

# Segmental and Non-Segmental Phonology of Kūnámá

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## ABSTRACT

This dissertation presents the descriptions of the segmental and non-segmental phonology of Kunama, a Nilo-Saharan dialect cluster spoken in Western Eritrea and Northern Ethiopia. It also provides an annotated multimedia corpus of the names and description of the Kunama cultural artifacts. The study uses primary data recorded from speakers of the Kunama Shukre dialect, spoken by an isolated minority group living in Tahtay Addi Yabo Woreda of Northwestern Zone of the Tigray Regional State, Ethiopia. The data was collected in three-round fieldworks in a period of two years (2014-15). The study has applied both impressionistic and instrumental analyses methods.

The segmental phonology part covers the description of consonant and vowel sounds, phonotactics and syllable structure, phonological and morphophonological process and phonological adaptation of loanwords. Kunama (Shukre) has 18 consonant phonemes, whereas, the glottal fricative /h/ consonant, which has previously been proposed as the 19<sup>th</sup> consonant phoneme of Kunama, is found to be marginal. Two labialized velar consonants are attested to be the allophonic variants of the basic velar phonemes. The language has five phonemic vowels with an equal number of longer counterparts. The schwa and the central high-close vowel have a phonetic status despite that they are frequent. The analysis of phonotactics and syllable structure shows that the language has a richer and moderately complex inventory of syllable shapes. The productive and the most frequent consonant clusters (CC) follow sonorant-obstruent pattern, in which the prenasalized sequences (Nasal-Obstruent) are the commonest of all. Clusters and geminates occur only word-medially, so more than one consonant is severely marked, word-initially while three consonant sequences (CCC) are disallowed. Typologically, Kunama syllables are specified as light-open, heavy-open, light-closed and heavy-closed structures. Syllable weight specification is based on the mora count in the rhyme constituents of a syllable. Kunama light syllables are mono-moraic, i.e. having either a short vowel or a short vowel with a non-sonorant coda; whereas, the heavy syllables are bi-moraic having a long vowel, a diphthong, or a short vowel with a sonorant coda. A (C) V (C) template that makes an obligatory nucleus and optional margins, therefore,

represents the Kunama basic syllable structures. While CV syllable is the unmarked structure, closed syllables (VC and CVC) are constrained word-finally. The morphophonemic processes comprise of terminal vowel deletion, vowel and glide epenthesis, glide formation, vowel rounding assimilation, gemination and degemination. Post-lexical alterations may cause constraint violations and necessitate resyllabification as such some constraints that operate on non-derived lexical items may not diametrically encode onto derivations. The analysis of phonological adaptation of loanwords explores the adjustment of word shapes and the mapping of sound segments of borrowed terms. Accordingly, consonant final loanwords are adapted with epenthesis of the nominal vowel suffix [a], and sound segments are adapted via substitution, deletion and retention strategies. The vowel adaptation is asymmetrical as both phonetically and phonologically grounded changes have been observed; nonetheless, the consonant adaptation is phonologically grounded.

The non-segmental phonology part covers the analyses of gemination, vowel length and tone, in the lexicon and in the grammar. Kunama is a tone language with quantity contrast of vowel and consonant length. It has three phonemic tone levels (High, Mid and Low) that combine in nine ways on the surface of bi-moraic syllables and on sequences of two light syllables. These level combinations are claimed to be the basic melodies of the language. Complex (polysyllabic) contour melodies that combine simple rises and falls are attested on polysyllabic words. The study attempts to show the importance of pitch scaling in Kunama tone production as such it proposes a four-point pitch height scale in the tonal space of three distinctive level heights. The F0 scaling splits the high tone into extra-high and high pitches though no evidence shows the prominence of the former in underlying contrast. Tone plays a grammatical role as well, and it marks number of the possessor, in a range of possessive constructions, and number of person object in verbs. It also identifies inclusive vs. exclusive possessor, copula vs. genitive, and used as an intensifier morpheme on adjectives in attributive function. The salient tonal processes in Kunama are triggered by morpheme boundary phenomena. These include spreading and floating of tones, re-linking of floating tones, high tone shifting and docking, contour formation, tone assimilation and a low tone terrace.

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## ABBREVIATIONS

1	First person	AO	Aorist
2	Second person	NP	Nominal phrase
3	Third person	AUG	Augmentative
SG	Singular	DEF	Definitive
PL	Plural	INSR	Instrumentalizer
DL	Dual	LOCT	Locative
INCL	Inclusive	DIMN	Diminutive
EXCL	Exclusive	MASC	Masculine gender
OBJ	Object	FRQ	Frequentative
CAS	Case	EPN	Epenthetic
NOM	Nominal, nominalizer	GEPN	Glide epenthesis
NEG	Negative	ADJLZR	Adjectivalizer
POSS	Possessive	INTR	Intrusive
VRL	Verbalizer	QNT	Quantifier
FEM	Feminine gender	PR	Present

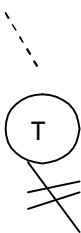
### Abbreviations used in tables

**S**=speaker; **T**=token; **L**=left; **R**=right; **M**=medial; **VD**=vowel duration; **SD**=standard deviation

**n**=number of tokens/repetitions; **Mn**=minimum; **Mx**=maximum; **ms**=millisecond; **Hz**=herz

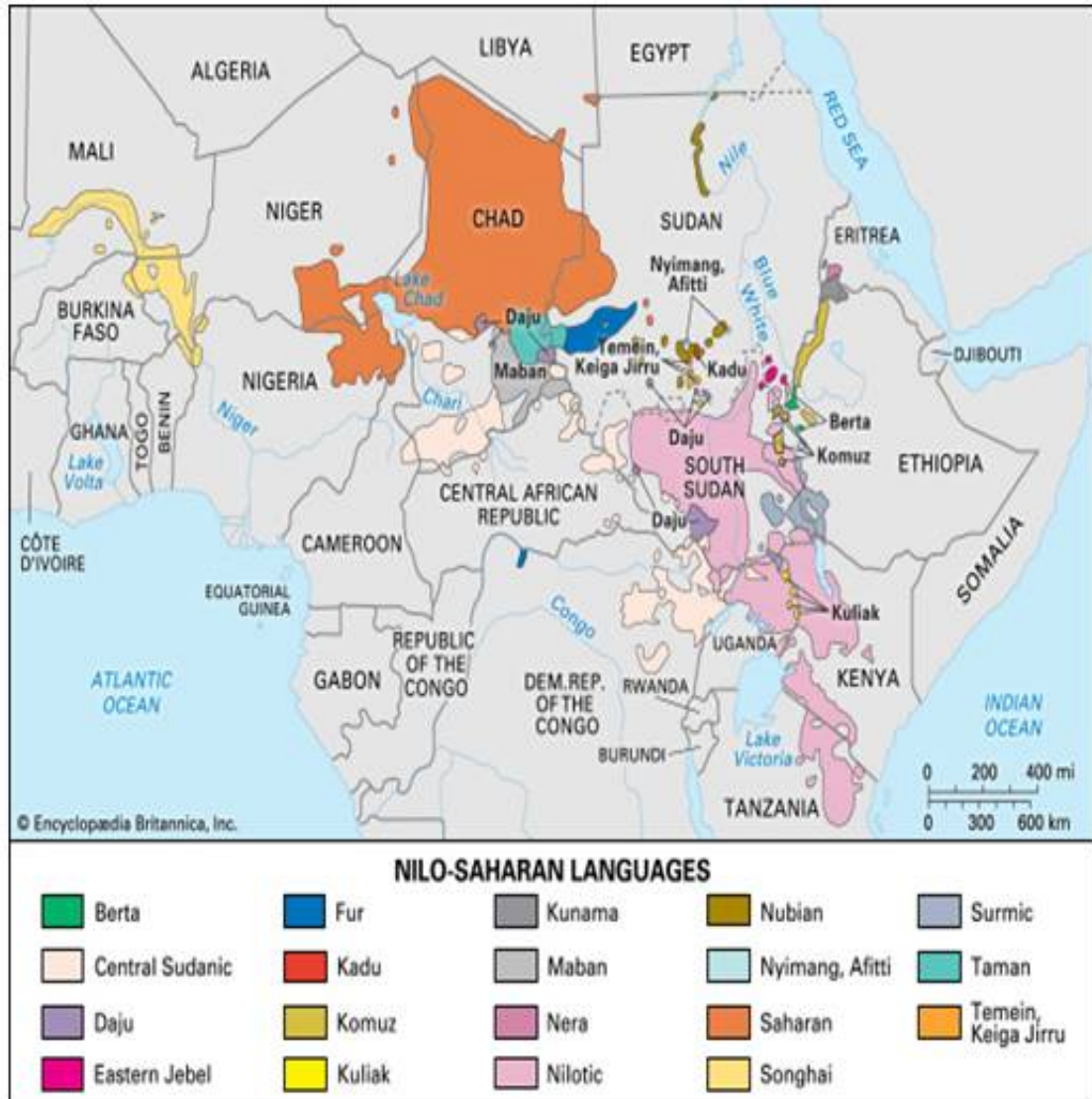
**M.Av**=mean of averages and **Av**=average

## SYMBOLS AND DIACRITICS

[ ]	Phonetic transcription		
/ /	Phonemic transcription		Spreading Tone
:	Long vowel		Floating Tone
ˈ	High Tone (H)		Delinked Tone
ˉ	Low Tone (L)		
ˊ	Mid Tone (M)		
ˆ	High-Low (HL) falling		
ˋ	Low-High (LH) rising		
ˊˉ	High-Mid (HM) falling		
ˊˋ	Mid-High (MH) rising		
ˊˉˋ	Mid-Low (ML) falling		
ˋˊˉ	Low-Mid (LM) rising		
!	Lowered pitch		
!	Raised pitch		
ˈ	Stress		
∅	Deleted segment		
+	Both morpheme and word boundaries		

**N:B** unless indicated by a square bracket and a parenthesis, words in this dissertation are in phonemic transcriptions.

## DISTRIBUTION MAP OF NILO-SAHARAN LANGUAGES



Source: Encyclopedia Britannica, Inc, Retrieved from <https://www.global.britannica.com>, Accessed 24/12/2016.

## CHAPTER ONE: INTRODUCTION

This chapter provides an overview of four major issues: the language background, ethnography, the sociolinguistic situation of the Kunama language, with a focus on the Shukre dialect, and critical review of previous linguistic analyses. It then introduces the present study.

### 1.1 The Kunama Language

#### 1.1.1 Nomenclature

Kunama is a self-referent name used to refer both the language and the speakers. Elderly consultants claim King Bazen of Aksum to be Kunama native and believe that they are named after his wife, Queen Kuname. In view of the Kunama matriarchal lineage system, their claim sounds plausible.

In other languages and neighboring tribes, the Kunama are called by different terms (Thomson, 1983 and Nikodimos, 1987). The Tigrinya speaking highlanders, Nikodimos (1987), use the derogatory Amharic and Tigrinya term ‘Baria’ referring either Kunama’s dark black skin color or the history of slave raid in the area. Thomson (1983) stipulated that, though Nara and Kunama were victims of slave raid by Ethiopians and Sudanese Muslims, the term rather is used to refer only to the neighboring Nara tribe. During the fieldwork in Shiraro, the term **tìròtà** was recorded from the <sup>1</sup>main consultant to be the Kunama equivalent for ‘Baria’. Nonetheless, he underlined that the connotation of ‘Baria’ is an offence to Kunama unless used in reference to their skin color only. Thus, the Kunama equivalent of this term in this study should be understood accordingly. In the local Arabic dialect, they are known by the terms Ba:za, Ba:zen or Ba:zany, and in Kunama, the Kunama are called Ba:da, Ba:den while the adjoining Nara tribe calls the Kunama by the name Diila(Thomson, 1983:281).

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<sup>1</sup> Berhane Kegnu, a 39 years old native Kunama man, was a public relation officer of Tahtay Addi Yabo woreda.

On the other hand, the self-referent term ‘Kunama’ has different etymologies proposed by researchers and the speakers themselves though a single most definition that agrees all is not found. For instance, Thompson (1983), referring to his anonymous sources, cites the Oromo word **ke-naama** or **kwe-naama** to compare with Kunama (“men I call them, those whom I call people). Kunama has /kòā/, /kùā/, [k<sup>w</sup>ā] and /kè/ that refer to ‘person, man’, so the present study claims the term to be of Kunama origin. Obviously, **nama** in Oromo is “person”, and the same word is not recorded in this study. However, the analogy that attaches the etymology of the term to the geographically and genetically distant Oromo does not seem justifiable. The other etymological supposition that is commonly heard from the natives is that Kunama means, “I moved away”. Therefore, the term ‘Kunama’ seems to be used in remembrance to their past that they were continuously pushed away from their own land, which was larger than the area they are living today.

### 1.1.2 Dialects

Thomson (1983), based on earlier accounts, explained that Kunama has eight dialects, Marda, Barka, Aymasa, Sokodasa, Tika, Takazze-Setit and Tigray, Iliit and Bitama. Later, Nikodimos (1987), a native Kunama Marda, has reported the same number of dialects. On the other hand, John (1999), a native Kunama Barka, reduces this number to seven and claims Iliit to be a different language or variety. Most available writings on the Kunama do not seem to consider Sokodasa, Takazze-Setit (Tigray), Iliit and Bitama while classifying the Kunama into four major groups, based on district and dialect. For instance, Thomson (1983:282-3) mentioned that he has no information about Sokodasa and Takazze-Setit and Tigray dialects; whereas, the Iliit claims Muslim Arab identity, and the Bitama shifts to the Tigre language, as they are far away from the main Kunama tribe. With the Iliit, Bender (1997:62) holds a similar view with that of Thomson. For understandable reason, the present study cannot update the information about Sokodasa, Iliit and Bitama but will bring more data about Takazze-Setit or the Tigray Kunama dialect. In account to previous studies, particularly of Thomson (1983), the main four dialects are overviewed. As Takazze-Setit or Tigray dialect is the focus of this thesis, it will be discussed along with the main dialects, in the next subsections.

#### ***1.1.2.1 Marda***

The Kunama Marda occupies the area Northeastern part of the provincial capital town of Barentu, in Eritrea. This dialect (Thomson, 1983) is assumed the most prestigious of all for some reasons. First, the high ranked leaders of the Kunama have used to be from Marda. Second, this dialect has been used for cultural and religious purposes and the earlier works, “pre-linguistic”, on Kunama have used the Marda dialect, for example, Bible translation by Swedish missionaries. It might be for the same reason that most previous linguistic analyses, reviewed in this study, focused on the Marda dialect.

#### ***1.1.2.2 Barka***

This dialect has the largest number of speakers living in the “mid-section” of the Gash (Sona) river, in Kalluku, Dukumbia and Ugaro area (Thomson, 1983). This is the area in the Southeastern part of Barentu town. Castelnovo (1938:9), as cited in Thomson (1983:282), noted that Barka is claimed to be the “purest” dialect, for an unexplained reason. Though not equal to Marda, the Barka dialect has earned better attention from linguists so far, as learned from the available literature. Connell et al (2000) indicate that the Barka and Marda dialects are very similar, with regard to tonal features.

#### ***1.1.2.3 Aymasa***

The Kunama Aymasa inhabits the area lower to river Gash to the West, in Delle, Gonya, Ishila, Bibbili, Shuminiti and Haikota villages, and in the Western part of Barentu town. This dialect is closer to the Barka than to the Marda (Thomson, 1983)

#### ***1.1.2.4 Tika***

The Tika dialect has fewer speakers that live in Makbuula village, along the river Gash and in the Southern part of Barentu. In the present data, **tī:kā`** is the Kunama name for Tekeze river.

#### ***1.1.2.5 Takazze-Setit or Tigray***

With regard to this dialect, Thomson (1983) did not provide any information, except referring it as “Takaze-setit and Tigray”. Most recently, Angesom (2012) uses the term “Shukre” for the Kunama of Ethiopian national; my consultants reaffirm this term so that

it will be used henceforth. During my stay with the Shukre Kunama community, I have learned that they do not like to be defined by two national identities, Eritrean and Ethiopian, and believe that all Kunama have the same Kunama ancestral origin.

The Kunama Shukre is a geographically isolated minority group after the independence of Eritrea in 1991. They majorly live in two Woredas, Tahtay Addi Yabo and K’afta Humera, in Northwestern Zone of the Tigray regional state. How far or close is this dialect to the other dialects will be a topic of future investigation.<sup>2</sup> Sample lexical comparison between the Shukre and the other four main dialects is presented, in (Table-1), below:

Table 1 Sample lexical comparison of four dialects

Word-medial consonant pattern	Shukre	Marda	Barka	Aymasa	Tika
C <sub>1</sub> C <sub>1</sub> ~r/IC <sub>1</sub>	ùffā ‘heart’	urfa	ulfa	?	uffa
C <sub>1</sub> C <sub>1</sub> ~rC <sub>1</sub>	dàkkā ‘woman’	darka	dakka	?	?
C <sub>1</sub> C <sub>1</sub> ~IC <sub>1</sub>	kāmmā ‘bone marrow’	kalma	dakka	?	?
C <sub>1</sub> ~rC <sub>1</sub>	gāmmā ‘sheep’	garma	gamma	?	gamma
r~l	bā.rè ‘two’	baare	baare	balle	balle
s~h	sāttè ‘three’	satte	satte	satte	hatte
s~h	sāllè ‘four’	salle	salle	salle	halle

The Marda words, in (Table-1), were recorded from the main consultant, so among the Kunama Shukre, Marda words are also used. During crosschecking,<sup>3</sup> an elderly Kunama explained that “these (the Marda forms) are used in Eritrea while these are commonly used among us”. He tried to justify by drawing analogy the Tigrinya language, “it is like

<sup>2</sup> The Marda, Barka, Aymas and Tika data is that of Thomson (1983).

<sup>3</sup> Abboy Fantay G/egziabher is a 73 years old native Kunama from Shiraro town.

the difference of the Tigrinya used in central zone (around Adwa) and in Southern zone (Raya)”.

Lexically, for instance, medial geminates in the Shukre words often become pre-liquid clusters (LC) in the same words of Marda and Barka. Either of the liquid consonants (l/r) is used as first member followed by any other consonant, as shown in (Table-1) above. With regard to cardinal numbers, Shukre is similar with Marda and Barka but different from Aymasa and Tika. On the other hand, other consultants were recorded for the Marda or Barka forms; therefore, cross-speaker variations in the use of words can be accounted for speaker’s affinity to one’s clan. Any native Kunama belongs to one of the four clans, regardless of the geographical national he/she bounds. See more on clan division under §1.2.6.

### **1.1.3 Genetic Affiliation**

The linguistic literature knows Kunama much earlier in the work of Englund (1873), who was a Swedish Evangelical missionary (Fatima, 2003), but the classification of Kunama is first noticed in Greenberg’s (1963) proposal of the Nilo-Saharan as one of the African super language families. Since then, the issue of Nilo-Saharan classification in general and Kunama in particular remains debatable among scholars. The prominently known contentious proposals after Greenberg (1963) are that of Bender (1976, 1996 and 2000), Ehret (2001) and Blench (2010). The arguments are both at macro-phylum level and internal classifications (Blench, 1995). The macro-phylum controversy emerges when Gregersen (1972) proposes a larger phylum that merges Niger-Congo and Nilo-Saharan and named ‘Congo-Saharan’ vis-à-vis lexical, phonological and morphological similarities of the languages, in both phyla (Blench, 1995:1).

Concerning the internal classification, the controversies look into super and subfamilies, individual languages and even the naming of these. The differences, among the aforementioned scholars, attribute mainly to parameters of classification, data shortage or weight as well as method of classification. The other factor that adds to the unsettled classification, as to Dimmendaal (1992), is the typological diversity of member languages and families that exhibit a range of features that are similar in some ways but different in

others. Besides, divergent languages, such as, Kunama, Berta and Gumuz, escalates the classification debate among comparativists.

In account to these, Greenberg (1963), on mass comparison, classifies Kunama along with East Sudanic, Central Sudanic and Berta, under the Chari-Nile super family (1976:441); whereas, Bender (1996) rejects this proposal for being conservative, and he coordinates Kunama with ‘Maba’, ‘Fur’, ‘Central Sudanic’, ‘Berta’ and a large group that he names ‘Core family’. Despite the differences in coordination of Kunama at the lower level of the classification, Bender (1997:62) stipulates, “Perhaps because of its location in relatively accessible Eritrea, membership of Kunama in Nilo-Saharan was seen quite early: much more literature exists than for Berta.”

The more deviant classification of Ehret (2001) puts Kunama under North Sudanic family, and he showed much difference from others with regard to the classification of other languages and in the naming of language families as well. Later, Blench (2010) takes Kunama and Berta as divergent languages and puts both at the periphery. In fact, much earlier, Bender (1976:475) reflects a similar view, “Kunama is a fascinating and isolate language that has been sadly neglected by Linguisticians, and its grand isolation shows up in both grammemes and lexicon.”

With more data, Bender (1996) advances the view on the divergence of Kunama and revises some of his earlier assumptions about some grammatical typologies of Kunama; for example, he renews his previous assumption on the non-segmental phonology of Kunama. Bender (1976) was with the opinion that Kunama phonology is straightforward; however, in his later works, especially of Bender (1996) after observing the supra-segmentals, particularly on ‘tone’ and ‘stress’, Kunama is described to be different from other Ethiopian languages. While Semitic languages are rich in sets of ejectives, Cushitic in implosives and Omotic in retroflexes, Kunama has none of these, and even as compared to other Nilo-Saharan languages that are rich in interdental or vowels, Kunama is different (Bender, 1996). Therefore, as to him, the divergence of Kunama lies on the features of non-segmental phonology, ‘tone’ and ‘stress’ as well as on a range of morphological typologies, such as pronoun and verb conjugation. As to

Bender (1996), Kunama tone compensates for the missing phonological segments. Similarly, Nikodimos (1987) explains, “basically Kunama is one of those languages that do not have the possessive form “of” or the verb “to be”, and makes up for this lack mainly by ‘tone’.

The Ethiopian Nilo-Saharan languages include, Surma, Majang, Murle, Kwegu-Muguji, Me'en, Suri-Bale, Nera, Buru, Anywa, Nuer, Nyangatom, Udu-Mayu-Fadashi, Kunama, Gumuz, Shita, Komo and Kwama (Bender,1983). Despite such controversies on the classification of Kunama at micro-level, Kunama has not been denied Nilo-Saharan membership by all classifiers, aforementioned. Above all, the number of its dialects, its geographical distribution and number of mother tongue speakers make it to be one of the four leading Nilo-Saharan languages of Ethiopia (Bender, 1983). Below, in (Figure-1), is Bender’s (1997) classification of Kunama in Nilo-Saharan family tree,

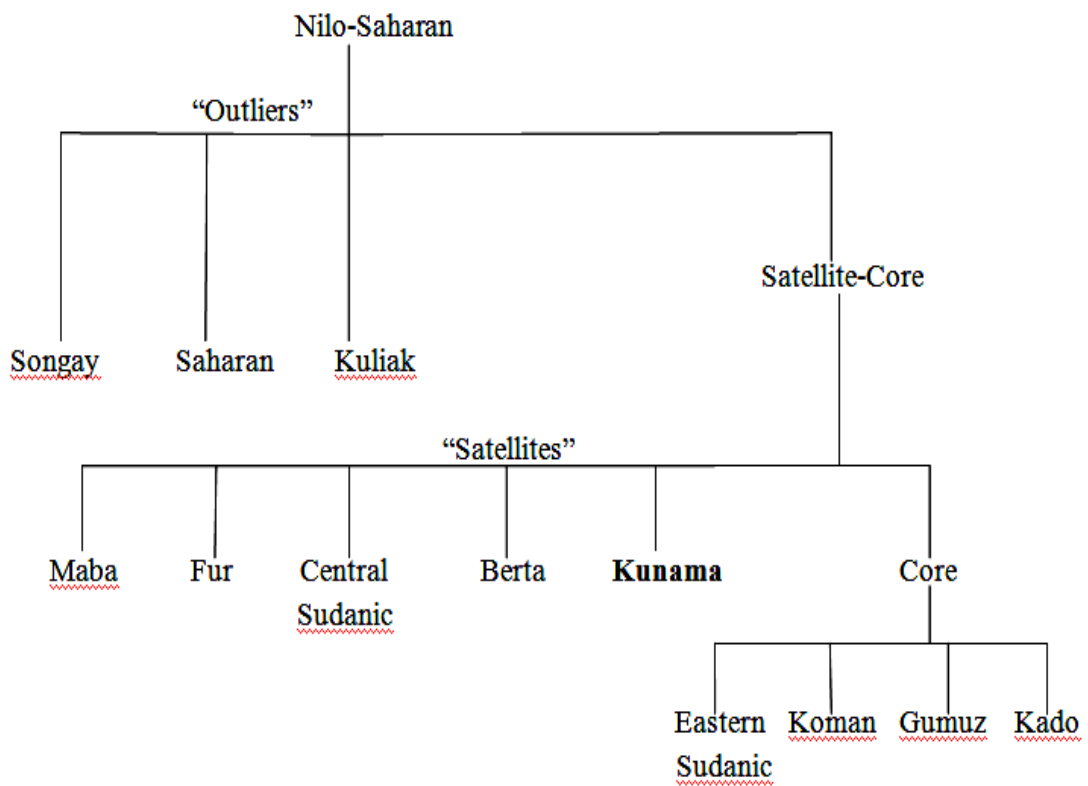


Figure 1 Kunama within the Nilo-Saharan family tree (Bender, 1997)

## 1.2 Kunama Ethnography

### 1.2.1 History of Origin

The arrival of Swedish missionaries and colonial Italy in Eritrea marked the beginning of studies on the Kunama language, culture and history (Thomson, 1983 and Fatima, 2003). However, none of those earlier writings as well as the more recent ones traces the exact origin of the Kunama, for which two prominent propositions have been mentioned in the available Kunama literature until recently. The first claim, mainly held by external writers, relates the Kunama with the Nilotic people in Eastern Sudan vis-à-vis linguistic, culture and racial (phenotype) similarities. In contrast, the Kunamas do not seem to accept this lineage, and by virtue of which most Kunama native writers (Berhane, 2011, Qorneliwes, 1988 and Alexander, 1982) maintain a different argument that claims indigenes to the area and beyond, where they are living today. This proposition, in turn, influences the works of non-native domestic writers, such as, Haftay (2011) and Aleqa Taye (1963), who connect the Kunama origin to the historic town of Aksum, in particular, and Eritrea and Tigray, in general. Accordingly, the oral literature makes Aksum to be the center of Kunama and claims that King Bazen of Aksum as well as his wife Queen ‘Kuname’ is Kunama native.

Similarly, consultants told me that they were once centered around Axum and pushed down to the lowland in Northwestern Tigray and Eritrea. In line with this, the justification given by the <sup>4</sup>main consultant to affirm Kunama’s indigenes was fascinating. While eliciting lexical entries, he was asked for the Kunama equivalent for the Tigrinya word, **bahiri** ‘sea’, and he replied **bahara**, which is an adapted form of the word. Meanwhile, I asked him “do you mean that this word does not have a Kunama equivalent?” Then here comes his response, as putted in Tigrinya, “አንተህ ሀወይ ንህና ባህር ሰጊርና አይመጻና” (lit. My brother Anteneh, we (Kunama) did not come crossing a sea). In his response, two important issues are embedded. Firstly, he conveyed that Kunama is indigenous to the proposed area, and secondly, language is a result of speakers’

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<sup>4</sup> Berhane Kegnu is member of Kunama Shukre, and he was the public relation officer of Tahtay Addi Yabo woreda.

experiences. In line with this, an <sup>5</sup>anonymous source and some of the elderly Kunama consultants mentioned the linguistic remnants of place names of Kunama origin and suggested the etymologies for some of those. The terms still are used as place names though some are endowed with Tigrinya flavors, and others are totally replaced by the Tigrinya equivalents. These place names are discussed in the following paragraphs:

Aksum [ā-kùssùmā] ‘fifth’ means the fifth hill and is derived from the Kunama ordinal number **kùssùmè** ‘five’ with the nominalizer prefix [a-]. This can be compared with, for example, **kōfâ** ‘to hunt’ vs. [**ā-kōfâ**] ‘hunter’, **bājà** ‘bad’ vs. [**ābājà**] ‘enemy’, **ǰúpà** ‘to steal’ vs. [**āǰúpà**] ‘thief’. In view of the process of agent noun derivation in this study, the suggested etymology of Aksum seems justifiable. The naming of Aksum, the historic capital town of ancient Ethiopia, considers the topography of the town, which is surrounded by hills and lies at the center of five small hills.

Masawa in the literal sense of the term in Kunama means ‘war eye’ and is derived from **māsā** ‘war, fight’ and **wā** ‘eye’. As to these oral sources, the implied meaning of Masawa is a seaport covering a large sphere where the Kunama keep an eye to defend intruders coming from the other side of the Red Sea.

Addi Kuala is a place name in Eritrea. Kuala is a typical Kunama male name while Addi is a Tigrinya term for ‘country, village or town’ that is supposed to replace its Kunama equivalent, **sù:kʷā** ‘country, village or town’. Therefore, its Kunama full name was suggested to be **Kùālā sù:kʷā**, which means the country or village of a man named Kuala.

Segeneiti is a small town in Eritrea. The term, in Kunama, literally refers to house of ostriches and is assumed to be derived from, **sēgēnā** ‘ostrich’ and **itā** ‘house’, and it denotes the living place of ostriches. Similar etymologies were suggested by the consultants for some place names in Northwestern Tigray, such as, Addi Yabo, Shire and Shiraro. While **yábò** is a typical Kunama male name, Addi is a Tigrinya term for ‘country, village or town’ that is claimed for replacing the Kunama equivalent, **sù:kʷā**

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<sup>5</sup> An unpublished internet source with written and released dates, 2000 and 2012, but without the author’s name.

‘country, village or town’. In full, **yábò sù:k<sup>w</sup>ā** means country or village of Yabo, this is similar to the suggestion given to Addi Kuala. The same etymological suggestions are not recorded for Shire and Shiraro. Overall, all of the suggested Kunama words and the etymological justifications given by the consultants seem justifiable in view of the present data and the analysis as well.

### **1.2.2 Location**

The Kunama lives in a small-scattered community around the Gash and Setit river basin, mainly along the border between Sudan and Eritrea in Eritrea (Tronvoll, 2009). This area includes the commonly known provincial capital town, Barentu, of the Kunama. Besides, a small number of this community lives in neighboring districts of Northwestern Tigray, in Ethiopia. The Ethnologue knows Kunama as a language of Eritrea, but since an isolated Kunama community lives in Ethiopia, the Kunama language should also be recognized as an Ethiopian language as well. Lussier (1997) as cited in Tronvoll (2009:119) explains, “The advent of Eritrea as a newly created state has put the Kunama in the position of a double periphery now that the national borders have divided them on the ground”.

The Kunama Shukre community inhabits some areas in Tahtay Addi Yabo and K’afta Humera Woredas, in Northwestern zone of the Tigray regional state. In K’afta Humera, they live mainly in Adi-goshu and Adebay areas. Under <sup>6</sup>Tahtay Addi Yabo <sup>7</sup>Woreda administration, T’abia Lemlem and Shiraro town are the main areas where the Kunama Shukre community lives in greater numbers. T’abia Lemlem comprises of three K’ushets, namely, Medabe, Shimblina and Ademiti. Each of these again administers different Got’s, where the Kunama are living. Under Medabe, the Kunama inhabits Ird Woyane, Medabe and Geza Mek’er; under Shimblina, they live in Addi Selam and Shimblina, and under Ademiti, they occupy Geza Idura, Ment’ebt’eb and Ademiti Got’s.

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<sup>6</sup> Tahtay Addi Yabo is one of the woredas in Northwestern Tigray zone.

<sup>7</sup> Woreda, T’abia, K’ushet and Got’ are used to refer local administrative units, in Tigray region. The administration size in these units is in descending order, of which Woreda is the largest unit.

### **1.2.3 Religion**

The Kunama (Alexander, 1982) have a traditional religion with monotheistic elements of belief. They worship only one God, **ānnā** and devoid the formal hierarchies in Christianity and Islam. Worshipping is ritualistic often marked by slaughter of animals and communal prayer. The supplication is meant to get rain, better harvest, protect birds and locusts from destroying their crops, and avoid conflicts and blood feud. As a result, the Kunama, especially those living far from urban areas, do not still comply with the principles of Christianity and Islam.

However, according to Alexander (1982), the coming of missionaries and colonial powers to the area converts the Kunama to Christianity (Catholic or Protestantism). Especially those in and close to urban areas were influenced to abandon their traditional belief. The Tigrinya speaking highlanders converted the Kunama to either Christianity or Islam by letting them feel their religion is backward. As to Berhane (2011), the Kunama in the present day Ethiopia were baptized to Orthodox Christianity in 1934, during the reign of Emperor Haileselassie. Such external and internal influences, in turn, jeopardize not only the Kunama belief system but also the accompanying rituals and related psychosocial elements of the society. A case in point, before Christianity, the Kunama were liberal with regard to sexual affair, but which later become a major cause of conflict among them (Haftay, 2011). Even though it is difficult to define and judge the merit of this custom, new orientations are expected to reshape pre-existing societal perceptions in every sphere of their lives. The present study does not verify the presence of this practice in the community.

### **1.2.4 Culture**

Different writers, Berhane (2011), Tronvoll (2009), Lussier (1997), Gebrekidan (1992), Qornelios (1988) and Alexander (1982), reported that the Kunama people have ample cultural attributes of tangible and intangible sorts. On the contrary, they are also equally concerned about the endangerment of most of the cultural traits before passing onto younger generations. These studies unanimously indict external interferences for the abandonment of the Kunama cultural practices. Alexander (1982) has mentioned the interferences of colonial powers and missionaries as well as the Abyssinians, who

subjected some of the peculiar practices of Kunama to either complete extinction or to replacement. Qornelios (1988) has mentioned “ቱካና” and “ባታ” among the completely vanished cultural practices, and he has noted that the replacement of the Kunama clan based social administration system by the modern administrative structure is caused by the same interferences. Similarly, the most recent works of Tronvoll (2009) and Lussier (1997) recite the Kunama long history of oppression under Italian and British colonial rules and the Abyssinian administration. They indicate that the continuity of this suppression is escalated to a new era and becomes most brutal after the 1993 succession of Eritrea, when the Eritrean regime particularly targets the Kunama tribe. Tronvoll (2009:128) describes the recent situation of the Kunama, “The Kunama claim that the Eritrean army is deliberately and consciously establishing bases in Kunama villages and on Kunama holy sites, in order to violate their cultural heritage. Since the Kunama home areas lie close to or straddle the border, many Kunama villages and towns have been converted to military bases.” Accordingly, a new war has been declared on the Kunama ethnic group, and thereby demolishing their cultural and linguistic practices.

On the other hand, the Kunama Shukre scenario seems a bit different, in Ethiopia. Notwithstanding the endangerment of cultural traits and the language, the present study has not found a report that situates the Shukre Kunama community under a direct attack by the government. However, since the political geography isolates this minority group from the main Kunama tribe, in Eritrea, they used to identify themselves with the majority Tigrinya speakers through which their culture and language have been put on a crossroad. Interestingly, however, some promising efforts have been started towards maintaining aspects of the Kunama tangible culture and language. Two primary schools are launched for Kunama mother tongue education, and the researcher visited the one in T’abiya Lemlem. The Kunama culture Museum in Shiraro town can be mentioned as exemplary for collecting and introducing the Kunama cultural artifacts.

#### *1.2.4.1 Intangible Heritages*

The most notable intangible cultural attributes of Kunama include, conflict mitigation, rites of passage, folk-dances, naming tradition, cooperative group work, hunting tradition, marriage and death ceremonies, traditional games, literary traditions and traditional clan administration system. Since the researcher is unable to get a first hand data about the recent status of the Kunama traditional festivals in Eritrea, most of the information used to describe the cultural practices is adapted from a recently released paper by <sup>8</sup>anonymous authors. However, the descriptions of most of the traditional festivals have been crosschecked with the studies of Tronvoll (2009) and Lussier (1997) that are relatively recent works. The similarity of the information obtained from the anonymous paper and that of Tronvoll (2009) clues that Tronvoll might have interviewed the authors in Shimelba refugee camp, in Ethiopia. In what follows, Some of the intangible heritages are overviewed:

#### **sāṅgānēnā** ‘bone reconciliation’

This is a uniquely Kunama traditional conflict mitigation system, which has been practiced among the society to solve higher conflicts that arise due to blood feud. The mediators, **sāṅgānēnè**, are used to be elderly Kunamas who are well known, respected and honored by their overall activities in a particular Kunama community. The system rebuilds peace and harmony between the culprit (murderer) and the innocent (murdered) parties, on a win-win strategy. The mediators do this by imposing the murderer to pay indemnity, often in kind (animals), to the victim’s family. If the culprit cannot afford this, any member of the clan has to pay the compensation. During the fieldwork, <sup>9</sup>an elderly consultant told me that if someone fails to pay the compensation, other members in the same clan, even those in Eritrea, have to pay for the damage.

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<sup>8</sup> Young Kunama intellectuals from Shimelba refugee camp (in Ethiopia) released on the web, in 2011.

<sup>9</sup>Tunga Areru is an 83 years old Kunama from Shiraro town.

### **àṅā ilā** ‘the cutting of hair’

This is a rite of passage performed when the young Kunama boys have reached a certain age and declare as they “brought up” into “adulthood” (Alexander, 1982). Until that time, the young Kunama boys are known as **gaijafna** ‘carriers of a distinctive hair style’, which symbolizes adolescence. Gathered by various elders, from different villages and accompanied by many of the young Kunama who have already passed through that ritual and therefore known as **ànfūrā** ‘young adult’, the **gaijafna** are led to the ritual places and through training and tests are brought up to adulthood, with which they also drop their **gaijafna** hair style and status. Tronvoll (2009:128) emphasizes, “Passing this ritual is crucial for Kunama boys, as it prepares them for adult responsibilities, like getting married and grants them access to further cultural rites and events.” Consequently, in the very event, “Elders collectively accompany groups of boys (from 10 to 100) to the sites of worship, where they are instructed on cultural ethics, moral stature, traditions and discipline” (Ibid).

### **túkkʷá**

Tukka is a recognized traditional festival meant for “show” and “entertainment” and held every two decades. The celebration lasts for a year accompanied by dramatic performances of the Kunama bravados combined with young Kunama men, wearing animal’s skin, covering their faces with the heads of these animals, and imitating the movements of those animals. On this very day, the Kunama people from all over the Kunama land participate, and the known Kunama dance, **ānā**, is played all day long and the Kunama traditional beer, **àifā**, is freely served for all. Circumcision of Kunama girls and introducing Kunama boys into the Kunama cultural ways make a part of the **túkkʷá** festivity. With regard to the time cycle, Tronvoll (2009:128) puts, “twice every decade (in the ninth and tenth years) the *tu’ka* ritual is celebrated.”

### **kundura**

Kundura is a feast mixed with prayers, worship, blessings and dances, so it has both cultural and religious purposes. In this annual celebration, young Kunamas, from many villages of the district, perform folk dances by blowing horns themselves. The village elders, traditional leaders, give orientation about the culture and pass cultural knowledge to new generations, along with blessings and pieces of advice (Tronvoll, 2009).

