pə̀ti	(NZP-be.big)	'big'

More commonly, verbs in Mongsen Ao are nominalised by the addition of the suffix *-pàʔ* which does result in tone sandhi on the verb, as seen in (193) and (194). Coupe

(2007) proposes a floating H tone which is associated with the final syllable of the verb root, but only realised in the environment of the suffix *-pàʔ*.

(193)	ahɪək	(drown. PST)[147]	ahɪə́k-pàʔ	(drown-NR)
(194)	ʧhaj	(play.sport.PST)	ʧhə́j-pàʔ	(play.sport-NR)

Looking at verbal nominalisation by prefixation, tone sandhi in Sumi therefore appears much more similar to Khezha than to Mongsen Ao – in the latter, the prefix simply copies the tone of the first syllable of the verb root. More significantly, it was highlighted in §7.3 that there appears to be a shift in Sumi from a prefixing strategy to an encliticising strategy using the nominaliser *-keu*. The preference for a post-verbal nominaliser shows some convergence with the most common Ao nominalisation strategy by suffixation. However, one main difference is that we do not find tone sandhi on verbs nominalised by *-keu* in Sumi, but we do in Mongsen Ao. Bruhn (2009) reports similar tone sandhi in verb nominalisation in Chungli Ao.

8.6 Summary of cross-linguistic comparison

This comparison of Sumi with neighbouring languages of Nagaland reveals a number of Sumi-specific features not typically found in neighbouring languages. These include: phonemic uvular stops; velar fricatives; simplified syllable structure; and little or no tone sandhi with nominal compounding.

There are some important phonological features that Sumi does not share with other languages of the Angami-Pochuri group. These include: phonemic diphthongs (found in Khezha and Kohima Angami); a default tone on nominal prefixes (found in Khezha); and extensive tone sandhi in nominal compounding. Other features that Sumi does not share with the Angami-Pochuri group, but does share with languages of the Ao group include: the absence of labio-dental affricates; stem-outward vowel harmony; simplification of syllable-initial clusters; a three-tone system; tone spreading to prefixes; and the use of an encliticising strategy to nominalise verbs.[148] However, given the current paucity of data, especially on Sangtam, it is difficult to conclusively attribute these features in Sumi to contact with languages of the Ao group.

Here, as in §6.5, it might be useful to consider Donegan and Stampe's (2004) work that attributes the different phonological and morphosyntactic profiles of the Munda and Mon-Khmer groups to differences in rhythm patterns. For instance, some Angami-Pochuri languages show evidence of having 'rising' or iambic word rhythms, resulting in features such as: diphthongisation; larger tone inventories; and a mainly prefixing strategy for verb nominalisation. The default /e/ vowel on prefixes in Khezha and Kohima Angami and the 'default' low tone on nominal prefixes in Khezha may also be evidence of this. In contrast, in the Ao languages and Sumi, we find features like: stem-outward vowel harmony; and a suffixing strategy for verb nominalisation. These may

[147] According to Coupe (2007), unaffixed verb stems in Mongsen Ao are default marked for past tense.

[148] It should also be noted that some languages of the Angami-Pochuri group do share some of these features: Mao show some stem-outward vowel harmony, and Khezha also has a three-tone system.

be evidence of 'falling' or trochaic word rhythms in these languages. Tone spreading from roots to prefixes may also constitute evidence for such rhythm patterns.

Consequently, if we accept Donegan and Stampe's proposal for Austro-Asiatic languages and apply it to the Angami-Pochuri and Ao languages of Nagaland, the features common to the Ao languages and Sumi would suggest that the biggest influence the former may have had on Sumi has been in the domain of *word rhythm*. Here, Sumi appears to have moved from a 'rising' or iambic rhythm to a 'falling' or trochaic rhythm under the influence of languages of the Ao group. This hypothesis is certainly worthy of further investigation, but it requires the urgent collection and analysis of much more data from the languages of the Angami-Pochuri and Ao groups, and Sangtam in particular.

In the next and final chapter, a summary of the findings of this study will be given, along with some discussion of areas that require further research.

9 *Concluding remarks*

9.1 Introduction

This work represents the first acoustic phonetic study of Sumi, and one of the first acoustic studies of a language of Nagaland. To conclude this description, a summary of the key findings of each chapter will be given, followed by some discussion of future areas of research.

9.2 Summary

9.2.1 Segmental phonology

Chapter 3 gave a description of the segmental phonology of Sumi, serving as an update to previous descriptions by Sreedhar (1976; 1980). The main difference is that this analysis includes the alveolar approximant phoneme /ɹ/ (§3.3.5) which is argued to be a recent borrowing that has become nativised in the language. This analysis also confirmed the existence of a number of features that are unusual within Nagaland, including a set of velar fricatives /x ɣ/ (§3.3.2) and uvular stops /q q^{h}/ (§3.3.1). Comparative evidence presented in Chapter 8 suggests that the velar fricatives developed from coronal rhotics (§8.2.1), while the uvular stops developed from velar stop plus rhotic clusters (§8.2.2).

Other segmental features to note include: a series of breathy nasals /$m^{ɦ}$ $n^{ɦ}$/ and a breathy lateral /$l^{ɦ}$/ that can occur both word-initially and word-medially, in addition to modal /m n l/. However, some speakers interpret word-medial /$m^{ɦ}$ $n^{ɦ}$/ as a sequence of /m/ and /h/, with a syllable boundary between the two segments (§3.3.4). Sumi also does not contrast alveolar and post-alveolar fricatives and affricates, with the alveolar variants only occuring before central vowels (§3.3.2).