### **jatta**

This is also a feast celebrated only to show endurance, courage and bravado of young Kunama men. In this festival young men dance wearing only local pants, which are forbidden, but they would instead deliberately wear and challenge chief of the event, **jatta manna**, an elderly man who would punish the culprits, whipping them on their naked upper bodies. The more the upper bodies of the young men bleed, the more cheers do they get from their female admirers.

### **indoda**

It is a prayer festival held before the main rain season. The ritual begins by the pleas of the Kunama communities to the chiefs of the rain, **gora manne**, and give presents for the chiefs, in compensation for the prayers they elevate to God, **anna**. The chiefs, as to Tronvoll (2009:128), pray for rain and protection of the forthcoming harvest.

### **kówā**

Kowa, as to Alexander (1982), is a cooperative group work among the Kunama society and is commonly practiced during harvesting times and when any member of the community is building a house. In my field visit, I have known that the **kówā** is still practiced, at least, among the Kunama Shukre community.

### **mīndōsósá**

This, as to consultants, is the Kunama naming ritual, in which community elders give names to newborn Kunamas.

Despite Kunama's rich cultural attributes, the available Kunama literature across a longer time span, since the arrival of missionaries to present-day Eritrea, depicts that these traditions are endangered if not vanished through time for various factors. Of all, the worst scenario is reported after the Ethio-Eritrea war (1998-2000) when the Kunama fall under political suppression, suspect and continuous attack by the regime, with the pretext that the Kunama's sympathy to the Ethiopian government. As a result, the Eritrean regime took over the places where these cultural events were held and changed them to military camps and farming areas owned by Tigrinya speaking investors. Besides, such gatherings of the Kunama are targeted to arrest and forcefully recruit the young Kunama in to the armed forces, under the cover term of national service. In relation to their cultural performances, the Kunama reflects another important concern is the treatment of the **sangganene**, conflict mediators, by the Eritrean regime. Tronvoll (2009:129) puts this fact as,

*The Kunama accuse the central authorities of undermining the position of the Sanga-Na'ne in Kunama society, having prohibited their role as 'peace-makers'. The targeting of traditional authority among the Kunama has forced many Sanga-Na'ne to flee to Ethiopia, or to renounce their ritual practices. Consequently, it is argued that intra-Kunama conflicts have been on the increase, since their traditional mechanisms of conflict resolution is banned; and due to lack of trust, few Kunama view government sanctioned conflict resolution mechanisms as an alternative.*

Similarly, among the Kunama Shukre of Ethiopia, most of these cultural festivals are abandoned. The isolation of the Shukre Kunama community from the main Kunama tribe, in Eritrea forces them to identify with the major Tigrinya speaking people. Consequently, the Shukre community tends to leave some of the well-known cultural traits of Kunama behind. According to an <sup>10</sup>elderly consultant, the modern jury replaces the **sāṅgānēnā** that the Kunama believes it to be above all forms of court procedures. Though he indicated that this custom is still practiced in Eritrea, the scenario of the Kunama, in Eritrea, does not seem to verify his conviction. In effect, the researcher tried to record the simulated version of the **sāṅgānēnā** ritual, but the output is not used for documentation because of its poor verbal input. Among the Kunama Shukre, some of the

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<sup>10</sup> Tunga Areru an 83 year old Kunama from Shiraro town.

surviving cultural practices include **kówā**, **àná kōílā** and **mīndōsósá** – though the researcher did not get the chance to attend any of these.

#### ***1.2.4.2 Tangible Heritages***

The Kunama have also been known for having a variety of tangible cultural attributes, such as, cultural ornaments and dressings, musical instruments, foodstuffs, household utensils and handcrafts. The researcher had the chance to visit the Kunama culture museum in Shiraro town and was able to record the available artifacts for documentation. The museum is a recent phenomenon and is meant to preserve Kunama traditional artifacts and introduce them to the new generation as well as to visitors and researchers. Even though the museum is still on establishment and more work is waiting, the initiative taken by the local administration is promising to maintain some of the assets of the Kunama and has to be appreciated.<sup>11</sup> A native Kunama, in charge of managing the Museum, told the researcher that more has to be done to establish the museum fully, but they begin to collect different cultural materials from members of the Kunama community, as free gifts and on pay. Some of these artifacts are described below while the video data is annotated and documented.

The artifacts are organized into four major types based on their uses among the Kunama, these are, ornaments and dressings of both female and male, household materials, hunting and farming tools, and musical instruments. (For the detail, refer to the annotated digital archive)

#### **Traditional ornaments and dressings of the Kunama**

The use of the ornaments and the dressings are identified across sex and social status. Unmarried women and men can wear the **ājárādà** ‘bracelet’ on their lower arms. It is often made of bronze, silver or gold. As to the museum guide, the bodyguards of King Bazen, who is believed to be a native Kunama, were used to wear this bracelet. This is another way of justifying their originality to Aksum.

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<sup>11</sup> Bahre, chairmain of T’abia Lemlem, is from Shiraro town and was one of my consultants.

The colorful ornaments are known by a general Kunama name, **dàdà** ‘bead’, which can be worn by both sexes, around their necks and feet. However, depending on the shape of the beads, each of these has its own name and are also be specified for women and men. The first type of bead is, **tájá pè:là** ‘dog’s tongue bead’, named after the shape of every single bead that looks like a dog’s tongue. Only females wear it on their necks. The other type, **k`nìnā d`dàd`** ‘pill bead’, is named after the shape of each bead looks like a pill; and **d`dàd` ñāṅṅārà** ‘gravel bead’ looks like fine grains of stone.

In addition, **k`lùmā d`dàd`** ‘bead of honor’ is men only, especially, the red bead is a symbol of heroic deeds and honor. Thus, only Kunama war heroes, brave hunters and honored guests wear this bead. Its name, /**k`lùmā d`dàd`**/ [**k`lùm`d`dàd`**], considers that it belongs to an honorable guest, **k`è:là** ‘guest’ and **d`dàd`** ‘bead’. Women wear the other type, **m`ìnd`d`dàd`** ‘foot bead’, on their feet above the heel.

Moreover, some of the traditional clothes of Kunama that belong to female and male members are **k`ārb`it`á`** ‘women scarf’ and **t`ág`it`ā/b`ārn`át`ā/k`áb`éll`ā** ‘Kunama male hat’. Kunama males wear this hat during festivals and farming activities to protect from the sun.

### **Traditional household utensils**

The Kunama are good at handcrafting and have uniquely their own household utensils, which are used for a range of household purposes and as means of income for a family. The first one, **d`ōk`ā** ‘water cooler’, is a water cooler and can also be used for cooling their traditional beer, **àif`ā**. It is made of a strong grass called raffia. As to the museum guide, the **d`ōk`ā** plays a vital role in the lives of the Kunama people and can better replace a refrigerator. The basket like material is generally referred as /**ʃi:n`á` d`á:d`á`**/ [**ʃ`índ`ád`á`**] ‘winnower’ or **s`āl`ānb`óm`ā**. This is made of the raffia grass and used to separate fine grains from chaff. It has different sizes, while the largest is known as **k`ōkk`ā**, the smallest one is **ʃ`ál`ā**.

The other utensils of the Kunama are those used to filter and drink their traditional beer, **àif`ā**. They used to filter their traditional beer by a funnel like object called, **l`āk`ādz`ā** ‘filter’. The traditional cups are of different sizes and used for drinking water and the

traditional beer. These are **s̀k̀ǹā** and **f̀f̀r̀ā**, made of the hard cover of a gourd plant. The former is similar to **jikina** that is commonly used for the same purpose among the rural community of Tigray and Amhara; therefore, its name is supposed to be borrowed and adapted to Kunama. However, the Kunama **s̀k̀ǹā** is large and serves for sharing one cup among a group at the same time, especially when drinking **àifà**. This tradition is a way of expressing harmony and closeness while the same tradition is common among the Gumuz people, another Nilo-Saharan group. The latter is smaller and appropriate for one person.

The last two household tools of the Kunama worth describing are **jinna** ‘mat’ and **s̀ng̀d̀ā** ‘traditional carrier tool’. The first is made of the raffia grass and used for sleeping and decorating their houses, like a curtain. Besides, they used to sell this mat to the non-Kunama, who are used to build small coffee shops, as commonly observed in Shiraro town. The second material, **s̀ng̀d̀ā**, can be considered as a brand item of the Kunama and helps to carry water, grain and goods. Mostly women and children are in charge of transporting grain, drinking water and other portable goods to and from the market.

### **Traditional musical instruments**

The Kunama harp, **k̀nk̀l̀ā/āb̀ng̀g̀l̀ā** ‘Kunama lyre’, is different from the one commonly used in other parts of Ethiopia. Unlike the ordinary five-string lyre, the Kunama lyre has only two strings, as to an <sup>12</sup>elderly consultant, and is similar with the <sup>13</sup>Tikurir harp. The other musical instrument is the Kunama flute, **f̀nf̀r̀ā**, which is found to be similar to the ordinary flute that is used in Northern Ethiopia.

### **Traditional hunting and harvesting materials**

It has been introduced above that the Kunama has a hunting tradition, which is considered as a symbol of heroic deeds among the community, and those who kill a lion or an elephant are honored to wear the red bead, **k̀l̀m̀ā d̀d̀ā** ‘bead of honor’. Kunama

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<sup>12</sup> Gidey Turka is a 79 years old Kunama elder from Ela Kunama located in the outskirt of Shiraro town.

<sup>13</sup> a tribe in Eritrea that are considered to be recent settlers from Nigeria, and denied recognition by the Eritrean regime (Tronvoll, 2009).

males use traditional spear, **másā**, for hunting, digging and defending themselves from an enemy. One edge of the spear is very sharp and is referred as **mándā**, which is designed to be used for hunting wild animals while the other edge is meant for simple farming activities. The other instrument is named **bólà** ‘whip’ and is used to urge on oxen during ploughing.

### **1.2.5 Livelihood**

The Kunama, Thomson (1983), are an agro-pastoralist ethnic group who lives on cultivating sorghum, millet and sesame, the latter as a cash crop, and raising cattle, goats, sheep and camels. Tronvoll (2009), on his part, indicates that they largely live on sedentary agriculture. The Kunama Shukre group mostly lives on similar activities like the main tribe in Eritrea, such as, cultivation of crops and raising different animals. Besides, the researcher has observed female members of the Shukre community while selling handicraft products in Shiraro town. Berhane (2011) explains that 90% of the Kunama in Ethiopia lives on agriculture and the rest 10% leads their lives on handicraft. However,<sup>14</sup> an elderly Kunama consultant told that they also raise goats and cattle. The Kunama Shukre area is lowland, bushy with extensive grasslands and a very hot temperature.

### **1.2.6 Social System**

Two important things are commonly mentioned in relation to the Kunama social organization. The first is their matrilineal family relationship and is uniquely of Kunama. As to Tronvoll (2009:112), “Kunama is the only group in Eritrea where descent is recognized through the maternal line.” Accordingly, a child is a member of the Kunama society only if his or her mother is Kunama, and relatives are only recognized on the mother's side i.e. each Kunama is the relative of his/her mother and not of his/her father. Consequently, they have used the term ‘relative’ to describe such close relationship that ties the different members to one’s mother side (Thomson, 1983). This system might have helped the Kunama to preserve their identity from total diffusion that could be caused by inter-ethnic marriages. During the fieldwork in Shiraro town, a secondary

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<sup>14</sup> Fantay G/egziabher is a 73 years old Kunama from Shiraro town

school teacher, from a <sup>15</sup>‘Tigraway’ mother and a Kunama father, told that though he speaks Kunama well, he has been denied Kunama membership. The form of denial is reflected through alienation and depriving sense of belongingness. As a result, he was not willing to work as a consultant. Though the researcher had known Kunama men married to women of other ethnic background, he has not been informed about a Kunama woman married to a man from other ethnic background.

The other fact concerning the Kunama social system is their clan based social structure. The first form of classification considers geography (district) and/or dialect, and mainly knows four main groups, Kunama-Aymassa, -Barka, -Marda and -Tika. However, this form of grouping in the existing literature does not consider other Kunama communities, mainly due to lack of information or geographical isolation. For instance, the Kunama Shukre that is directly related to this work has not been often mentioned in the few available literature, mainly for lack of information or studies on this isolated group at large.

On the other hand, the most notable clan based social structure of the Kunama refers to kinship. In this, all Kunama inevitably belongs in one of the four clans: Gumma, Kalawa, Semma and Shiwa. In the Marda dialect, the names of the four clans are Gurma, Karawa, Serma and Shurua, respectively (Qornelios, 1988 and Berhane, 2011). The variation in the names of the clans is accounted to be dialectal. This form of grouping, as to the elderly consultants, considers only blood relationship and precludes the parameters of dialect and district. As a result, all of the consultants told the researcher that to which clan they belong. Nevertheless, the elderly consultants invariably remark that the clan division does not imply social hierarchy and believe that all Kunamas are descendants of the same Kunama ancestry. Alexander (2002), a native Kunama anthropologist, reflects that Kunama often disregard outsiders’ views that impose social strata and national boundary remarks. Likewise, the present consultants do not seem comfortable with references that have nationality connotations, such as, Eritrean Kunama and Ethiopian Kunama. They simply consider these references as a difference of geographical location.

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<sup>15</sup> A Self referent name for Tigrinya speaking people.

Consequently, throughout this paper, care is taken to address them by the common name Kunama or by the names of the dialects.

### **1.3 The Sociolinguistic Situation**

#### **1.3.1 Number of Speakers**

The Kunama is one of the minority ethnic groups in Eritrea, which is estimated to number between 50,000-140,000. On the other hand, the population size of the Kunama fluctuates across various reports, as Eritrea conducts no national census based on ethnic category (Tronvoll, 2009). Based on the 1996 report of the Eritrean government, the number of the Kunama in Eritrea, among other ethnic groups, is shown to be 64,000 (Woldemikael, 2003:120), as cited in Tronvoll (2009:113). The latter report seems conservative in view of the estimated number of the Kunama people before half a century. For example, (Thomson, 1983) reported that, in 1969, the official number of Kunama was 70,000. The Ethnologue reports the number of the Kunama in Eritrea to be 142,000. In account to the considerable differences among the reports, it is difficult to arrive at a plausible figure. Tronvoll (2009) associates the conservative reports of the Eritrean government to the regime's repressive policy of minority groups that especially targets the Kunama, for historical and political reasons.

The number of the Kunama Shukre population, in Ethiopia, is by far less than the Kunama population size in Eritrea. The 2007 National Census of EPRDF reported the Kunama population size in Ethiopia to be 4,860. Haftay (2011) indicated the number of Kunama Shukre to be around 6700 and noted that this figure does not include those who are in Shimelba refugee camp. He again specified that 3010 Kunama live in Tahtay Addi Yabo Woreda, and 3000 of those live in K'afta Humera Woreda while the rest 600 Kunama are believed to live in different urban areas along with the Tigrigna speaking people, in Tigray, and other parts of Ethiopia.

The present study, based on the statistical figure obtained from the public relation bureau of Tahtay Addi Yabo Woreda, shows that the total number of the Kunama in the mentioned Woreda is 2437, 314 male led households and 293 female led households. In view of those 3000 Kunamas living in K'afta Humera Woreda, the total population of

the Kunama in Ethiopia is estimated between 5000-6000, which is closer to the number provided by Haftay (2011).

Finally, it has to be known that due to the plight and exclusion of the Kunama by the Eritrean government, a considerable number of Kunama are in exile from which more than 2000 Kunama are found in Shimelba refugee camp, in Ethiopia. According to the CORC (2007) report, the Kunama refugees make the second highest number, in the refugee camp, next to the Tigrinya speaking Eritreans.

### **1.3.2 Bilingualism and Tendency of Language Shift**

A statistical figure that shows the exact number of monolingual and bilingual Kunama is not found. Based on the oral sources, of the present study, most of the Kunama Shukre living in Tahtay Addi Yabo Woreda including Shiraro town are bilingual in Tigrinya. Monolingual Kunamas are found in some remote villages, such as, Ird Woyane and Medabe. The researcher visited the monolingual Kunama living in Medabe, which is a 1:30hrs on foot distance from the town of Shiraro and straddles to the Eritrea border. In view of the status of Tigrinya as the official language of the region, and the isolation of the Shukre community from the main Kunama tribe after 1991, bilingualism, to this minor group, might not be an issue of further thought. The Kunama use Tigrinya for everyday communication in schools, market places and government offices (Haftay, 2011). In reference to Hassen (2011) and the present fieldwork observation in the same area, the Kunama's state of language ( $L_1$ ) proficiency, language use and code-switching behavior are overviewed in the following paragraphs.

**Language proficiency:** Majority of the Kunamas are proficient in listening and speaking both the Kunama and Tigrinya languages. However, by age group, while the old generation, above 36 years old, has high proficiency in Kunama than in Tigrinya, the vice-versa is shown to be true for the young generation, which signals language loss of the younger generation in Kunama (Hassen, 2011).

**Language use:** Kunama is used around the home environment among family members and neighbors; whereas, outside the home area, Tigrinya is highly used and more vital at the local market, in governmental institutions, mass media, in education, for religious

activities and in social gatherings. This is an indicator for tendency of language shift on the part of the Kunama. The situation seems critical in view of the status Tigrinya as the language of wider communication in the Kunama area and the region as a whole. Hassen (2011:138) stipulates, “Language shift towards Tigrinya on the part of the Kunama speech community is apparent since the language used in the region is Tigrinya.”

During the fieldwork that was conducted in the same study area, code-switching behavior was observed on the part of the consultants. When they narrate stories, it was needed to remind every of the consultants to say things in Kunama, repeatedly in the middle of their talks. To my knowledge, they mix codes unconsciously and seemingly consider it as a normal language use behavior and a way of identifying themselves with the majority Tigrinya speakers.

Accordingly, state of language shift is apparent in the Kunama community, particularly on the part of young members (Hassen, 2011). Hassen (2011) analysed different indicators of language shift tendency, such as, Language proficiency ( $L_1$  and  $L_2$ ), Language use, Language attitude and Code-switching, based on samples selected from Shiraro town, T’abia Lemelem and Addi Goshu. Each of these indicators is again checked across different variables, namely, sex, age, level of education and place of residence (urban and rural). The study found that, except for language attitude, the results from the rest of the indicators more favors Tigrinya than Kunama, which therefore enables to conclude that tendency of language shift is apparent among the Kunama Shukre community. Hassen (2011:146) predicts, “Since most members of the Kunama speech community have low economic status, they are more likely to shift towards Tigrinya to improve their livelihood.”

Other indirect manifestation of Kunama identity diffusion is observed vis-à-vis some of the endangered traditions. For instance, one of the well noticeably endangered traditions is the abandonment of native Kunama proper names, which have been replaced by Tigrinya proper names. Among the 13 consultants, only two persons were found with Kunama native proper names. More surprisingly, even the age-old ones have non-native

names and this extends to the names of their fathers'. Thus, it has been long since the Kunama tends to identify to the norms and values of the Tigrinya speaking people.

### **1.3.3 The State of Endangerment**

Many factors have to be taken into account to label one's language and culture as endangered. Number of mother tongue speakers, especially the newborn ones, politico-geography, attitudes of speakers towards their language, place of the language in media as well as political and historical suppression are among the major benchmarks. Accordingly, to give a clear picture of the Kunama language's state of endangerment, the researcher tried to review some sociolinguistic variables. For instance, as compared to the Tigrinya speaking people, the Kunama are minority groups in terms of population in both Eritrea and Ethiopia, which in turn makes them bilingual in Tigrinya. Besides, the politico-geography of this people in itself exposed them for different attacks and alienation, especially which emanate from the Eritrean side. As to Tronvoll (2009), the reasons for their being under attack by their own government are many.

Firstly, the Kunama geography put them in a politically turmoil situation. Lussier (1997:441) as cited in Tronvoll (2009:119) put this situation in clear terms "The advent of Eritrea as a newly created state has put the Kunama in the position of a double periphery now that the national borders have divided them on the ground." Secondly, their hostile relationship, historically, with the Abyssinians (highlanders of Eritrea and Ethiopia), made them to be a marginalized group. The third factor is the Kunama military alliance with Ethiopia during the Ethio-Eritrea war has put them under suspect by the Eritrean government. The last point could be the fertile nature of the Kunama land attracts the highlanders and made conflict to be more likely. Because of these, the Kunama in Eritrea are prone to exile, imprisonment and murder.

Moreover, Hassen (2011) and Haftom (2011), in their studies on the Kunama Shukre prove that most Kunamas use the Tigrinya language outside the home environment, in schools and for daily communication purposes, and identify themselves with the cultural practices of the majority Tigrinya speakers. Especially, Hassen (2011) proved that Tigrinya is more vital than Kunama among the Kunama Shukre community. From the

account given so far, it seems valid to conclude the Kunama language is endangered and the values of the people are vanishing.

#### **1.3.4 Language Literacy and Revitalization Efforts**

The Kunama language has been into the writing system much earlier since the first Swedish missionaries arrived in the area in 1866 (Thomson, 1983). The missionaries were used the Latin alphabet and did many literary works including Bible translation, in the Kunama language. This was interrupted by colonial Italy, who forced the missionaries to use the Italian spelling or Roman orthography for Kunama;<sup>16</sup> Rev. Hagner, cited in Thomson (1983:285) described this, “In the Italian time we were forced to use Italian spelling, and it was a real disaster.” After the end of the Italian occupation, missionaries were resumed to use a more phonetic variety of spelling, which appeared more difficult for the ordinary Kunama and even to the educated ones. This time the Kunama, in Eritrea and Ethiopia uses the Ge’ez alphabet, but information is not found when exactly the Ge’ez alphabet replaced the former system.

Concerning the Kunama Shukre community, the current situation of language literacy and mother tongue education is overviewed, in the next paragraphs, based on fieldwork observation and interview.

The Kunama language uses the Ge’ez alphabet and Kunama mother tongue education is in its infancy stage. The researcher has visited a first cycle primary school at T’abia Lemlem, where children are learning in Kunama. Based on an<sup>17</sup> informal interview with one Kunama teacher and the main consultant, they have raised some problems that cast on the staggering mother tongue education. These include, quality of the teaching materials, shortage of educated native Kunama teachers and the improper representation of the language in the orthography being used. Some keen Kunama natives, who are not well trained in pedagogy as well as those who have backgrounds in other fields prepared the teaching materials. As a result, they are highly concerned about the quality of the

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<sup>16</sup> Rev. Olle Hagner, in the late 1960’s was a veteran of 40 years service among the Kunama. He was responsible for much of the revision of the earlier literary works and his own works later (Thomson, 1883:285).

<sup>17</sup> Kidanemariam teaches Kunama in a primary school at T’abia Lemelem, and Berhane Kegnu, public relation officer of Tahtay Addi Yabo woreda, was my main consultant.

materials. The main consultant, for instance, with a diploma in Agriculture was involved in the preparation of those textbooks, and most others in the material writing team were at the same educational level. Similarly, almost all Kunama native primary school teachers, including those teaching other subjects elsewhere in Northwestern Tigray zone, have only a diploma and have not been given a chance in the summer program. This, in turn, casts on the staggering Kunama mother tongue education.

The other concern raised was about the unseemly representation of some consonant sounds and the non-segmental features of the language, in the orthography being used. The voiced velar nasal consonant segment /ŋ/, as to the main consultant, is confusingly represented by a grapheme that obviously stands for a different sound in Tigrinya. In view of the Kunama being bilingual in Tigrinya, such representation might distract easy reading on the part of the schoolchildren. The other more important gap noticed in the orthography is that the suprasegmentals, tone, gemination and vowel length, are not totally taken into account despite that they are prominent in the language. Though tone orthography is a demanding task, the issue can make a huge project in the future.

After the fieldwork, the researcher has formally requested the College of Social Sciences and Languages, at Mek'ele University, to offer a chance for some native Kunama teachers in the summer program. And he justified that this project is community based and will be extended after the completion of the study. Interestingly, the college again formally requested the Regional Education Bureau and got a positive reply. Presently, five Kunama primary school teachers have been attending the summer degree program at Mek'ele University. It is hoped that these teachers will add a lot to the language maintenance effort in general and the Kunama mother tongue education in particular.

#### **1.4 Previous Studies on the Kunama Language**

In this section, the earlier linguistic analyses on the Kunama language in general and any of the dialects in particular are reviewed. This helps to situate the present study in the context of the existing studies on the language, and thereby to start from the more concerning gap. As one of the least studied Nilo-Saharan languages, the available studies on the Kunama grammar in general and the phonology in particular are limited and

incomplete. In view of the considerable number of dialects, the existing studies are far less than the expected.

#### **1.4.1 Published Works**

Even though the earliest publications on the Kunama language were contributed a century and half ago by the Swedish Evangelical missionaries, the researcher has not yet find any of those for review. As a result, the present study mainly confined to assess the later studies, especially those after the early 1970's while some of the other earlier works will be overviewed as cited in recent publications.

##### ***1.4.1.1 Early Descriptions of the Kunama Language***

The earliest descriptions of the Kunama language, as indicated in (Fatima, 2003), are that of P. Englund (1873), a Swedish missionary, who published an article on Kunama grammar entitled, "Ett litet prof pa Kunama-Spraket", and the work of Reinisch (1881), an Austrian professor, who contributes an excellent grammar description of the Kunama language. The first study was acknowledged for adding much for the quality of the latter paper, as the author himself puts, "the small but very useful booklet of P.Englud had been very helpful" (Tegner, 1884:114) as cited in Fatima (2003).

The other contribution within this time bound is a Bible translation, in the Kunama language, by two missionaries J.M. Nilsson and August Anderson in the in the 19<sup>th</sup> century from 1898 until 1910's (Fatima, 2003 and Thomson, 1983). Besides, Anderson (1907) further published ethnographical articles on the Kunama people, in the time range, aforementioned.<sup>18</sup>The translation works were used as vital data sources for later studies like that of Thomson's (1983), who describes the Kunama phonology and noun phrase. He used 200 sample sentences from the revised versions of the translations, especially from Tabbila Lelida (Thompson, 1983:285).

According to Thomson (1983:285), the flaws in the literary works attributes mainly to failure to indicate vowel length, stress and tone as well as the defect to establish consistent system of consonant length. These shortcomings, as to Rev. Olle Hagner,

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<sup>18</sup> For further information about the earlier translations and literary works see Thomson (1983).

were caused by their use of the Italian spelling system, as imposed by the Italian regime, which he described, “It was a real disaster” (Thomson, 1983:285).

The other earlier study on the Kunama grammar is “Grammatica della Lingua Cunama” by Giuseppe-Fermo da Castelnuovo del Zappa (1938), the Capuchin Mission to the Kunama. Thomson (1983:285) referred this work to be “pre-linguistic”, which might seem for the author’s use of the classical Latin style, which suppressed Kunama constructions that do not fit into this framework, and the “Italian spelling conventions.” Despite this, Thomson (1983) owes much debt for the work as having richer data and guesses that the Barka dialect was the focus of that study.

#### ***1.4.1.2 Later Descriptions of the Kunama Language***

The later descriptions on the Kunama language can again be viewed in two perspectives: those that solely dedicated to the Kunama language, and the ones that viewed Kunama in the ambit of Nilo-Saharan classification, by presenting comparative notes on the lexicon and grammar of the language.<sup>19</sup> Studies of the latter type include, Greenberg (1963, 1966, 1971), Bender (1975, 1976, 1983 and 1997), Ehret (1989, 2001), Blench (1995). In these works and probably in more other editions, the Kunama language and people are mentioned while the major portions are devoted to issues of Nilo-Saharan classification, based on limited data from earlier studies of Kunama. However, Bender, in his later publications of the Nilo-Saharan classification (1996, 1997 and 2000), provides his own Kunama data and gives more information about the ethnography of the Kunama people.

Therefore, critically reviewed are those studies that are devoted to the description of the Kunama language. These include, Connell et al (2000), Bender (1996), Thomson (1983, 1989) and Tucker and Bryan (1966). The assessment mainly looks into the central foci of the studies, the major findings and the noticed gaps while specific issues will be cited in the body of the analysis whenever found necessary.

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<sup>19</sup> A review of those studies on comparative linguistics and Nilo-Saharan classification is not presented in a separate section. Information and findings, if there are, are mentioned in this thesis when they are found relevant.

### **Connell, Hayward and John Abraha (2000)**

This article, “Observations on Kunama Tone”, is entirely devoted to investigate the tonal system of Kunama, based on Barka data. It presents phonological and phonetic discussions on the basic tones of the language, and the surface melodies.

Accordingly, Kunama is a register tone language whose basic tones are level. It has a rich tonal inventory with three level tones (High, Mid and Low), three falls (HM, HL and ML) and a rise (MH), which give the language a seven-way potential to combine its level tones. The present study adds LH and LM rising contours and additionally posits complex combinations of contours surfacing on adjacent syllables. Thus, the tonal inventory of Kunama (Shukre) is enriched with three level tones, three falls and three rises. Tone plays lexical and grammatical roles in Kunama; whereas, the study does not come across an evidence for lexically prominent stress. The study focuses on the Barka dialect but claims that the findings could work for the Marda dialect too, with regard to tonal phenomena. The study indicated the absence of the low tone on monosyllabic words, but the present study has analyzed the low tone on similar contexts. On monosyllabic words, however, all the three distinctive tones are often realized in raised pitch ranges as compared to the tones surfacing on polysyllabic contexts. The present study has tried to treat the phenomena in terms of pitch height scaling.

The study has indicated issues for further inquiry and remarked that, “much more remains to be explored regarding Kunama non-segmental phonology” (Connell et al, 2000:33). Other clearly stated gaps for future studies include grammatical tone, tone in the verb phrase, tone in derivational morphology, for instance, in compound noun formation and pitch scaling. Connell et al (2000) explained the latter, “Unlike West African tone languages, with three level tones, the Kunama tonal system exhibits interesting differences that could add a lot to our understanding of tonal phenomena”. The present study has treated some of the suggested issues, such as, grammatical tone in derivations and pitch scaling. The more specific findings of the study will be cited in the main body of the analysis when they are found relevant. Overall, this study is found to be the first work that gives full attention to Kunama tone and makes a breakthrough to the proper treatment of Kunama tone, which the present study has benefited from.

### **Bender M. Lionel (2001)**

This is Kunama-English wordlist where lexical entries are marked for tone including non-final fallings, which Bender (1983) in his editorial comments to Thomson (1983) has reflected that the falling tone would be restricted to word-final position. In line with this, Bender (1996) also recognizes other prosodic features for Kunama, for example, the marking of stress that goes to the extent of marking two degrees of stress. The present study does not treat stress but confirm the presence of phonetic stress, which sometimes conditions extra duration on underlyingly long vowels.

### **Bender M. Lionel (1996)**

It is with this particular study that Bender describes the Kunama language, including its phonology, morphology, syntax and prosodic features, by using Marda data. He reviews earlier assumptions of his own and that of Thomson (1983 and 1989) about the Kunama language, particularly of its prosody. The study starts by presenting preliminary information on the language and gives lexical and grammatical data in situating Kunama in the Nilo-Saharan languages family tree.

He posits 19 consonant phonemes and 5 phonemic vowels with an equal number of longer counterparts. The present study posits 18 consonant phonemes for Kunama Shukre while the glottal fricative sound is posited as marginal. The study presents diphthongs and indicates the possibility of triphthongs, which the present study identifies the potential triphthongal contexts. In this work, Bender reconsiders his first view that the phonology of Kunama is straightforward, and explains Kunama to be different, in many of its features, from other Ethiopian languages. Unlike the Semitic languages that are rich in sets of ejectives, the Cushitic in implosives and the Omotic in retroflexes, Kunama has none of these. Besides, different even from other Nilo-Saharan languages that are rich in interdental vowels, Kunama is different. Bender (1996) gives recognition to Kunama suprasegmentals: vowel length, gemination, stress and tone. He marks two level tones, High and Low, and a falling tone, and two degrees of stress. Against his earlier view, in his editorial comment to Thomson (1983), non-final falling tone is also analyzed, which therefore gives recognition to the credence of Kunama tone, and expects a rich tonal inventory for Kunama. As to him, the divergence of Kunama can

also be attributed to its immense potential and deviant features of its non-segmental phonology, which especially goes with its tone and ‘stress’ as well as its morphology; the first one is suggested for further inquiry.

The greater portion of the paper is devoted to describing Kunama morphology. Unlike the commonly known Afro-Asiatic verb classification, prefixes and suffixes in Kunama divide verbs into two conjugational types that are lexically distributed and very unlike the Afro-Asian aspectual use of the prefixes and suffixes. In addition, he stipulates that Kunama adjectives have the same forms as the nouns, which, therefore, are considered under the same nominal sets. Moreover, he describes Kunama’s rich pronominal system, singular, dual and plural number as well as inclusive-exclusive pronouns though this feature is also found in other Nilo-Saharan languages, for example, Nyimang of East Sudanic. Finally, Bender (1996) observes that Kunama shares the SOV-type syntax of the Ethiopian Afro-Asiatic languages and has lexical influences from Semitic and Cushitic languages. To sum up, this volume, apart from the issues reviewed, gives sample texts with free translations and the language map of the Kunama area.

### **Thomson E. David (1983)**

Among the later works on Kunama, Thomson’s analysis is found to be exhaustive with regard to the segmental aspects of the language. His article, “Kunama Phonology and Noun Phrase”, basically focuses on the Marda dialect but provides data from Barka, Ti:ka and Aymasa, thereby making lexical and grammatical comparisons throughout.

He posits five phonemic vowels (i, e, a, o, u) with an equal number of longer counter parts (ii, ee, aa, oo, uu), and provides two diphthongs, au, ia, which the second has phonemic status. Besides, his consonant inventory comprises of 19 consonants phonemes, but his description to some of these consonants is different, in some respects, from that of Bender (1996), which will be mentioned in the related portions of the present study. The study also brings evidence for vowel harmony in verb conjugation where /u/ causes the change of /i/ to [u] (Thomson, 1983:289).

With regard to suprasegmentals, he analyzes contrastive gemination, stress and tone, of which stress is mentioned to play only lexical meaning contrast while the two have lexical and grammatical roles. However, he questioned the phonemic status of vowel length and correlated length to stress. The present study, rather, analyzes distinctive vowel length in unstressed context. Whereas, Thomson (1983:289) provides evidence for stress without vowel length, in verb prefixes, '**antike** 'he saw me', '**aantike** 'he saw us', for which the present study analyzes a low tone on the first and a high tone on the second but not stress and length. Consequently, he recognizes two level tones (high and low) but the tone marking is observed on fewer words, and only the high tone is marked with acute accent. Instead, the marking of stress is consistent, and the syllable preceding a geminate is usually stressed. He tends to treat vowel length and tone as stress. In contrast, the present study have analyzed tone, vowel length and gemination as prominent both in the lexicon and grammar, but prominent stress is not attested though stress is beyond the scope of the present study. Overall, Thomson (1983) describes Kunama segmental phonology and noun morphology in detail, but comparatively he gives only a limited room to the analysis of prosodic phonology, in general and tone, in particular.

Thomson describes the noun morphology in much detail, addressing both inflectional and derivational typologies. In the first, number, gender, possessive constructions and different cases as well as compound noun formation, nominal phrase and nominal sentences are well discussed. Nominal sentence structure and their transformed structure, such as, affirmative, negative and interrogative, are also treated.

Thomson (1989), in his subsequent study on "Kunama verb system", did not resolve the confusion that correlates vowel length to 'stress'. He marks "normal tone", "high tone" and "tone rise". The normal tone, as to Thomson (1989), refers to the low tone.

### **Tucker and Bryan (1966)**

This article presents a 12-page grammar sketch of Kunama based on data from an earlier study by Stevenson. It analyzes lexical and grammatical stress and tone. They mark stress and three level tones (high, mid and low). This study is one of those who posit

three level tone heights, and the other study with the same proposal is that of Connell et al (2000). The present study has also posited the same number of distinctive heights.

#### **1.4.2 Unpublished Works**

The unpublished studies, except that of Banti and Nikodimos (1994), are B.A senior essays and M.A theses conducted at Addis Ababa University. While all of the senior essays focus on the Marda dialect, for the only reason that their sole informant, Nikodimos Idris, was a speaker of the Marda and a student of Addis Ababa University by then, the two theses target the Shukre dialect, in Northwestern Tigray of Ethiopia. Most of these studies posit 19 consonants phonemes and five phonemic vowels with an equal number of longer counterparts. Each of these is critically reviewed in the subsequent paragraphs.

#### **Angesom Abadi (2012)**

This is the most recently written MA thesis on the syntactic relations of Kunama (Shukre), which is also the focus of the present study. The study is structured in four chapters, of which the first presents brief notes on the language and the people. In the main body of the paper, thorough explanation is given to case marking, different ways of marking possession and constituent order. Accordingly, he identifies two core cases, nominative and objective, and describes the others as peripheral. The grammatical marking of the two core cases is optional, for which constituent order is rather used, as an alternative way of marking syntactic relation in Kunama. Besides, Angesom discusses lexical possession, pronominal possession, where the order of the possessor and the possessed varies accordingly, kin term possession and predicative possession.

With regard to supra segmentals, the study indicates the lexical and grammatical prominence of stress and tone. Two tones, High and Low, are rarely marked but the markings are indicated to be temporal, except for the grammatical ones. Whereas, he marked stress consistently and is indicated to be grammatically distinctive. However, my data does not suggest an evidence of grammatical stress. Similar to most previous studies, tone gets only marginal attention, and whose markings are inconsistent and have not been done throughout. Up to the reach of the present researcher, this study has been

found to be the only available linguistic analysis on the Shukre dialect. All the remaining earlier studies focused on the Marda and a few on the Barka dialects; therefore, it can be concluded that dialectology in Kunama is still an unexploited area for linguistic inquiry.

### **Hassen Nuru (2011)**

This M.A thesis is a sociolinguistic survey of the Kunama Shukre and particularly assesses “the state of language shift”. The study follows a quantitative analysis and explores different sociolinguistic variables that are core indicators of language shift tendency. These includes: Language proficiency, Language use, Language attitude, Code-switching behavior and language maintenance efforts, and each of these variables are checked across age group, sex, place of residence (Urban and Rural), and educational background.

Concerning Code-switching behavior of the Kunama, the study observes that during conversations outside the home area, the Kunama frequently mix Kunama and Tigrinya languages with each other. This is similar to the present fieldwork observation conducted in the same area. The present researcher was expected to remind the consultants repeatedly to go back to Kunama while recording conversations; they frequently mix Tigrinya in the middle of their talks.

Generally, the study concludes that, except language attitude, the rest of the variables highly favor the Tigrinya language, so the state language shift is described to be apparent among the Kunama community, in Ethiopia.

### **Nikodimos Idris (1987)**

Nikodimos is a native speaker of Kunama Marda and studies on “Kunama sentence structure” for his senior essay, at Addis Ababa University. This is the first exhaustive analysis of Kunama grammar by a native Kunama. In addition to Kunama syntax, the study provides much information on Kunama ethnography and geographical setting. His role as the only key consultant, by then, for almost all of the studies (senior essays) at Addis Ababa University makes him the state-of-the-art in the study of the Kunama language. Though the central focus of the present study is the phonology of Kunama,

some of the related points discussed by Nikodimos are overviewed in the following paragraph.