The six-vowel inventory of Sumi, comprising /i e ɨ a u o/, is not unusual for the area (§3.5), but it should be noted that some other Angami-Pochuri languages, such as Kohima Angami and Khezha, have developed phonemic diphthongs, not present in Sumi (§8.2.5). Sumi also displays stem-outward vowel harmony onto certain prefixes and minor syllables (§3.6.1).

9.2.2 Phonotactics

In Chapter 4, it was shown that Sumi has a preference for open syllables (§4.2), like most other Angami-Pochuri languages (§8.3.1). However, closed syllables are possible in word-medial position due to vowel syncope and resyllabification (§4.5). Phonemic consonant clusters are not permitted in word-initial position in Sumi, although they are

found in other related languages (§8.3.2). Nouns in Sumi were also shown to be minimally disyllabic, while verbs are minimally monosyllabic (§4.4).

It was further argued that sesquisyllables, comprising a minor syllable followed by a full syllable, are relevant phonotactic units in Sumi. This is reflected in word minimality requirements for nouns and verbs (§4.4), as well as in differences in verb nominalisation, depending on the syllable structure of the verb (§7.3.2).

9.2.3 Tone phonology and phonetics

Chapters 5 and 6 examined Sumi tonal phonology in much greater depth than any previous work on Sumi, confirming previous analyses of three contrastive tones (§5.2) and providing an analysis of the syllable as the tone-bearing unit (§5.3). It also showed that all three tones can occur after all consonant phonemes and with all vowel phonemes in Sumi (§5.4). The three tones can occur in any combination in morphologically derived words, but there are only a certain number of tone melodies permitted on morphologically underived ones (§6.3). It was further shown that the high tone in Sumi is the most marked one (§6.4). Note that a three-tone system is not unusual for the languages of the area, although other Angami-Pochuri languages have been described as having 4 to 5 tones – it was suggested that contact with languages of the Ao group, which typically have 3 tones, may have influenced Sumi, although this is still a preliminary hypothesis (§8.4).

The phonetic realisation of these tones was examined in §5.5, with pitch, measured as F_0, found to be the primary acoustic correlate. Duration and phonation type were not found to correspond to any particular tone. A number of acoustic experiments looked at the phonetic variation in the realisation of these tones. It was found that prevocalic voiced and voiceless consonants had a lowering and raising effect of F_0, but the effect of voiceless aspirated stops was not as predictable (§5.6.2). Vowel intrinsic F_0 was found to be present in Sumi, but only for M and H tones, not L tone (§5.6.1). Finally, it was demonstrated that declination, or the general downward trend of F_0 across an intonational unit, only affected L tone and not M tone (§5.6.3).

9.2.4 Morphotonology

Chapter 6 examined prefixes in Sumi that could be analysed as being lexically unspecified for tone. Using an autosegmental framework, rules that assigned tones to these prefixes were posited: tone spreading rules were proposed for some noun roots, but a default L tone rule was necessary for noun roots specified for H tone (§6.2.3). However, a critique of this analysis suggested that these rules may represent historical changes in the language and not synchronically productive processes (§6.2.4).

Morphologically conditioned tone variation was investigated in Chapter 7. Here, we looked at tone sandhi accompanying verb nominalisation that affected monosyllabic and disyllabic verbs, but not sesquisyllabic ones (§7.3.2). Only a few instances of tone sandhi were noted in the formation of nominal compounds (§7.2) – this was found to be areally unusual (§8.5.1).

9.3 Significance of work and areas for future research

The task of describing and understanding the tone system of a language is a complex one, requiring an understanding of both the segmental phonology and phonotactics of the language, as well as a grasp of its morphology. Moreover, a diachronic perspective sometimes needs to be taken in order to account for synchronic tone rules and tone sandhi. This necessitates cross-linguistic comparisons with other related languages, provided data are available.

It is hoped that this descriptive work will form the basis for future research on other linguistic topics in Sumi, including the interaction between lexical tone and post-lexical intonation, as well as a more thorough morphological analysis of the language. More Sumi speakers will also need to be recorded in order to investigate inter-speaker variation.

At the larger level, it is hoped that further work on Sumi and the languages of Nagaland can contribute to our understanding of tone language typologies, both within the Tibeto-Burman family as well as the larger 'African' tone vs. 'East Asian' tone language dichotomy. More importantly, it will be necessary to consider the role of the word-level rhythm in the development and evolution of tone.

At the community level, it is hoped that this phonological description of Sumi, with its focus on lexical tone, will help foster a greater awareness and understanding of tone for the more learned members of the Sumi-speaking community and allow them to make more informed decisions as they continue to develop a practical orthography which distinguishes tonal minimal sets.

In general, much more descriptive work needs to be done for Sumi and for all the languages of Nagaland in the areas of phonetics, phonology, morphology and syntax. The urgent need for such work comes at a time when languages like English and Nagamese, the lingua franca of Nagaland, are gaining currency at the expense of speakers' home languages. This author's personal wish is that projects such as this one will spark an interest in younger Sumis to document and study their own language.

Appendix A: Word list

Note that the orthography used largely reflects the author's own working orthography, and not the one currently used by the Sumi Literature Board.

Word	Gloss	Tone Melody	Speaker	
			IZ	JA
a-a	place	LL	✓	
aba	dung, stool	LL	✓	
abeghi / abighi	shoulder	LLL	✓	
aboshi / aboshu	long mortar	MMM	✓	
acheku	corner	LLL	✓	✓
achhophe	broom	MMM	✓	✓
ado	time	LL	✓	
afo	elder sister	HL	✓	✓
aghau	bird	MML	✓	✓
aghaumhi	bird feather	MMLL	✓	
aghi	bone	LL	✓	
aghiba	rattan	LLH	✓	
aghibo	paddy (plant)	LLL	✓	
aghime	hardship	MMM	✓	
aghiyi	thatch	LLH	✓	✓
aghoki	bridge	LLL	✓	
aghüma	manure	LLL	✓	
aghungu	spirit	LLH	✓	
agi	face	MH	✓	✓
ahu	measuring scale	LH	✓	
ahu	tooth	MM	✓	
ahukikha	door	MMLM	✓	
a-i	arum lily	LL	✓	
ainba	mud	MML	✓	
aje	name	MM	✓	✓
aji	blood	LL	✓	✓
ajukhu / ajikhu	cup	MMM	✓	✓
akengu	white ash	LLH	✓	
akhabo	fish pond	LLM	✓	✓
akhaubo	bamboo plant	LLLL	✓	✓
akhi	bee	MM	✓	
akhonhe	knee	LLL	✓	✓
akhosa	cat	MMM	✓	✓

akhumu	large pestle	LLH	✓	
aki	house	LL	✓	
akicheku	corner of room	LLLL	✓	
akicheku	corner of room	LLL	✓	
akichhi	breast	LLM	✓	✓
akichhi	full	MMH	✓	
akichhibo	wing	LLHH	✓	✓
akichhiqho	armpit	LLHH	✓	
akichhizü	milk	LLMH	✓	✓
akichi	mouth	LLH	✓	✓
akighi	rope	MMH	✓	
akihe	writing	MMH	✓	
akimi	husband	LLL	✓	
akini	ear	LLH	✓	✓
akiphimi	student	LLLH	✓	
akipi	speaking	MMH	✓	
akipiti	act of burning	MMM	✓	
akipitiu	the man	LLLLL		✓
akishe	forehead	MMM	✓	✓
akithimi	deceased person	LLLH	✓	
akive	stomach	LLH	✓	
akiye	writing	MMH	✓	
aküba	defecating	MMH	✓	
akughoki	throat	LLLL	✓	
akuhu	plant root	LLH	✓	
aküka	power	LLH	✓	
akulho	curry; dish	LLH	✓	
akulho	fatigue	LLL	✓	
akulho	insect larvae	MMH	✓	
akülü	warmth	LLH	✓	
akümla	bubble	LLM	✓	
akümla	work	LLL	✓	
akuo	neck	LMH	✓	
akuphu	searching	MMH	✓	
akupo	running	LLL	✓	
akupu	bloom	LLH	✓	
akupu	bridge	LLH	✓	
akuqho	lid	MMM	✓	
aküsau	the friend	LLLL	✓	
aküsü	pain	LLL	✓	
akütsü	black	LLL	✓	✓
akütsü	head	LLM	✓	✓

akütsü	rotten	LLH	✓	✓
ala	path	LL	✓	✓
alaghi	road	LLH	✓	
alakhü	bench	MMM	✓	
ale	song	LL	✓	
alekiphe	singing	LLMH	✓	
alha	layer	LL	✓	✓
alhache	ant	MMH	✓	✓
alhi	business transaction	LL		✓
ali	pot	LL	✓	✓
alikhuliki	kitchen	LLMHL	✓	
alimhi	soot	LLH	✓	
alo	good	MM	✓	
aloshi	liver	MML	✓	
alothi	seed	MML	✓	
alu	field	LL	✓	✓
ama	son-in-law	LL	✓	
amakishiu	son-in-law	LLLMH	✓	
amhi / amihi	hair; feathers	LL	✓	✓
ami	fire	LL	✓	✓
ami	housefly	LH	✓	
amili	tongue	LLH	✓	✓
amishi	cow	LLL	✓	
amiti	salt	LLM	✓	✓
amitti	saliva	LLH	✓	✓
amiyi	charcoal	LLL	✓	
amiyi	housefly	LLH		✓
amkhu	crumbs	MMM	✓	
amkhü	chin	LLL	✓	
amla	chest	LLL	✓	✓
amlhü	wind	MMM	✓	
amlo	heart	LLH	✓	
ampe	year	LLL	✓	
amqa	lower back	LLL	✓	
amqha	loft	LLH	✓	
amtsü	lips	LLL	✓	
amu	older brother	LH	✓	✓
amukishiu	daughter-in-law	LHLMH	✓	
amülhü	wind	MMM	✓	
ana	cooked rice	LL	✓	✓
anathi	banana	LHM	✓	
anga	baby / daughter	MH	✓	✓