Against the previous researches conclusive remarks that **-y** and **-e** are the only plural morphemes, he noted that these two serve for words ending in nominalizer **-a** only, and true of the “dual” morpheme **-me**. However, for words that end in **-e** or other vowels than **-a**, the “plural” morpheme is **-ay** and the “dual” is **-am**. Nikodimos specifies the distribution of phonologically conditioned allomorphs of the “plural” and “dual” morphemes of Kunama. The present study does not prove the same number suffixes except that **-a** and **-e** are the singular and plural morphemes, respectively. The dual person is marked by gemination while taking the plural suffix vowel.

On the other hand, an important gap in this study is the marginal attention given to the suprasegmentals, especially to tone. Nikodimos remarked the prominence of tone in Kunama, “basically Kunama is one of those languages that do not have the possessive form “of” or the verb “to be”, and makes up for this lack mainly by ‘tone’. Consequently, a slight mistake in the tone might transmit a wrong message with bad connotation”. Some examples from Nikodimos (1987) include:

<i>mu:satà</i>	<i>‘The dog of Musa’</i>
<i>mu:sátá</i>	<i>‘Musa is dog’</i>
<i>mariá aná</i>	<i>‘The hair of Mary’</i>
<i>mariá anà</i>	<i>‘Mary is hair’</i>

Nikodimos is also the first mother tongue speaker to argue that Kunama is primarily a tone language, but he does not mention stress at all. He identified three tonemes, rising, falling, level, and indicated the possibility of combining rises and falls, but he does not mark tone throughout the study. Truly, this gap does not refer only to Nikodimos, as John and Klaus (1998:28) contend, “It is a peculiar tradition of East African comparativists to shun tone analysis.”

The present study attempts to check the tonal marking of copula vs. genitive by recording one of the minimal pairs, cited by Nikodimos (1987), with three consultants. It is true that the high tone marks copula and the mid tone identifies the genitive, both heights surface on the terminal vowel, but in the former Kunama speakers additional insert a boundary pause while the latter has been said at once so that the terminal vowel undergoes deletion. For Nikodimos the contrast is due to high vs. low tones.

### **Brutawit Fekadesellasi (1984)**

Brutawit writes her senior essay on “a comparative analysis of Kunama and Amharic segmental phonemes”. The study predicts the major errors, which a native Kunama would commit when s/he speaks Amharic, by comparing Amharic vowel and consonant phonemes that are not found in the Kunama sound system.

### **Meseret Tesfaye (1983)**

The other senior essay is written on “Kunama (Marda) Verb Inflections”. Under verb inflection, it covers classification of verbs into pronominal prefixing and suffixing, root verbs into consonant beginning and vowel beginning. Besides, she treated morphophonemic changes, particularly vowel deletion, vowel fusion, syllable deletion of compound verbs and allomorphic variation. In line with verb inflection, the study concludes that Kunama (Marda) verbs inflect for person, number, tense, imperative and jussive mood, but not for gender because gender is lexically marked.

### **Seyoum Mekuria (1983)**

This senior essay addresses “Morphophonemics of Kunama Nouns and Adjectives”, focusing on the ‘Marda’ dialect. It explores inflectional and derivational morphology of nouns and adjectives, where the morphophonemic processes are discussed. Inflections of nouns for number, gender and case, derivation of nouns from verbs and adjectives, and derivation of adjectives from nouns and verbs are the main discussion points. Accordingly, he identifies inflectional affixes for number and case, and allophonic variants of these, and explains vowel deletion, gemination and epenthesis, as the most common morphophonemic phenomena in Kunama.

### **Tefsehet Lemma (1982)**

Tefsehet studies on “Noun Morphology of Kunama” for her senior essay, at Addis Ababa University. She focuses on the Marda dialect for the only reason that her informant, Nikodimos Idris, is a speaker of Marda. Nikodimos was the only informant for most of the researchers working on the Kunama language at Addis Ababa University by then. She organizes the main part of her essay in three major sections: inflection of nouns, derivation of nouns, formation of compound nouns and some possessive constructions. In account to these, there is no phonemic ways of marking gender. Gender is lexically marked, and tone is explained to be prominent in marking gender, as cited below:

*hakima*            ‘doctor’  
*hakima darka*    ‘female doctor’

As to Tesfhet, a mid-tone on the second example changes the meaning into ‘wife of the doctor’. However, the present study does not show the role of tone in marking grammatical gender, but in similar contexts tone rather distinct genitive vs. copula. Besides, in possessive constructions tone marks number of the possessor. Generally, she observes distinctive lexical tone only as a substitute for inflectional affixes, but tone marking is not done at all and no mention is made about other suprasegmentals.

### **Aster Zewdie (1981)**

This senior essay is on “Kunama Phonology” with a focus on the Marda dialect. The phoneme inventory in this study consists of 19 consonants and 5 vowels. Among the prosodic features, the study briefs vowel length, gemination and tone. She posited three tone heights, High, Mid and Low, with a few minimal triplets, but no mention of stress. This is different from Thomson (1983) who presents two level tones and lexically contrastive stress.

## **1.5 The Present Study**

### **1.5.1 Why Kunama?**

Two sensible reasons are considered to describe the Kunama language: (a) state of endangerment, and (b) explicit and implicit gaps in previous analyses. The first reason upholds the critical situation of the Kunama culture and language. A considerable account is presented throughout the preceding sections about the historic and continual plight of the Kunama tribe due to in and out powers. To make things worse, the main Kunama tribe in Eritrea has been put under serious political suppression, which includes detention, killing and fleeing, by the current Eritrean regime (Tronvoll, 2009). This scenario escalated after the Ethio-Eritrea border conflict, 1998-2000 (Ibid). Their land has been grabbed, places of cultural and religious events are changed to military camps or else owned by others (Ibid). Even though the Kunama situation is far beyond saving their language and culture, this study is meant to contribute some linguistic facts that would help towards maintaining the language.

The current state of affairs of the Kunama Shukre community is different from those in Eritrea. In Kunama Shukre, at least, some works have been started towards revitalizing the language and the culture. However, the complete success of the steps taken in revitalizing the language and conserving the other attributes of this isolated community cannot be viewed out of the discourse of the main Kunama tribe, in Eritrea. After the 1993 independence of Eritrea, the Tigray Kunama group is isolated from the main Kunama tribe so that they tend to identify themselves with the majority Tigrinya speaking people. This in turn has been reflected in all forms of identity diffusion, which particularly is reflected by tendency of language shift to Tigrinya, especially on the part of the new generation. In view of such factors and the small population size of the Shukre group, describing and documenting the language is worthwhile and a priority.

The second reason for studying Kunama is derived from the gaps in previous works on the language. Bender (1983) stipulates that the Kunama language is one of the little studied languages under the Nilo-Saharan phylum and has longer been considered as a language isolate. Besides, almost all of the linguistic inquiries so far mainly focused on

two dialects, Marda and Barka while Kunama has eight dialects. In spite of this, the non-segmental phonology of Kunama, in its broadest sense, has been given a marginal attention, and the debate over the status and size of the suprasegmental features is still open for investigation. In view of the many dialects and the possible variations among these, only little has been known about the Kunama language, in general and the dialects, in particular. To make things worse, the present researcher has known only one linguistic description presented on the morphosyntax of Kunama Shukre. Therefore, the rationale of the present study is mainly derived from the two main reasons discussed above.

### **1.5.2 Aim and Expected Contribution**

The focal objective of this study is to describe the segmental and non-segmental phonology of Kunama, and to document an annotated corpus of some cultural traits of the people. In order to achieve this goal, primary data was collected in three-round fieldworks.

The outcome of the study is assumed to have the following contributions:

- Kunama, in general, and many of its dialects, in particular, are least studied and not well documented. This study, therefore, will contribute to the exploration and maintenance of the linguistic facts of Kunama (Shukre) and can serve as a reference for the development of Nilo-Saharan linguistic inquiry as well as the linguistic erudition at large.
- Comparative linguists, so far, unanimously mentioned that the shortage and/or the absence of linguistic data on the Kunama language as well as on many of its dialects, especially almost nothing is available on the Kunama Shukre dialect, has contributed to the unsettled debate over the classification of Kunama, at micro-level. Previous studies have commonly used data from Marda and Barka, and to some extent from Aymasa and Tika dialects. In account to this, the present study is hoped to fill the data gap, and may further trigger dialectology.
- This study is conducted in the realm of Documentary Linguistics, so it also overviews and exposes some of the non-linguistic facts of the Kunama people.

This, in turn, will encourage and provide initial information for future researchers from other fields to explore on the Kunama language and ethnography.

- Mother tongue education in Kunama (Shukre) is in its infancy, so the outcomes of this study will help to enhance the staggering language maintenance effort vis-à-vis amending the orthography, teaching material and dictionary preparation.
- Above all, since the Kunama Shukre community had my consent to get a copy of this paper, it will motivate them to play the primary role in the language revitalization works that already have been started.

### **1.5.3 The Research Context and Scope**

This study is conducted in the realm of documentary linguistics, and its goal is to produce a linguistic description and a documentation of culture informed corpus. The description part covers the analyses of segmental and suprasegmental phonology. The segmental phonology analysis covers the description of consonant and vowel sounds, syllable structure and phonotactics, morphophonemics and phonological adaptation of loanwords. The analysis of the non-segmental phonology includes the description of consonant gemination, vowel length and tone, both in the lexicon and in phrase level grammar. Nevertheless, stress is beyond the scope of the present study. The documentation part looks into an annotated corpus of texts that include the names of the cultural artifacts of Kunama, recorded during the visit of the Kunama culture museum, and short tales. Since the study is carried out to earn an academic degree, a standard documentation is not expected.

Since the political status co between Ethiopia and Eritrea does not allow the researcher to make a choice among the Kunama dialects, the Kunama Shukre dialect becomes the default target of this study. In Ethiopia, the Kunama community mainly lives in two Woredas: Tahtay Addi-Yabo and K'afra Humera, located in Northwestern Zone of the Tigray regional state. Though Data was collected in the former woreda, two of the consultants were from the latter.

#### **1.5.4 Methodology**

In this section, the methodological preliminaries that have been considered in data recording, transcription, description and documentation are explained.

##### ***1.5.4.1 Ethnographic Research Method***

Ethnographic field method is used to obtain the necessary data, as this method of data collection is believed to do better to achieve the objective of this study (linguistic description and corpus documentation). I was not there to simply record and analyse speech segments, so first I had tried to establish a dialectical relationship between the community of speakers and myself. By participating in the routines of their daily lives, I was able to build trust with most of the consultants, and thereby to understand the use of their language from their point of view. To this end, Franchetto (2006:183) stipulates, “Ethnographic information is a crucial component of any language documentation. If the wider goal is not simply to collect texts and a lexical database, but also to present and preserve the cultural heritage of the speech community, then ethnographical information must be linked to the linguistic data and its annotation and analysis.” Accordingly, three types of data are collected in the field, as discussed in the next subsection.

##### ***1.5.4.2 Data Domain***

A field-based documentary corpus and data for grammar description, as to Himmelmann (1998), cited in Lupke (2010:62), can be obtained from three different “communicative events”:

- A. Observed Communicative Events (OCEs) where the only influence of the researcher is (ideally) their presence.*
- B. Elicitations (Es) being communicative events heavily influenced linguistically by and only created for the sake of the researcher such as word lists, paradigms or acceptability judgments.*
- C. Staged Communicative Events (SCEs) occupy a middle ground between OCEs and Es. They are prompted or staged for linguistic purposes, but often use non-linguistic prompts such as pictures, video clips that consultants are asked to sort or describe, or games they are invited to play and describe. Their linguistic structure is less likely to be influenced by the researcher than that of elicitations.*

In account to this, 1500 items wordlist, and 2 hours of semi-controlled phrases and short sentences, from the communicative events in type (B and C) above, and 10 hours of texts from type (A), were recorded. Besides, 49 minimal sets that show a minimum of two-way and a maximum of five-way contrast were selected from the main wordlist and re-recorded from the main consultant, with an extra care taken of sound quality. Since this study is on lexical phonology and phrase level grammar, the linguistic description in this paper benefited much from the wordlist (B) and from the phrases and short sentences (C). Lupke (2010) suggests elicitation (B) and staged communicative events (C) to be vital and help to get series of fauna and flora taxonomies as well as paradigms (nouns and verbs). Besides, he underlines that conventional data gained only from OCEs (narratives and procedural texts) are not adequate to provide enough samples of the speech community's linguistic practices. However, for the main analysis, many insights have been obtained from the recorded texts that encompass personal stories, folktales, conversations, historical narrations, descriptions, blessing, cursing and praising.

The other types of data used in this study are video and photographs. They are used to document some aspects of the Kunama Shukre socio-cultural and socio-economic activities, such as, traditional houses, vegetation/crop types, cultural materials, cultural dresses and pictures of community members. The role of photographs in language documentation (Austin, 2013) includes, to give graphical explanation of names of plants, animals, traditional goods and materials, illustration of the geographical environment of the field, illustration of people met in the field, illustration of the setting of recording, and as part of the metadata.

#### ***1.5.4.3 Data Collection Tools***

Wordlist prompts, notebooks and audio-visual equipments were used to capture every conversation during the elicitation task.

##### ***1.5.4.3.1 Wordlist Prompts***

Lexical items were elicited by using SIL African Comparative Wordlist and Swadesh basic vocabularies. Before the main fieldwork, the English prompts were translated to Tigrinya, particularly to the common variety used in Western and Central zones of

Tigray region because the Kunama used to speak this variety. Though the researcher has a good knowledge of Tigrinya, three native Tigrinya speakers who are original to the aforementioned variety were participated in translating the wordlist prompts. Words that lack appropriate Tigrinya equivalents were elicited by means of extended verbal descriptions and non-verbal prompts. Besides, field notebooks were used during unplanned elicitations that were triggered by spontaneous communication with a native Kunama. The data collected in this way includes, names of traditional household utensils and native speakers' reflection on any Kunama issue. The notebooks were highly important to keep metadata entries: the consultant's biodata, date and place of recording, discourse genres and any commentary given by speakers.

#### 1.5.4.3.2 Audio-visual Equipments

Audio and video recorders were used as main data capturing tools and both are SONY branded. The audio recorder was mainly used during lexical elicitation and interviews while the videotape was used to record context based texts, cultural materials, the topography and the overall setting of the Kunama area. When needed, pictures were taken by using the video recorder.

#### ***1.5.4.4 Fieldwork and Language Consultants***

The main fieldwork was conducted in three rounds in a period of two years (2014-15). In all trips, a total of 13 Kunama native speakers were met for lexical elicitation, text recording and for interview. In order to soothe the bureaucracy, things were prearranged during a preliminary fieldwork.

##### 1.5.4.4.1 Preliminary Fieldwork

It was conducted in Mek'ele, the capital city of Tigray regional state, in April 2014. First, a formal letter was obtained from Mek'ele University, addressing Tahtay Addi Yabo Woreda administration and confirming that the mission of the fieldwork is only academic. Besides, to reach the Kunama community easily and to get the required data, some people, who are originally from Shiraro and live in Mek'ele and others who had been to the Kunama area before for research and official duties, were contacted. By doing so, it was possible to get a facilitator and the names of prominent native Kunamas

who can better help in the field. Had it not been for this preparation, the main fieldwork would have been unsuccessful. As the Kunama area is a buffer zone that converges on the Eritrean boarder, free movement is unlikely for a stranger.

#### 1.5.4.4.2 Main Fieldwork

The main fieldwork was conducted in Tahtay Addi Yabo Woreda, in three rounds. The first round was in Shiraro town, from 15-21 of June 2014. During that short visit, I introduced myself to the key consultants and <sup>20</sup>my facilitator, and recorded the first 100 lexical items and arranged an appointment for the second round fieldwork.

The second round fieldwork was from 7 October-19 November 2014. Most of the lexical and text data were collected during this visit to Shiraro town and three areas in T'abia Lemlem: Ela Kunama, Geza Mek'er, and Medabe.

The last fieldwork was conducted in August 2015 after writing the phonology. It was conducted to elicit additional paradigms of phrases and syntactic constructions, and thereby to substantiate the description of grammatical tone. It was conducted in Mek'ele, after the first five native Kunama (primary school teachers) had joined the summer degree program, at Mek'ele University. The required data was recorded from <sup>21</sup>two of those students, within two consecutive days. They are from Addi Goshu area of K'afta Humera Woreda, where a section of the Kunama Shukre community lives. The main areas of the Kunama Shukre community and the field sites are shown, in (Figure-2), below:

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<sup>20</sup> Ato Merzu Nigusse is a Tigrinya speaker and was my facilitator. He is a local militia, popular in the area, especially among the Kunama community. Merzu was born in Shiraro and lived his whole life in Shiraro.

<sup>21</sup> Dagnew Shintli and Ashebir are Kunama native primary school teachers. They are among the five native Kunamas who got the first chance of the Summer degree program.

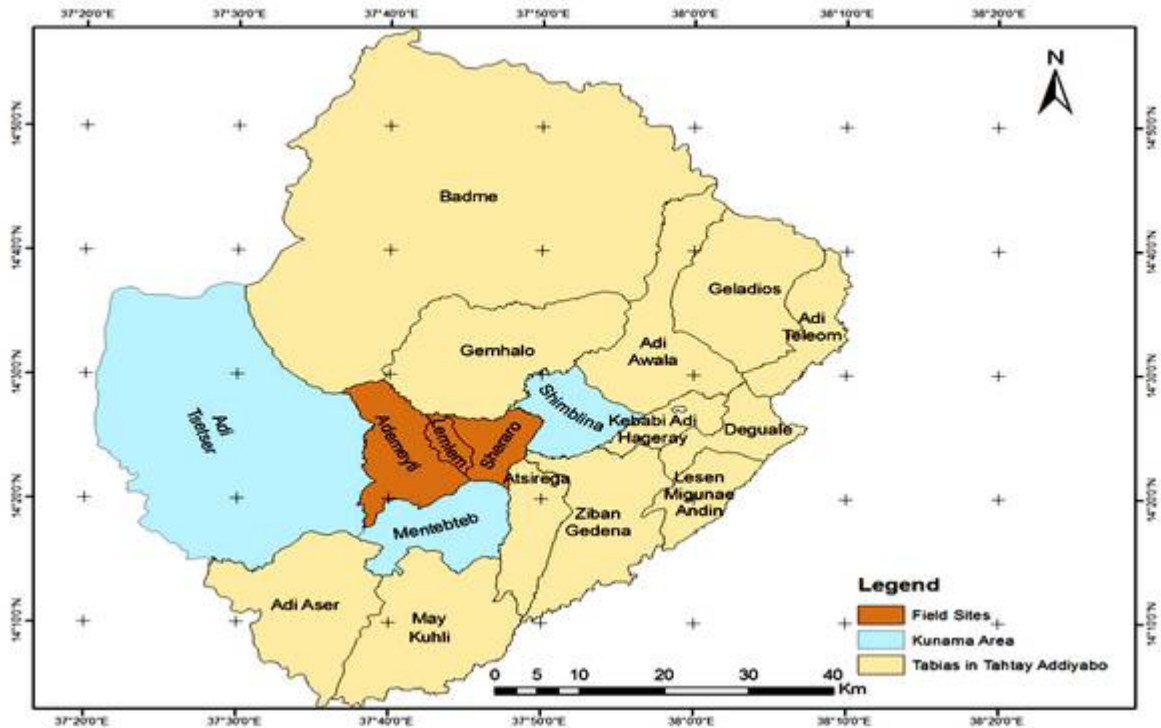


Figure 2 Map of the Kunama Shukre areas and main field sites

Speakers were selected by three parameters: being Kunama native, how long they live in the area and inclusive of different age groups. Both younger and elder native male Kunamas were included. Unfortunately, a female consultant was not found for lexical elicitation, except one elderly woman who participated in text recording. Ultimately, 13 native consultants were participated during the recording of all forms of data. The 1500 items wordlist was mainly recorded from three male native speakers from Shiraro town. Ato Bahre is a 35 years old man and chairperson of Tabial Lemlem; Abboy Fantay G/egziabher is a 73 years old man, who lives on farming, and Berhane Kegnu is a 39 years old man, who was the public relation officer of Tahtay Addi Yabo Woreda. He has been my long time consultant; even after the fieldwork, we had much through repeated telephone conversations.

Berhane has a diploma in Agriculture, and he is a well-informed and well-versed Kunama speaker who has been playing a major role in the revitalization project that starts Kunama mother tongue education. As part of the main wordlist, 49 minimal sets were re-recorded from the main consultant (Berhane). The wordlist was finally cross-checked with Abboy Fantay, who had also participated in text recordings. This elderly

man provided the Kunama ordinal and cardinal numbers and was the only one, among other consultants, who is able to count up to one million. Along with this, Abboy Fantay was recorded for more information, for example, about the Kunama calendar, i.e. the way of counting seasons in the year and days of the week. Many lexical items that other consultants did not know or remember were elicited from him.

The remaining eight consultants who were participated in a range of text elicitation and in the recording of the simulated **sāṅgānénā** are above 65 years of age. Three of those including the elderly woman are from Geza Mek'er, five kilometers from Shiraro; one of them is from Shiraro, and the rest three are from Ela Kunama, in the outskirts of Shiraro town. All of the consultants are mentioned by name in the acknowledgement.

#### ***1.5.4.5 Transcription, Annotation and Linguistic Description***

The audio data is first converted to .wav format by using the Audacity 2.0.6 Software ([http:// audacity.sourceforge.net/](http://audacity.sourceforge.net/)) while the documentation video data is edited and produced in MPGE4 format by using Adobe Premiere Pro CS6 version 6.0.0 (319 (MC:264587)). Since both formats are compatible with ELAN, the audio and video data were easily handled for transcription and annotation. The audio data was arranged by the consultant's name, date and place of recording. This was helpful, especially during the acoustic experiment, to arrange the stimuli contexts and the measurement figures obtained from each speaker.

The 1500 items wordlist, 2hours of controlled phrases and sentences were transcribed in ELAN4.8.1(<http://tla.mpi.nl/tools/tla-tools/elan/>). This software can accommodate integrated multimedia data, so transcriptions are always available for lasting use. Accordingly, the segmental and supra-segmental transcriptions were repeatedly checked. The wordlist is transcribed in two tiers, one for transcribing the Kunama words in IPA, and the other for transcribing the Tigrinya equivalents in English orthography. Tone is conventionally marked on each syllable vowel. Both Phonemic and phonetic transcriptions were done as cited in the body of the analysis while the annexed version of the wordlist is in phonemic transcription. The segmental and non-segmental phonology of Kunama (Shukre) is described based on the wordlist, controlled phrases and short

sentences. Besides, two acoustic experiments were carried out: the first is an instrumental analysis of vowel quality, and the second is an instrumental analysis of fundamental frequency (pitch). The outputs of both experiments are used to substantiate (or otherwise) the impressionistic analysis with instrumental data.

A 30 minutes length video corpus is annotated in ELAN 4.8.1. The annotation consists of the names of Kunama cultural artifacts that were recorded during visiting the Kunama cultural museum, and sample short tales recorded from five Kunama elders. The annotation is multi-tiered consisting of five tiers: IPA transcription of native utterances, word break, morpheme break, word and morpheme glossing and English free translation with commentaries on the cultural artifacts. The multimedia document along with the source video file and the metadata is submitted for archival, as part of the paper work. It gives a good picture or explanation of the Kunama tangible cultural heritages that have been overviewed in §1.2.4.2 above.

### **1.5.5 Organization of the Dissertation**

This dissertation is structured into nine chapters. The first chapter introduces the present study the Kunama language, aspects of the people's lives, critical review of previous studies and the present study. Chapter 2 and 3 describe consonant and vowel sounds, respectively. In these chapters, vowel length and gemination are discussed along with the segmental phonology. While syllable structure and phonotactics are illustrated in chapter four, chapter five presents phonological and morphophonological processes. The sixth chapter observes the phonology and phonetics of tone in the lexicon. Chapter 7 illustrates the prominence of grammatical tone as well as the form and behavior of tones in the tonal processes that have been analysed in phrase level grammar. Chapter 8 illustrates the phonological adaptation of loanwords. The last chapter summarizes the main findings of the study.

## CHAPTER TWO: CONSONANT SOUNDS

### 2.0 Introduction

This chapter presents the description of consonant sounds based on impressionistic analysis. It is organized into four main sections. Section 2.1 gives the present study's proposal of phonemic and phonetic consonants inventory. Section 2.2 discusses the phonemic status of the consonants. Section 2.3 details phonological and phonetic discussions on all consonant sounds and shows the distributional pattern of each. Section 2.4 provides evidence for lexical and grammatical gemination. Although gemination is an issue of non-segmental phonology, it is discussed in this chapter for convenience.

### 2.1 Consonant Inventory

Previous studies, such as, Aster (1981), Tefshet (1982), Seyoum (1983), Meseret (1983), Thomson (1983) and Bender (1996) have commonly proposed 19 consonant phonemes for Kunama (Marda). On the other hand, differences, concerning the place of articulation of some of the consonants, are noticed between Thomson (1983) and the rest, especially Bender (1996). Thomson describes /k, g, ŋ, h/ as palatals, /dʒ, tʃ, ʃ, ɲ, j/ as alveo-palatals, whereas, Bender (1996) contends /k/ and /g/ to be velars, /h/ post-velar and /dʒ, tʃ, ʃ, ɲ, j/ palatals.

The present study posits 18 consonant phonemes for Kunama (Shukre) while the glottal fricative consonant /h/ is claimed to be marginal. This is due to its rarer distribution, lack of a minimal pair and irregular distribution that shows its tendency of replacing the voiceless velar plosive /k/. The latter phenomenon suggests its occurrence as post-velar [k<sup>h</sup>]. Besides, two labialized velars [k<sup>w</sup>] and [g<sup>w</sup>] have been analyzed as allophonic variants of the basic velar plosive consonants. Other phonetic consonants that show irregular distribution and vary across speakers have been recorded, namely, a voiced alveo-dental plosive [d], and a voiced bilabial fricative [β]. The details of the nature of these segments will be discussed in forthcoming sections. Generally, the present proposal of consonant inventory is different from the previous proposals in its size and in

its description of articulatory place of some consonants. The latter is apparent as compared with that of Thomson (1983).

In the consonant inventory given below, in (Table-2), square bracket enclose allophonic variants; the question mark denotes the marginal status of /h/, and the parentheses embrace the phonetic consonant that has been found to be frequent but has been considered as a phenomenon of the Kunama voiceless velar weakening tendency. The shaded row indicates the missing of voicing in the fricative series, in Kunama.

Table 2 The Inventory of phonemic and phonetic consonants of Kunama

		<b>Bilabial</b>	<b>Labio-dental</b>	<b>Alveolar</b>	<b>Palatal</b>	<b>Velar</b>		<b>Post-velar</b>	<b>Glottal</b>
						plain	labialized		
<b>Plosives</b>	Vd	b		d		g	[g <sup>w</sup> ]		
	Vl			t		k	[k <sup>w</sup> ]	(k <sup>h</sup> )	
<b>Nasals</b>		m		n	ɲ	ŋ			
<b>Fricatives</b>	Vd								
	Vl		f	s	ʃ				h?
<b>Affricates</b>	Vd					dʒ			
	Vl					tʃ			
<b>Laterals</b>	Vd			r					
<b>Semi-vowels</b>	Vd	w		l		j			

## 2.2 Phonemic Status of Consonants

In this section, contrastive data will be presented to show the phonemic status of consonants. The consonants are contrasted first by their similarity in place of articulation and keeping manner of articulation to be different. Second, they are contrasted by their similarity in manner of articulation while articulatory place is kept different. Some of the contrastive examples given in (1-18) are near minimal pairs and this is due to a distributional gap. On the other hand, word-final contrast is absent for all consonants as all words in Kunama end in vowels, for instance, citation forms are nominals ending with the terminal vowel /a/. The phonemic status of the alveo-lateral liquid /r/ is determined by a word-medial contrast only as it does not occur word-initially. Besides, the word-medial contrast of the two semi-vowels /j, w/ is dubious as they often glide to make part of a vowel sequence in this position.

### Contrasting examples by Place of articulation

*/b/, /m/, /f/, /w/*

<b>Word-initial</b>	<b>Word-medial</b>	
(1) <i>bā</i> ‘dance (traditional)’	(2) <i>àbà</i> ‘I’	<i>lābá</i> ‘dry out, wipe off’
<i>mā</i> ‘tooth’	<i>àmā</i> ‘this’	* <i>lāmā</i> ‘razor’
<i>fā</i> ‘burying’	<i>kāfá</i> ‘feces’	<i>lāfá</i> ‘maize’
<i>wā</i> ‘eye’	<i>kāwā</i> ‘flour’	<i>lāwā</i> ‘think’

*/d/, /t/, /n/, /s/, /r/, /l/*

<b>Word-initial</b>	<b>Word-medial</b>
(3) <i>dā</i> ‘returning’	(4) ?
<i>tá</i> ‘slaughter (animal)’	<i>ātā</i> ‘opening (v), leading’
<i>nā</i> ‘drinking’	<i>ánā</i> ‘udder’
<i>sà</i> ‘giving’	<i>āsā</i> ‘dig’
?	<i>àrà</i> ‘white’

là ‘transplant’

áláˀ ‘lizard’

/ɲ/, /f/, /dʒ/, /tʃ/, /j/

**Word-initial**

**Word-medial**

(5) ɲā ‘meat’

(6) ?

fā ‘to be born’

āfā ‘old (not new)’

?

ádʒā ‘running’

tʃā ‘to die’

àtʃā ‘medicine’

jā ‘beating (a person)’

ājā ‘dream’

/g/, /k/, /ŋ/

**Word-initial**

**Word-medial**

(7) gādā ‘travelling’

(8) tāgā ‘threshing-floor’    àgā ‘navel’

kādā ‘crossing (river)’

tākā ‘know’    ?

ŋādā ‘food’

?    àŋā ‘possessive suffix’

**Contrasting examples by manner of articulation**

/b/, /d/, /g/, /t/, /k/

**Word-initial**

**Word-medial**

(9) bádáˀ ‘thigh’

(10) dàbà ‘lake’    sūbà ‘river’

dádáˀ ‘separating’

dàdà ‘bead’    súːdā ‘sleep’

gādā ‘travelling’

dāgā ‘begging’    sògā ‘chest’

tá:dá ‘carving’

dātā ‘thing’    ?

kādā ‘crossing (river)’

?    sù:kā ‘village, country’

**/m/, /n/, /ɲ/, /ŋ/**

**Word-initial**

- (11) mā ‘tooth’  
nā ‘drinking’  
ɲā ‘meat’  
ŋā ‘eating’

**Word-medial**

- (12) ʃimà ‘tail’  
ʃɪnā ‘vagina’  
?  
ʃɪŋà ‘thin’

**/f/, /s/, /ʃ/**

**Word-initial**

- (13) fādà ‘throw’  
sādā ‘poison’  
ʃādā ‘occasional’

**Word-medial**

- (14) kōfā ‘pus’  
kōsá ‘cough’ (n)  
kōʃá ‘hunting’

**/dʒ/, /tʃ/**

**Word-initial**

- (15) dʒulá ‘saliva’  
tʃulā ‘world’

**Word-medial**

- (16) ádzā ‘running’  
àtʃá ‘medicine’

**/r/, /l/**

**Word-medial**

- |                      |                  |                         |
|----------------------|------------------|-------------------------|
| (17) ɲè:rà ‘lie (n)’ | kōrá ‘suck’      | fūrā ‘plunder (a town)’ |
| ɲè:là ‘tongue’       | kòlà ‘defending’ | fúlā ‘crunch’           |

**/w/, /j/**

**Word-initial**

- (18) wà ‘leaving off’  
jā ‘beating’

(? distributional gap, and \*loanword)

The open spaces (as denoted by the question marks) in the minimal pairs given above, in (1-18), should not imply that that particular consonant phoneme does not occur word-initially or –medially. Instead, they indicate the lack of examples for that particular consonant phoneme that fit into the context of the minimal-pairs or –triplets for the rest of the consonants therein.

## 2.3 Description of Consonants

In the preceding section, the consonant phonemes are contrasted in identical environments as arranged by similar articulatory features. In this section, the distributional pattern of each of the consonant phonemes and their phonetic realizations are presented with reference to the following and preceding vowel phonemes. This again helps to explore and specify the phonological environment, where some of the consonant phonemes occur with a different phonetic realization. The consonant phonemes are arranged by manner of articulation for convenience.

### 2.3.1 Plosives

The plosive consonant phonemes in Kunama are /b, d, t, g, k/. In the plosive series, Kunama lacks /p/. Each of these is described below with examples.

/b/ [b] is a voiced bilabial plosive occurring in word-initial and -medial positions following or preceding all vowels. In rare cases, the voiced bilabial plosive may undergo spirantisation and realized as voiced bilabial fricative /β/, in intervocalic position. The fricativized form of the stop, however, fluctuates across speakers and shows less distribution, so the phenomenon is assumed to be a case of an idiolect rather than to be an allophonic variant.

(19) /bī:lā/	[bī:lā]	forest
/bénā/	[bénā]	upper arm
/bōbā/	[bōbā]	root
/būbā/	[būβā]	flower

/būrdzâ/	[būrdzâ]	horn (musical instrument)
/dàbà/	[dàbà]	lake
/di:bà/	[di:βà]	village
/nībīrâ/	[nīβīrâ]	needle
/dábēdā/	[dábēdā]	to be late
/gādzībā/	[gādzībā]	face

**/d/** [d] is a voiced alveolar plosive and co-occurs with all vowels. Besides, it has also been recorded as voiced alveo-dental plosive [ɖ] with one of the consultants. In light of its variation across speakers, the alveo-dental plosive variant, therefore, is considered as a case of an idiolect. Previously, Thomson (1983) classified this consonant as an alveo-dental sound while Bender (1996) described it to be an alveolar.

(20) /dìgìnā/	[dìgìnā]	wedding
/dèsā/	[dèsā]	liver
/dèdā/	[dèɖā]	child
/dōrōdà/	[dōrōdà]	pushing
/dūmā/	[dūmā]	clay
/dàbà/	[dàbà]	lake
/bádáʔ/	[béɖáʔ]	thigh
/wà:ḏāʔ/	[wà:ɖāʔ]	full
/tùŋgùdā/	[tùŋgùdā]	pound (v)

**/g/** is a voiced velar plosive and has two allophones, [g<sup>w</sup>] and [g]. [g<sup>w</sup>] is voiced labialized velar plosive that occurs following back vowels as in (21); /u/ and /o/ are the only occurring back vowels in Kunama. [g] is a voiced velar plosive that occurs elsewhere as in (22). Earlier, Thomson (1983) described **/g/** as palatal while Bender (1996) classified it as a velar sound. Thomson (1983) has posited the labialized variant

of the velar plosive as a double sound for Kunama Tika dialect, whereas, the present study interpreted this to be labialization of velar consonants conditioned by back vowels.

(21)	/àùggā/	[àùgg <sup>w</sup> ā]	cat
	/ùgà/	[ùg <sup>w</sup> à]	stone
	/túgā/	[túg <sup>w</sup> ā]	knee
	/āsūgā/	[āsūg <sup>w</sup> ā]	shoe
	/gùgàrā/	[gùg <sup>w</sup> àrā]	trouser
	/sògā/	[sòg <sup>w</sup> ā]	chest
	/fōgà/	[fōg <sup>w</sup> à]	cloth
(22)	/gì:rà/	[gì:rà]	horn
	/gēgādzā/	[gēgādzā]	sword
	/gòlà/	[gòlà]	honey
	/gūdzá/	[gūdzá]	stick
	/gā:lá/	[gā:lá]	bellows
	/tàngidà/	[tàngidà]	to be expensive
	/ìgídā/	[ìgídā]	surrounding
	/úgūdà/	[úgūdà]	shake (tr)

/k/ is a voiceless velar plosive and is realized as [k<sup>w</sup>] and [k]. [k<sup>w</sup>] is voiceless labialized velar plosive that occurs following the back vowels /o/ and /u/, as can be observed in (23). [k] is a voiceless velar plosive that occurs elsewhere, as in (24), except that /k/ exhibits tendency of weakening in the surface forms of words, as can be examined in (25).

(23) /'mōkkā/	['mō:kk <sup>w</sup> ā]	lion
/fùkkā/	[fùkk <sup>w</sup> ā]	bird
/ùkā/	[ùk <sup>w</sup> ā]	urine
/túkkâ/	[túkk <sup>w</sup> â]	gun
/āùkā/	[āùk <sup>w</sup> ā]	sweat (n)
/ābūrūkā/	[ābūrūk <sup>w</sup> ā]	partridge
(24) /kì:nā/	[kì:nā]	sorghum
/kèmà/	[kèmà]	scorpion
/kònā/	[kònā]	hand
/kōrá/	[kōrá]	suck
/kūtá/	[kūtá]	breast
/màkàbà/	[màkàbà]	warthog
/īkīmā/	[īkīmā]	nail

With regard to the articulation of the voiceless velar plosive /k/, a recurring phonetic phenomenon has been observed. Kunama speakers have been heard replacing /k/ often with [k<sup>h</sup>] and sometimes with [h] regardless of the phonetic environment. The partial or complete fricativization of the voiceless velar plosive is claimed to be a phenomenon of velar weakening, as can be examined in (25) below,

(25) a. /ùkùnā/	[ùk <sup>h</sup> ùnā] ~ [ùhùnā]	ear
b. /làkùdà/	[làk <sup>h</sup> ùdà] ~ [làhùdà]	knead
c. /kāwā/	[hāwā]	flour
d. /kòkòbā/	[k <sup>h</sup> òk <sup>h</sup> òbā] ~ [k <sup>h</sup> òhòbā]	blood
e. /dòlòkà/	[dòlòk <sup>h</sup> à]	tortoise (of land)
f. /kākūpa-tjērārā/	[k <sup>h</sup> āk <sup>h</sup> ūntjērārā]	spider

g. /wiākùrà/	[wiāk <sup>h</sup> ùrà]	sun
h. /túkú:rá/	[túk <sup>h</sup> ú:rá]	deep
i. /mākālâ/	[mǝk <sup>h</sup> ǝlâ]	cheek
j. /ákúláʔ/	[ák <sup>h</sup> úlá <sup>ˀ</sup> ]	armpit
k. /lākòdá/	[lāk <sup>h</sup> òdá]	chew

In the surface forms of the words given in (25a-k), the voiceless velar plosive is either partially fricativized, as [k<sup>h</sup>] or fully fricativized, as [h]. Besides, in (25-a, -b & -d), the articulation of the voiceless velar plosive fluctuates between [h] and [k<sup>h</sup>] across the consultants. The velar weakening tendency noticed on the part of Kunama speakers might be attributed to the fact that majority of Kunama Shukre speakers are bilingual in Tigrinya, which is a dominant language outside the home environment. The high frequency of glottal and pharyngeal consonants in Tigrinya, which have been in frequent contact with Kunama, seemingly brings about the fricativization of the velar consonant and can be considered as an introduction of a speech tradition to Kunama. More on this can be seen in (Chapter 8).

/t/ [t] is realized as voiceless alveolar plosive that occurs in word-initial and -medial positions preceding and following all vowels. Thomson (1983) described this consonant phoneme as an alveo-dental sound, but in the present study, no evidence suggests a dental articulation.