angazüa	cradle	MHLL	✓	
anha / anaha	snot	LL	✓	✓
ani	aunt	MM	✓	
anipu	wife	LLL	✓	
anu	son	MM	✓	
aphi	body	MM	✓	
aphi	clothes	LL	✓	
aphitsü	ankle	LLH	✓	
aphu	village	LL	✓	
apinedo	week	LLLL	✓	
apite	calf muscle	LLH	✓	
apiti	sharpening stone	LLM	✓	
apiti	sowing seed	LLL	✓	
apo	belly	LL	✓	
appu	son	LH	✓	✓
apu	dipper, water scoop	MM	✓	✓
apuh	father	LL	✓	✓
apuh	mushroom	LL	✓	✓
apukhuki	short mortar	LMMH	✓	
apumi	young man	MML	✓	
aqhi	moon	LL	✓	✓
aqho	brain	LL	✓	✓
aqhou	below	MMM	✓	
aqo	pit	LL	✓	✓
aqü	bone marrow	LL	✓	✓
asa	colony / suburb	LH	✓	
asa	hair	LL	✓	
asa	nose bridge	MM	✓	
asa	portion of meat	MM	✓	
asamo	dream	LLL	✓	
ashi	meat	LL	✓	
ashomi	tail	LLL	✓	
asü	wood	LL	✓	
asübo	tree	LLL	✓	
asülo	wood chips	LLL	✓	
asüna	millet grain	MML	✓	
asütsakithe	news	MMMLH	✓	
athikishi	uncooked rice	LLLM	✓	
athonhe	tortoise	MMM	✓	
athuthu	steam	MMM	✓	
atoqhe	lizard	MMM	✓	
atotiu	the woman	MMHL		✓

atsünhüzü	sweat	LLLL	✓	
atsütsü	sky	MMH	✓	
atutu	long yam	LLL	✓	
au	hand	MM	✓	✓
aulothi	finger	MMLL	✓	
aumlo	forearm	MMLH	✓	
avelau	afternoon	LLLM	✓	
avi	mithun	MM	✓	
avü	ice	MM	✓	
avütsa	frost	MMMM	✓	
awo	pig	LL	✓	✓
awoki	hog house	LLL	✓	
awoshi	pork	LLL	✓	
awoti	piglet	LLL	✓	
awu	chicken	LL	✓	✓
awucho	banana	MMM	✓	✓
awudu	rooster	LLH	✓	
awukhu	chicken egg	LLM	✓	✓
awuki	chicken house	LLL	✓	
axine	sin	LLH	✓	
axone	fermented soya beans	LHL	✓	✓
ayeghi	earth	MMH	✓	
ayepu	star	MMM	✓	
ayikhu	egg	LLM	✓	
ayikhu	soya bean	LLH	✓	✓
aza	command	LL	✓	
aza	mother	LH	✓	✓
azü	water	LL	✓	
azü-a	bed	LLL	✓	✓
azübo	bedroom	LLL	✓	
azübo	water bottle	LLM	✓	
ba	to defecate	L	✓	
bidi	four	LH	✓	
chhe	slide	L	✓	
ghajuku	yam leaf	LML	✓	
heqhi	to kill	LM	✓	
hukuthu	origin	MMH	✓	
i-a	my place	LL	✓	
ifo	my older sister	HL	✓	
ikujo	we two	LLH ~ LMH	✓	
imili	my tongue	LLH	✓	✓
imiti	my salt	LLM		✓

imla	my chest	LLL	✓	✓
imu	my older brother	LH		✓
inaqhe	morning	LLM	✓	
itimi	child	MHL	✓	
iwucho	my banana	MMM		✓
kaku	book	LH	✓	✓
kakukiphi	studying	LHLH	✓	
khaumi	mosquito	LLH	✓	
khetsünhe	sun	LHL	✓	✓
khurshi	horse	LL	✓	
kighinoli	innards	LLMH	✓	
kimiyemitsa	English language	LLLHL	✓	
kini	two	MM	✓	
kipitimi	man	LLLL	✓	
küla	to marry	LL	✓	
küpükami	thief	MMML	✓	
küthü	three	LH	✓	
lakhi	one	MH	✓	
lhidi	business	LL		✓
lhothemi	youth	MML	✓	
limili	her tongue	HLH		✓
limiti	her salt	HLM		✓
limla	her chest	HLL		✓
masakepu	obligation	MLMH	✓	
meshomheghi	culture	LLMM	✓	
minhe	gnaw, chew	MH	✓	
mla	to foam	LM	✓	
mlah	to work	LL	✓	
mlla	to be easy	MH	✓	
muku	twenty	LH	✓	
mülhü	blow	LH	✓	
murasü	snow	LHH	✓	
omili	your tongue	LLH	✓	✓
omiti	your salt	LLM		✓
omla	your chest	LLL	✓	✓
omu	your older brother	LH		✓
pamili	his tongue	LLH	✓	✓
pamiti	his salt	LLM		✓
pamla	his chest	LLL	✓	✓
phu	to search	L	✓	
pi	to speak	L	✓	
piti	to burn	MM	✓	

piti	to give birth	MH	✓	
puthomta	middle of night	LHLM / MMMM	✓	
shikipivimi	doctor	MLLMH	✓	
shikipiviu	the doctor	MLLMH	✓	
shikükau	the teacher	LLMH	✓	
shoghethi	leaf used as soap	LLM	✓	
sü	to hurt	L	✓	
Sümi	Sumi	ML	✓	
Sümitsa	Sumi language	MLL	✓	
totimi	woman	MHL	✓	
tsütsüghu	rain	MML	✓	
tüghashi	wild animal	LLH	✓	
ye	to write	L	✓	

Appendix B: Tone comparison chart

Syll	Word	Gloss	Tone	POS
1	*pi*	say	L	*v*
	sü	hurt	L	*v*
	ngo	and	L	*conj*
	ju	look at	M	*v*
	lho	create	M	*v*
	pa	he	M	*pron*
	li	she	H	*pron*
2	*aki*	house	LL	*n*
	aphu	village	LL	*n*
	timi	person	LL	*n*
	sasü	with	LM	*postp*
	niye	I	LM	*pron*
	ghili	about	LM	*adv*
	appu	son	LH	*n*
	aza	mother	LH	*n*
	eno	and	ML	*conj*
	shiphe	create	ML	*v*
	aje	name	MM	*n*
	kini	two	MM	*num*
	khani	sometimes	MM	*adv*
	anga	child	MH	*n*
	lakhi	one	MH	*num*
	afo	older sister	HL	*n*

	vilo	to	HM	*post*
	linga	her child	HH	*n*
3	*asamo*	dream	LLL	*n*
	akimi	husband	LLL	*n*
	aküghü	big leaf	LLM	*n*
	shoghethi	soap	LLM	*n*
	aküka	power	LLH	*n*
	tüghashi	wild animal	LLH	*n*
	ithulu	look for	LML	*v*
	ghajuku	yam leaf	LML	*n*
	bepesü	cook.take	LMM	*v*
	achuka	kitchen	LMM	*n*
	akchhizü	milk	LMH	*n*
	axone	fermented soya beans	LHL	*n*
	khetsünhe	sun	LHL	*n*
	anathi	banana	LHM	*n*
	ghenguno	for, because of	LHM	*post*
	murasü	snow	LHH	*n*
	zümüxa	rotate	MLL	*v*
	lhochuphe	start to cook	MLL	*v*
	nitsülo	Give (it) to us	MLM	
	khochile	answer	MLH	*v*
	ikhone	short	MLH	*adj*

	lhothemi	youth	MML	*n*
	alothi	seed	MML	*n*
	achhophe	broom	MMM	*n*
	akhosa	cat	MMM	*n*
	ayeghi	land	MMH	*n*
	apukhu	leg	MMH	*n*
	totimi	woman	MHL	*n*
	panongu	they	MHL	*pron*
	ighono	very	MHM	*adv*
	ikemu	despite this	MHH	*conj*
	afono	older sister + no	HLL	*n*
	süveno	put and…	HML	*v*
	khijehi	How much?	HMM	
	kutomo	a lot	HHL	*adv*

References

Acharya, K. P. (1983). *Lotha grammar*. Mysore: Central Institute of Indian Languages.

Basumatary, Phukan. (2005). *An introduction to the Boro language*. New Delhi: Mittal Publications.

Beckman, Mary E. (1986). *Stress and non-stress accent*. Dordrecht: Walter de Gruyter.

Beckman, Mary E. & Jennifer J. Venditti. (2012). Tone and intonation. In William Hardcastle (Ed.), *Handbook of phonetic sciences* (2nd edition) (pp. 603-652). Malden, MA: Blackwell Publishers.

Bielenberg, Brian & Zhalie Nienu. (2001). Chokri (Phek dialect): phonetics and phonology. *Linguistics of the Tibeto-Burman Area,* 24(2): 85-122.

Blankenship, Barbara, Peter Ladefoged, Peri Bhaskararo & Nichumeno Chase. (1993). Phonetic structures of Khonoma Angami. *Linguistics of the Tibeto-Burman Area*, 16(2): 69-88.

Boersma, Paul, & David Weenink. (2009). Praat: doing phonetics by computer (Version 5.1.22) [Computer program]. from http://www.praat.org/

Bouchery, Pascal & Lemlila Sangtam. (2012). The Kinship Terminology of the Sangtam Nagas. *European bulletin of Himalayan research* 41: 9-29.

Bradley, David. (1997). Tibeto-Burman languages and classification. In David Bradley (Ed.), *Papers in Southeast Asian linguistics No. 14: Tibeto-Burman languages of the Himalayas* (pp. 1-64). Canberra: Pacific Linguistics.

Bruhn, Daniel. (2009). The tonal classification of Chungli Ao verbs. *UC Berkeley Phonology Lab Annual Report (2009)*. Retrieved 19 August 2009, from http://www.linguistics.berkeley.edu/phonlab/annual_report/documents/2009/dwbruhn_Ao-paper_UC-PhonLab.pdf

Burling, Robbins. (2003). The Tibeto-Burman languages of Northeastern India. In Graham Thurgood & Randy LaPolla (Eds.), *The Sino-Tibetan Languages* (pp. 169-191). London: Routledge.

Cassidy, Steve, & Jonathan Harrington. (2001). Multi-level annotation in the EMU speech database management system. *Speech communication,* 33: 61-77.

Chambers, Jack K. & Peter Trudgill. (1998). *Dialectology*. Cambridge: Cambridge University Press.

Chao, Yuen Ren. (1980). A system of tone-letters. *Fangyan*, 2: 81-82. (Original work published 1930).

Chelliah, Shobhana. (1997). *A grammar of Meithei*. Berlin; New York: Mouton de Gruyter.

Chen, Matthew Y. (2000). *Tone sandhi: patterns across Chinese dialects*. Cambridge: Cambridge University Press.

Collier, Rene. (1974). *Laryngeal muscle activity, subglottal air pressure, and the control of pitch in speech*. Haskins Laboratory Status Report on Speech Research, 137-170.

Connell, Bruce. (2001). *Downdrift, downstep, and declination*. Paper presented at *Typology of African Prosodic Systems Workshop*. Retrieved 29 October 2009, from http://www.spectrum.uni-bielefeld.de/TAPS/Connell.pdf.

Connell, Bruce. (2002). Tone languages and the universality of intrinsic F_0: evidence from Africa. *Journal of phonetics*, 30: 101-129.