(26) /títâ/	[títâ]	see
/títímâ/	[títímâ]	narrow
/tēdā/	[tēdā]	castrate
/tèrā/	[tèrā]	moon
/tōmá/	[tōmá]	fire
/túttúnáʔ/	[túttúná <sup>ˀ</sup> ]	leprosy

/túnkúǎʔ/	[túnkúǎ̃]	highest point, summit
/tākā/	[tākā]	know
/tàmàggà/	[tàmàggà]	hare

### 2.3.2 Nasals

Kunama has four nasal consonant phonemes, namely, /m/, /n/, /ɲ/ and /ŋ/. The occurrence of each of the nasal consonant is illustrated below.

/m/ [m] is realized as voiced bilabial nasal. It occurs in the environment of all vowels and in word-initial and -medial positions.

(27) /mìntǎ̃/	[mìntǎ̃]	cut, decide
/mīndā/	[mīndā]	leg
/mèttá/	[mèttá]	dull
/mēnā/	[mēnā]	throat, Adam's apple
/mòsā/	[mòsā]	every
/múláʔ/	[múlá̃]	pluck (feather)
/màkàbà/	[màkàbà]	warthog
/kòmā/	[kòmā]	stamp (with a foot)

/n/ [n] is voiced alveolar nasal. Distributionally, it does not occur preceding the high back round vowel /u/ in word-initial position. Like the other alveolar sounds, Thomson (1983) described this consonant as alveo-dental.

(28) /ní:dá/	[ní:dá]	sink (v)
/nè:nà/	[nè:nà]	mediate
/nókótâ/	[nókótâ]	marsh
/nābùlà/	[nābùlà]	grave

/nāùdā/	[nāùdā]	picking up
/ànā/	[ànā]	hair
/bòbònā/	[bòbònā]	nose
/gùnùdâ/	[gùnùdâ]	voice

**/ɲ/** [ɲ] is realized as voiced palatal nasal sound. In terms of distribution, no example is found that shows the occurrence of the palatal nasal phoneme word-initially preceding the back close mid round vowel /o/. Bender (1997:70) described the palatal nasal phoneme as one of the consonants that cannot be reconstructed in proto Nilo-Saharan languages. The same fact is revealed in the present study of synchronic Kunama via its occurrence in all word positions.

(29) /ɲíɲā/	[ɲíɲā]	bite
/ɲè:là/	[ɲè:là]	tongue, language
/ɲúmā/	[ɲúmā]	hide (tr)
/ɲújà/	[ɲújà]	steal
/ɲā/	[ɲā]	meat
/kòkòɲā/	[kòkòɲā]	egg
/kàkùɲā/	[kàkùɲā]	testicle

**/ŋ/** [ŋ] is a voiced velar nasal consonant. Formerly, Thomson (1983) described this consonant as palatal nasal while Bender (1996) contended this to be a velar nasal sound. With regard to distribution, it occurs in word-initial and –medial positions although in the latter it shows high frequency of occurrence only as a member of a homorganic nasal-plosive cluster [ŋg], as can be examined in (31). This homorganic sequence is labialized as [ŋg<sup>w</sup>] following back vowels, as can be observed in (31). The word-medial distribution of the singleton velar nasal can be seen, in (30). Besides, no lexical item is

found to show its co-occurrence preceding the front vowels /i, e/, in word-initial position.

(30) /ɲòɲà/	[ɲòɲ <sup>w</sup> à]	frog
/ɲùrùdā/	[ɲùrùdā]	groan (of dog)
/ɲàdà/	[ɲàdà]	eating
/ɲàɲà/	[ɲàɲà]	mosquito
/àɲā/	[àɲ <sup>ã</sup> ]	possessive suffix
/éɲgéɲà/	[éɲgéɲà]	chameleon
/ʃɪɲà/	[ʃɪɲà]	thin
(31) /ēnèɲgà/	[ēnèɲgà]	mother
/dʒɪɲgá/	[dʒɪɲgá]	threshing (grain)
/āɲgērā/	[āɲgērā]	spy
/ɲāɲgārā/	[ɲāɲgārā]	gravel
/ɲàɲgɪʃā/	[ɲàɲgɪʃā]	branch (of a tree)
/àɲgògòlā/	[àɲgògòlā]	brain
/àɲgàdà/	[àɲgàdà]	to be different
/gáɲgāmā/	[gáɲgāmā]	hard
/àbàɲgàlà/	[àbàɲgàlà]	harp
/sāɲgā/	[sāɲgā]	bone
/àɲgillà/	[àɲgillà]	sugar cane
/búɲg <sup>w</sup> áʔ/	[búɲg <sup>w</sup> áʔ]	dust
/ùgùɲg <sup>w</sup> ā/	[ùgùɲg <sup>w</sup> ā]	to be naked

/āūŋg<sup>wá</sup>/

[āūŋg<sup>wá</sup>]

hyena

In the following paragraph, acoustic evidence is presented to show the difference between the singleton velar nasal /ŋ/ and the homorganic nasal-plosive cluster [ŋg], word-medially. The acoustic analysis compares the average durations of /ŋ/ and /g/ against the average duration of the homorganic nasal-plosive sequence [ŋg] in word-medial position. It also examines the spectrograms and waveforms of the unit consonants and the cluster.

Duration is measured in millisecond (ms) from 16 sampled words and equal number of repetitions. The average duration of the cluster [ŋg] and the singleton consonants are given, in (Table-3) while the raw duration measurement data and the sampled contexts are annexed.

Table 3 Average duration of /ŋ/, /g/ and [ŋg] word- medially

Stimuli	Word-medial		
	Average Duration (ms)	SD	n
Velar nasal /ŋ/	83.5	10.2	8
Voiced velar plosive /g/	65.8	12.6	8
Homorganic nasal plosive cluster [ŋg]	141.4	40.3	8

n= number of repetitions

The average durations of the singleton velar nasal phoneme (83.5ms) and the singleton velar plosive (65.8ms) are less than the average duration of the homorganic nasal-plosive cluster (141.4ms). This implies that the velar nasal sound occurs both as a singleton consonant and as member of the nasal-plosive cluster in word-medial position. On the other hand, the average duration of the singleton velar plosive consonant is 65.8ms, which is less than half the average duration of the homorganic cluster (141.4ms). Moreover, the average duration (83.5ms) of the velar nasal consonant is longer than the average duration (65.8ms) of the voiced velar plosive consonant. Besides, the cluster duration, as can be observed in a sampled context given in (Figure-4), is even longer than the duration the geminate liquid (a geminated consonant phonetically approximates duration of two consonants),

A similar comparison can be made from the spectrograms and waveforms of the sampled contexts where the three stimuli occur. For instance, the acoustic display in (Figure-3) below shows that the velar nasal phoneme occurs as singleton in word-medial position of the sampled context. In this specific context, the duration of /ŋ/ is shown to be closer to the computed average duration.

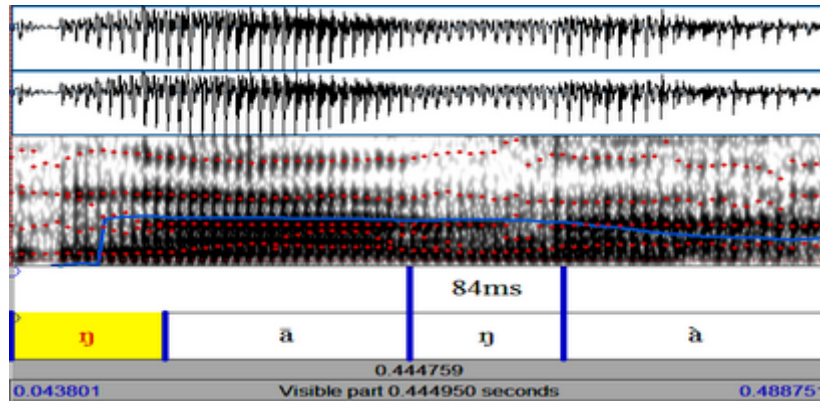


Figure 3 Waveform and spectrogram of /ŋãŋà/ 'mosquito'

In the words where the velar nasal occurs as a member of the [ŋg] cluster, it is possible to trace the spectrograms and waveforms of the nasal and the plosive portions of the cluster. Although both consonants are voiced, the sonorous velar nasal depicts a darker spectrogram as compared to the grey spectrogram of the velar plosive.

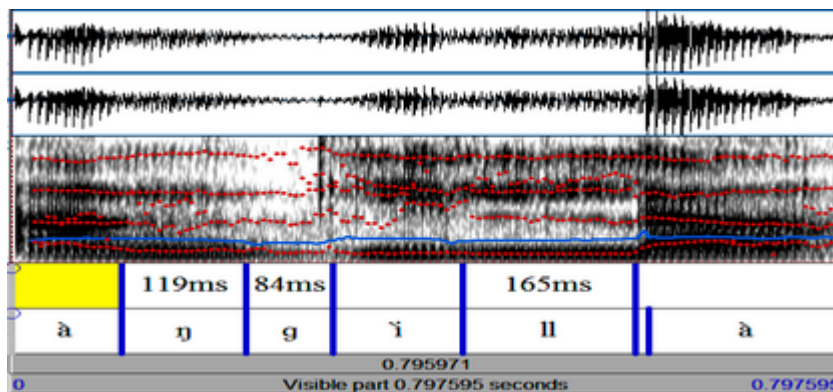


Figure 4 Waveform and spectrogram of /ãŋgillà/ 'sugar cane'

Since nasals are sonorous, they reveal darker spectrograms than the obstruents with grey spectrograms. This indicates that sonorous consonants are produced with more articulatory power so that they show more intensity than the less sonorous ones, in this

case, the voiced obstruents. Concerning this, Ladefoged and Maddieson (1996:116) depict that “The steady state portion of a voiced nasal consonant is characterized acoustically by a low frequency first resonance with greater intensity than the other resonances. The higher resonances have low amplitude.”

Similarly, the waveforms of each unit consonant of the homorganic cluster can be distinguished via observing the relative difference in the peaks of the respective waveforms. Although voiced consonants in general are characterized by regular patterns (periodic waves) of the vocal cord vibration reflected in a waveform, the less sonorous voiced obstruents can show shorter waveform peaks, i.e. subdued wiggly lines. See the spectrogram and waveform display of the voiced velar plosive consonant in (Figure-5) below.

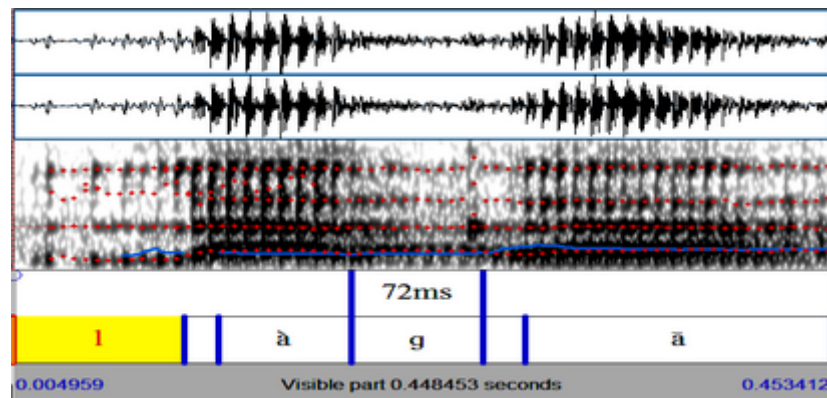


Figure 5 Waveform and spectrogram of /lāgā/ 'land'

As can be learned from the above three figures, the voiced velar plosive sound exhibits weak vocal cord vibration, as depicted in its waveforms, relative to the nasal sound regardless of the voicing of the velar plosive consonant /g/. The vocal cord vibration of the velar nasal /ŋ/ is higher (or longer waveform peaks) than the voiced velar plosive /g/ as nasals are more sonorous than obstruents. Similarly, the voiced velar plosive sound depicts a greyer spectrogram relative to other sonorous sounds, and this indicates that the voiced velar plosive consonant is produced with a lesser spectral power (intensity) as compared to the velar nasal consonant.

### 2.3.3 Fricatives

Kunama has three voiceless fricative consonant phonemes /f/, /s/ and /ʃ/, whereas, the glottal fricative /h/ shows a marginal distribution for which its phonemic status is not confirmed via a minimal pair. In the fricative series, the language lacks voicing. Each of these is described below:

/f/ [f] is a voiceless labio-dental fricative sound. It co-occurs with all vowels as can be seen in the following (32),

(32) /fi:lā/	[fi:lā]	rat
/fēfēnā/	[fēfēnā]	wing
/fò:ḡā̀/	[fò:ḡā̀]	cloth
/fōīdā̀/	[fōīdā̀]	whistle (v)
/fú:ṭā/	[fú:ṭā]	lung
/fúfáʔ/	[fúfáʔ]	termite hill
/fànàkā/	[fànàkā]	season, time
/ʃānfā/	[ʃāmfā]	beeswax

/s/ [s] is a voiceless alveolar fricative. Lexical items with initial /s/ and followed by the high-close front vowel /i/ have not been recorded.

(33) /sēnà/	[sēnà]	grass
/sèkètā/	[sèkètā]	shoulder
/sòlòbā/	[sòlòbā]	bride/bridegroom
/sò:là/	[sò:là]	virgin
/sūbà/	[sūbà]	river
/sādā/	[sādā]	poison

/āsā/	[āsā]	dig
/kōsá/	[kōsá]	cough (n)

/ʃ/ [ʃ] is a voiceless palatal fricative consonant. Unlike the other fricative sounds of Kunama, the palatal fricative consonant is perceived to be noisier, and even more intense than the other sibilant /s/. This is similar to Thomson’s (1983:287) description of the same consonant as, “The Kunama /ʃ/ is more strident than the English one”. In terms of distribution, this consonant co-occurs with all vowels as in (34).

(34) /ʃɪŋà/	[ʃɪŋà]	thin
/ʃè:bè/	[ʃè:bè]	ten
/ʃèrā/	[ʃèrā]	discuss, haggle
/ʃòfà/	[ʃòfà]	hump
/ʃündā/	[ʃündā]	star
/ʃābà/	[ʃābà]	stir
/ʃāʃā/	[ʃāʃā]	wound
/móʃā/	[móʃā]	mane

The voiceless glottal fricative consonant /h/ is claimed to have a marginal status in Kunama (Shukre) as it shows defective distribution in the present data. On the other hand, in some adapted forms of Tigrinya words, such as, /**hak’i**/ ‘truth’ that is rephonologized as [**hākā**] ‘truth’, the glottal fricative consonant is retained. Elsewhere, as can be examined in (35) below, the presence of /h/ in word-initial positions before the central low vowel /a/ rather is confirmed to be secondary.

- (35) a. /áddádōdā/ [háddədōdā] ‘frighten someone’  
 b. /āùkā/ [hāùk<sup>w</sup>ā] ‘sweat (n)’  
 c. /áínáʔ/ [háíná<sup>-</sup>] ‘ash’

d. /ámâ/ [hámâ] ‘sweet, taste(n)’

In (35a-d) above, this consonant does not exist in the underlying representation of the words as understood from deliberate speeches of the consultants.

### 2.3.4 Affricates

The two affricate consonants of Kunama are /tʃ/ and /dʒ/, as described below.

/tʃ/ [tʃ] is realized as voiceless palatal affricate. This contradicts to Thomson’s (1983) description of the same consonant as an alveo-palatal stop. In terms of distribution, the voiceless affricate does not seem to occur before the front close-mid vowel /e/, word-initially.

(36) /tʃĩtʃĩrǎ/	[tʃĩtʃĩrǎ]	shine
/tʃótʃǎ/	[tʃótʃǎ]	roast
/tʃǎ/	[tʃǎ]	death
/lǎgátʃũlá/	[lǎgátʃũlá]	world
/ùtʃùrà/	[ùtʃùrà]	flow
/kōtʃǎ/	[kōtʃǎ]	fight
/wàtʃōnǎ/	[wàtʃōnǎ]	eyebrow

/dʒ/ [dʒ] is a voiced palatal affricate. Previously, Thomson (1983) classified this as alveo-palatal stop. Initially, this consonant phoneme has not been recorded preceding the back mid round vowel /o/.

(37) /dʒírǎ/	[dʒírǎ]	game
/dʒíggǎ/	[dʒíggǎ]	green
/dʒēndʒǎ/	[dʒēndʒǎ]	placenta
/dʒũlá/	[dʒũlá]	saliva

/dʒágābā/	[dʒágēbā/	potter
/ádʒā/	[ádʒā]	running
/múdʒā/	[múdʒā]	hundred
/àndʒèrà/	[àndʒèrà]	knife
/gādzībā/	[gādzībā]	face
/gēgādzā/	[gēgādzā]	sword
/bōdzōlá/	[bōdzōlá]	hunchback
/gādzōdā/	[gādzōdā]	praying

### 2.3.5 Liquids

Kunama liquid consonants are /l/ and /r/.

/l/ [l] is a voiced alveo-lateral sound occurring in word-initial and medial positions, as can be observed in (38).

(38) /li:dā/	[li:dā]	antelope
/lēdā/	[lēdā]	light (fire) (v)
/lōbājā/	[lōbājā]	clear (land for planting)
/lùfòdà/	[lùfòdà]	convalescent
/lābā/	[lābā]	dry out (cloth)
/ēlā/	[ēlā]	tree
/gōlā/	[gōlā]	honey
/nābùlà/	[nābùlà]	grave

/r/ [r] is a voiced alveo-lateral sound that never occurs in word-initial position. In word-internal environment, it occurs preceding and following all vowels.

(39) /tīrā/	[tīrā]	sew
/dūrūfā/	[dūrūfā]	fat
/àrà/	[àrà]	white
/àtòròdā/	[àtòròdā]	selfish
/àtèrèbà/	[àtèrèbà]	trader
/fōrōdā/	[fōrōdā]	sacrifice (for God)
/ōrā/	[ōrā]	circle (n)
/gū:rá/	[gū:rá]	chase

### 2.3.6 Semi-vowels

Kunama semi-vowels are /j/ and /w/. In word-initial position, they do not tend to make part of a vowel sequence. Besides, the geminate counterparts of the singleton semi-vowels do not glide. In word-internal environment, the singleton semi-vowels rather tend to make part of a vowel sequence; a clear exception to this is observed due to /biā/ ‘water’ vs. /bijà/ ‘worm’. Consequently, identifying word-medial glides and vowel sequences in the underlying form of a word seem to be ambiguous in Kunama. Thus, the issue may require further experimental investigation.

/j/ is a voiced palatal semi-vowel. Word-medially, the palatal semi-vowel often glides to make part of a diphthong. As a result, for example, [àjlā] ‘cow’ and [ájnã] ‘ashes’ are interpreted respectively as [àilā] and [áiná̃].

(40) /jòkè/	[jòkè]	come
/jā/	[jā]	beating
/jāwā/	[jāwā]	grinding

/bījà/	[bījà]	worm
/kūjā/	[kūjā]	sky
/bājā/	[bājā]	bad

/w/ [w] is a voiced labial semi-vowel. In word-medial position, following the low central vowel /a/, the bilabial semi-vowel often glides to make part of a vowel sequence. As a result, words like [àwrā] ‘word’ and [nāwdā] ‘carrying’ are interpreted as [àùrā] and [nāùdā]. Distributionally, the labial semi-vowel, in word-initial position, is not recorded before /e, o, u/.

(41) /wīá/	[wīá]	day
/widà/	[widà]	silent
/wàgà/	[wàgà]	place
/wā/	[wā]	eye
/wà:ḍā/	[wà:ḍā]	full
/gālāwâ/	[gālāwâ]	grasshopper

In addition, the bilabial semi-vowel can be realized as post-velar following back vowels as has been discussed under §2.3.1 above.

## 2.4 Gemination of Consonants

The majority of Kunama consonant phonemes, except /dʒ, r, ŋ, h/, have geminate counterparts, and in this language, gemination is word-medial only. Consonant gemination is prominent both lexically and grammatically though minimal pairs are not recorded for all consonant geminates. On the other hand, the minimal pair test for geminated and singleton consonants is not easy mainly for the presence of other distinctive suprasegmentals in the language (tone and vowel length). Consequently, surface tone melodies may not be controlled in some of the geminate minimal pairs discussed in the following section.

### 2.4.1 Lexical Gemination

Minimal pairs for germination have been recorded for eleven consonant phonemes /d, t, k, m, n, f, s, ʃ, tʃ, l and j/, as shown in (41) below:

- |                                 |                             |
|---------------------------------|-----------------------------|
| (41) a. bàdà ‘back (body part)’ | bāddā ‘above’               |
| b. kòtā ‘dress (v)’             | köttā ‘seat (n)’            |
| c. ākámá⁻ ‘incubate’            | ákámmā ‘molar’              |
| d. sákòdà ‘hatch’               | sákkōdā ‘squash, crush’     |
| e. kōmá ‘to love’               | kōmmā ‘to deny’             |
| f. ānā ‘song’                   | ānnā ‘God’                  |
| g. ʃīnā ‘vagina’                | ʃīnnā ‘traditional mat’     |
| h. tāfā⁻ ‘add, increase’        | tāffā ‘fasten, bind (load)’ |
| i. kāfā⁻ ‘excrement’            | kāffā ‘mud’                 |
| j. súsá ‘preparing’             | sússā ‘co-wife’             |
| k. kōʃá ‘giving birth’          | 'kóʃʃā ‘healthy’            |
| l. fǎʃòdà ‘decorate’            | fǎʃʃòdà ‘change (currency)’ |
| m. àtʃā ‘medicine’              | àtʃʃā ‘corpse’              |
| n. tálà ‘scar’                  | tállà ‘rock’                |
| o. kòlà ‘defending’             | kòllā ‘friend’              |
| p. ājā ‘dream’                  | ājjā ‘no’                   |

As can be examined in the minimal pairs given above, the minimal pairs in (41-a, -b, -c & -k) do not show the same surface tone pattern so that they can be considered as near minimal pairs. However, it has been observed that the difficulty of controlling surface tone patterns on these minimal pairs does not subdue gemination from being primarily distinctive. Instead, this can be accounted for Kunama being a tone language with quantity contrast of length.

In the same manner, Thomson (1983:289) provided some lexical and grammatical minimal pairs for gemination, which some of the pairs equally show stressed syllables on different positions, for example, **ta'ma** ‘now’ vs. **'tamma** ‘today’. By way of interpretation, the presence of stress on both entries does not change the fact that gemination being primarily distinctive. The examples in (42) below are presented to show the geminate counterparts of the remaining consonants, /b, g, ɲ and w/, for which minimal pairs have not been recorded.

- (42) gùbbà ‘bat’  
 tíbbībā ‘straight’  
 dzígǵà ‘green’  
 tāǵǵímā ‘heavy’  
 tàǵǵā ‘hare’  
 kúɲɲà ‘termite’  
 à-wwā ‘1SG POSS-father’

Previously, Thomson (1983:294) has interpreted a geminate velar nasal consonant, -ɲɲ- in the “headless” possessor suffix –aɲɲa-, for the Marda and Tika dialects. In the present study, however, a geminated velar nasal is not observed and is supposed to be of dialectal variation.

### 2.4.2 Grammatical Gemination

In Kunama Shukre, dual person pronouns are distinguished by gemination as shown in the following (43). The tonal pattern in the dual and plural forms are the same, and they are all high-toned in their underlying forms.

(43)	Dual	Plural
First person	ámmè ‘we two (he and I)’	ámè ‘we’ (EXCL)    kímè ‘we all’ (INCL)
Second person	émmè ‘you two’	émè ‘you’
Third person	ímmè ‘they two’	ímè ‘they’

### 2.5 Chapter Summary

To summarize, the consonant inventory proposed for Kunama (Shukre) is shown to be different from previous proposals, in some respects. The first and the main difference lie on the number of phonemic consonants. While all previous studies suggest 19 phonemes, this study posits 18 phonemes. The glottal fricative /h/ consonant is claimed to be marginal, in the present data of Kunama Shukre. Kunama has two labialized velar allophones and other phonetic consonants, of which the post-velar [k<sup>h</sup>] is shown to be a frequent phonetic phenomenon. This phenomenon is interpreted as tendency of voiceless velar weakening, and which is claimed to be caused by a speech tradition brought into Kunama from Tigrinya via language contact, word borrowing and Kunama speakers being bilingual in Tigrinya. Kunama lacks voiced fricative consonants. All consonant phonemes occur in word-initial and –medial positions, except the alveo-lateral liquid /r/ that never begins a word. All words end with vowels, so word-final contrast is missing for all consonants; exceptions with final /l/ do exist, rarely. The velar nasal /ŋ/ consonant happens both word-initially and –medially. In the former, the velar nasal occurs only as singleton while in the latter position, it occurs both as singleton and as a unit of the homorganic nasal-plosive cluster [ŋg]. The word-medial distribution of the two semi-vowels is dubious, as singleton they often glide to make part of a vowel sequence (diphthongs). All consonant phonemes, except /dʒ, ŋ, r/, have geminate counter parts. Gemination is phonemic both lexically and grammatically, and it is only word-medial.

Overall, the consonant inventory of Kunama is simple both in size and in consonant types, as compared to other Nilo-Saharan languages of Ethiopia. For instance, Gumuz has 39 phonemic consonants though 8 of which have questionable phonemic status; it has uvular, a glottal stop and glottalized-labials, -alveolars and –alveo-palatals (Ahland, 2012). Kunama has none of these.

## CHAPTER THREE: VOWEL SOUNDS

### 3.0 Introduction

In this chapter, phonological and phonetic discussions are presented on the vowel sounds based on perceptual and acoustic data. The acoustic study of vowel qualities and vowel duration will be presented in a separate section.

### 3.1 Vowel Inventory

Most previous studies, Meseret (1981), Thomson (1983), Tesfhit (1983) and Seyoum (1983) posit five phonemic vowels with length distinction. Vowel length contrast in Kunama seemingly agree all previous studies though some of those has also reported their suspicion that correlate vowel length with stress. For instance, Thomson (1983:289) indicated vowel length in his data but parallel underlined that vowel length is conditioned by stressed syllables. Similarly, an interaction between vowel length and tone has been observed in the present study, particularly the correlation between contour tones and vowel length has gained due concern. Nevertheless, clear lexical contrasts are also found that prove the phonemic status of vowel length. The issue of segment and tone interaction will be discussed in (Chapter- 6).

In this study, five phonemic vowels, namely, /i/, /e/, /a/, /o/, and /u/, and an equal number of longer counterparts, /i:/, /e:/, /a:/, /o:/, and /u:/, are recorded. Besides, two phonetic vowels, [ə] and [ɨ], are commonly heard in word-internal environment during fast speeches and in short unstressed syllables. As a result, it is sometimes difficult to trace among the basic vowel phonemes, /a/, /e/ and /o/, which the schwa is affiliated to. Despite the considerable distribution of the phonetic vowels, especially of [ə], no compelling evidence is found to count them as phonemes or as allophones.

Table 4 The Inventory of phonemic and phonetic vowels of Kunama

	Front	Central	Back rounded
High	i: i	(i)	u u:
High-mid	e: e	(ə)	o o:
Low		a a:	

\* *Parentheses enclose the phonetic vowels*

### 3.2 Phonemic Status of Vowels

The following sets of minimal pairs ascertain the phonemic status of Kunama vowels. Contrasting examples are given based on articulatory criteria. While height of the tongue (or size of the oral cavity) identifies the vowels vertically as high-close, high-mid and low, the horizontal position of the tongue or tongue advancement (size of the pharyngeal cavity) along with the shape of the lips (rounded or unrounded) specifies the vowels as front, central and back rounded. The fourth distinctive criterion is length of the vowels, which obviously goes along with the prosodic system of the language but is discussed in a later section of this chapter for convenience.

#### Contrasting examples by tongue height

/i/ : /u/

##### Word-initial

(1) ítā ‘house’

ūtā ‘vomit (v)’

##### Word-medial

(2) ɲɪɲā ‘biting’

ɲúɲà ‘stealing’

/e/ : /o/

(3) éllá<sup>-</sup> ‘one’

òllā ‘to follow’

(4) dèrà ‘tear (tr)’

dōrá<sup>-</sup> ‘put’

**/a/ : /i/**

(5) āfā ‘old (not new)’

ɨfā ‘brother/sister’

(6) tākā ‘know’

tíkā ‘hear’

**/a/ : /u/**

(7) āmmā ‘laugh’

ūmmā ‘black’

(8) tādā ‘erase’

tūdā ‘kneel’

**/a/ : /e/**

(9) àbā ‘I’

ēbā ‘penis’

(10) kālā ‘lick’

kēlā ‘count’

**/a/ : /o/**

(11) àrà ‘white’

ōrà ‘circle, round’

(12) gādā ‘moving, going’

gōdā ‘to pour (water)’

More contrastive examples, in terms of the position of the tongue and the shape of the lips, are given in (13-16):

**/i/ : /e/**

**Word-initial**

(13) íbā ‘twin’

ēbā ‘penis’

**Word-medial**

(14) tīrā ‘sew’

tērā ‘moon’

**/o/ : /u/**

(15) ótā ‘uproot’

ūtā ‘vomit (v)’

(16) sò:là ‘virgin’      kōjā ‘fall (intr)

súlà ‘brown’      kūjā ‘sky’

In Kunama, word-final vowel contrast occurs rarely so that minimal pairs are found only for /a/, /e/ and /o/, as given in (17a-c). In citation forms, /a/ is the only occurring word-final vowel and /e/ is a plural suffix but can also occur in the basic forms of some

nominal classes such as numerals. Besides, the other vowels are also found rarely in some exceptional class of words, for example, in independent personal pronouns and adverbials.

- |                            |                |
|----------------------------|----------------|
| (17) a. àmā ‘this’         | ámè ‘1PL EXCL’ |
| b. ídā ‘going down’        | ídè ‘again’    |
| c. bà:rà ‘to be poor’      | bā:rè ‘two’    |
| d. áiná <sup>-</sup> ‘ash’ | āinō ‘what?’   |

### 3.3 Description of Vowels

In what follows, the description of Kunama vowels will be presented in detail with the distributional pattern of each vowel phoneme and the phonetic variants within words.

#### 3.3.1 Front Vowels

The Kunama front vowels are /i/ and /e/ that occur in word-initial and internal positions. In citation forms, both are absent from word-final positions. In the grammar, the front high mid vowel /e/ is the plural suffix in nominals as such it occurs in word-final positions of verbal conjugation. The front high-close vowel /i/ is also found in word-final position in some adverbials, for example, /àsàndī/ [àsàndī] ‘yesterday’.

/i/ [i] is a front high-close vowel that is produced with the front of the tongue assumes the highest position, even higher and closer than the back high close round vowel /u/. It can be realized as high central vowel [ɨ], which is a phonetic variant of the [i] vowel. This phonetic phenomenon is considered as reduction in vowel quality and may happen when a syllable lacks its prominence in rapid speeches. The examples below, in (18), show the distribution of /i/ in word-initial and medial positions:

- |             |         |                   |
|-------------|---------|-------------------|
| (18) /ɪnfã/ | [ɪŋfã]  | nasal mucus, snot |
| /ilòdà/     | [ilòdà] | walk, wander      |
| /ibiɸã/     | [ibiɸã] | untie, solve      |

/ɪddīrâ/	[ɪddīrâ]	courageous, brave
/ɪʃkúlláʔ/	[ɪʃkúlláʔ]	bag
/ɪkīmā/	[ɪkīmā]	nail
/li:sā/	[li:sā]	heifer
/ʃɪgídā/	[ʃɪgídā]	animal
/nībīrā/	[nībīrā]	needle
/tɪfōdā/	[tɪfōdā]	spit
/kibīrā/	[kɪbɪrā]	patient (adj)
/dɪgɪnā/	[dɪgɪnā]	wedding
/kɪtɪtɪdā/	[kɪtɪtɪdā]	flying
/áʃʃɪ/	[áʃʃɪ]	olden times
/sēllā-sī/	[sēllāsī]	tomorrow

/e/ is a front high-mid vowel. It can be realized as central high-mid vowel [ə], in polysyllabic words and when a syllable gets short and unstressed. The words in (19) show the distribution of /e/ and its phonetic variant, in word-initial and -medial positions:

(19) /ē/	[ē]	yes
/ēmālā/	[ēmālā]	rubber
/ētēŋgānā/	[ētēŋgānā]	fireplace
/èggàdà/	[èggàdà]	load
/ékkénáʔ/	[ékkénáʔ]	first
/gē:ráʔ/	[gē:ráʔ]	tall, far
/ɲè:là/	[ɲè:là]	tongue
/sèsègà/	[sèsègà]	bamboo
/fēfēnā/	[fēfēnā]	wing

/bà:ṛè/	[bà:ṛè]	two
/sàllè/	[sàllè]	four

However, in citation forms, the occurrence of [e] in word-final position is confined to some class of nominals, such as, cardinal numbers. In some words, for example, /**ɲè:là**/ [ʼ**ɲè:là**] ‘tongue’ and /**ɲè:rà**/ [ʼ**ɲè:rà**] ‘lie (n)’, the long /e:/ vowel can be heard as the more open [ɛ] vowel due to the extra length conditioned by the stress on the penult syllable. This phonetic phenomenon can be contrasted to the realization of short /e/ as [ə] in an unstressed syllable.

### 3.3.2 Back Vowels

Kunama has two back vowels, namely, /u/ and /o/ as described below.

/u/ [u] is a back high round vowel and occurs in word-initial and –medial positions. In citation forms, word-final [u] is recorded only in the third person singular pronoun, /**únū**/ [ú**nū**] 3SG, the only singular person pronoun ending in /u/. Unlike the other vowel phonemes, [u] does not show a tendency of reduction in quality. In (20) below are words showing the distribution of /u/ within words.

(20) /ú:dá <sup>ˀ</sup> /	[ú:dá <sup>ˀ</sup> ]	wood
/ùffā/	[ùffā]	heart
/ùnū/	[ùnū]	3SG
/ùsùlà/	[ùsùlà]	law, order
/ūsūná/	[ūsūná]	polygamy
/fúlā <sup>ˀ</sup> /	[fúlā <sup>ˀ</sup> ]	peanut
/gùnùdà/	[gùnùdà]	voice
/ābūrūk <sup>wā</sup> /	[ābūrūk <sup>wā</sup> ]	dove
/ɲùrùdā/	[ɲùrùdā]	groan (of dog)
/kūbūlā/	[kūbūlā]	drum

/o/ is a back high-mid round vowel. In an unstressed syllable, the short /o/ can be realized as [ə], as can be observed in (21) below, although not as frequently as /a/ and /e/ do.

(21) /ótā/	[ótā]	uprooting
/ōrmōfā/	[ōrməfā]	tooth stick
/ōrōbā/	[ōrōbā]	noon
/ōbià/	[ōbià]	grandparent
/ōddōmā/	[ōddōmā]	day time (not night)
/òtōgōnā/	[òtōgōnā]	heel
/mōŋgólà/	[məŋgólà]	danger
/gòbòdà/	[gòbədà]	drag
/tōkómà/	[təkómà]	hot, warm
/kōkōjā/	[kəkōjā]	egg
/fònfōrā/	[fəmfōrā]	flute
/sòlòbā/	[sòlòbā]	bride/bridegroom
/kòsòsònā/	[kòsòsònā]	tradition, custom

As the other vowels described above, /o/ rarely occurs in word-final position of citation forms. Seeming exceptions with final [o] are found in question words, for example, **íkánō** ‘which?’

### 3.3.3 The central low open vowel /a/

/a/ is a central low open vowel. The short /a/, in an unstressed position, can be realized as schwa [ə] in the same way as the /e/ and /o/ vowels do. In citation forms, this vowel phoneme has the highest frequency occurring in all word positions. Consider in (22) below:

(22) /āsā/	[āsā]	dig
/áddáʔ/	[áddáʔ]	wild area
/āgāsā/	[āgāsā]	middle
/ākòtā/	[ākòtā]	sesame seed
/ábíjā/	[ábíjā]	man
/àdàbà/	[àdàbà]	harvest season
/àmàlà/	[àmàlà]	rain
/ágālā/	[ágālā]	skin
/làʃjā/	[làʃjā]	goat
/làgā/	[làgā]	land, earth
/bālā/	[bālā]	(be) lost
/gàbàlà/	[gàbàlà]	monkey
/sàsàlā/	[sàsàlā]	fiancé/fiancée

It has been discussed that [ə] and [ɨ] are subsidiary vowels in Kunama. While the former is related to the fundamental vowels /a/, /e/ and /o/, the latter is affiliated to /i/. In the surface forms of words and in rapid speeches that contain [ə], it can be difficult to tell which phoneme the vowel belongs to, for example, /sèrā/ [sèrā] ‘neck’ vs. /sārā/ [sārā] ‘half’. The phonemic affiliation of [ə] becomes clear, however, from hearing those words in slow speeches.

On the other hand, it is difficult to draw the specific conditioning environment for the realization of the subsidiary vowels, except that they are frequently heard when the basic vowels are short and occur in unstressed position. Hence, tentatively the only conclusion given to the status of the subsidiary vowels is that they can be considered as allophones of different vowel phonemes realized instead of their respective phonemes when those phonemes occur in unstressed syllable.

### 3.3.4 Diphthongs

In Kunama, diphthongs are sequences of two different vowel qualities, and they are tautosyllabic. There are four diphthongs in Kunama, these are, [au], [ai], [ia] and [oi]. Thomson (1983:289) identified [au] and [ia], and Bender (1983), in his editorial comment to the former, additionally posited [ai] and [oi]. A single instance of minimal pair recorded by Thomson, also found in the present data is /bìā/ ‘water’ vs. /bìjā/ ‘worm’. Kunama diphthongs can therefore be described as rising [au, ai, oi], and falling [ia] as well as back-front [oi]. Of these, the [oi] sequence is both rising and fronting. Consider the data, in (23-26) below, that illustrate the occurrence of diphthongs in Kunama.

#### [au]

(23) áútá̄ ‘bush’	dā̀ùdā̄ ‘lack (v)’	èldā̀ùdè̄ ‘nine’
nā̀ùdā̄ ‘carry’	à̀ùrà̄ ‘word’	bā̀ùdá̄ ‘bark (as dog)’
sā̀ùrā̄ ‘picture’	fā̀ùdè̄ ‘many’	ā̀ùkā̄ ‘sweat (n)’
tā̀ùdā̄ ‘grow up’	à̀ùsà̄ ‘milk’	
tā̀ùkà̀dà̄ ‘burst’	kā̀ùkā̄ ‘crow’	

#### [ai]

(24) fā̀idā̄ ‘mat’	á̀íná̄ ‘ash’
ā̀inōmā̄ ‘hippopotamus’	nā̀idā̄ ‘soak’
kā̀ílá̄ ‘parrot’	tā̀itā̄ ‘arm’
gā̀idā̄ ‘stoop’	à̀ilà̄ ‘cow’
à̀ifā̄ ‘beer (traditional)’	kā̀ilà̄ ‘fear’
mā̀idōkā̄ ‘well (adv)’	bā̀idā̄ ‘barren woman’

#### [ia]

(25) wī́á̄ ‘day’	wī́ākùrà̄ ‘sun’
bī́ā̄ ‘water’	bī́ātā̄ ‘butterfly’

[oi]

(26) fōídâ ‘whistle’ (v)

kòitā ‘lean against’

ōikèdā ‘open’

ōidā ‘pull’

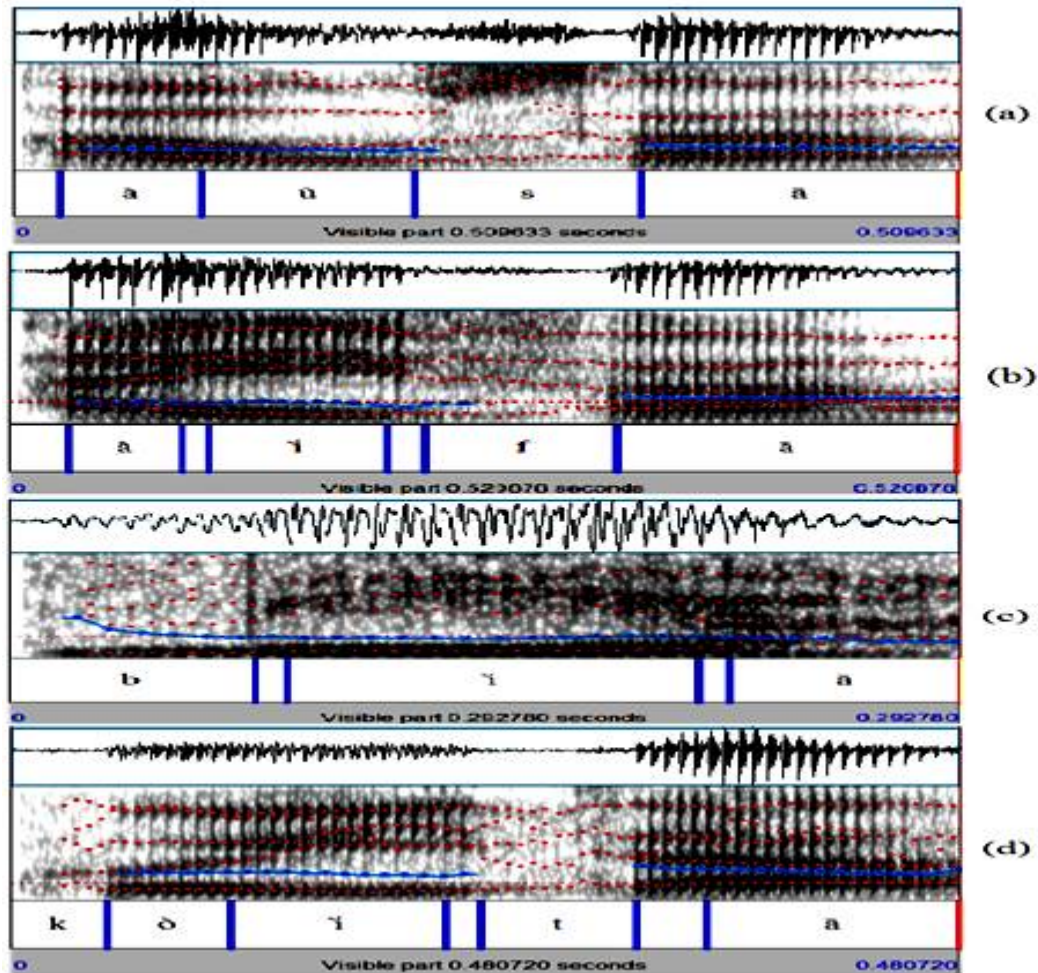


Figure 6 Spectrograms and waveforms of diphthongal contexts

The progressive lowering and rising of the formant patterns ( $F_1$  and  $F_2$ ), as can be traced in (Figure-6) via the red dotted lines, indicate the change in the quality of vowels while articulating the different diphthongs. During the articulation of the rising diphthongs [ai] and [oi], as can be observed from (Figure-6-b and -d) above,  $F_1$  progressively lowers from [a] and [o] to [i] while  $F_2$  moves higher in frequency in the same order of the unit vowels. The lowering of  $F_1$  in the rising diphthongs indicates the change in the tongue height from low/mid to high. Whereas, the rising of  $F_2$  parallels tongue advancement as

the articulation goes from the central/back vowels to the front vowels, thereby to indicate the frontness of [i]. In contrast, in the falling diphthong [ia], the higher F<sub>2</sub> during [i] appreciably lowers during the articulation of [a]. In the same way, although [au] is a rising diphthong, it is also characterized by the horizontal position of the tongue. While [a] is central, [u] is back; as a result, the F<sub>2</sub> values of both vowels are proximal and, in steady-state, they continue in parallel lines, until the end. Actually, relative lowering in the F<sub>2</sub> values of [u] is observed against the F<sub>2</sub> of [a].

On the other hand, notice the changes in the F<sub>1</sub> patterns against the horizontal axis when moving from one vowel to the other, in the articulation of the four diphthongs. The F<sub>1</sub> indicator cue in the case of a falling diphthong [ia], as in (Figure-6-c), starts very closer to the x-axis during the articulation of [i] and then considerably rises during [a]. This is because high vowels have the lowest F<sub>1</sub> values while the low vowel [a] has the highest F<sub>1</sub> scores; F<sub>1</sub> is inversely correlated to tongue height. Similar changes in the F<sub>1</sub> pattern of the falling diphthong [au], in (Figure-6-a), is observed while F<sub>1</sub> lowers from [a] to [u].

Generally, two important concerns can be raised with regard to the articulation of diphthongs and the two glide consonants. First, in word-initial position, both groups are often perceived differently as such while the diphthongal vowels are heard as two different vowel qualities with relatively similar prominence of articulation, the semi-vowels /w/ and /j/ do not show tendency of gliding.<sup>22</sup> Second, in word-internal environment, however, the possibility of the singleton semi-vowels to make part of a vowel sequence as well as the formation of a glide in between vowels seems ambiguous, as can be learned from the contrastive pair, /bɪä/ ‘water’ vs. /bɪjə/ ‘a worm’ . Thus, the interpretation of diphthongs in comparison to glides would make a topic of future investigation.

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<sup>22</sup> Carr (1993:194) notes, “It is interesting that rules of glide formation have much the same format regardless of which language they occur in. While there is some variation in the range of high vowels which may act as input, the triggering environment is constant, adjacency to another vowel.”

### 3.3.5 Potential Triphthongs

Sequences of three vowels potentially exist in Kunama although the issue requires further instrumental investigation that suffices to make conclusive remarks. Bender (1996) has also indicated the possibility of finding triphthongs in Kunama. Tentatively, the potential triphthongal contexts are identified while starting with [a], [u] and [o], then with a medial glide (often the palatal glide), and then end with [a], [i] and [o]. Therefore, they are considered moving from one vowel to a glide and then to a third vowel. On this assumption, the first two or the last two vowels are often found any one of the four diphthongs described above. The words, in (27) below, suggest the sequences that would make potential triphthongs to be [aia], [uia], [oia], [aui] and [aio].

- (27) a. ājā ~ āā ‘dream’  
b. mājá ~ māíá ‘cripple’  
c. kùjà ~ kùà ‘sky’  
d. kōjà ~ kōā ‘fall (intr)’  
e. sàwità ~ sàùità ‘wind’  
f. ājōkōmā ~ āiōkōmā ‘light (not heavy)’

The words given above, in (27), show potential triphthongs of VGV phoneme sequences, where the medial G stands for the glide consonants that are followed and preceded by a vowel.<sup>23</sup> In (Figure-7), examine the formant patterns of the potential triphthongs:

As can be examined from the spectrograms (formant patterns) and waveforms, in (Figure-7) below, it seems difficult to specify the medial semi-vowels as glides or as part of a vowel sequence. Because glide consonants are the most vowel like sounds, they often show similar spectrogram and waveform patterns with vowels. When the

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<sup>23</sup> The difference between glides and vowels is easy to define; because the later class of sounds maintain steady-state. However the difference between glides and diphthongs is difficult to determine; because the two sounds do not maintain steady state, rather they are the sounds with a gradually changing formant pattern (Keerio, 2011:110).

articulation goes from [a] to [j] and from [a] to [i], the F<sub>1</sub> and F<sub>2</sub> patterns are shown to be similar. In both of these, while the F<sub>1</sub> cue gradually closes to the horizontal axis, the F<sub>2</sub> indicator rises, correspondingly. Thus, at the level of this analysis, it is hard to tell whether the palatal glide stands in its own or makes part of a sequence of vowels.

Likewise, similar formant patterns are observed as the articulation goes from [a] to [w] and [a] to [u]. In (Figure-7), the F<sub>1</sub> pattern gradually gets closer to the horizontal axis as the articulation goes from [a] to [w] or to [u] then to [i]. This indicates that [a] has the highest F<sub>1</sub>, and which lowers during [w] and [u], and then through [i]. Because [i] has the lowest F<sub>1</sub> value so that its F<sub>1</sub> pattern is shown to be much closer to the horizontal axis. Therefore, a full-fledged comparative analysis of monophthongs, diphthongs and glides is required to specify the acoustic feature difference among these classes of sounds. The present study tentatively concludes that, Kunama is likely to have triphthongs.

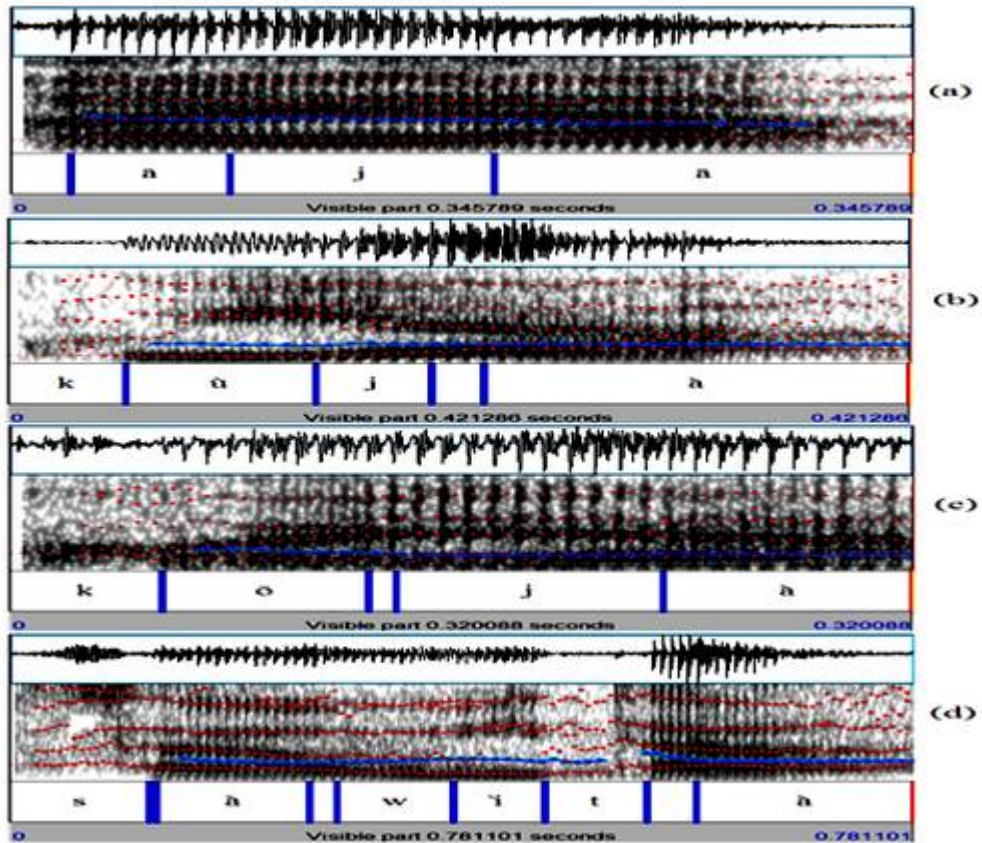


Figure 7 Spectrograms and waveforms of potential triphthongal contexts

### 3.4 Distinctive Vowel Length

Vowel length plays a contrastive role both in the lexicon and in the grammar although clear minimal pairs for grammatical length are lacking. Thomson (1983) has indicated his opinion that correlates vowel length with stress so that he questioned the prominence of lexical length contrast in Kunama. Notwithstanding the presence of words that show stress-induced length of vowels, the present study rather argues for the possibility of finding distinctive length in unstressed contexts. In the same manner, the present analysis suggests that vowel length can be conditioned by contour tones that demand two targets. Nonetheless, since long vowels are recorded in the context of tone levels, length minimal and near-minimal pairs are not lacking.

#### 3.4.1 Lexical Meaning Contrast for Vowel Length

Contrastive vowel length is commonly analyzed in the penultimate syllable of disyllabic words. Since word-final vowels in general show phonetic length, final length contrast is claimed to be neutralized in Kunama. In account to this, length marking is not done on word-final vowels throughout the body of this paper. Below, in (28-32), are minimal and near-minimal pairs for vowel length. Although tonal differences are not controlled in some of the pairs, the length distinction is argued to be primarily contrastive.

/i:/	/i/
(28) lí:lā ‘hunger, drought’	lílā ‘tying’
fī:lā ‘rat’	fílā ‘swell’
ʃī:náˀ ‘dirt’	ʃínā ‘vagina’
tī:kāˀ ‘place name’	tíkā ‘hear’
í:ʃáˀ ‘outside’	íʃá ‘washing (clothes/utensils)’
bī:bá ‘red’	bíbáˀ ‘carrying (child on back)’

	<b>/e:/</b>		<b>/e/</b>
(29)	kè:lā ‘guest’		kēlā ‘counting (v)’
	sé:dā ‘track (of animals)’		sēdā ‘to desire’
	gē:dā ‘belch’		gēdā ‘divide, cut’
	<b>/u:/</b>		<b>/u/</b>
(30)	bū:rā ‘spotty (color of an ox)’		būrā ‘satisfaction (of food/drink)’
	fū:fā <sup>-</sup> ‘nape’		fúfā <sup>-</sup> ‘termite hill’
	dū:dā ‘jumping (from above)’		dúdā <sup>-</sup> ‘smoke (n)’
	sú:sā <sup>-</sup> ‘soup (of meat), gravy’		súsā ‘preparing’
	<b>/o:/</b>		<b>/o/</b>
(31)	dō:rā ‘chicken’		dōrā ‘put’
	kò:mā ‘to be offended’		kòmā ‘stamp (with one’s foot)’
	gō:dā ‘plan (n)’		gōdā ‘pour’
	kò:jā ‘washing (one’s body)’		kòjā ‘giving birth’
	<b>/a:/</b>		<b>/a/</b>
(32)	là:fā ‘gruel’		làfā <sup>`</sup> ‘maize’
	bá:dā ‘illness’		bádā <sup>-</sup> ‘thigh’
	sà:rā ‘billy-goat’		sārā <sup>`</sup> ‘half’

### 3.4.2 Grammatical Contrast for Vowel Length

Clear minimal pairs for vowel length are not recorded. The example below, in (33), is a near-minimal pair for length. This is observed in noun phrases where adjectives occur in attributive function. In Kunama NPs, adjectives come following the head noun and carry distinctive vowel length and tone. In citation form said in isolation, the adjectival base carries a mid tone and a short vowel, /fǎfǎ/ ‘beautiful’, and it inflects for degree as [fǎ:fǎ], which contrasts to [fǎfǎ]. Now examine the grammatical meaning contrast marked by vowel length and tone in the formation of the NPs given, in (33-a & -b):

- (33) a. /kī:f-ā/ ‘girl’ + /fǎfǎ/ ‘beautiful’ → [kǐfǎfǎ] ‘A beautiful girl’  
b. /kī:f-ā/ ‘girl’ + /fǎ:fǎ/ ‘beautiful’ → [kǐfǎ:fǎ] ‘A very beautiful girl’

The long vowel and the high tone surfacing on the penult syllable vowel of the adjectival base, as in (33-b), are intensifier morphemes so that the NP inflects for degree. In contrast, as in (33-a), the change in the grammatical meaning of the NP is marked by a short vowel and a mid tone marked on the same adjective. The tonal processes observed on the surface of the outputs, in (33) above, will be discussed in (Chapter -7).

### **3.5 Acoustic Analysis of Vowel Quality**

In this section, the acoustic analysis of the vowel phonemes will be presented in order to supplement the description given in the preceding sections and substantiate some of the claims made based on the impressionistic analysis.

#### **3.5.1 Method**

Methodological considerations are overviewed in this section. These include the selection of the stimuli context, number of speakers, number of experimental words and token, materials measured, the instrument used and how measurements were taken.

##### ***3.5.1.1 Preconditions of Choosing Appropriate Context***

The working trend and guidelines used among acoustic phoneticians (Crossers, 1978; Lindblom, 1986; Ladefoged, 2001; Swenson, 2015) suggest that identifying a productive context is primarily mandatory to arrive at sound conclusion concerning quality of vowels through formant measurement. In this regard, many phoneticians, such as Swenson (2015), recommend the general trend that favors word contexts created by voiceless obstruents as the best environment to extract unbiased formant measurements from vowels. In his view, voiced obstruents and sonorants rather have showed the most influence on vowel quality. Besides, among voiceless obstruents, some of the fricatives particularly the sibilants /ʃ, s/ have been shown to impact on adjacent vowels in cross-linguistic acoustic experiments. While working on the present experiment, it has been observed that transitional boundaries created by voiced consonants require careful inspection before segmenting the boundaries with vowels. As a result, word contexts created by the voiceless obstruents were considered to the extent allowed by their distribution in the present data.

<sup>24</sup>On the other hand, due to specific cross-linguistic variations, flexibility is maintained in consultation to specific scenarios observed in this study. Likewise, while Kunama voiceless obstruents were chosen first to be the productive contexts, word contexts created by the voiceless palatal fricative consonant /ʃ/ were excluded from the experimental wordlist. The spectrogram and waveform inspection of /ʃ/ illustrate the opinion that it may affect the following vowel feature and blurs the boundary for proper segmentation; the voiceless palatal fricative consonant /ʃ/ of Kunama is found to be noisier and longer in duration. On the contrary, due to lack of sufficient number words in the productive context aforementioned, mainly for the high front vowel /i/, some word contexts created by either of the two liquid consonants were included in the experiment. In order to reduce the effect to come due to these consonants, however, extra care was taken during segmentation.

Moreover, measurements were extracted from the penultimate syllable vowel of disyllabic words with CVCV sequences. This is because word-initial and -final vowels often show natural tendency of phonetic length in Kunama, and most of the minimal pairs for vowel length are found to have a CVCV shape. Specific flexibilities have been considered in the choice of productive context in addition to the insights learned from the available phonetics literature.

### ***3.5.1.2 Speakers and Data Recording***

The main wordlist comprising of 1500 lexical entries was elicited from three native male speakers of 35, 39 and 73 years old. Unfortunately, it was not possible to find a female speaker for lexical elicitation. Under the main wordlist elicitation task, words in complete minimal sets were separately recorded from the main consultant. The words and tokens from the remaining two consultants are selected from the main wordlist recorded from them.

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<sup>24</sup> For instance, Swenson (2015:111) has reported the vowel context created by liquids [l\_\_r] as productive context in Luo, a Western Nilotic language of Kenya, as this consonant context shows a negligible impact on the medial vowel.

### ***3.5.1.3 Developing the Experimental Wordlist and Tokens***

Eighty-two words (/i/=16; /e/=11; /o/=13; /a/=24; /u/=18) were selected from the main audio data recorded from three Kunama native male consultants in the field. Primarily the target words were minimal pairs that show length, but finding minimal pairs was found to be difficult due to the interface of Kunama suprasegmentals. As a result, additional words recorded in a non-minimal set context were used for measurement. The aforementioned number is not a purposively obtained list but rather happens while filtering words, which fulfill the requirements of productive contexts for vowel formant measurements.

Likewise, the number of stimulus for each vowel is highly dependent upon the distribution of the vowels in the context of voiceless obstruents and other productive contexts in this language. For instance, the number of stimulus for the low open central vowel /a/ is greater due to its high distribution. However, such imbalance in the number of selected contexts is compensated by increasing the number of tokens for the vowels that are represented by a limited number of words so that the variation does not bias the obtained result. Hence, the number of tokens for each vowel is /i/=69; /e/=61; /o/=51; /a/=65 and /u/=46. Therefore, the total number of raw tokens taken from three speakers (four tokens from each) is 292. The difference in the number of tokens of the vowels is because some words are not found in all tokens and in the speech of all speakers.

Likewise, all formant plots presented in forthcoming sections are results of computed averages of F<sub>1</sub> and F<sub>2</sub>. The number of F<sub>1</sub> and F<sub>2</sub> averages for short and long vowels were: /i/=24, /e/=24, /o/=22, /a/=24, and /u/=22. This implies that each of the short and long vowel phonemes are represented with equal number of average values. For instance, the short and long high front vowels have 12 stimuli each. The detail of the stimuli context and the raw measurement data are annexed.

### ***3.5.1.4 Data Manipulation in PRAAT and Materials Measured***

The audio data (.wav) of the selected words is extracted and exported in three main folders created with the name of each speaker, and in each of these folders, short and long vowel contexts were put in separate folders. The sound format adjustment and

audio data extraction was done by the help of the Audacity software. Then, each sound file was easily imported to PRAAT version 5.3.32 ([www.praat.org](http://www.praat.org)) to extract the measurement values from the targeted materials. While doing these preliminary tasks, poor quality sounds were rejected.

The main materials measured are two formant frequencies, Formant one ( $F_1$ ) and Formant two ( $F_2$ ) and vowel duration. Only the two formant frequencies ( $F_1$  and  $F_2$ ) were considered following Ladefoged (2001:44) who stresses that “the most useful representation of the vowels of a language is a plot showing the average values of formant one and formant two for each vowel as spoken by a group of speakers.” The formant frequency figures are extracted from a vowel’s midpoint as traced by the vowels spectrograms and the formant indicator cues; in PRAAT, the formant patterns can be traced via the red dotted lines. To get the most accurate formant measurements, the common trend is to measure the formants at the center of the vowel to avoid the latent impact of pre- and post-vocalic consonants (Ladefoged and Maddieson, 1996:286). Similarly, Swenson (2015:111) recommends that, “Only one pitch period should be measured in the centre of the vowel, during steady state formants and away from consonant transition”. Accordingly, the present analysis measures formant values as represented, in (Figure-8), below:

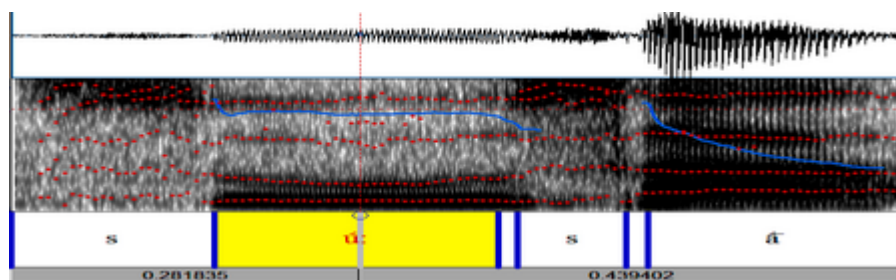


Figure 8 Way of extracting vowel formant values in PRAAT

On the other hand, vowel durations were measured along with the formant frequencies, and this again required extra care while segmenting transitional boundaries of the vowels with the adjacent consonants. While doing this, boundary inspection was worked through repeated listening by zooming out the specific vowel portion in a given word; this inspection was guided by noting spectrogram and waveform differences of the vocalic

and the non-vocalic segments. In cases when the traditional boundary between a prevocalic voiced consonants (in the case this experiment, the liquids) and postvocalic voiced consonants, the boundary is demarked at the point where a clear sound of a vowel is detected. Sometimes this point is shown to be different from the point of the vowel-voicing onset; consequently, during this transitional span we may hear an odd sound of neither of the preceding consonant or the following vowel. By implication, depending on the stimulus context, a sizable portion, across a transitional boundary, can be trimmed before extracting the required information.

Finally, average  $F_1$  and  $F_2$  values as well as vowel durations are computed for each speaker for further analysis. The average formant values and the means of the three speakers' average are used to draw the vowels formant plot by the help of the JPlotFormants software version 1.4 (Roger Billerey-Mosier 2001). While the average formant and duration values are presented in the body of this paper, the raw measurement data together with the selected stimuli contexts are annexed.

### **3.5.2 Possible Gaps and Limitations**

Firstly, the main wordlist elicited particularly from two of the consultants were taken in an open field, for reasons of the speaker's convenience, so external noise interference hampered the use of more words than included in the experiment. However, the recording of minimal word sets, lately used as the main experimental inputs, with the main consultant was done in a better environment though not in ideal soundproof room. Secondly, tone and stress are not controlled in the selected word contexts, mainly because of the prosodic feature load in Kunama and the interface they create. The experiment with all the limitations is managed by reading the linguistic literature in the area of acoustic phonetics and with a closer guidance of my supervisor. In addition, some of the selected word contexts used in the experiment may not strictly conform to the working guidelines due to lack of enough words in Kunama as per the principles of the guideline. However, as the principles also allow flexibility depending upon the specific language under investigation, no significant bias is expected in the outcome. Moreover, due to the presence of other distinctive prosodies in Kunama, it may require further investigation to understand fully the complexities of tone and stress and the

possible interactions these features may have with vowel sounds. A full-fledged acoustic study, therefore, is hoped to fill in such gaps in the future.

### 3.5.3 Result and Discussion

#### 3.5.3.1 Analysis of Vowel Formant and Duration

The acoustic analysis confirms that there is no considerable quality difference between the short and long vowels of Kunama; if there is anything, it is attributed to duration. Both vowel groups (short vs. long) have shown to occupy the peripheral position in the vowel space, except for some degree of centralization tendency, which is noticeable on all short vowels. All the five short vowels and their long counterparts are shown occupying the periphery<sup>25</sup> in the vowel space, as can be observed from the formants plot, in (Figure-9), below:

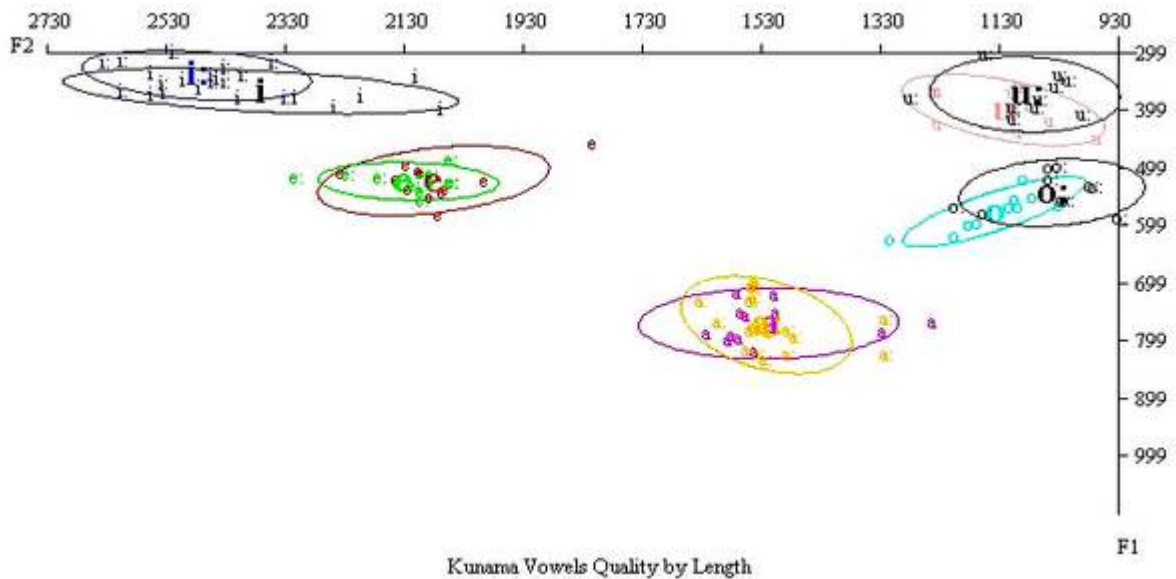


Figure 9-Average formants plot of vowel phonemes by length

<sup>25</sup> One of the main tenets of Dispersion Theory (Lindblom, 1986) is that quality vowels occupy the peripheral position in the vowel space like the cardinal vowels do. Therefore, if the vowels are maximally distant from each other within the available vowel space, they are apparently easiest to distinguish from each other.

<sup>26</sup>Previous analyses, as noted before, unanimously report that vowel length is distinctive in Kunama so that the five short vowels have corresponding long counterparts. The present study comes up with the same conclusion and further explores how large is this durational difference in acoustic terms. Accordingly, the computed average duration values of all long vowels, except for the close-mid vowel /e/, are almost double of their short counterparts. In some of these, the long high close vowels /i, u/, the durational difference is shown to be beyond two-fold.

Generally, the result obtained from the experiment showed that Kunama is a five-vowel system with an appreciable length distinction. Therefore, it can be concluded that both the short and long vowels of Kunama are almost closer to the cardinal vowels. The length contrastive pairs are verified to have compatible average formant values while the average duration figures are explored to be prominent for all pair of vowels, regardless of comparative differences within a pair. The average formant values and durations of short and long vowels are presented, in (Table-5 & -6), below:

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<sup>26</sup> However, Thomson (1983:289) reflected, "It is unclear whether distinctive length is found lexically, since there seems to be a correlation with stress..."

Table 5 Average F<sub>1</sub> and F<sub>2</sub> values of short vs. long vowels

Speaker	Vowels	Token-1		Token-2		Token-3		Token-4	
		F <sub>1</sub>	F <sub>2</sub>	F <sub>1</sub>	F <sub>2</sub>	F <sub>1</sub>	F <sub>2</sub>	F <sub>1</sub>	F <sub>2</sub>
1	/i/	343	2116	373	2561	380	2321	371	2540
	/i:/	341	2402	350	2434	367	2607	353	2538
2	/i/	400	2076	376	2210	346	2450	336	2556
	/i:/	299	2521	378	2332	318	2352	327	2434
3	/i/	379	2415	395	2253	362	2482	347	2509
	/i:/	314	2607	318	2636	351	2454	340	2455
1	/e/	458	1818	505	2112	543	2073	524	2000
	/e:/	527	2052	511	2088	513	2228	517	2172
2	/e/	536	2065	508	2109	519	2150	536	2129
	/e:/	556	2101	532	2118	525	2053	528	2084
3	/e/	509	2243	583	2077	550	2092	494	2131
	/e:/	487	2054	543	2101	516	2315	526	2139
1	/o/	568	1101	520	1092	624	1317	590	1162
	/o:/	498	1034	532	980	501	1047		
2	/o/	554	1107	568	1118	551	1078	595	1171
	/o:/	521	1048	556	1020	557	1028	587	930
3	/o/	566	1033	599	1185	618	1209	605	1151
	/o:/	534	974	567	1206	578	1157		
1	/a/	767	1247	719	1515	717	1576	819	1545
	/a:/	825	1323	783	1486	707	1545	732	1634
2	/a/	757	1562	752	1571	751	1512	788	1628
	/a:/	727	1543	730	1549	834	1526	793	1474
3	/a/	797	1574	799	1591	790	1586	786	1331
	/a:/	821	1538	780	1535	782	1550	825	1486
1	/u/	360	1102	394	1085	423	1238		
	/u:/	382	1065	386	995	395	1112	335	1172
2	/u/	439	1106			418	1050	368	1246
	/u:/	396	1073	393	1228	360	1039	304	1158
3	/u/	401	1109	372	1113	451	969	368	1238
	/u:/	408	993	348	1018	378	1284	341	1032

Table 6 Average durations of short vs. long vowels

Speaker	Vowels	Average durations in ms				M.Av. Vd and Ratio of Long vs. Short vowels
		Token-1	Token-2	Token-3	Token-4	
1	/i/	96	91	83	75	/i:/=208.67 /i/=92.75  <b>1 : 2.24</b>
	/i:/	189	159	151	231	
2	/i/	96	103	97	94	
	/i:/	171	186	274	270	
3	/i/	75	114	108	81	
	/i:/	197	185	242	249	
1	/e/	114	140	202	150	/e:/=155.8 /e/=234.5  <b>1 : 1.5</b>
	/e:/	220	240	251	220	
2	/e/	139	161	174	167	
	/e:/	222	210	256	210	
3	/e/	175	105	180	163	
	/e:/	291	247	226	221	
1	/o/	114	107	88	76	/o:/=159.1 /o/=72.57  <b>1 : 2.19</b>
	/o:/	157	154	168		
2	/o/	68	63	69	73	
	/o:/	143	154	144	137	
3	/o/	77	70	88	74	
	/o:/	188	155	191		
1	/a/	79	54	64	137	/a:/=179.33 /a/=93.17  <b>1 : 1.9</b>
	/a:/	127	148	135	214	
2	/a/	74	65	194	94	
	/a:/	155	175	264	176	
3	/a/	83	86	95	93	
	/a:/	158	168	210	222	
1	/u/	55	79	103		/u:/=173.7 /u/=73.4  <b>1 : 2.4</b>
	/u:/	107	136	202	185	
2	/u/	73		78	52	
	/u:/	151	128	282	170	
3	/u/	70	91	81	52	
	/u:/	209	166	144	170	

The instrumental data, in (Table-5), for each vowel phoneme have been interpreted based on the horizontal position, front-back dimension, of the tongue position as reflected in  $F_2$  values. Besides, the  $F_1$  values that indicate the vertical position of the tongue, commonly refers to height distinction, is also taken into account. The mean values of the  $F_1$  and  $F_2$  averages reveal that Kunama vowels are closer to the cardinal vowels in that they are well dispersed in the vowel space and occupying the periphery, except the central low open vowel /a/ that occupies a central position in the vowel space. Therefore, it may not qualify for the status of cardinal vowels.

In relative terms, the high front vowel is produced when the front of the tongue is more closer to the roof of the oral cavity while the high back round vowel is pronounced when the back of the tongue becomes comparatively in lower contact with the roof of the mouth. Acoustically, this height difference is reflected in  $F_1$  values that comparatively are lesser for /i/ than for /u/. On the contrary, similar height difference is not observed in the high-mid set, in which the tongue blade assumes similar middle height for the front high-mid set, in which the tongue blade assumes similar middle height for the front high-mid /e/ and the back high-mid /o/ vowels. This is reflected through the average  $F_1$  values that are closer for both vowels, as in (Figure-9) above. With regard to the low central open vowel /a/, the tongue is at its lowest vertical position (higher  $F_1$  values), and the horizontal position of the tongue ( $F_2$ ) is at equilibrium of the front and back sets. Actually, the  $F_2$  values of /a/ reveal its relative tendency of backness because its articulation is similar to the back vowels, except for the non-protruding shape of the lips during /a/. Hence, the lower  $F_2$  values of /u/ and /o/ relative to the  $F_2$  values of /a/ can be attributed to the lip rounding effect of the two back vowels.

The pillar for contrastive analysis of the vowel phonemes in this study is the length distinction. The average duration values of short and long vowels presented in (Table- 6) above show that the duration of all long vowels, except the close-mid vowel /e/, is almost double to their short counterparts. In the long high close vowels, /i, u/, the durational difference is shown to be more than double. Similarly, the resulting vowel plot chart depicts relative tendency of centralization for all short vowels though this tendency seems to be prominent in back high-mid round vowel /o/ and the front high-

close vowel /i/. The following formant plots, in (Figure-10 & -11), show the positions of short and long vowels within their own space:

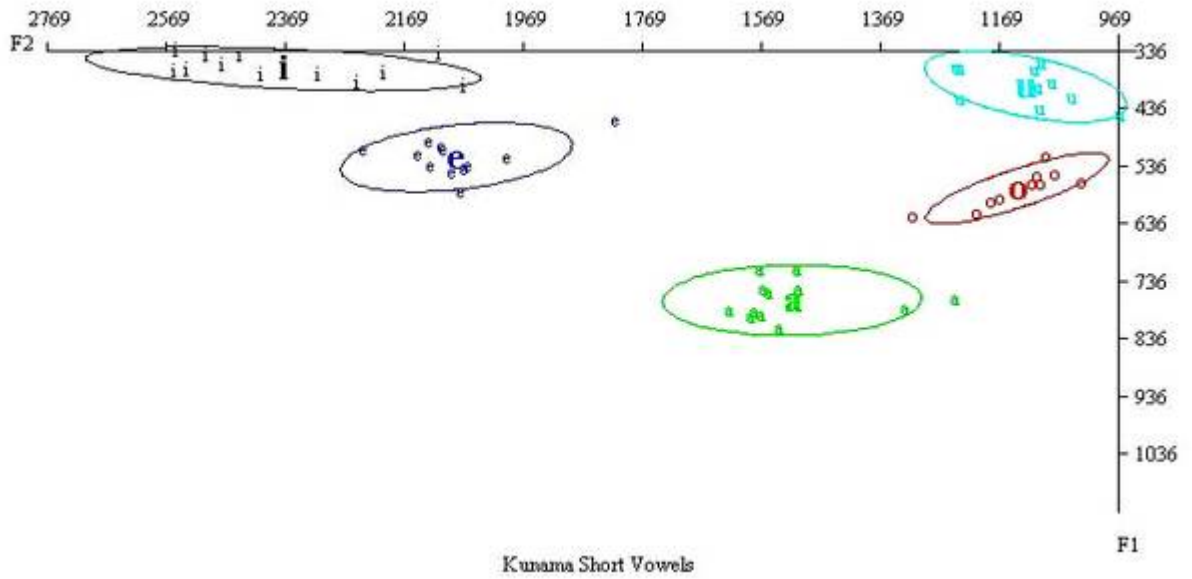


Figure 10-Average formant plot of short vowel phonemes

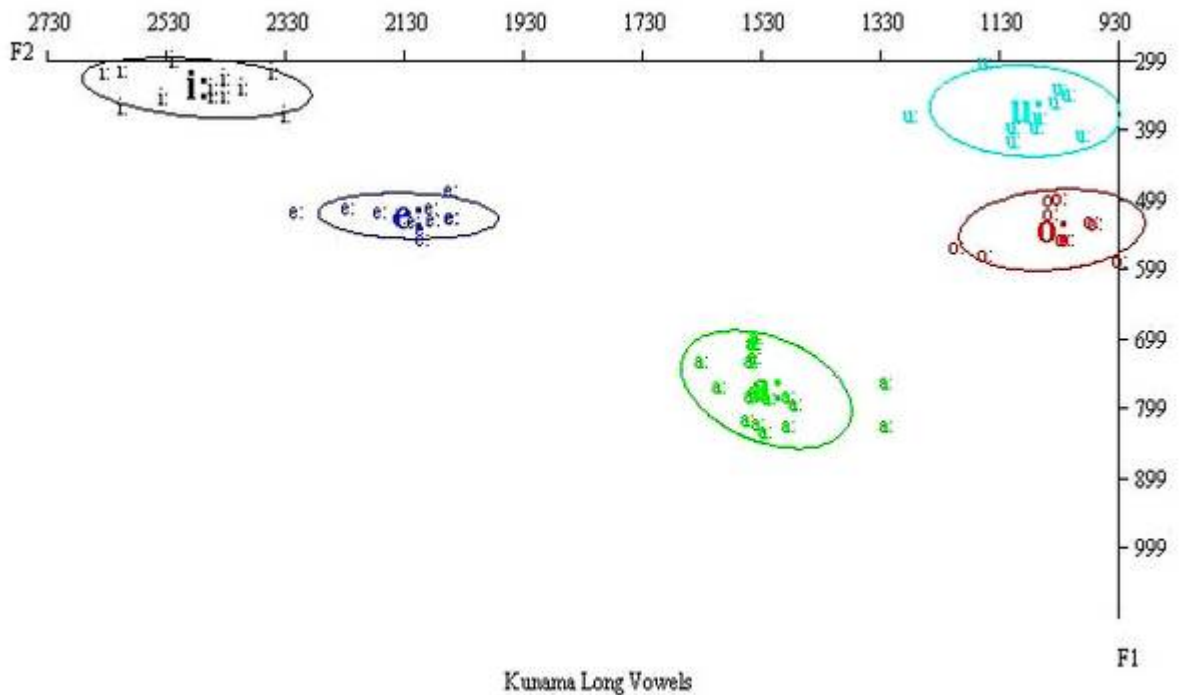


Figure 11-Average formants plot of long vowel phonemes

### 3.5.3.2 Description of Vowels based on Instrumental Data

In this section, contrastive length of vowels is described in detail, and each length pair is compared within a set (front, back and central) based on the formant means, in the vowel space.