Coupe, Alexander. (2003). *A phonetic and phonological description of Ao: a Tibeto-Burman language of Nagaland, North-east India*. Canberra: Pacific Linguistics.

Coupe, Alexander. (2007). *A grammar of Mongsen Ao*. Berlin; New York: Mouton de Gruyter.

Donegan, Patricia & Stampe, David. (2004). Rhythm and the synthetic drift of Munda. *The yearbook of South Asian languages and linguistics*, 2004, 3-36.

Donohue, Mark. (2003). The tonal system of Skou, New Guinea. In Shigeki Kaji (Ed.), *Proceedings of the symposium on cross-linguistic studies of tonal phenomena: historical development, phonetics of tone, and descriptive studies* (pp. 329-365). Tokyo: Research Institute for Languages and Cultures of Asia and Africa, Tokyo University of Foreign Studies.

Donohue, Mark. (2005). Tone and the Trans New Guinea languages. In Shigeki Kaji (Ed.), *Proceedings of the symposium "Cross-linguistic studies of tonal phenomena: tonogenesis, Japanese accentology, and other topics"* (pp. 33–53). Tokyo: Tokyo University of Foreign Studies, Institute for the Study of Languages and Cultures of Asia and Africa.

Giridhar, Puttushetra Puttuswamy. (1980). *Angami grammar*. Mysore: Central Institute of Indian Languages.

Giridhar, Puttushetra Puttuswamy. (1987). *Angami-English-Hindi dictionary*. Mysore: Central Institute of Indian Languages.

Giridhar, Puttushetra Puttuswamy. (1994). *Mao Naga grammar*. Mysore: Central Institute of Indian Languages.

Goldsmith, John. (1979). The aims of autosegmental phonology. In Daniel A. Dinnsen (Ed.), *Current approaches to phonological theory* (pp. 202-222). Bloomington: Indiana University Press.

Gordon, Matthew. (2003). Collecting phonetic data on endangered languages. In Sarah Hawkins (Ed.), *Proceedings of the 15th International Congress of Phonetic Sciences* (pp. 207-210). Barcelona.

Green, Antony Dubach. (2005). Word, foot, and syllable structure in Burmese. In Justin Watkins (Ed.), *Studies in Burmese linguistics* (pp. 1-25). Canberra: Pacific Linguistics.

Grierson, George A. (Ed.). (1967). *Linguistic survey of India* (Vol. 3, Part 2). Delhi: Motilal Banarsidass. (Original work published 1903-1928).

Gruessner, Karl-Heinz. (1978). *Arleng Alam, die Sprache der Mikir: Grammatik und Texte*. Wiesbaden, Franz Steiner Verlag.

Gussenhoven, Carlos. (2004). *The phonology of tone and intonation*. New York: Cambridge University Press.

Haden, Ernest F. (1955). The Uvular /r/ in French. *Language*, 31: 504-510.

Hajek, John. (2006). On doubly articulated labial-velar stops and nasals in Tibeto-Burman. *Linguistics of the Tibeto-Burman Area,* 29(2): 123-132.

Harrington, Jonathan. (2010). *Phonetic analysis of speech corpora.* Wiley-Blackwell.

Harris, Thomas. C. (2009). Breathy nasals in Sumi. Unpublished Honours Thesis. University of Melbourne, Melbourne.

Haudricourt, André-Georges. (1954). De l'origine des tons en vietnamien. *Journal Asiatique*, 242: 69-82.

Hellmuth, Chris, Tom Myers & Alexander Nakhimovsky. (2006). The Linguist's Toolbox and XML Technologies. In *Proceedings of the EMELD'06 Workshop on Digital Language Documentation: Tools and Standards: The State of the Art.* 20-22 June 2006. Lansing, MI.

Hildebrandt, Kristine. (2007). Tone in Bodish languages: typological and sociolinguistic contributions. In Matti Miestamo & Bernhard Wälchli (Eds.), *New challenges in typology* (pp. 77-100). Berlin: Mouton de Gruyter.

Hombert, Jean-Marie. (1974). Universals of downdrift: their phonetic basis and significance for a theory of tone. In William R. Leben (Ed.), *Proceedings of the 5th Annual Conference on African Linguistics* (pp. 169-183). Stanford University, California.

Hombert, Jean-Marie. (1978). Consonant types, vowel, quality and tone. In Victoria A. Fromkin (Ed.), *Tone: a linguistic survey* (pp. 77-111). New York: Academic Press.

Hussain, Sarmad. (1997). Phonetic Correlates of Lexical Stress in Urdu. Unpublished Dissertation. Northwestern University, Evanston.

Hutton, John H. (1968). *The Sema Nagas*. London: Oxford University Press. (Original work published 1921).

Hutton, John H. (1969). *The Angami Nagas; with some notes on neighbouring tribes*. Bombay: Indian Branch, Oxford University Press. (Original work published 1921).

Hyman, Larry. (2006). Word-prosodic typology. *Phonology*, 23: 225-257.

Hyman, Larry. (2007). Kuki-Thaadow: an African tone system in Southeast Asia. *UC Berkeley Phonology Lab Annual Report (2007).* Retrieved 8 October 2009, from http://linguistics.berkeley.edu/phonlab/annual_report/documents/2007/Hyman_KT_Tone_PL_Annual.pdf

Hyman, Larry. (2009). How (not) to do phonological typology: the case of pitch-accent. *Language sciences*, 31(2): 213-238.