#### 3.5.3.2.1 Short vs. Long Front Vowels

In the front set, /i/ and /e/ are contrasted in between short and long realizations vis-à-vis average duration differences, which are supposed to cause the distinction in F<sub>1</sub> and F<sub>2</sub> values of vowels. While F<sub>1</sub> figures show vowel height distinction, the F<sub>2</sub> figures are indicators of centralization tendency.

The mean of the average duration of the short high-close front vowel is 92.75ms while its long counterpart reveals 208.67ms. Thus, the duration of long /i:/ is more than twice the duration of the short /i/. Consequently, the mean of the average F<sub>1</sub> and F<sub>2</sub> values of short /i/ and long /i:/ are shown to be 367Hz, 2374Hz vs. 338Hz, 2481Hz, respectively. On average, long /i:/ is comparatively higher and more front than its short counterpart, but the difference between the two is more pronounced in frontness than in height.

On the other hand, the difference between the mean of the average durations (155.8ms vs. 234.5ms) for short /e/ and long /e:/ is shown to be moderate as compared to the variation in between /i/ and /i:/. This is also reflected in the closeness of the mean of F<sub>1</sub> and F<sub>2</sub> averages, which respectively are 522Hz, 2083Hz vs. 523Hz, 2125Hz. They exhibit similar height in the formant plots, although some degree of centralization tendency is observed during the short /e/. Had it not been for the mean averages of formants, the centralization tendency of short /e/ would be more noticeable, as it sometimes is centralized to schwa [ə]; actually, centralization is more frequent in the short low central vowel /a/. In surface forms, it can sometimes be difficult to identify between short /e/ and short /a/ in word-internal environment. For example, /sèrā/ [sə̀rā] ‘neck’ vs. /sārā/ [sā̀rā] ‘half’, the two short vowels in unstressed syllables are realized as schwa so that it can be hard to identify the basic phonemes that each belongs to, in fast speech. Centralization tendency is reflected with a lowering F<sub>2</sub> for front vowels and



**(Sampled from speaker-2)****Mean of averages**

(34)	tikā ‘hear’	VD=48ms , F <sub>2</sub> =2188Hz	VD=92ms, F <sub>2</sub> =2374Hz
	títá ‘see’	VD=101ms, F <sub>2</sub> =1983Hz	
	lílá <sup>-</sup> ‘tie’	VD=68ms, F <sub>2</sub> =2184	

**(Sampled from speaker-2 and speaker-1)****Mean of averages**

(35)	sèrā [sə̀rā] ‘neck’	VD=107ms, F <sub>2</sub> =1864Hz	VD=155ms, F <sub>2</sub> =2083Hz
	sèrā [sə̀rā] ‘neck’	VD=82ms, F <sub>2</sub> =1682Hz	

The raw duration scores of the front vowels in the specific context given above, in (34 and 35), are less than the mean duration values of the short vowels; particularly, the difference is more appreciable in the front high-mid vowel /e/. This implies that Kunama either may have extra short vowels, or such variation in duration might be caused by the effect of phonetic stress; the issue can make a topic of future study. The present analysis seem to suggest that the extra short duration of vowels accounts for the lowering of the F<sub>2</sub> values so that some of the short vowel symbols are skewed to the center of the vowel space, as observed in (Figure-12) above.

Similarly, in some word contexts of long front vowels, extra long duration scores have been recorded, for example, in /gì:rā/[gì:rā] ‘horn’ and /pèrà/[pè:rà] ‘lie (n) (falsehood)’. In these words the raw duration scores of long /i:/ and long /e:/ are 350 ms and 605ms, respectively.<sup>27</sup> The extra long duration in these words is supposed to be conditioned by the stress on the penult syllable, and consequently, the long /e:/ in this context has been heard as open low-mid vowel [ɛ]. These word contexts were not selected for the acoustic measurement due to the unproductive consonant context in them, as both vowels occur in an environment of nasal and voiced velar consonants. In fact, words having such extra long vowels are rarer in the present data so that [ɛ] is claimed to have a phonetic status, and the obtained vowel formant means do not verify

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<sup>27</sup> Meister and Werner (2009:168), based on acoustic studies on Estonian and Finnish vowels, reported, “The longer the duration of ambiguous stimulus, the more likely it is categorized as the more open vowel of a pair”.

the open low-mid front vowel [ɛ]. Below, in (Figure-13), are spectrograms and waveforms of long vs. short front vowels:

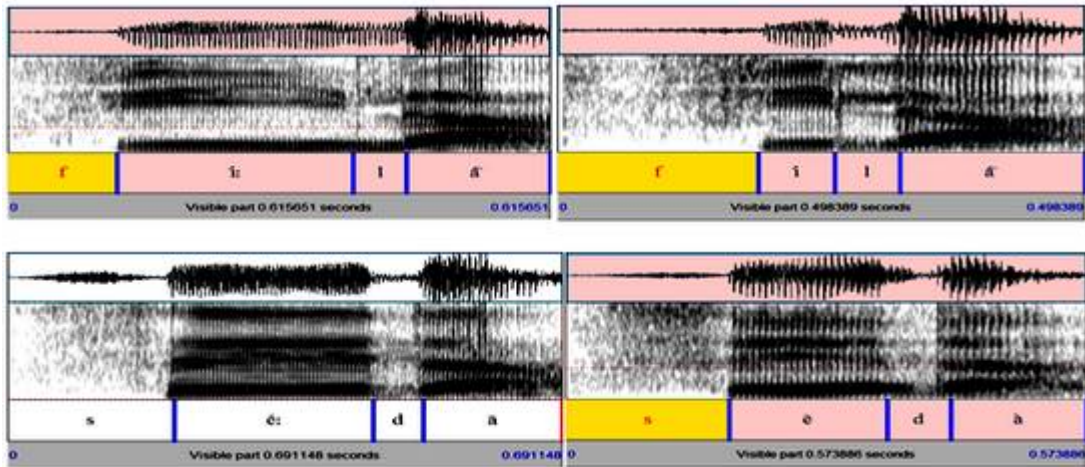


Figure 13 Spectrogram and waveforms of long vs. short front vowels

### 3.5.3.2.2 Short vs. Long Back Vowels

In the back vowels, we find the high close round vowel /u/ and the high-mid round vowel /o/. Comparatively, the latter is more back than the former while keeping the obvious difference in tongue height.

The mean of the average durations of short /o/, 72.75ms, is half the mean of the average durations of its long counterpart, i.e. 159.1ms. The  $F_1$  and  $F_2$  of the short and long /o/ are 576.3ms, 1141.1Hz and 543.1ms, 1042.4 ms, respectively. Therefore, as shown in the formant means, long /o:/ happened to be higher and more back than short /o/. The centralization tendency is clear for short /o/ vowel as compared to the other short vowels.

The mean of the average durations of short /u/ is 73.4ms, which is less than half the mean duration of the long /u:/, i.e. 173.7ms. The  $F_1$  and  $F_2$  means for the short and long pair respectively are 399.4Hz, 1126.4Hz vs. 369.8Hz, 1076.9Hz. Accordingly, long /u:/ is relatively higher and more back than the short /u/. This means that in producing the long /u:/ vowel, the back of the tongue comes in close intact with the back part of mouth and with much protruding of the lips. Besides, muscular tension of the tongue is tenser due to the significant durational length noticed during its articulation. See the formant

plot, in (Figure-14), and the spectrogram display for long and short back vowels, in (Figure-15), below:

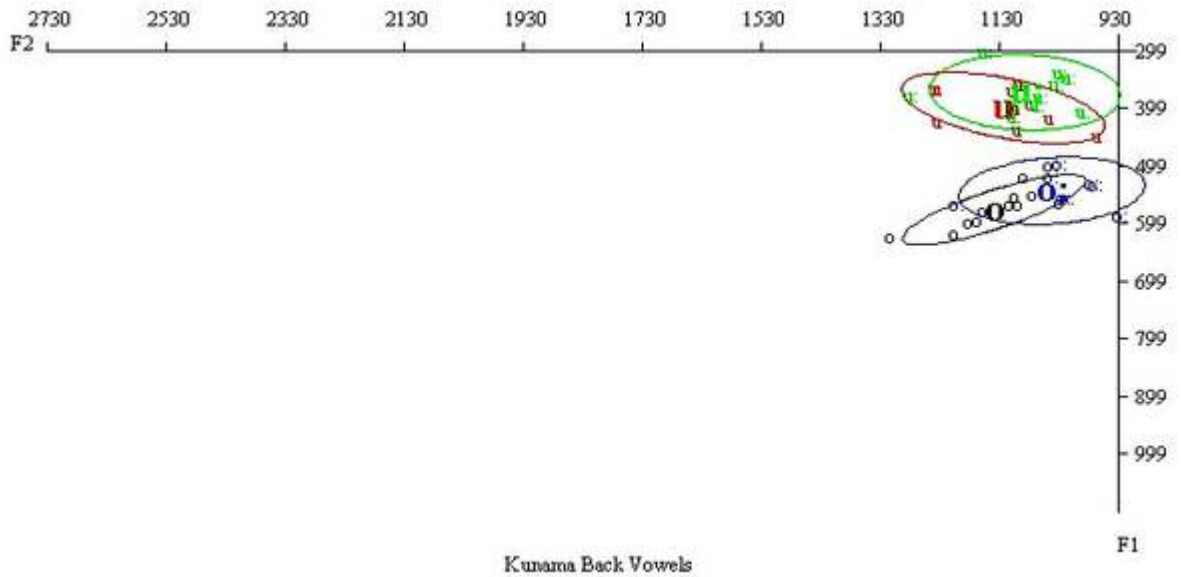


Figure 14-Average formants plot of back vowels (length pairs)

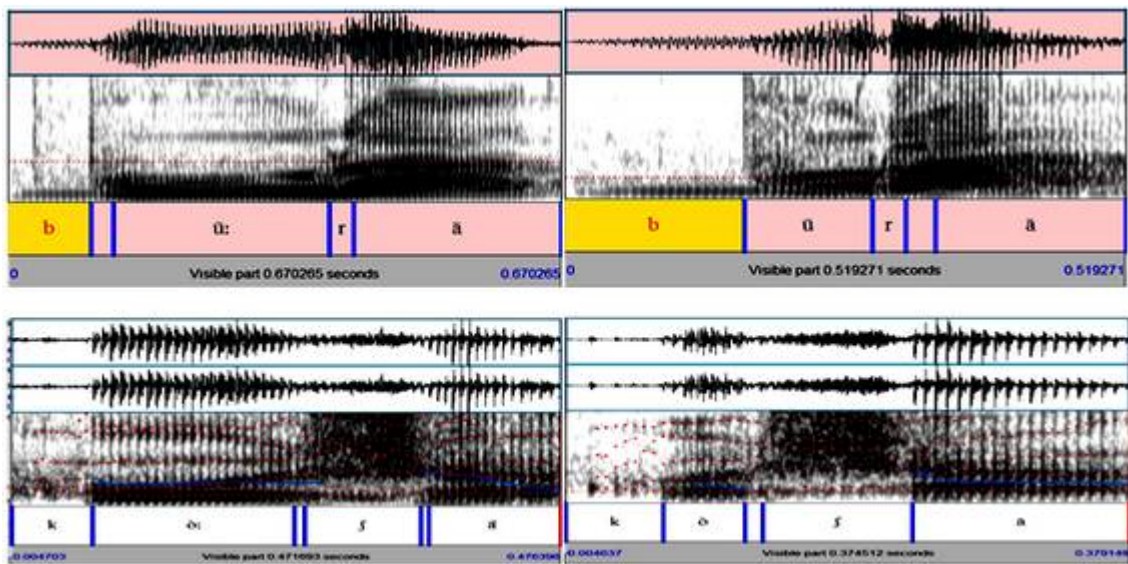


Figure 15 Spectrograms and waveforms of long vs. short back vowels

### 3.5.3.2.3 Short vs. Long Central Low Open Vowels

The mean of the average durations for short /a/ (93ms) is nearly half of the same mean duration (179ms) of long /a:/. In contrast, the F<sub>1</sub> and F<sub>2</sub> mean of averages of both vowels are shown to be very closer, 770.2ms, 1519.8Hz vs. 778.25 ms, 1514Hz. On the other hand, the realization of short /a/ as [ə] in unstressed syllable is a frequent phenomenon that has been detected in word-internal environment. Nonetheless, the raising of the short /a/ to the space of the schwa is not reflected through the mean F<sub>1</sub> and F<sub>2</sub> values. See the formant plot below, in (Figure-16):

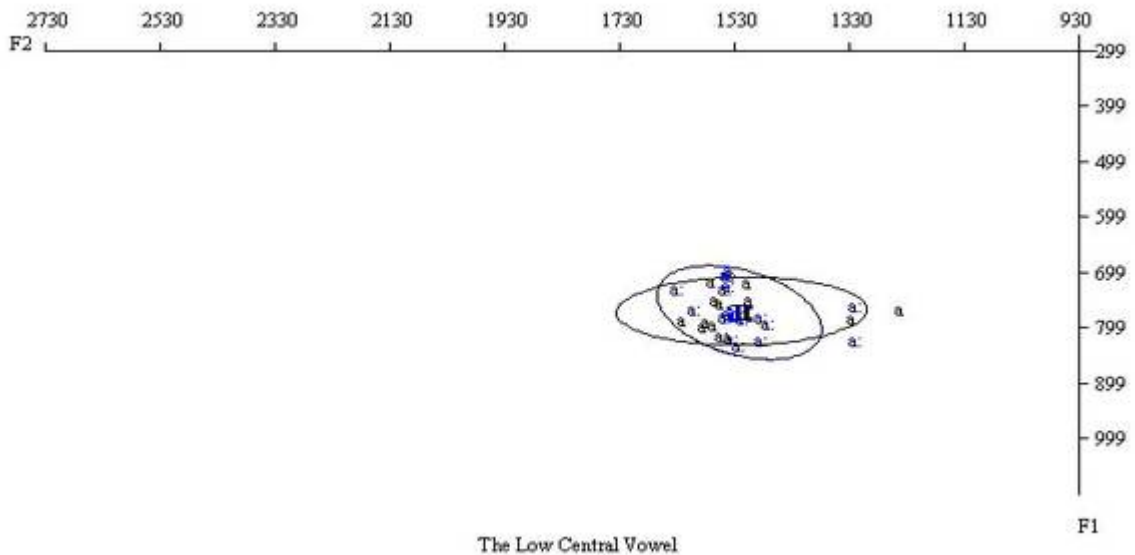


Figure 16 Average formants plot of the central low open vowel (length pair)

Had it not been for the formant means, short /a/ and long /a:/ would have been sparsely represented in the perceptual space of the vowels. Despite the compatible formant means of long and short /a/, the raw formant scores of long /a:/ show that it is more back than its short counterpart. Besides, the duration figures of the two vowels rather suggest an observable difference, as can be noticed from the sampled raw duration scores, in the following (36), and the spectrograms, in (Figure-17).

**Raw duration of short /a/ and long /a:/ (Sampled from speaker-3)**

(36) /kāfā/ [kāfā̃] ‘faeces’	VD=54ms	/kā:sâ/ [kā:sâ] ‘belly’	VD=185ms
/sārā/ [sārā] ‘half’	VD 98ms	/sà:rà/ [sà:rà] ‘billy-goat’	VD=226ms
/làfā̃/ [làfā̃] ‘maize’	VD=94ms	/là:fā/ [là:fā] ‘gruel’	VD=214ms
/tàfā/ [tàfā] ‘add’	VD=60ms		

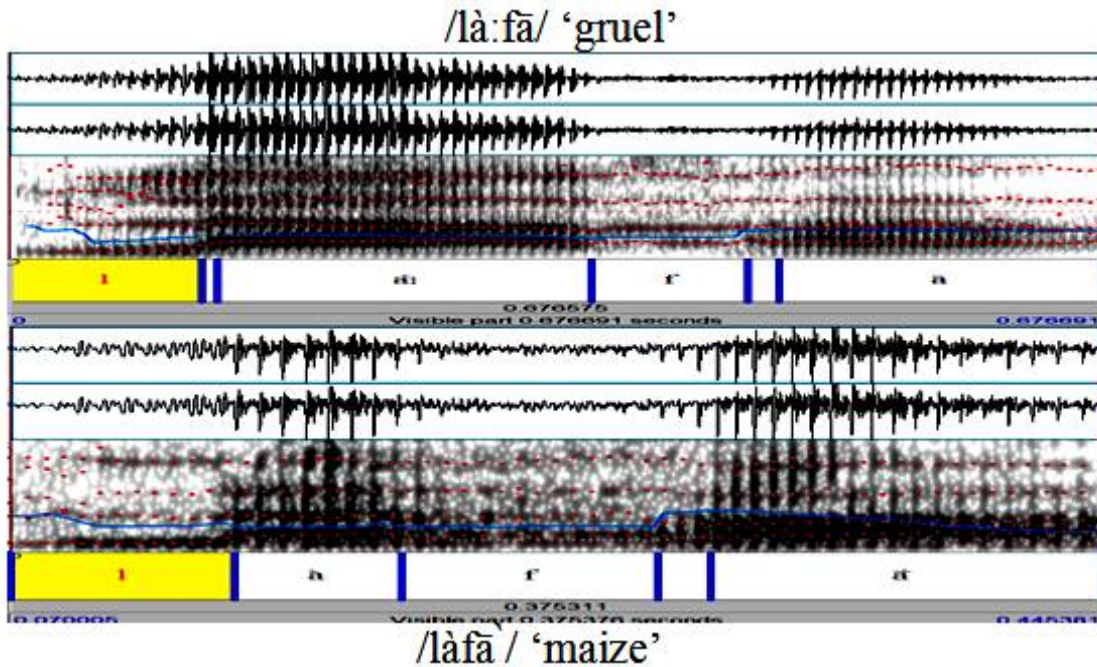


Figure 17 Spectrogram and waveforms of long vs. short central low open vowel

The vowel formant plots presented so far are based on the computed averages of formants, as obtained from three speakers, and they are drawn on F<sub>1</sub> against F<sub>2</sub>. The formant plot in (Figure-18) below, however, is different from all the rest in two ways. First, it is based on the computed means of the average formant values given beneath, in (Table-7). Second, the formant plot is drawn on F<sub>1</sub> (ordinate) against F<sub>2</sub>-F<sub>1</sub> on F<sub>2</sub> (abscissa). Ladefoged (2001:177) argues,

*There is no doubt that the traditional description of vowel height is more closely related to F<sub>1</sub>.... The so-called front-back dimension has a more complex relationship to the formant frequencies.... F<sub>2</sub> is affected by both backness and lip rounding. We can eliminate some of the effects of lip rounding by considering F<sub>2</sub> in relation to F<sub>1</sub>. The degree of backness is best related to the difference between F<sub>1</sub> and F<sub>2</sub>. The closer they are together, the more back a vowel sounds.*

Table 7 Means of Average Formants and Durations of short vs. long vowels

Mean of Averages															
	F <sub>1</sub>	SD	n	F <sub>2</sub>	SD	n	VD		F <sub>1</sub>	SD	n	F <sub>2</sub>	SD	n	VD
/i/	367	20	12	2374	173	12	92	/i:/	338	23	12	2481	100	12	208
/e/	522	31	12	2083	101	12	155	/e:/	523	17	12	2125	79	12	234
/u/	399	32	10	1126	89	10	73	/u:/	369	31	10	1076	89	10	173
/o/	576	32	10	1141	81	10	72	/o:/	543	30	10	1042	82	10	159
/a/	770	31	12	1519	113	12	93	/a:/	778	31	12	1514	94	12	179

n=number of averages

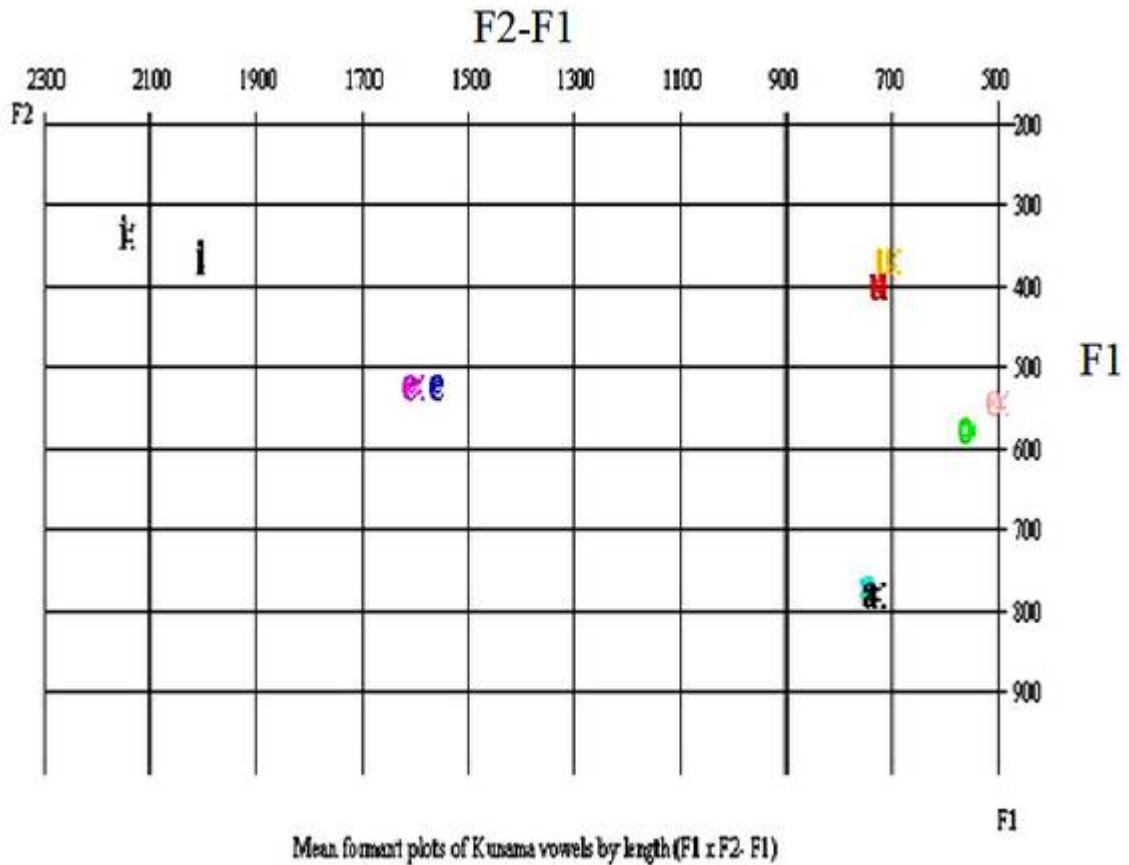


Figure 18 Mean formants plot of vowel phonemes by length (F1 x F2- F1)

The formants plot in (Figure-18) above, following the assumption of Ladefoged (2001), brings forth some points worth mentioning. First, the Kunama central low-open vowel /a/ tends to be a back vowel, as the effect of lip rounding is normalized. Second, the high-mid back vowel /o/ is shown to be more back than both /u/ and /a/. Comparing the mean F1 values against the differences (F2-F1), the results for /o/ are found to be more closer to each other than the same results obtained from /u/ and /a/ so that /o/ is more back than these two back vowels.

### **3.6 Chapter Summary**

Based on the impressionistic and acoustic analyses, Kunama has a simple inventory of vowels as compared to other Nilo-Saharan languages that show upto ten phonemic vowels. It has five phonemic vowels with length contrast and two phonetic vowels. Four diphthongs have commonly been analysed, and potential sequences of three vowels have been claimed. The acoustic analysis of vowel quality seems to suggest that the short and long vowels of Kunama exhibit an appreciable difference only in length quality. Consequently, the short vowels exhibit some degree of centralization tendency relative to their longer counterparts. The durational difference for all length pairs is found to be considerable; the long vowels show double the duration of their short counterparts. Kunama has two front vowels, two round back vowels and the central low open vowels although the latter could possibly be a back vowel, with the assumption that neutralizes the effect of lip rounding in acoustic terms. In account to the closer F1 and F2 mean values of each length pair and their peripheral position in the vowel space, the present study claims that both the short and the long vowels of Kunama qualify the status of cardinal vowels.

## **CHAPTER FOUR: PHONOTACTICS AND SYLLABLE STRUCTURE**

### **4.0 Introduction**

This chapter examines the phonotactics and syllable structure of Kunama. The first part elaborates on the phonotactics and the constraints that apply on co-occurrence of sound segments, and the second part deals with the syllable structure typology and the syllabification process. The last part shows the re-syllabification process.

### **4.1 Phonotactics**

In this section, the Kunama cluster phonotactics and the constraints that operate on the co-occurrence of sound segments as well as on the distribution of sound segments will be discussed. These, in turn, will help to define the syllable and syllable structure of Kunama, and to specify the marked and unmarked segment combinations at the level of lexical and post-lexical phonology. The term phonotactics in its general sense illustrates the account of segment sequencing and combinations in a language's system, and it specifically explains the constraints on the free arrangement of sound segments (Clark and Yallop, 1995:70).

#### **4.1.1 Consonant Clusters**

Consonant cluster refers to a sequence of two different consonants, so it does not include geminates. Consonant clusters, in Kunama, occur in word-medial position only and happen in non-derived lexical items and derived lexical items. However, the language does not permit word-initial consonant clusters (or more than one consonant) and a cluster of three consonants at all, at least, at the level of lexical phonology.

The most commonly observed consonant sequences are the pre-nasalized clusters that can be represented as NO (N stands for nasals, O for obstruent consonants), i.e. a nasal followed by an obstruent. Besides, clusters having other sonorant consonants, such as, the two liquids as first members followed by obstruents (LO) are observed. These clusters follow a general, sonorant-obstruent (SO), pattern and include [nd, ntʃ, nf, nb,

nk, ŋg, ns, nt, mt, ndʒ, rd, rdʒ, rg, ld]. Though the SO clusters are productive, distributional differences are noticed on the sub-patterns, i.e. NO vs. LO. While the pre-nasalized sequences (NO) have showed the highest frequency, the liquid-obstruent (LO) sequences are less frequent.

Other clusters, such as, sonorant-sonorant [lm, rm], obstruent-obstruent [ʃk, fb] and obstruent-sonorant [fr], also occur, but either they are less productive or occur only in derived contexts. The consonant clusters of Kunama can be classified as core and non-core clusters, based on productivity and frequency. However, some of the productive clusters, such as, [lm], [rm], [fr] and [ʃk] are put under the non-core cluster series, mainly for being less frequent or for occurring only in derived lexical items.

#### ***4.1.1.1 Core Clusters***

Core clusters refers to those consonant sequences showing high distribution in non-derived lexical items. They are identified by the general pattern sonorant-obstruent, in which obstruents are further defined by the feature [+voiced, -voiced]. This class of clusters mainly includes pre-nasalized obstruent clusters (NO) and Liquid-obstruent clusters (LO). These combinations can further be categorized as homorganic and non-homorganic clusters. Of the NO and LO sequences, the homorganic clusters are [nd, mb, mf, ŋg, ns, nt, rd, rt, ld], and the non-homorganic ones include [nk, rg, ntʃ, ndʒ, rdʒ]. Among the homorganic clusters, [nb] and [nf] undergo place assimilation before a labial consonant and show up as [mb] and [mf] sequences, respectively. More on homorganic consonant assimilation can be seen in (Chapter-5).

##### ***4.1.1.1.1 Sonorant-Voiced Obstruent***

This type of sequence comprises of all sonorants, except semi-vowels, as the first member of the cluster and voiced obstruents as a second member of the cluster. Examine the data in (Table-8) below:

Table 8 Distribution of sonorant -voiced obstruent consonant sequences

Consonant sequences	Lexeme	Gloss
Sonorant + voiced obstruent		
[nd]	àndā ʃùndā kùndā dūndūnā mìndā sàndā àsàndī dēndērā ʃìndādā* tílìndādā*	big star salt fog leg donkey yesterday clitoris broom bell
[nb]	ìnbá ánbāká gānbēdā ìnbāngā	cry, weep crevice leftover(food) uncle(mother's brother)
[ndʒ]	dʒēndʒā àndʒèrà āndʒìlā	Placenta knife shin
[ŋg]	āsāngā ʃòngòdā mōngólà	head smile crooked
[rd]	ārdā	intestine
[rg]	dʒìrgà dàrgà	malaria side
[rdʒ]	būrdʒá	horn(musical instrument)
[ld]	èldāūdè kòmaldà	nine last

#### 4.1.1.1.2 Sonorant-Voiceless Obstruent

In the same way, the clusters of this pattern have showed high distribution in Kunama. Among the first member sonorants indicated above, the liquid lateral /l/ and the velar nasal /ŋ/ are not found along with voiceless obstruents. For instance, in the [nk] cluster, the nasal consonant does not undergo place assimilation before the voiceless velar plosive while this [nk] cluster is frequent like the other pre-nasalized sequences. This

phenomenon seems fascinating from typological point of view, in cluster phonotactics. See the examples, in (Table-9):

Table 9 Distribution of Sonorant -voiceless obstruent consonant sequences

Consonant sequences	Lexeme	Gloss
Sonorant + voiceless obstruent		
[rt]	sārtá	string
[mf]	gòmʃōrā*	beard
[mt]	ʃīm tódā	twist
[nk]	ànkòràdā kónkè ʃònkòllà tēnkā túnkúfá ánkātā	medicine burn(v) hoe(n) flea highest point (of a mountain) lower (Adj)
[ntʃ]	mīntʃá kākūntʃērārā*	cut, decide spider
[nf]	īnfá ʃānfā fònfòrā ānfūrā	mucus(nasal) beeswax flute young (person)
[ns]	kònsàttè	eight
[nt]	kòntàllè āntānā íntā ùkùntèmà* āntórá kòntàbà:rè	six fly(n) see deaf bald seven

#### 4.1.1.2 Non-Core Clusters

Consonant sequences of the form sonorant-sonorant (SS), obstruent-sonorant (OS) and obstruent-obstruent (OO) are observed as minor clusters for their less distribution as well as for being results of post-lexical alterations. In the SS clusters, the first members are the liquids followed by the bilabial nasal. Of the SS clusters, [rm] is more frequent than [lm]. With regard to OO clusters, [ʃk] is analyzed in more instances than [fb], which is found in a single derived lexical item. Similarly, an instance of OS cluster [fr] is analyzed, as the only cluster made up of the voiceless labio-dental fricative, as first member, followed by the liquid /r/. The implication of the [fr] sequence might solve an

important problem in the syllabification of intervocalic singleton /r/ and will be discussed in a later section. See, (Table-10), below:

Table 10 Sequence of consonants with rare distribution

Consonant sequences	Lexeme	Gloss
<b>Sonorant + Sonorant</b>		
[lm]	ēlmāgā*	fruit
[rm]	ārmā àbārmā dārmā ōrmōjā	shield(n) second dusk, twilight tooth stick
<b>Obstruent + Sonorant</b>		
[fr]	āfrīngā	red pepper
<b>Obstruent + Obstruent</b>		
[k]	ājkāwā bàjkùllā ájkósūmā íjkùllā	rubbish army (be) spoiled, ruined bag
[fb]*	āīfbūrā*	drunk (n)

\* derived words

Generally, the type of consonants that often occur as first member of the clusters are sonorants followed often by obstruents, and rarely with another sonorant. Likewise, only a single word is found to show a cluster that have an obstruent as first member followed by a sonorant. Clusters with consonants of the same class, i.e. Sonorant-Sonorant and Obstruent-Obstruent, are possible but less frequent as compared to the clusters with first member sonorants followed by obstruents. Other consonant clusters are also found but in loan words, such as, [lf] in **ālfā** “thousand”. Besides, the consonants that are banned from making a cluster are /p/ and /h/. The present analysis of cluster phonotactics disregards the ambiguous case of the semi-vowels, /w, j/, which fluctuates in between part of a diphthong and part of CC clusters. Thus, the [jf] and [wr] sequences, as in **āīfā** ~ **ājfa** ‘traditional beer’, and in **àūrā** ~ **àwrā** ‘word’, are analyzed to be diphthongs.

#### 4.1.2 Morpheme Boundary Sequences

In post-lexical phonology, consonant and vowel sequences seemingly enjoy to occur across morpheme boundaries regardless of the constraints that operate on non-derived lexical items. Disallowed consonant sequences are formed following the deletion of the terminal vowel while unpermitted vowel sequences occur when a boundary pause is inserted to curb deletion of the terminal vowel. Such sequences are eminent during word formation processes, such as, NP formation, compounding and reduplication. Consider examples, in (1), below and occurring sequences are in bold:

- (1) a. /dātā/ ‘thing’ + /būbījā/ ‘every’ [dāt**b**ūbījā] ‘everything’  
 b. /ʃè:bè/ ‘ten’ + /sàttè/ ‘three’ [ʃè**bs**àttè] ‘thirty’  
 c. /ʃè:bè/ ‘ten’ + /ānā-lā/ ‘on the top of’+ /ella/ ‘one’ [ʃè**bn**àlà **ē**llā] ‘eleven’  
 d. /ʃè:bè/ ‘ten’ + /kònsàttè/ ‘eight’ = [ʃè**bk**ònsàttè] ‘eighty’  
 e. /kātā-kètā/ ‘fetus’ + /kè:là/ ‘guest’ [kāt**k**ètākèlā] ‘stranger (unknown person)’  
 f. /árántà/ ‘bed’+ /mindā/ + /jūndā/ [árán**tm**indjūndā] ‘north’  
 g. /ʃādāʃādā-mmū/ [ʃād**d**ʃādāmmū] ‘sometimes’  
 h. /fùlùfùlumā/ [fù**fl**ùmā] ‘smooth, amusing’  
 i. /fākàlà/ ‘yellow’ + /dàdà/ ‘bead’ [fākà**l**àdà] ‘yellow bead’

In (1a-i) above, disallowed sequences freely occur across morpheme boundaries, and some of these violate the most unmarked constraints, such as, the constraint on CCC sequences and on word-initial CC sequences. For example, in (1-f & -i), three consonant sequences are formed across the morpheme boundaries, these are, [ntm], [ndʃ] and [fld], respectively. In the former, though the [nt] and [nd] sequences are among the core clusters attested in single words, the constraint violation arises due to the addition of the third segment followed by a vocalic syncope. Similarly, another unmarked constraint is violated, in (1-h) above, where the [fl] sequence happens word-initially. In the same context, the [fl] sequence is formed at the boundary of the reduplicated noun base. In the

remaining outputs, obstruent-obstruent and obstruent-sonorant sequences are formed, and most of these sequences are not attested in single words. Along with these, a sequence of two vowels [ae] occurs, in (1c), where a slight pause is inserted to curb the deletion of the terminal vowel.

At the level of the lexical phonology, the palatal nasal consonant /ɲ/ is dismembered from the domain of cluster making consonants. Consequently, when /ɲ/ comes preceding another palatal consonant, in this case /tʃ/, it undergoes depalatalization, as in (2) below:

(2) /kàkùɲā tʃērārā/<sup>28</sup> [kākūntʃērərə] ‘spider’

/ɲ/ → [n] / \_\_\_\_ /tʃ/

In this specific context, thus, the constraint on the [ɲtʃ] sequence is not still violated. In contrast, the palatal nasal consonant comes before the alveolar fricative [ɲs], as analyzed in verbal conjugation shown, in (3), below:

(3) [kīf-óm-ā -nì-ɲ-sū-nā]

girl-DEF-SG-3SG-INTR-sleep-PR

“The girl sleeps”

The role of [ɲ] is unidentified and is considered as intrusive. In account to the free occurrence of disallowed sequences across morpheme boundaries, it is possible to suggest that constraints that fully operate on non-derived lexical items do not necessarily encode onto the post-lexical phonology. The strategies that may help to repair constraint violations will be discussed in a later section.

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<sup>28</sup> This word was elicited to be in its basic form but my analysis later seems to suggest that it is formed from two nominal bases. While /kàkùɲā/ ‘testicle’ is found in my data, I do not get the other one.

## 4.2 Syllable Structure

### 4.2.1 The Kunama Syllable and Points of Departure for Syllabification

Prior to diagnosing the Kunama syllable structure, it sounds logical to start with the very notion of a syllable in Kunama, in view of what others have defined a syllable. A single most agreed definition of a syllable is not found and it remains to create an unsettled debate among linguists. For instance, Kahn (1976), as cited in Zec (2007:162), defines a syllable as a prosodic unit “larger than the segment and smaller than the word”. The Kunama syllable, however, is not always larger than a segment as the language has a syllable containing a short vowel nucleus only. Thus, in the context of Kunama, a syllable can be defined as a phonological unit containing a sonority peak, i.e. often a vowel.

Concerning syllabification, similar controversies are found in the literature, and none of the syllabification principles has enjoyed cross-linguistic acceptance. For some languages, the SSP<sup>29</sup> works better than the MOP<sup>30</sup> while for others the vice-versa does work, and in some languages both principles may not clash. Hence, the most important thing in syllabification is the language specific constraints. Accordingly, the present study analyzes the syllable structure of Kunama based on the phonotactics of the language and the specific constraints therein. Later, the wellformedness of the present syllabification will be evaluated in accordance with other general syllabification principles. In the following paragraphs, the Kunama phonotactics and its constraints are summarized to make clear the points of departure for the present syllabification.

All consonant phonemes occur in word-initial and -medial positions, except the alveolar liquid /r/ that never begins a word, in Kunama. All consonants have geminate counter parts, except /dʒ, r, ŋ/ and /h/, and germination is phonemic. All Vowels can occur in all word positions, but citation forms end in the singular suffix vowel [a]. Vowel length is phonemic and length contrast is neutralized word-finally. Besides, all words end in a vowel, and the language has a single word that has only one vowel.

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<sup>29</sup> Sonority Sequencing Principle

<sup>30</sup> Maximum Onset Principle

Kunama has a range of core and non-core clusters of two consonants, but consonant clusters are word-medial only, i.e. word-initial CC is marked. By the same constraint, geminates are also word-medial only, and thus CC sequences indicate a syllable boundary. The cluster formation in this language, therefore, follows a coda-onset pattern. Three consonant sequences (CCC) are totally constrained in non-derived lexical items, but these could happen across morpheme boundaries. Such constraint violations necessitate re-syllabification.

Sequences of two vowels are commonly analyzed in single words so that they are analyzed as diphthongs, [au, ai, ia and oi]. All diphthongs occur only in word-initial and -medial positions, except in monosyllabic words, such as, **biā** ‘water’ and **wiá** ‘day’. The same restriction seemingly encodes on phrase-final vowel sequences, which often are separated via glide formation (see in the next chapter). Other sequences of vowels, such as, [ae], occur across morpheme boundaries if boundary pause is inserted. Kunama shows potential sequences of three vowels in single words, mainly for word-medial glides. In derived contexts, however, morpheme boundary sequences of three vowels are shown to be curbed by glide formation.