Hyman, Larry. (2010) How to study a tone language, with exemplification from Oku (Grassfields Bantu, Cameroon). *UC Berkeley Phonology Lab Annual Report (2010)*, 179-209.

Hyslop, Gwendolyn. (2009). Kurtöp Tone: a tonogenetic case study. *Lingua,* 119: 827-845.

Jacques, Guillaume. (2012). From denominal derivation to incorporation. *Lingua*, 122: 1207-1231.

Joseph, Umbavu Varghese. (2007). *Rabha* (Vol. 5). Leiden: Brill Academic Publishers.

Kapfo, Kedutso. (1989). Tones in Khezha noun constructions. *Linguistics of the Tibeto-Burman Area,* 12(2): 67-78.

Kapfo, Kedutso. (2005). *The ethnology of the Khezhas and the Khezha grammar*. Mysore: Central Institute of Indian Languages.

Kapfo, Kedutso. (2007). *Kuzhale-Chahale dikshüneri (Khezha-English dictionary)*. Mysore: Central Institute of Indian Languages.

Kingston, John. (2005). The phonetics of Athabaskan tonogenesis. In Sharon Hargus & Keren Rice (Eds.), *Athabaskan prosody*. Amsterdam: John Benjamins.

Kingston, John. (2011). Tonogenesis. In Marc van Oostendorp, Colin J. Ewen, Elizabeth Hume & Keren Rice (Eds.), *The Blackwell companion to phonology* (pp. 2304-2333). Malden, Mass: Wiley-Blackwell.

Kiparsky, Paul. (2002). Syllables and moras in Arabic. In Caroline Féry & Ruben van de Vijver (Eds.), *The syllable in optimality theory* (pp. 1-31). Cambridge: Cambridge University Press.

Klatt, Dennis H. (1973). Discrimination of fundamental frequency contours in synthetic speech: implications for models of pitch perception. *Journal of the Acoustical Society of America,* 53(1): 8-16.

Kuolie, D. (2006). *Structural description of Tenyidie: a Tibeto-Burman language of Nagaland*. Kohima: Ura Academy Publication Division.

Laniran, Yetunde Ọ. (1993). Intonation in tone languages: the phonetic implementation of tones in Yoruba. PhD Dissertation. Cornell University, Department of Modern Languages and Linguistics.

Laniran, Yetunde Ọ. & George N. Clements. (2003). Downstep and high raising: interacting factors in Yoruba tone production. *Journal of phonetics*, 31(2), 203-250.

LaPolla, Randy. (2008). Nominalization in Rawang. *Linguistics of the Tibeto-Burman Area*, 31(2): 45-66.

LaPolla, Randy & Chenglong Huang. (2003). *A Grammar of Qiang with annotated texts and glossary*. Berlin: Mouton de Gruyter.

Lewis, M. Paul, Gary F. Simons & Charles D. Fennig (Eds.). (2013). *Ethnologue: languages of the world* (17th edition). Dallas, Texas: SIL International. (Online version: http://www.ethnologue.com/)

Maddieson, Ian. (1978). Universals of tone. In Joseph H. Greenberg, Charles A. Ferguson & Edith A. Moravcsik (Eds.), *Universals of human language: phonology* (pp. 335-365). Stanford, California: Stanford University Press.

Maddieson, Ian. (2001). Phonetic fieldwork. In Paul Newman and Martha Ratliff (Eds.), *Linguistic fieldwork* (pp. 211-229). Cambridge: Cambridge University Press.

Maddieson, Ian. (2005). Voicing and gaps in plosive systems. In Martin Haspelmath, Matthew S. Dryer, David Gil & Bernard Comrie (Eds.), *The world atlas of language structures* (pp. 26-29). Oxford: Oxford University Press.

Marrison, Geoffrey. E. (1967). The classification of the Tibeto-Burman languages of Nagaland of North-East India. Volume I (Text) and Volume II (Appendices). Unpublished PhD dissertation. School of Oriental and African Studies, University of London.

Matisoff, James A. (1970). Glottal dissimilation and the Lahu high-rising tone: a tonogenetic case-study. *Journal of the American Oriental Society*, 90(1): 13-44.

Matisoff, James A. (1973a). *The grammar of Lahu*. Berkeley; Los Angeles: University of California Press.

Matisoff, James A. (1973b). Tonogenesis in Southeast Asia. In Larry Hyman (Ed.), *Consonant types and tone (Southern California Occasional Papers in Linguistics 1)* (pp. 71-95). Los Angeles: University of Southern California.

Matisoff, James A. (1994). Protean prosodies: Alfons Weidert's Tibeto-Burman tonology. *Journal of the American Oriental Society*, 114(2): 254-258.

Matisoff, James A. (2003). *Handbook of Proto-Tibeto-Burman: system and philosophy of Sino-Tibetan reconstruction*. Berkeley: University of California Press.

Mazaudon, Martine. (1977). Tibeto-Burman tonogenetics. *Linguistics of the Tibeto-Burman Area*, 3(2): 1-123.

Mazaudon, Martine. (2003). Tamang. In Graham Thurgood & Randy LaPolla (Eds.), *The Sino-Tibetan Languages* (pp. 291-314). London: Routledge.

Mazaudon, Martine, & Michaud, Alexis. (2008). Tonal contrasts and initial consonants: a case study of Tamang, a 'missing link' in tonogenesis. *Phonetica*, 65: 231-256.

Monsen, Randall B. & A. Maynard Engebretson. (1977). Study of variations in the male and female glottal wave. *Journal of the Acoustical Society of America*, 62: 981-993.

Morey, Stephen. (2005). The tone and syllable structure of Turung. In Paul Sidwell (Ed.), *SEALS XV - Papers from the 15th annual meeting of the Southeast Asian Linguistics Society* (pp. 149-168). Canberra: Pacific Linguistics (Electronic Publication E1).

Ohala, John J. (1983). Cross-language use of pitch: an ethological view. *Phonetica*, 40: 1-18.

Okell, John. (1969). *A reference grammar of colloquial Burmese*. London: Oxford University Press.

Pike, Kenneth. (1947). *Phonemics: a technique for reducing languages to writing*. Ann Arbor: University of Michigan Press.

Pike, Kenneth. (1948). *Tone languages: a technique for determining the number and type of pitch contrasts in a language, with studies in tonemic substitution and fusion*. Ann Arbor: University of Michigan Press.

Pittayaporn, Pittayawat. (2007). Directionality of tone change. In Jürgen Trouvain & William J. Barry (Eds.), *Proceedings of the 16th International Congress of*

Phonetic Sciences (ICPhS XVI) (pp. 1421-24). Saarbrücken, Germany: Saarland University.

Pulleyblank, Douglas. (1986). *Tone in lexical phonology*. Dordrecht: D. Reidel.

Remijsen, Bert. (2002a). Word-prosodic systems of Raja Ampat languages. PhD dissertation. Leiden University. LOT Dissertation Series vol. 49.

Remijsen, Bert. (2002b). Lexically contrastive stress accent and lexical tone in Ma'ya. In Carlos Gussenhoven & Natasha Warner (Eds.), *Laboratory phonology* 7 (pp. 585-614). Mouton de Gruyter.

Remijsen, Bert & Vincent J. van Heuven. (2005). Stress, tone and discourse prominence in the Curaçao dialect of Papiamentu. *Phonology,* 22(2): 205-235.

Rhodes, Russell. (2009). Lexical Tone in Chungli Ao. Unpublished ms. UC Berkeley.

Rietveld, A. C. M. & Carlos Gussenhoven. (1985). On the relation between pitch excursion size and prominence. *Journal of phonetics,* 13: 299-308.

Rose, Phil. (1987). Considerations in the normalisation of the fundamental frequency of linguistic tone. *Speech communication,* 6(4): 343–352.

Ross, Malcolm. (2010). A preliminary analysis of East Kewa Tone. In Kenneth A. McElhanon & Ger Reesink (Eds.), *A Mosaic of languages and cultures: studies celebrating the career of Karl J. Franklin* (pp. 294-309). SIL e-Books, 19. Dallas: SIL International. Retrieved 15 June 2013, from http://www.sil.org/silepubs/abstract.asp?id=52526

Sema, I. Lozhevi. (1993). *Sümi tsashe (Sema Anglo dictionary)* (1st ed.). Zunheboto, Nagaland: Sema Literature Board.

Sreedhar, Mangadan Veetil. (1976). *Sema phonetic reader*. Mysore: Central Institute of Indian Languages.

Sreedhar, Mangadan Veetil. (1980). *A Sema grammar*. Mysore: Central Institute of Indian Languages.

Swu, Scato & Yepthomi, Hokishe. (2004). *Anglo-Sümi Tsashe (Anglo-Sumi dictionary)* (2nd ed.): Scato Swu & Hokishe Yepthomi.

Temsunungsang, T. (2008). Tonality and the analysis of sub-minimal words in Ao. In Stephen Morey & Mark W. Post (Eds.), *North East Indian Linguistics. Volume 1*. (pp. 45-64). New Delhi: Cambridge University Press India.

Teo, Amos. (2012). Illustrations of the IPA: Sumi (Sema). *Journal of the International Phonetic Association*, 42(3), 365-373.

Teo, Amos. (2013). Deverbal nominals in Sumi. In Gwendolyn Hyslop, Stephen Morey & Mark W. Post. (Eds.), *North East Indian Linguistics. Volume 5.* (pp 192-209). Delhi: Cambridge University Press / Foundation.

Thurgood, Graham. (2002). Vietnamese and tonogenesis: revising the model and the analysis. *Diachronica,* 19(2): 333-363.

Voorhoeve, Jan. (1973). Safwa as a restricted tone system. *Studies in African Linguistics,* 4: 1-22.

Weidert, Alfons. (1987). *Tibeto-Burman typology: a comparative account*. Philadelphia: John Benjamins.

Whalen, Douglas H. & Andrea G. Levitt. (1995). The universality of intrinsic F_0. *Journal of phonetics*, 23: 349-366.

Xu, Yi, & Q. Emily Wang. (2001). Pitch targets and their realization: evidence from Mandarin Chinese. *Speech communication*, 33: 319-337.

Xu, Yi, & Ching X. Xu. (2003). Effects of consonant aspiration on Mandarin tones. *Journal of the International Phonetic Association*, 33(2): 165-181.

Yang, Cathryn. (2010). Tone change in Lalo. In Yvonne Treis & Rik De Busser (Eds.), *Selected Papers from the 2009 Conference of the Australian Linguistic Society*. Retrieved 20 April 2013, from: http://www.als.asn.au

Yip, Moira. (1989). Contour tones. *Phonology* 6: 149-174.

Yip, Moira. (2002). *Tone*. Cambridge: Cambridge University Press.