#### **4.2.2 Internal Structure of a Syllable**

The internal structure of Kunama syllable has onset, nucleus and coda. The constituents can further be specified in terms of obligatoriness and optionality as well as by the number of segments permitted in each constituent. The status of each constituent is discussed in the successive paragraphs.

In view of word-initial vowels, the Kunama syllable has an optional onset. And by the constraint that bans more than one consonant in word-initial position, the onset slot is maximally filled by a single consonant. The constraint on initial complex onset is supposed to operate equally on word-medial syllables so that consonant clusters and geminates are heterosyllabic. In view of the prominence of gemination, geminated consonants are counted as two consonants.

The nucleus is obligatory and can be filled by short and long vowels as well as diphthongs. The potential triphthongs are not considered for now. A Syllabic liquid consonant is analyzed following post-lexical alterations and will be discussed in a later section.

All words in Kunama end in a vowel so that coda is optional, and by virtue of this, we do not expect a complex coda, i.e. more than one consonant coda.

In account to the status of the syllable constituents, the syllabification of Kunama starts at the nucleus and goes to the margins. However, the Kunama phonotactics does not state the preference of onset to coda or the vice-versa. Consequently, its basic syllable structure template is (C) V (C) that gives four main syllable shapes, these are, V, CV, VC and CVC. Kunama syllable can be a vowel only, a vowel preceded or followed by one consonant and a vowel plus one of the optional constituents. The constituents that immediately branches from the syllable node are the onset and rhyme. The onset does not have branching skeletons or segments; whereas, the rhyme has branching constituents, i.e., the nucleus and coda though the latter is absent in word-final syllables. The coda does not have branching skeletons or segments while the nucleus can have branching segments as the language has phonemic long vowels and diphthongs. Accordingly, the onset and rhyme are head constituents immediate to the syllable while the nucleus and coda are sub-heads of the syllable and are immediate constituents of the rhyme. Phonological weight based syllabification is relevant to the Kunama syllable and will be detailed in the forthcoming section.

#### **4.2.3 Syllable Structure Typology**

Syllables of a language, in the linguistic literature, are traditionally classified as open and closed; whereas, the more recent and most agreed parameter used to define syllable typology is Weight (Katamba, 1989). On the other hand, the weight measurement criteria differ across languages and among linguists. Syllable weight correlates to the rhyme, i.e. either to the quantity of the nucleus or presence of coda though the latter does not matter in some languages. For some languages, Zec (2007), the number of segments permitted in the onset and coda further reproduces syllable typology. Thus, while some languages

allow more than one consonant in either of the margins, others do not. Kunama is among those languages with restricted syllable margins.

The first parameter used to classify Kunama syllable is the presence and absence of coda; open syllables are with no coda while closed syllables have codas. Accordingly, Kunama has both open and closed types of syllables, of which the first predominates in frequency while the latter suffers from positional restriction. To this end, open syllables are common in all word positions and are the only syllable types in word-final position; whereas, closed syllables are analyzed only in non-final word positions. Seeming exceptions to word-final closed syllables can be found, e.g. /**dìngūl**/ ‘prophet’, rarely. However, the constraint on word-final consonants is violated by the liquid consonant, which is sonorous so that it can also be counted as part of the vocalic nucleus.

The second and most important parameter used to produce a typological distinction in Kunama syllable structure is syllable weight though the weight measurement criteria are language dependent. As to Davenport and Hannahs (2005:81), the obvious way determining syllable weight is the quantity of the mora in the rhyme constituents. Syllables with only a short vowel in the rhyme are light, whereas, those consisting of long vowels, diphthongs or those with codas are heavy (Ibid). Hyman (1984 and 1985) first introduced the concept of syllable weight specification by the mora count of a syllable via the phonological weight or the moraic theory. Actually, the correlation between mora and syllable weight is a well-founded step in the linguistic literature. For instance, among the later proponents of the moraic theory, Hayes (1989), as cited in Ouden (1995:22), explains,

*The mora is a unit expressing phonological weight. One mora makes a phonologically light syllable and more moras make a heavy syllable. In languages with contrastive vowel length, long vowels are assigned two moras and short vowels one mora. These moras are dominated by the syllable node. In Hayes' words: "...certain sonorous segments [are selected], on a language-specific basis, for domination by a syllable node." Next, the onset consonants are bound to this syllable node. Onsets have no influence on syllable weight and are therefore not attached to moras, but directly to the syllable node. Coda consonants are bound to the preceding mora. Syllable weight based on structure differs language-specifically, which leads to the claim of Moraic Phonologists that moraic structure of languages can vary. For example, in languages like English and Latin, closed syllables (CVC) count as heavy, whereas in others, like Lardil, CVC counts as a light syllable. Hayes posits a Weight by Position Rule that is present in some languages (English, Latin, Dutch), but not in all. In languages where the rule works, codas are assigned moras 'of themselves'. In other languages, they are the daughters of preceding moras.*

In account to the tenets of the moraic theory, a mora is a minimal phonological unit of length on the rhyme, which is commonly referred as “timing tier”.

Kunama has phonemic length of vowels and consonants, and it owes diphthongs and moraic consonants that add to the weight of a syllable; the mora is analyzed to be the tone-bearing unit (TBU) in Kunama (see in Chapter-6). Thus, the quantity of the mora on the rhyme units is used to specify light and heavy syllables of Kunama. Syllables having long vowels, diphthongs or short vowels with a sonorant coda are classified as heavy so that they are bi-moraic. Syllables with a short vowel or a short vowel with a non-sonorant coda are light so that are mono-moraic. The presence of coda does not necessarily make a heavy syllable in Kunama though this is claimed after the analysis of contour tone licensing ability of a syllable. Contour tones have not been analyzed on closed syllables having a short vowel and a non-sonorant coda. Obstruent geminates and obstruent-sonorant clusters create such syllables. The non-sonorant codas, instead, carry the continuation of the pitch height surfacing on the preceding vowels. Similarly, sonorant codas have also been analyzed to carry the same pitch height surfacing on the preceding vowel. In other instances, however, sonorant codas have borne a pitch height different from the nucleus. In such cases, the mora-to-segment alignment operates in a one-to-one fashion, and the rhyme constituents are linked to independent moras. The non-sonorant codas, whereas, will become daughter nodes of the preceding vowel mora. This claim seemingly collides to the very definition of the mora, and if mora is related to a phonological unit of length, non-sonorant codas can be moraic so that all closed

syllables of Kunama will become heavy (bi-moraic). Based on the analysis of contour tone phenomena, however, the present study proposes that a consonantal mora might also be related to other underlying qualities of consonants. This remains to be an issue of future research.

Coming to syllable classification, Kunama heavy syllables are bi-moraic and its light syllables are monomoraic. Tri-moraic syllables do exist but in fewer words; such syllables can be referred as super-heavy. Overall, the following four types of syllables are proposed:

- Light-open
- Heavy-open
- Light-closed
- Heavy-closed

#### ***4.2.3.1 Open Syllables***

Open syllables exhibit a predominant distribution while they are further classified as light-open and heavy-open depending on the number of moras in the nucleus, as explained in the following sections.

##### ***4.2.3.1.1 Light-open Syllables***

Light-open syllables have a short vowel nucleus and an optional onset. They take V and CV skeletons. The CV syllable is unmarked while the V pattern is often restricted to word-initial position. Consider the following syllabified examples, in (Table-11), syllable boundaries are indicated by a period (.), and target syllables are bolded:

Table 11 Distribution of light-open Syllables

Syllable Structure	Examples	Syllable Structure	Examples
V	é ‘yes’	V-CV-CV	à.bì.nā ‘elephant’ ē.mē.lā ‘rubber’ ē.lā.gā ‘seed’ ù.kù.nā ‘ear’ ā.kū.lā ‘armpit’ ī.kī.mā ‘fingernail’ á.gā.lā ‘skin’ ù.sù.lā ‘law’
CV	là ‘transplant’ sā ‘giving’ táˀ ‘slaughter(animal)’ tʃā ‘die’ bá.dáˀ ‘thigh’ là.fā ‘maize’ kò.là ‘preventing’ tí.kā ‘to hear’	CV.CV.CV	sò.lò.bà ‘bride/bridegroom’ gà.bà.là ‘monkey’ dà.rà.sà ‘giraffe’ kā.fò.gà ‘dress(n)’ kō.kō.ŋā ‘egg’ kō.kō.bā ‘blood’ dū.rū.fā ‘fat’ bō.bō.nā ‘nose’

#### 4.2.3.1.2 Heavy-open Syllables

The heavy-open syllables take V:, VV, CV: and CVV shapes. They are non-final syllables, except in a few monosyllabic CVV words. See (Table-12) below:

Table 12 Distribution of heavy-open syllables

Syllable Structure	Examples	Syllable Structure	Examples
CVV	bīā ‘water’ wīá ‘day’	CVV-	<b>kāù.kā</b> ‘crow’ <b>nāù.dā</b> ‘carry’ <b>bāu.dā</b> ‘bark’ (of a dog)’ <b>kāí.lá</b> ‘parrot’ <b>fāì.dá</b> ‘polish’
CV: -	bī̄.bá ‘red’ bū̄.rā ‘spotty (color of an ox)’ fū̄.tā ‘lung’ fù̄.nà ‘crocodile’ gì̄.rā ‘horn’ gā̄.lá ‘bellows’	VV-	āī̄.nō.mà ‘hippopotamus’ áī̄.lē.wā ‘moth’ ōī̄.kè.dā ‘open’
		V: -	ǔ̄.lá ‘wild edible root’ ĩ̄.já̄ ‘outside’

As can be learned from, (Table-9), above, word-final heavy open syllables of -CVV shape are not found in single lexical items, except for the monosyllabic CVV words. Likewise, this is not found even in the post-lexical phonology. Thomson (1983:290), however, has analyzed phrase final CVV in noun inflection, **dedoa** ‘the/that child’. In the present study, the same definite noun shows a different pattern, as in (3):

(4) /dèd-à/ ‘child’+ /wám-ā/ DEF                      [dè.dò.mā] ‘the child’.

The terminal vowel undergoes rounding assimilation before the labial glide while the initial syllable vowel of the definite marker is elided. Thus, the expected medial CVV in the out surface is not formed. The difference with that of Thomson might be attributed to dialectal variation.

#### *4.2.3.2 Closed Syllables*

In the conventional sense, closed syllables are designated as heavy, merely for having coda/s. However, in some languages, this does not necessarily make a syllable heavy (Katamba, 1989). Accordingly, Kunama closed syllables are further specified as light closed and as heavy closed. Keeping VC or CVC template shapes for both, they differ by the quality of consonants in the coda. In terms of distribution, closed syllables are restricted to non-final word positions as Kunama words end in vowels; consequently, closed syllables are found in the context of geminates and consonant clusters that are intervocalic only.

##### *4.2.3.2.1 Light-closed Syllables*

A (C) VC template characterizes light closed syllables where the optional onset slot does not matter whether it is filled by a sonorant or a non-sonorant consonant, in the view that makes onset out of the weight specification criteria. Accordingly, these syllables will have one mora in the nucleus but the coda consonants share the vowel's mora nodes as least/non-sonorous consonants are assumed non-moraic. While the VC pattern is restricted only to word-initial position, the CVC is common both in word-initial and -medial positions. See (Table-13) below:

Table 13 Distribution of light-closed syllables

Syllable Structure	Examples	Syllable Structure	Examples
CVC-	<b>dūf.fā</b> ‘leaf’ <b>mèt.tā</b> ‘dull’ <b>sèg.gà</b> ‘left(direction)’ <b>bàf.kùl.là</b> ‘army’	-CVC-	kòn.sàt.tè ‘eight’
VC-	<b>āf.rīŋ.gā</b> ‘red pepper’ <b>ùf.fā</b> ‘heart’ <b>ád.dá</b> ‘wild area’ <b>ék.ké.ná</b> ‘first’ <b>āf.kà.wà</b> ‘rubbish’ <b>áf.kó.sū.mā</b> ‘ruined’ <b>íf.kúl.lá</b> ‘bag’	-VC-	?

#### 4.2.3.2.2 Heavy-closed Syllables

The heavy-closed syllables takes the same syllable structure template (C)VC as the light closed syllables, but the closed-heavy syllables demand a sonorant coda. Even though, a long vowel or a diphthong is the essential quality of heavy syllables, in general, the heavy closed syllables necessarily require a coda to fulfill the typological specification of closeness. On the other hand, fewer words are analyzed for a super-heavy VVC-syllable having a diphthongal nucleus and a coda. Such syllables can be considered as tri-moraic depending on the type of consonant in the coda. See, in (Table-14), below:

Table 14 Distribution of heavy-closed syllables

Syllable Structure	Examples	Syllable Structure	Examples
CVC-	<p>sà<b>n</b>.dà ‘donkey’</p> <p>ǰù<b>n</b>.dā ‘star’</p> <p>kù<b>n</b>.dā ‘salt’</p> <p>mī<b>n</b>.dā ‘leg’</p> <p>dū<b>n</b>.dū.nā ‘fog’</p> <p>gò<b>m</b>.ǰō.rā ‘beard’</p> <p>kò<b>n</b>.tāl.lè ‘six’</p> <p>sú<b>ŋ</b>gōdā ‘movement’</p> <p>tá<b>l</b>.là ‘rock’</p>	-CVC-	<p>mù.<b>tùŋ</b>.gù.lā ‘trunk’</p> <p>à.<b>bàr</b>.mà ‘second’</p> <p>dà.<b>bàn</b>.dā ‘big lake’</p> <p>āf.<b>rīŋ</b>.gā ‘red pepper’</p> <p>kò<b>n</b>.tāl.lè ‘six’</p> <p>ā.<b>sāŋ</b>.gā ‘head’</p> <p>tí.<b>rīŋ</b>.gā ‘partridge’</p>
VC-	<p>ē<b>l</b>.mā.gā ‘fruit’</p> <p>à<b>n</b>.dzè.rà ‘knife’</p> <p>ā<b>n</b>.tā.nā ‘fly(n)’</p> <p>ì<b>ŋ</b>.gí.dáˀ ‘detour’</p> <p>ā<b>n</b>.tó.rá ‘bald’</p> <p>ā<b>n</b>.fū.rá ‘young(man)’</p> <p>è<b>l</b>.dàu.dè ‘nine’</p> <p>à<b>n</b>.dā ‘big’</p> <p>ā<b>r</b>.dā ‘intestine’</p> <p>ǰ<b>n</b>.tà ‘see’</p> <p>ā<b>n</b>.nā ‘God’</p> <p>í<b>w</b>.wā ‘father’</p>	-VC-	?
VVC-	<p>ā<b>ūŋ</b>.gáˀ ‘hyena’</p> <p>à<b>ùg</b>.gā ‘cat’</p>		

As can be seen from (Table-13 and -14), the VC syllable is not found word-medially. Thomson (1983:291) has indicated the same distributional restriction of the VC syllable. The CVC pattern is common in word-initial and -medial positions but is highly marked word-finally. The commonest phonological environment for Kunama closed syllables are intervocalic geminates and consonant clusters.

Against the markedness of word-initial consonant cluster, Thomson (1983:291) has mentioned seeming exceptions to CCV-, such as, **kwa** ‘a man’. The same word, in the present study, is interpreted as a [k<sup>w</sup>ā]~[kòā]~[kùā] ‘man’, where the labial glide is realized as post-velar and sometimes glides to the high back round vowels, thereby making part of a vowel sequence. Therefore, this monosyllabic word shows either CV or CVV so that the variation can be dialectal.

Typologically speaking, Kunama phonotactics prefers open syllables to closed syllables so that closed syllables in general are more marked than open syllables. Among the open syllable shapes, CV is unmarked while V, V: , VV, CV: and CVV are marked word-finally. Word-medial restriction also applies on some of these, for instance, V, V: and VV are marked in word-internal environment. Kunama closed syllables are CVC and VC, of which the former is marked in word-final position while the latter is additionally marked in word-medial position. The constraint on word-final consonants, therefore, can be referred as ‘NOCODA’<sup>31</sup> constraint because it invariably avoids a closed CVC. By the same constraint, the Kunama loanword adaptation process forces borrowed terms satisfy the nocoda constraint on final syllables and applies word-final epenthesis strategy or sometimes deletes the final consonant.

#### 4.2.4 Syllabification Tree Models

The linguistic literature commonly recites two general syllabification trends, these are, linear and non-linear approaches. While the linear approach directly links the syllable node to the constituent segments (vowels and consonants), the non-linear approach proposes branching hierarchical structure, in which, different levels in a syllable are

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<sup>31</sup> There is a constraint called **NOCODA**, prohibiting closed syllables, which outranks any other relevant constraint, i.e. it is **undominated** (Parker, 2015:176).

linked to each other. The present study goes for the non-linear phonology and uses two models to represent the syllable structure typology of Kunama, these are, the multi-tiered hierarchical branching model and the moraic theory syllabification model. While the former is used to show the conventional way of representing syllable structure, the latter is used to represent the weight-related typology of the Kunama syllable structure. Both ways are believed to be relevant to represent the Kunama syllable structure typology.

### **The Multi-Tiered Phonological Theory Model**

The branching hierarchical structure is developed into a new version that works in the realm of Multi-tiered Phonological theory (Katamba, 1989). The new version, in phonological representations, claims a number of independent levels linked to each other. To this end, a syllable structure will be represented by associating the syllable tier, the immediate and non-immediate constituent tiers, the skeletal tier and the segmental tier hierarchically.

It is the one that commonly used by phonologists in recent days (Katamba, 1989:153). Accordingly, five independent tiers, namely, the syllable, head constituent (onset and rhyme), sub-head constituent (nucleus and coda), CV (skeletal) and segmental tiers are represented and linked to each other in hierarchical branching fashion. The notations used are:

$\sigma$  = Syllable O=onset N=nucleus Co=coda R=rhyme V=vowel C=consonant G=glide  
S=sonorant consonant, a colon (:) =long vowel, VV=diphthong

It has to be noted that the syllable template representation given below, in (Figure-19), does not imply that Kunama is a templatic language. The weight-related syllable structure typology needs a different representation and will be treated in the forthcoming section.

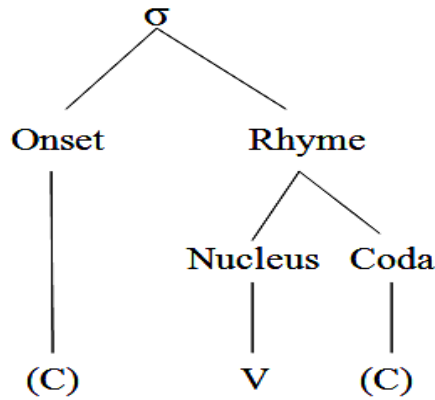
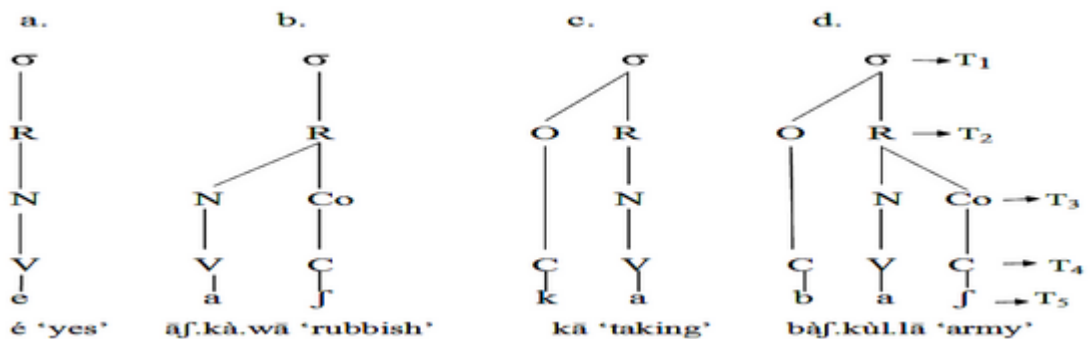


Figure 19 Multi-tiered hierarchical representation of Kunama basic syllable structure template

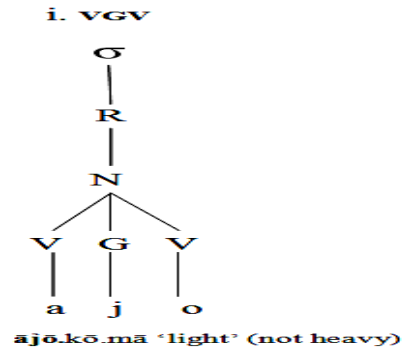
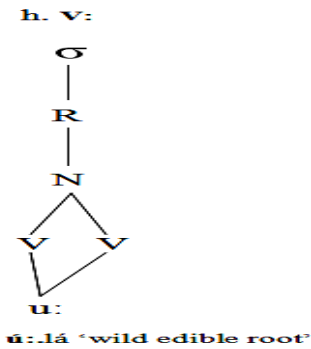
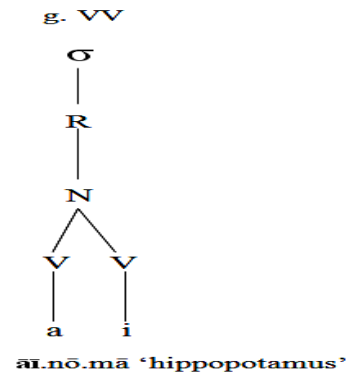
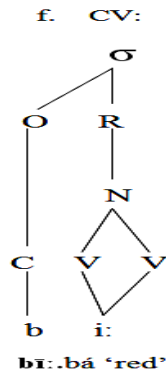
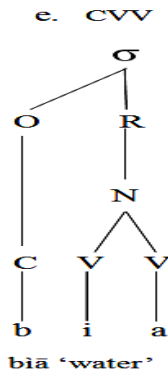
In the following trees, in (5), V, VC, CV and CVC syllables are represented. Among the four syllable shapes, a nucleus only syllable, as in (5-a), is analyzed in the only occurring monosyllabic word and initial of polysyllabic words.

(5)



In (5-a) above, all tiers are hierarchically linked and none of them has branching constituents as the syllable is made of one vowel; this is found to be the only occurring monosyllabic V word. Whereas, in (5-c), the syllable node has branching heads, onset and rhyme, and each head is connected to one segment. In (5-b), the syllable node is directly linked to one head, i.e. the rhyme, and again the rhyme branches to the nucleus and coda (sub-heads) that are filled by one segment each. All of the above tree diagrams represent light syllables. On the contrary, representing heavy syllables by the same model may not be as simple as this one. For instance, consider the representation of V:, VV and VGV syllables, in (6), below:

(6)



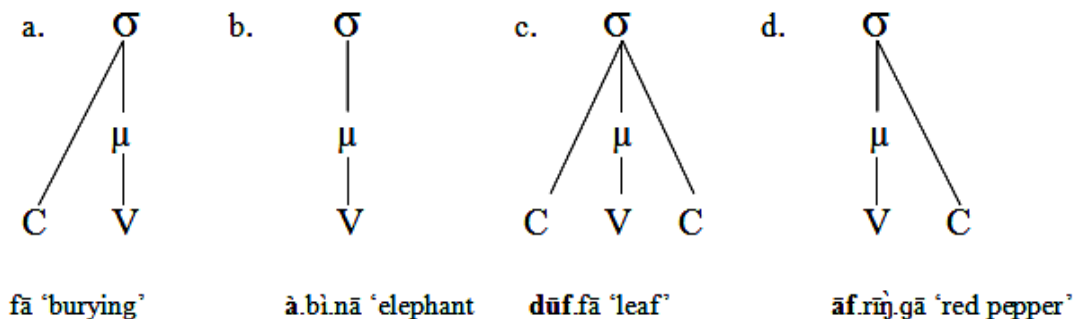
The hierarchical syllabification model represents only the number of segments in the head and sub-head constituents so that it does not necessarily show how heavy or light a syllable is. In effect, by looking at the tree diagrams above, in (6), we may judge the syllables as light because they do not have codas. In Kunama, however, a syllable weighs more or less based on the quantity of the mora therein, so the moraic syllabification model better represent heavy syllables. The moraic theory model directly links syllable nodes to weight units, i.e. the moras, as discussed in the following paragraph.

## The Moraic Theory Model

Hyman (1985), as cited in Katamba (1989:155), contends that weight units embedded in segments are determinant to represent a syllable structure. These units are moras that have to be linked directly to the syllable node.

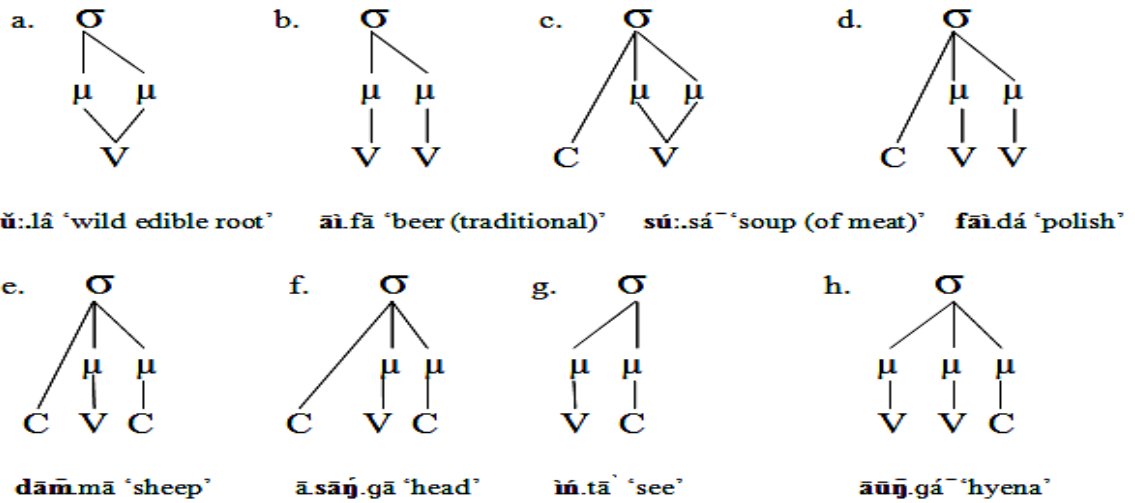
The structure trees in (7) represent light syllables that are mono-moraic. Light syllables have either a short vowel only or a short vowel closed by a non-sonorant coda; note that onset has no place in syllable weight specification. Accordingly, the structure trees in (7-a & -b) represent light-open syllables; whereas, the structure trees, in (7-c & -d), represent light closed syllables. Thus, only sonorant codas are linked to the vowel mora node or to an independent mora of their own, depending on the pitch height surfacing on the nucleus and the coda.

(7) Light Syllables (target syllables are in boldface)



Similarly, heavy syllables as in (8a-g) below can be identified into different shapes in accordance with weight, i.e. the number of moras in a syllable. While the heavy open syllables, in (8a-d), show two overt moras associated either to a long vowel or to a diphthong, the heavy closed syllables have two overt moras aligned to the vowel and the sonorant coda. Therefore, sonorant codas are aligned to an independent mora. The representation given in (8-h) is a super-heavy syllable having two moras in the nucleus and one mora in the coda so that the syllable becomes tri-moraic.

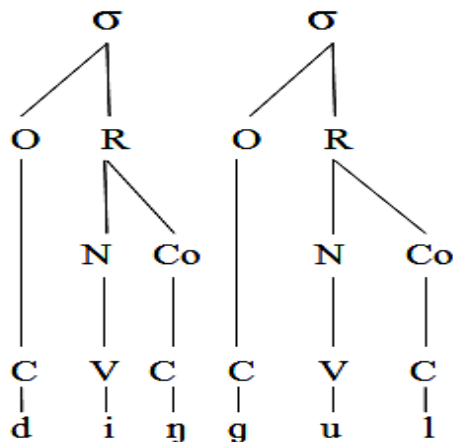
(8) Heavy Syllables (target syllables are in boldface)



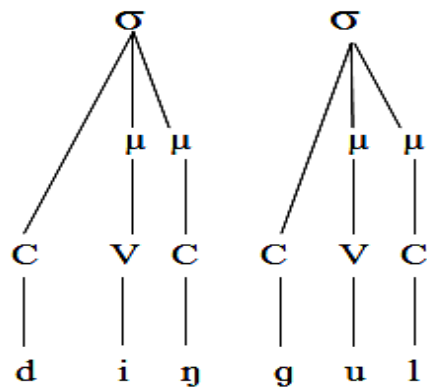
In the following (9), consider the syllabification of **dĩngūl** 'prophet', which exceptionally shows final CVC syllable, via the two syllabification models. Word-final closed syllables are highly constrained in Kunama, but this word shows a sequence of two heavy-closed syllables,  $CVC_1C_2VC$ . The coda slot of the final CVC is occupied by the lateral liquid /l/. As a result, the final syllable template could rather be CVL instead of CVC (L stands for the lateral liquid).

(9)  $CVC_1C_2VL$

a. Branching Hierarchy Multi-Tiered Model



b. Moraic Theory Model



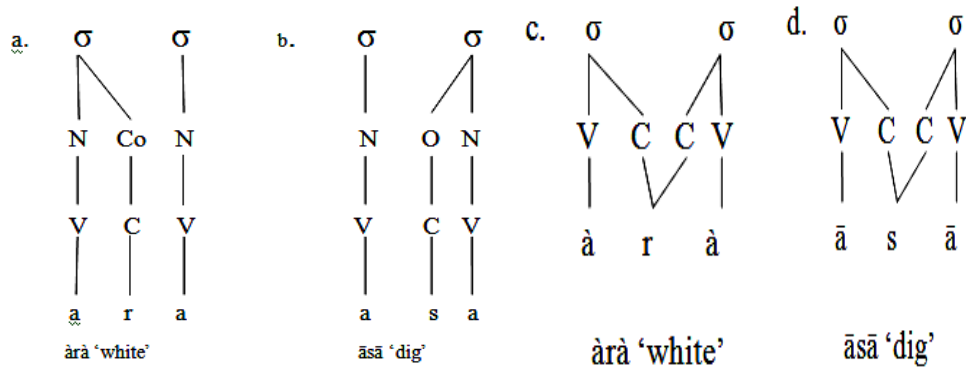
#### 4.2.5 The Case of Intervocalic Singleton Consonants in Kunama

This section is designed to solve an important syllabification problem, which the Kunama phonotactics could not justify fully. The problem mainly looks into the syllabification of intervocalic singleton consonants in VCV words of Kunama. Onset and coda are optional constituents and complex onset and codas are severely constrained. Nonetheless, in the case of intervocalic singleton consonants, in VCV words, both margins are equally legitimate to get the consonant. The only justifiable means offered by the Kunama phonotactics is that onset wins over coda because the CV syllable is unmarked in the language. If so, why the scenario of intervocalic singleton consonants necessitates further explanation in the present analysis? This is because of the constraint on word-initial /r/. In Kunama, the alveo-lateral liquid /r/ never begins a word, and this implies that this consonant cannot be a syllable onset. This invokes the researcher to check if the same constraint encodes onto word internal /r/ and prevents from being an onset to word-medial syllables. In effect, three proposals are suggested within the phonotactics and other syllabification principles to find out the single most way of syllabification for intervocalic singleton consonants of Kunama.

The first proposal brings the notion of ‘Ambisyllabicity’ and checks if it can resolve the contradiction between the constraint on word-initial /r/ and the MOP. The Onset First Principle, Kahn (1976, Clements and Keyser (1983), as cited in Katamba (1989:161), parses intervocalic singleton consonants, in VCV sequences, as onset of the final syllable instead of as coda of the initial syllable. The Onset First Principle is later developed into the maximum onset principle (MOP) and is used to parse intervocalic singleton consonants as syllable onsets. In contrast, the Kunama phonotactics does not allow /r/ as word-initial syllables onset so that ambisyllabification of /r/ can intervene to calm the clash of the MOP and this constraint. Otherwise, we will have two different syllabifications for intervocalic singleton consonants in VCV sequences. The first is the syllabification of /r/ as coda of the penult syllable (VC.V), and the second way parses other medial singleton consonants as onset to the final syllable (V. CV). Nonetheless, the permissibility of applying two different syllabifications for the same VCV words is

questionable. On this view, while the syllabifications in (10-a &-b) are rejected, the ambisyllabification of singletons, in (10-c &-d), will be accepted.

(10)

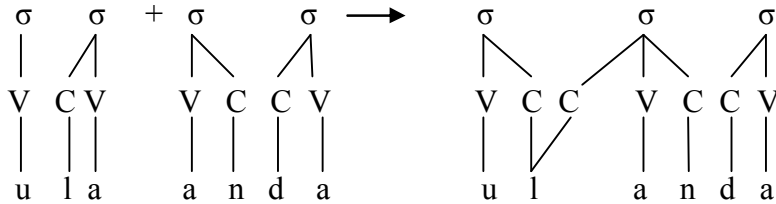


The second proposal favors the syllabification of intervocalic singleton consonants as coda of the penultimate syllable, but it presumes that the terminal vowel is not part of the underlying structure. Since this hypothesis predicts the deletion of the terminal vowel [a] by the post-lexical rule, it jeopardizes the permissibility of the core syllabification task as a whole. If so, all VCV words will become monosyllabic VC, and to the worst, all words in the language will be consonant endings.

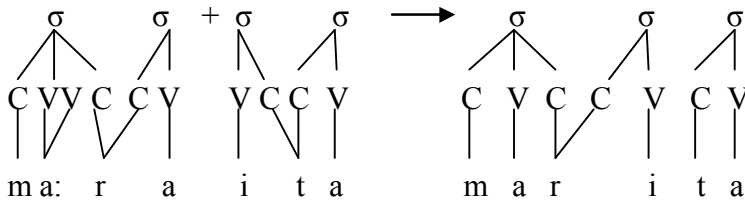
On the other hand, this assumption does not seem valid in two ways. Firstly, since the terminal vowel is deleted only across morpheme boundaries, in the right-edge inputs it remains part of the re-syllabification process. Secondly, the terminal vowel will not be deleted in the presence of boundary pause, so it is difficult to assume it as extra-syllabic. The re-syllabification process often repairs constraint violations caused by the deletion of the terminal vowel. It re-aligns survivor segments across morpheme boundaries to the empty positions of a syllable. For instance, either the intervocalic singleton consonants will get a new vowel nucleus or they will shift to the coda position of the preceding syllable. In some cases, the re-syllabification maintains these consonants as coda as they were at the level of core syllabification.

However, there are instances where post-lexical constraint violations may not be fully amended only by the re-syllabification process, and this will be discussed later. In account to these gaps, the proposal under discussion is no longer accepted. Consider the following re-syllabifications, in (11&12), that may give a room for ambisyllabic consonants. For simplicity, only three tiers, the syllable, the skeletal (CV), and the segmental tiers are represented.

(11) /ùlà/ ‘body’ + /àndā/ ‘big’ → [ùlāndā] ‘obese’

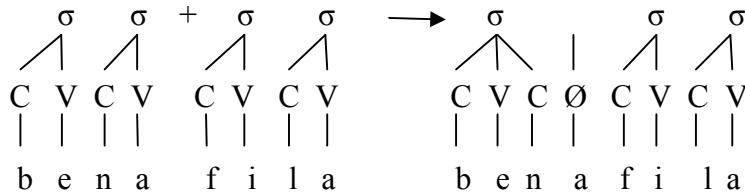


(12) /má:rá/ ‘bile’ + /ítā/ ‘house’ → [má rí tã] ‘gallbladder’



In the derivation of the noun phrase above, in (11), the terminal vowel is deleted at the morphemes boundary, but the liquid onset of the first input final syllable can possibly be ambisyllabic by the re-syllabification process. It can be onset of the output medial syllable as the empty nuclear slot is re-filled by the initial vowel of the second input through re-syllabification of the surface output. It can also be coda of the initial syllable of the output. In contrast, if the second input is consonant beginning, the same onset consonant instead shifts to the coda position of the preceding syllable. Thus, ambisyllabicity is dependent up on the initial segment of the second input (right) so that it will not be a way out to get the best syllabified output in Kunama. Consider, in (13), below:

(13) /bénā/ ‘upper arm’ + /filā/ ‘swelling’ → [bénfī lā] ‘muscle’

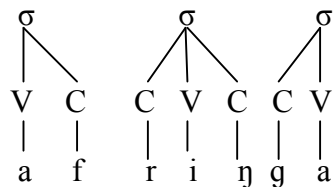


In (13) above, the final syllable onset of the first input (left) shifts to the coda position of the initial syllable of the output because the terminal vowel deletion remains uncompensated; the second input is consonant initial.

The third proposal brings two workable arguments within the Kunama cluster phonotactics and speaker’s insertion of pause between syllables of a word. Based on these arguments, the ambisyllabification proposal can be rejected as irrelevant to Kunama. The first argument learns that native speakers sometimes insert a syllable pause that aligns the /r/ as onset of the final syllable, for example, **mā:rá** ‘bile’ is pronounced with a pause inserted before the /r/ so that the word-initial constraint on /r/ may not be encoded onto word-internal syllable onset.

The second and more valid counter argument to ambisyllabicity arises from the syllabification of /r/ as a medial syllable onset. When /r/ occurs as second member of a cluster, as in /āfrīŋgā/ ‘red pepper’, it becomes onset of the medial CVC syllable. By the constraint that bans word-initial cluster and word-final consonant, Kunama clusters are hetro-syllabic so that in the [fr] cluster, the /r/ definitely becomes the onset of the penultimate syllable as represented, in (14), below:

(14) /āfrīŋgā/ ‘red pepper’



This scenario implies that the constraint on word-initial /r/ does not prevent it from being onset of word-medial syllables. Besides, the syllabification of /r/ as onset of the penult syllable obeys the SSP. Because /r/ is more sonorous than /f/, it should not be behind the voiceless obstruent if both segments are aligned to the coda of the antepenultimate syllable. Besides, if both consonants are syllabified as onset of the penult syllable, it again obeys the SSP but violates the phonotactic constraint that bans more than one consonant onset. The phonotactic constraints of Kunama override other syllabification principles.

Generally, word-initial constraint on single segments does not diametrically encode onto word-internal environment so that the ambisyllabification proposal is eventually rejected as irrelevant to Kunama. Instead, the onset first principle matches to the working scenario in Kunama. As a result, the present study parses intervocalic singleton consonants as syllable onsets in the core syllabification whatever they may shift to a coda position during the re-syllabification process.

#### **4.2.6 Wellformedness of Cluster Syllabification in view of the MOP and SSP**

In this section, the so far account on the syllabification of Kunama consonant clusters is reviewed via the MOP and the SSP. This is done with the assumption of exploring the extent to which the phonotactic constraints of Kunama comply with the basic tenets of the syllabification principles, and thereby to see if there is clash of principles. In so doing, the Kunama cluster phonotactic constraints will not be compromised but are kept dominant over any of the syllabification principles.

The MOP, Kahn (1976), Clements and Keyser (1983) as cited in Katamba (1989:161), propagates the onset first principle on the fact that the CV syllable structure is the least marked cross-linguistically. Thus, the MOP favors the maximum possible consonants to the onset position. Accordingly, in VC<sub>1</sub>C<sub>2</sub>V and CVC<sub>1</sub>C<sub>2</sub>V sequences, the MOP operation goes for V.C<sub>1</sub>C<sub>2</sub>V instead of for VC<sub>1</sub>.C<sub>2</sub>V if the language permits word-initial CC. Nonetheless, as Kunama disallows word-initial cluster or more than one consonant initially, complex onsets are severely marked. Thus, Kunama clusters and geminates are

heterosyllabic and become wellformed as VC<sub>1</sub>.C<sub>2</sub>V and CVC<sub>1</sub>.C<sub>1</sub>V, which make the MOP irrelevant in this case.

In the same way, what will happen if the same sequences are syllabified as VC<sub>1</sub>C<sub>2</sub>.V and CVC<sub>1</sub>C<sub>2</sub>.V in view of the maximum coda principle? Firstly, this way directly contradicts to the MOP that favors the maximum possible number of consonants in the onset. Secondly and most importantly, word-final consonants are severely constrained in Kunama so that complex coda is unlikely to happen elsewhere. This again goes along with the optional status of syllable margins in Kunama, and in turn, strengthens the claim that Kunama clusters and geminates are heterosyllabic.

On the other hand, the Kunama cluster phonotactics seemingly complies with the sonority sequencing principle (henceforth SSP), particularly with the formation of sonorant-obstruent clusters. The concept of sonority as well as the sonority measurement criteria have not yet earned consensus among phoneticians. Among a range of views on the phonetic correlate of sonority, the most recent definition given by Ladefoged and Johnson (2011:245) would clarify this concept:

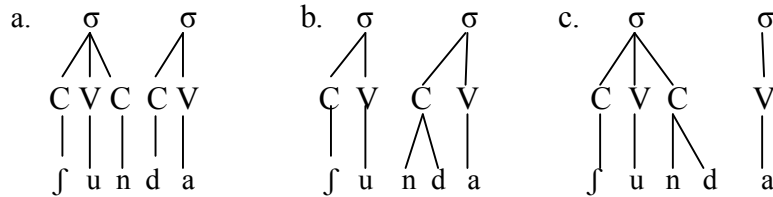
*The Sonority of a sound is its loudness relative to that of other sounds with the same length, stress, and pitch. Besides, the acoustic intensity or “the amount of acoustic energy present” in a sound determines its loudness, which then refers to openness and voicing as well.*

Disregarding the controversies over the issue of correlation, the most agreed point is that vowels are the highest in sonority. And the sonority hierarchy of the core classes of consonants earns relative consensus. Whereas, most unsettled is the sonority hierarchy of sub-classes of consonants, such as, related to the feature [voicing]. The argument over the presence of language specific variations (or otherwise) is not yet settled (Clements, 1990). Following Clements (1990:292), the sonority hierarchy of the core classes is represented as follows: (< stands for less than)

*Obstruents < nasals < liquids < glides < vowels*

Accordingly, in what follows, the possible parsing of Kunama clusters and geminates will be shown via the syllabification trees below, in (15) and (16), respectively:

(15) Comparing the possible division of NC clusters as in /ʃündā/ ‘star’:

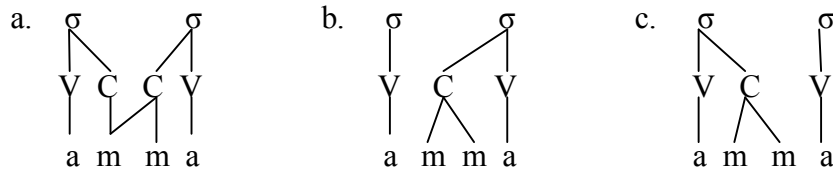


The syllabification in (15-a) conforms to the phonotactic constraint of Kunama and to the SSP but is MOP compliant. In view of the maximum onset principle that prescribes the largest possible number of consonants for the onset position, the [nd] cluster should go to the final syllable onset. However, since syllable onset in Kunama is maximally filled by one consonant, the best syllabified output in this language is the one shown above, in (15-a), and which is also up to the SSP. As the alveolar nasal /n/ is more sonorous than the voiced alveolar plosive /d/, it should be closer to the nucleus. However, the SSP also allow the syllabification in (15-c), so the well-formedness condition, in this case, is guided by the phonotactic constraint of the language. Since Kunama highly constrains word-final closed syllable, it does not allow more than one consonant in the coda. As there are no word-final consonants, a CC coda is not expected in the syllables elsewhere. Besides, in view of the optional status of syllable margins, complex margins are unlikely to occur. The syllabification, in (15-b), is ill formed in view of both the phonotactic constraint and the SSP. While the former rejects complex onset, the latter does not allow the least sonorous consonant to be closer to the nucleus; /n/ higher in sonority than /d/.

The wellformedness condition in the syllabification of geminates can be assessed in the same way as the cluster syllabification. As has been noted before, Kunama geminates are also hetro-syllabic, so the structure below, in (16-a), is well-formed in view of the phonotactic constraint and the SSP. The same consonants cannot be tautosyllabic in account to the SSP that again operates as per the OCP and precludes the sonority plateau to come by onset or coda consonants in the same syllable. Geminated consonants are

counted as two consonants in view their distinctive role in Kunama and by phonetic approximation of duration. Thus, geminates are constrained from being tautosyllabic. Consequently, the structure trees, in (16-b) and in (16-c), represent ill formed syllables in terms of both the language’s constraint and the SSP while the syllabification in (16-a) is MOP compliant.

(16) Comparing the possible division of geminates (C<sub>1</sub>C<sub>1</sub>) as in āmmā ‘laugh’



The MOP blocks tautosyllabic coda clusters as a whole while the core clusters conform to the SSP requirement for tautosyllabic coda clusters, except the OL and OO clusters. In the same way, tautosyllabic onset clusters literally comply with the MOP but severely constrained by the phonotactics. The only onset cluster that complies with the SSP is the OL pattern, whose formation patten is in reverse to the core clusters, in which the more sonorous segment precedes the less sonorous one. Other clusters that contradict to the SSP requirement for both onset and coda are the OO clusters. As this cluster formation pattern creates a sonority plateau, it violates the OCP. By the same analogy, tautosyllabic geminate onsets and codas are also disfavored by the SSP for creating sonority plateau. The assumption of cluster tautosyllabicity in Kunama results in clash of principles while hetro-syllabicity is up to the demands of the SSP.

Overall, it is possible to argue that the wellformedness condition of cluster syllabification in Kunama can be governed by the phonotactics itself. While the SSP favors the hetro-syllabicity of Kunama clusters, the MOP does not seem relevant in this case. However, the MOP is important in parsing intervocalic singleton consonants of Kunama whose phonotactics does not dictate the preference of onset to coda or the vice-versa. In cases where the phonotactic constraints of Kunama trembles to fully justify the parsing of clusters with a deviant formation patten, for example, the [fr] cluster with obstruent-sonorant pattern, the SSP further clues that this cluster cannot be a tautosyllabic coda. Hence, we can prove that /r/ can be onset to word-internal syllables.

#### 4.2.7 Post-lexical Changes and Resyllabification

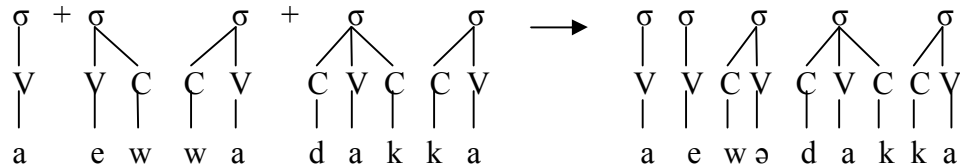
Constraint violations arise following post-lexical alterations, commonly across morpheme boundaries. To repair constraint violations, re-syllabification is found to be important. While the core syllabification is represented via non-derived lexical items, the re-syllabification process focuses on derivations. The re-syllabification process helps to predict new permissible boundaries of syllables in the surface of outputs. The new boundaries can also be traced via slight pauses inserted by speakers. Among a range of post-lexical alterations observed in Kunama, some of those cause floating segments. Floating segments are able to surface phonetically but may/may not be re-linked to a skeletal (CV) slot depending on the segmental composition of the inputs and the resulting outputs. These post-lexical scenarios are discussed in the subsequent sections, where the re-syllabification process helps to attend the constraint violations and other repair strategies thereof.

##### 4.2.7.1 Re-alignment of Segments to Vacant Syllable Slots

Following post-lexical rules, not every segment in the inputs shows up in the output surface structure so that some surviving segments need to be re-aligned to vacant syllable slots on either side. This in turn would bring changes in syllable shape and syllable count of the output surface. Such changes are therefore resolved through the re-syllabification process as shown below, in (17). The post-lexical rules that trigger re-syllabification of the outputs are indicated before the examples.

(17) a. Degemination

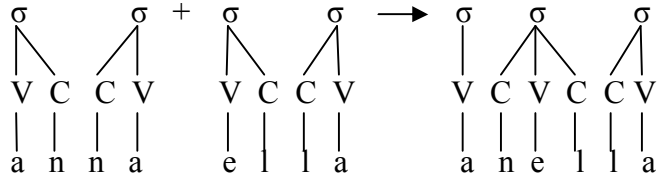
/a-/-1SG POSS + /ē-wwā/3SG-‘father’+ /dàkkā/ ‘woman’ → [áèwədàkkà] ‘mother-in-law’



In deriving the kinship noun, as in (17a), degemination occurs in the output surface. As a result, the initial VC syllable of the first noun input (left-to-right) is re-syllabified as V syllable in the output surface structure.

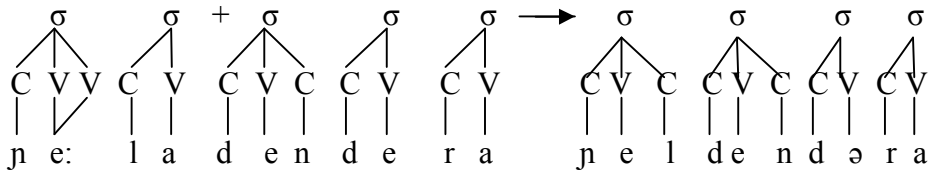
b. Degemination and terminal vowel deletion

/ānnā/ ‘God’ + /éllā/ ‘one’ → [ānēllā̄] ‘promise (n)’



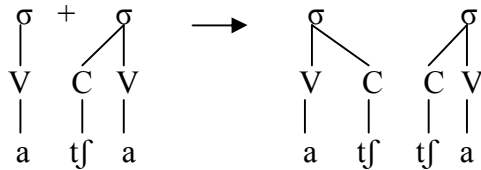
c. Terminal vowel deletion and cluster formation

/jè:là/ ‘tongue’ + /dēndērā/ ‘clitoris’ → [jèldēndērā] ‘palate’



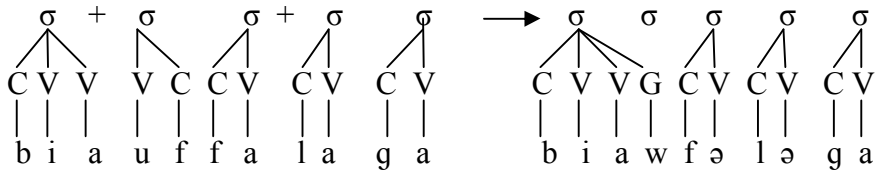
d. Gemination in noun derivation

[a-] NOM + /tʃā/ ‘die’ → [ātʃtʃā] ‘corpse’



e. Glide formation and degemination

/biā/ ‘water’ + /ùffā/ ‘heart’ + /làgā/ ‘land’ → [biāwfələgā] ‘island’



In (17-b) above, when two nouns both having geminated consonant are joined to form another noun, the process results in elision of the terminal vowel and in shortening of the geminate of the first input. While the empty nucleus is re-filled by the initial vowel of the second input, the degemination leaves the initial syllable of the first input with no coda.

Onset consonants may also shift to the coda position of a preceding syllable because of losing its nucleus through deletion provided that the second input is consonant initial. For example, in (17-c) above, the deletion of the terminal vowel results in the formation of the [ld] cluster at the morphemes boundary, thereby forcing the lateral liquid to shift from the onset position, in the underlying structure, to the coda position of the preceding syllable in the output surface structure.

The formation of the labial glide is supposed to necessitate the re-syllabification shown, in (17-e) above, where three noun bases join to form the noun phrase. At boundary of the first two inputs, a sequence of three vowels happens that ensures formation of a homorganic glide i.e. high back round vowel glides to form the labial glide [u~w]. This, in turn, causes shortening of the geminate in the second input, in a way that evades sequence of three consonants that is marked in Kunama; note that a geminate approximates the duration of two consonants. On the other hand, the question of syllabifying the glide whether to the empty coda position of the initial syllable or a syllable in itself is tough. In the former assumption, the initial syllable of the output will become a heavy closed CVVC syllable having three moras; note that Kunama sonorant consonants are moraic. In consideration to the presence of tri-moraic syllables in Kunama, the CVVC syllable is likely permissible though the same syllable shape is not attested in single words. Thus, the labial glide is re-syllabified as coda of the preceding syllable instead of being syllabic.

Overall, the re-syllabification process noted above, in (17), has revealed changes in syllable shapes and syllable count. It then repairs constraint violations caused by post-lexical changes in some ways. For instance, a dangling consonant is re-linked to a CV-tier after losing the nucleus it dominates through deletion. Re-linking can take place in both directions (left or right) of the morpheme boundaries depending on the initial sound of the next input. If the next word begins with a vowel, the consonant is parsed as onset to the next available vowel, in accordance with the Onset First Principle. If the next word is consonant beginning, the dangling consonant will shift to the preceding syllable coda provided that the coda slot is empty. By the re-syllabification process, floating onset

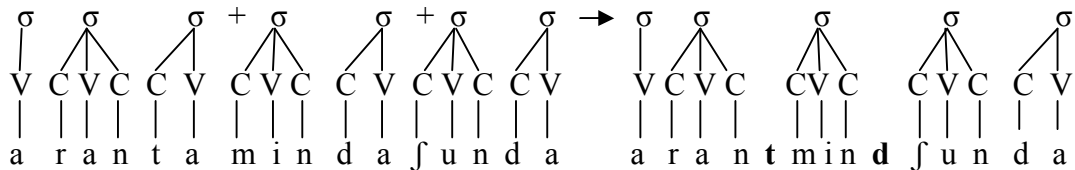
consonants, therefore, are re-linked to the CV-tier and remain to be part of the surface structure of the output.

#### 4.2.7.2 Floating Segments and Extra-syllabicity

In this section, the re-syllabification process focuses on the outputs that show a bit serious violations to constraints. The re-syllabification process may repair the constraint violations but in a way that is different from the one shown in the preceding section, i.e. re-linking of floating segments. Let us bring the dangling consonant hypothetical scenario from the preceding section, *if the next word is consonant beginning, the dangling consonant will shift to the preceding syllable coda provided that the coda slot is empty*. Nevertheless, what will be the fate of the dangling consonant if the preceding syllable coda is preoccupied? This consonant is phonetically specified but will not be re-linked by association lines to the CV-tier. Such floating segments are referred as ‘Extrasyllabic’<sup>32</sup> Katamba (1989:183).

In Kunama, floating consonants will be extra-syllabic when the terminal vowel deletion results in a sequence of three consonants. This scenario presumes the first input word to have a consonant cluster and the next input word has to be consonant initial. Since this violates the constraint that bans sequence of three consonants, the re-syllabification process leaves extra-syllabic segments unassociated to the CV skeleton as shown, in (18).

(18) /árántà/ ‘bed’+ /mīndā/ ‘leg’ + /jūndā/ ‘star’ → [árántmīndjūndā] ‘north’

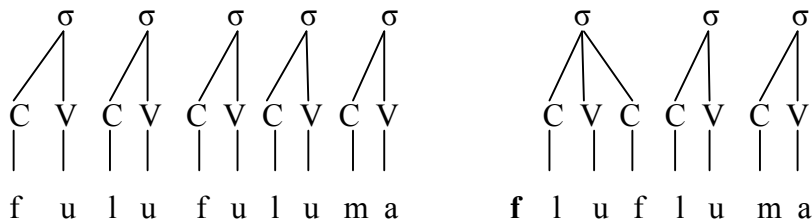


As represented in the structure tree given, in (18), the terminal vowels are deleted across both boundaries, thereby causing sequences of three consonants to happen in the output surface. In the first two boundaries (left-to-right), the final CV syllables of the first two inputs, /árántà/ and /mīndā/, are dissolved for losing their nuclei through deletion while

<sup>32</sup> Extrasyllabic segments can be phonetically fully specified without being linked by association lines to a C or V (Katamba, 1989:183).

the onset consonants remain unlinked to the skeletal (CV) tier for lacking vacant slots on either side of the syllables. Even though these floating consonants are able to surface phonetically, they cannot be re-linked to any syllable slot because the phonotactics does not tolerate complex margins. Consequently, these floating consonants eventually remain extra-syllabic. This implies that in connected speeches, the extra-syllabic segments lack prominence so that they will not be articulated. Similar instances that show up floating segments as extra-syllabic are more common in reduplication, as can be observed in (19).

(19) /fùlùfùlumā/ [flūflūmā] ‘smooth, amusing’



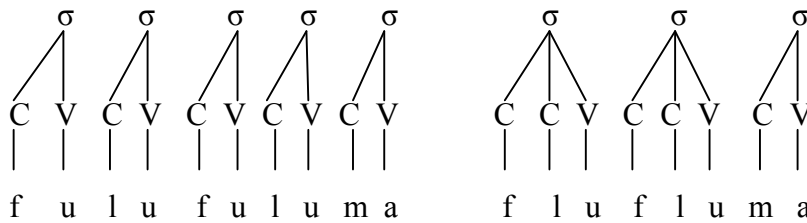
During the reduplication process in (19), consonant clusters are formed both in initial and medial positions of the output surface, but not because of the obvious deletion of the terminal vowel. Instead, these clusters are formed as the high back round vowel is sandwiched in between the labio-dental fricative and the lateral liquid consonants. The medial [fl] cluster does not literally violate any constraint as Kunama clusters are word-medial and obstruent-sonorant sequences are phonotactically permitted despite their rare occurrence in single words. Thus, the re-syllabification process can easily repair the medial sequence.

On the contrary, the same [fl] cluster initially rather violates the constraint that severely bans initial CC. In consideration to the higher sonority of liquid consonants, we can assume that the initial [fl] cluster to be permissible as long as the /l/ is able to compensate the empty vocalic position. In a different place, the lateral liquid has shown to be syllabic, at least, at the level of re-syllabification. On the other hand, the initial [fl] cluster is a well-formed onset cluster in terms of the SSP as the more sonorous sound /l/ is closer to the nucleus than the least sonorous /f/. In this particular case, the SSP clashes with the constraint that severely bans more than one consonant in syllable margins. In

such a case, the language constraint obviously overrules the general syllabification principles<sup>33</sup>, so the floating onset /f/ because of losing the vowel nucleus it dominates remains unlinked to any syllable slot though it phonetically surfaces. Hence, this floating segment is considered as extra-syllabic.

On the contrary, in consideration to the pause inserted by native speakers during connected speech, these clusters can be tautosyllabic and re-syllabified as, **flū.flū.mā**. The phenomenon would be taken as an exception that violates the constraint on complex onset. Thus, the empty vocalic nucleus may rather be silenced (not deleted) either for being unstressed or for easing articulation. The latter is of course the obvious reason behind all morphophonemic changes. A similar violation against another stronger constraint has been analyzed via a single word, /dɪŋgū/ [dɪŋgū] ‘prophet’, where the alveo-lateral liquid occurs word-finally despite that word-final consonants are severely marked. In simple terms, the alveo-lateral liquid violates constraints in both contexts so that highly sonorous segments are liable to violate the unmarked constraints (stronger constraints), in Kunama. On this assumption, the reduplicated adjectival base in its surface form would be re-syllabified as in (20) so that extra-syllabicity will be rejected in this case.

(20) /fùlùfùlumā/ [flū.flū.mā] ‘smooth, amusing’



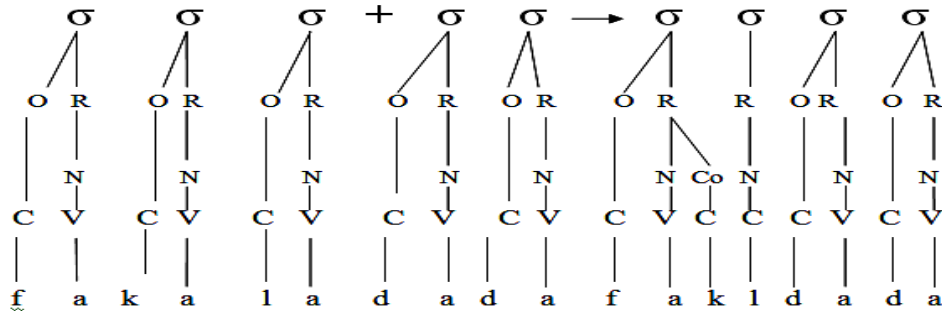
<sup>33</sup> According to Katamba (1989:163), “Language specific restrictions on consonant clustering override universal principles.”

### 4.2.7.3 Post-lexical Syllabic Liquid

The re-syllabification process also reveals a syllabic liquid /l/, as can be considered in (21), below:

(21) /fakàlà/ ‘yellow’ + /dàdà/ ‘bead’ → [fakl̀dàdà] ‘yellow bead’

/fakàlà/ ‘yellow’ + /dàdà/ ‘bead’ → [fakl̀dàdà] ‘yellow bead’



In the formation of the NP above, in (21), the terminal vowel is deleted, and the penult syllable nucleus of the first input is unpredictably deleted. Consequently, a sequence of three consonants happens at the morpheme boundary. Since CCC sequences are barred by the Kunama phonotactics, the constraint violation has to be repaired by re-syllabification, as in (21).

In this study, clusters that combine the semi-vowels /w, j/ with other consonants have been referred as volatile clusters due to the high gliding tendency of the semi-vowels in inter-vocalic and post-vocalic position. For instance, in words such as **ájna** ‘ash’ and **áwtá** ‘bush’, the sequences [jn] and [wt] have been commonly analyzed as diphthongs. Hence, volatile clusters are not considered in the discussion of cluster phonotactics. However, in post-lexical phonology, a clear instance where the labial glide happens with the lateral liquid [lw] is analyzed. This is triggered by the deletion of the terminal vowel and this sequence still conforms to the hetro-syllabicity of Kunama CC clusters. See, in (22), below:

(22) /nābùlà/ ‘grave’ + /wàgà/ ‘place’ → [nà.bùl.wā.gā] ‘cemetery’

### 4.3 Chapter Summary

The discussion in this chapter shows that the Kunama phonotactics permits CC clusters but only word-medially, and it bans CCC sequences. The language has a range of CC cluster patterns, of which the sonorant-obstruent sequences are the most frequent. Within this general pattern, the pre-nasalized (nasal-obstruent) sequences again are the highest in distribution. Among the pre-nasalized clusters, the [nk] cluster is typologically captivating because the alveolar nasal does not go place assimilation before the voiceless velar, unlike the common phenomena of homorganic clusters. More than one consonant is not allowed word-initially, and all words end with a vowel; consequently, clusters and geminates are heterosyllabic. A word, in Kunama, may begin with a short or a long vowel as well as with a diphthong; whereas, word-final diphthongs do not seem to occur, except in some monosyllables. Accordingly, the Kunama syllable has an obligatory nucleus, often filled by vowels, and optional margins if not simple margins. The language's phonotactics as well as the constraints thereof considerably manages the syllabification process, but it does not dictate the preference of onset to coda or the vice-versa. This is assumed as the only gap of the Kunama phonotactics that especially wonders in the case of intervocalic singleton consonants. In this particular case, the Onset first principle becomes relevant to the Kunama syllabification. Note that the language's cluster phonotactics complies with the SSP if not the former governs the latter, especially at the level of post-lexical phonology.

Kunama has a rich inventory of syllable structures, and some of those are moderately complex. Although the language's syllable structure can basically be represented by a (C) V (C) template, the quantity of weight units (mora) in the nucleus and the type of coda consonants help to further define its syllables as light-open (V, CV), heavy-open (CVV, CV:, CVV, VV, V:), light-closed (VC, CVC), heavy-closed (CVS, VS), and super-heavy (VVS). (S stands for sonorant codas i.e. a nasal or a liquid). While the CV syllable is unmarked, closed (VC, CVC) syllables are marked in word-final position. Syllable weight determines the distribution of tone patterns so that contour tones and complex contour melodies are sensitive to quantity of the mora, in a syllable and in a word.

Constraint violations happen following post-lexical changes, and which necessitate resyllabification. The resyllabification process, in turn, brings forth three scenarios, these are, re-alignment of surviving segments to vacant syllable slots on either side of the boundary, extra-syllabic segments and a syllabic liquid [l]. The unmarked constraints on word-initial CC and-final closed VC or CVC syllables, in Kunama, are sometimes violated by the alveo-lateral liquid [l].

## CHAPTER FIVE: PHONOLOGICAL AND MORPHOPHONOLOGICAL PROCESSES

### 5.0 Introduction

This chapter treats the most salient phonological and morphophonological processes. The former looks into nasalization of vowels and homorganic nasal plosive cluster assimilation while the latter inculcates deletion of the terminal vowel, vowel and glide epenthesis, glide formation, vowel assimilation, gemination and degemination. Previously, Seyoum (1983) has reported vowel deletion and epenthesis as prominent processes in Kunama, whereas, Thomson (1983) has not mentioned vowel insertion at all but has noted evidence of vowel deletion, vowel harmony and consonant intrusion. The driving force behind Kunama morphophonemics is unclear, except that the deletion rule in some cases applies to repair the constraint violations caused by marked sequences of consonants. The language does not allow CCC sequences in general and word-initial CC sequences in particular.

### 5.1 Phonological Processes

#### 5.1.1 Nasalization of Vowels

In Kunama, vowels will be nasalized following a nasal consonant, as in (1), below:

(1) /sāŋgā/	[sāŋgã̃]	bone
/ŋàdà/	[ŋãdã̃]	eat
/mēnā/	[mẽnã̃]	throat
/nūnā/	[nũnã̃]	steal
/dʒĩŋgá/	[dʒĩŋgã̃]	thresh (grain)

### 5.1.2 Homorganic Nasal-Plosive Cluster Assimilation

The alveolar nasal consonant [n] undergoes place assimilation before labial consonants, [b] and [f]. See below, in (2):

(2) /inbāŋgā/	[imbāŋgā]	uncle (mother's brother)
/īnfā/	[īm̥fā]	mucus
/ānbāká/	[āmbāká]	crevice
/gānbēdā/	[gāmbēdā]	leftover (food)
/jānfā/	[jāŋfā]	wax

## 5.2 Morphophonological Processes

### 5.2.1 Deletion of the Terminal Vowel

The terminal vowel, which is a singular suffix of nominals, often deleted at morpheme boundary with the addition of other morphemes. In (3) below, the second inputs' initial vowel is /a/ so that the deletion of the terminal vowel is inevitable as avoidance of boundary hiatus.

(3) a. /ùl-à/ 'body' + /ànd-ā/ 'big'	[ūlāndā] 'obese'
b. /làg-ā/ 'land' + /àr-à/ 'white'	[lògārà] 'lime'
c. /ēl-ā/ 'tree' + /ànd-ā/ 'big'	[èlāndā] 'a big tree'
d. /āsājg-ā/ 'head' + /àn-ā/ 'hair'	[āsājgānā] 'hair of a head'

The terminal vowel is also deleted when it happens with another vowel at morpheme boundary. This can be observed in the following derivations; verbs from adjectives with the addition of an adverb of frequency, as in (4-a & -b), adjective from noun, in (4-c), and a compound noun, as in (4-d):

- (4) a. /sā:s-á7 ‘wide’ + /ídā/ ‘going down’ [sāsídá] ‘widen’  
Wide-FRQ
- b. /gē:r-á7 ‘long’ + /ídā/ ‘going down’ [gérídá] ‘lengthen’  
Long-FRQ
- c. /mōŋgól-à/ ‘crook’ (n) + /ídā/ ‘going down’ [mōŋgól-ídá] ‘crooked’  
Crook-FRQ
- d. /dūm-ā/ ‘clay’ + /ít-ā/ ‘house’ [dūmītá] ‘kitchen’

However, the deletion of the terminal vowel in all the contexts shown above, in (4), takes place in the face of a resulting permitted sequence of vowels, i.e. [ai]. Thus, the driving force behind this deletion is unknown.

The same deletion of the terminal vowel is observed even with the addition of consonant initial words, as in the following (5):

- (5) a. /tùŋgùd-à/ ‘pound’ + /dā:d-à/ ‘help’ [tùŋgùddā:dà] ‘pounding pot’
- b. /bén-ā/ ‘upper arm’ + /fíl-ā/ ‘swelling’ (intr) [bénfí:lā] ‘muscle’
- c. /ɲè:l-à/ ‘tongue’ + /dēndēr-â/ ‘clitoris’ [ɲèldèndērā] ‘palate’
- d. /gòm-ā/ ‘beard’ + /ʃōr-ā/ ‘chin’ [gòmʃōrā] ‘beard (not mustache)’

For instance, in (5-a), the terminal vowel deletion causes the formation of a fake geminate [dd] while in the remaining (5b-d), permitted clusters of consonants, [nf], [mj] and [ld], are formed at the boundaries.

The deletion of the terminal vowel may cease to happen if pause is inserted at morpheme boundary. The insertion of a slight pause seemingly identifies nominal phrases from nominal sentences with zero copula. While nominal phrases are pronounced at one go, nominal sentences are produced with a slight boundary pause, as in (6) below:

- (6) a. /kāf-á/ ‘faeces’ + /ít-ā/ ‘house’ [kəfā-ítā] ‘this is a latrine’  
 b. /ít-ā/ ‘house’ + /ùff-ā/ ‘heart’ [ità-ùffā] ‘this is a saloon’  
 c. /tōm-á/ ‘fire’ + /ū:d-á/ ‘wood’ [tōmá-údā] ‘this is a firewood’

The resulting boundary sequences, [ai] and [au], in (6) above, are among the diphthongs analyzed in this study.

The deletion rule does not apply on the plural suffix vowel [e], as in the following (7) :

- (7) a. /ʃígíd-è/ ‘animal’ + /ágāl-ā/ ‘skin’ [ʃígídè-ágālā] ‘skin of animals’  
 b. /ʃūkk-è/ ‘bird-PL’ + /bà:rè/ ‘two’ [ʃūkkè bā:rè] ‘two birds’  
 c. /ēl-è/ ‘tree-PL’ + /sāttè/ ‘three’ [ēlèsāttè] ‘three trees’  
 d. /ít-ē/ ‘house-PL’ + /sāttè/ ‘three’ [ítèsāttè] ‘three houses’

The terminal vowel may not totally be deleted, but it remains in other vowel quality, i.e. the schwa. See in (8) below:

- (8) a. /kóww-ā/ ‘rite of boys’ + /míntʃ-ā/ ‘cut’ [kówwēmíntʃā] ‘ceremony of circumcision’  
 b. /āsāńg-ā/ ‘head’ + /sāńg-ā/ ‘bone’ [āsāńgəsəńgā] ‘skull’  
 c. /ádd-á/ ‘wild area’ + /sānd-ā/ ‘donkey’ [áddəsāndā] ‘zebra’  
 d. /fóg-á/ ‘cloth’ + /kòt-ā/ ‘dress’ [fógəkòtā] ‘wearing cloth’  
 e. /fóg-á/ ‘cloth’ + /tīr-á/ ‘sew’ [fógətīrā] ‘sewing cloth’  
 e. /sèmmà/ ‘bee’ + /ítā/ ‘house’ [sèmməítā] ‘beehive’

In some cases, consonants can be deleted following the deletion of vowels at morpheme boundaries, thereby blocking sequence of three consonants. For example, [kòńfùllà] ‘pointing finger’ is formed from /kònā/ ‘hand’ + /ànʃùllà/ ‘finger’. In here, at morpheme boundary [n] is deleted following the deletion of the nominal vowel suffix and the initial vowel of the second morpheme. This prevents the resulting sequence of three consonants, a geminate and the palatal fricative [ʃ].

Largely, a cluster of three consonants is not permitted in Kunama; note that a geminate phonetically approximates the duration of two consonants. For example, in deriving the following adjective from a noun and a kin term, a tri-consonantal geminate [kkk] happens at morpheme boundary. This disallowed sequence is triggered by the elision of the terminal [a] and is repaired via deleting one of the consonants.

(9) /ākkā/ ‘sibling + /kàilā/ ‘fear (n)’                      [āk-kàilā] ‘coward’

### 5.2.2 Epenthesis

An insertion of two vowels [i, i] and the palatal glide [j] has been observed. The epenthetic segments are inserted to avoid unnecessary sequence of segments across morpheme boundaries.

#### 5.2.2.1 Vowel Epenthesis

Kunama epenthetic vowels [i, i] are slotted following the deletion of the terminal vowel, and thereby avoiding unwanted CC sequences and the marked CCC sequences, at morpheme boundaries. See, in (10), below:

- (10) a. /sèrā/ ‘neck’    [sèrìsèrìimā] ‘shy’
- b. /bād-ā/ ‘back’ + /gì:r-ā/ ‘horn’                      [bādīgì:rā] ‘spinal cord’
- c. /mìntf-ā/ ‘cut’    [mìntfìmìntfā] ‘pieces’
- d. /mās-ā/ ‘spear’ + /bātf-á/ ‘fight’                      [māsìbítfā] ‘war’
- e. /gād-ā/ ‘moving, going’ + /biā/ ‘water’                      [gādìbiā] ‘flood’
- f. /dʒìrgà/ ‘mosquito’ + /bá:dā/ ‘illness’                      [dʒìrgìbādā] ‘malaria’
- g. /àbinà/ ‘elephant + /mā/ ‘tooth’                      [àbinìimā] ‘tusk of an elephant’

In (10a-g), the deletion of the terminal vowel [a] at morpheme boundaries is followed by [i] epenthesis so that evades disallowed consonant sequences, [sr], [dʒ], [ntfm], [sb], [db], [rgb] and [nm], respectively.

In account to the observed scenarios on terminal vowel deletion and vowel epenthesis across morpheme boundaries, it can be deduced that the two rules operate in an order that the deletion of the terminal vowel conditions the environment for vowel epenthesis if unpermitted sequences are going to happen across that boundary and if pause is not inserted. In the standard linguistics term, non-deletion of [a] or its reduction to [ə] bleeds epenthesis, causing it to not apply.

### 5.2.2.2 *Glide Epenthesis*

Glide insertion is commonly observed in Kunama though it often tends to be similar with glide formation. In the following derivations, in (11), the palatal glide is inserted before the number suffix vowel of the output.

- |      |   |  |
|------|---|--|
| (11) | a. /t̪-ā/ ‘house’ + /ā̀n-ā/ ‘self’      | [t̪- ā̀n-ì-j-ā] ‘his/her own house’<br><br>House-own-3SG.POSS-G EPN-SG |
|      | b. /dāk-k-ā/ ‘woman’                    | [dāk-k- ì-j- ā] ‘wife’<br><br>Woman-3SG.POSS-GEPN-SG                   |
|      | c. /ábíj-ā/ ‘man’                       | [ábíj-ì-j-ā ] ‘husband’<br><br>Man-3SG.POSS-GEPN-SG                    |
|      | d. /áʃʃt̪/ ‘previously’ + /ā̀ndā/ ‘big’ | [áʃʃt̪-ì-(j)ā̀ndā] ‘story’<br><br>Olden time-GEPN-big                  |

The insertion of the glide segment fills the empty onset before the number suffix vowel [a] so that the unmarked CV syllable structure is maintained. In the post nominal possessive constructions given above, in (11a-c), the constituents occur in order of possessed-number of possessor-number of possessed. In all three cases, the third person singular possessor suffix vowel –i- is identified by a low tone. In (11-a), the third person object vowel [i] is suffixed to the post nominal possessive base, **ā̀n-ā**, whereas, in (11-b & c), the object vowel is suffixed to the possessed noun stem. An insertion of the labial glide is not found.

### 5.2.3 Glide Formation

The formation of the glides across morpheme boundaries is a way of eliminating unpermitted vowel sequences. In the following sub-sections, the formation of the two glide consonants is discussed.

#### 5.2.3.1 Formation of the Labial Glide

The labial glide [w] is formed in the environment of round back vowels [u] and [o], as in the following (12):

- (12) a. /làfā/ ‘maize’ + /òikèdā/ / ‘uncover’            [lòfāwòikèdā] ‘harvesting maize’  
b. /biā/ ‘water’ + /ùffā/ ‘heart’ + /làgā/ ‘land’ [bíāwfəlògā] ‘island’  
c. /tjā/ ‘death’ + /ùsùlà/ ‘law, order’            [tjāwsulā] ‘funeral’  
d. /āìfā/ ‘traditional beer’ + /òìdā/ ‘cover’        [àìfāwòìdā] ‘fermenting alcohol’

In (12-a & -d), the labial glide is formed on the round high-mid vowel [o] despite that the vowel leaves its trace behind as [ə]. When the verb phrase is formed, in (12-a), from a verb base and the noun base, a sequence of three vowels [aoi] happens at the boundary. The formation of the glide breaks this sequence by taking the onset position. The same glide is formed, in (12-b & -c), on the face of the other round vowel [u]. The labial glide curbs the sequence of three vowels [iau] by assuming the coda position. The NP shown, in (12-b), is a concatenation of three noun bases, and it means “a land at the heart of a water body”. Along with this, the labio-dental fricative geminate undergoes shortening so that the phonological syllable boundary, in the underlying structure of the output, is shifted one-step forward. At the surface of the output, the voiceless labio-dental fricative /f/ takes the onset position of the next syllable after the glide. Consequently, the following syllable shows up with simple onset due to the degeminated labio-dental fricative [f]; therefore, the degemination rule following the formation of the labial glide evades the severely constrained sequence of three consonants [wff]. Had it not been for the degemination rule, the formation of the labial glide leaves the next syllable with a

complex onset, which is marked in Kunama. Geminates phonetically approximate the durations of two consonants.

On the other hand, the output shown above, in (12-b), may also show the ambiguous interpretation in sequence of three vowels and glide formation. We have noted before that potential triphthongs possibly occur in non-derived words, whereas, in post-lexical rule, such sequences are shown to be curbed via the formation of a glide. Hence, we may assume that the formation of the glide as well as the degemination rule circumvent an extra-heavy syllable structure CVVVC. The same syllable shape is not analyzed in the core syllabification. Thus, this may suggest that sequences of three vowels will be evaded if they arise constraint violation on marked sequences.

### 5.2.3.2 Formation of the Palatal Glide

The formation of the palatal glide is analyzed in a few instances shown, in (13), below:

- (13) a. /làgā/ ‘land’ + /āìōkōmā/ ‘light (not heavy)’ [làgàjòkòmà] ‘barren land’  
 b. /sādā/ ‘giving’ + /itā/ ‘house’ [sədāj̥tā̃] ‘tribute’  
 c. /sēllā-sí/ ‘tomorrow’ [sēllā(j)ùtùdà] ‘the day after tomorrow’

In (13-a), the terminal vowel is deleted in boundary hiatus, and consequently, three vowels are expected to occur at the boundary. However, the formation of the palatal glide on the face of the front high-close vowel prevents the resulting sequence of three vowels [aio]. The same glide is formed at the boundary, as in (13-b), where the terminal vowel survives as [ə].

In (13-c), the palatal glide is formed on the postposition vowel [-si] of the time adverb /sēllāsi/ ‘tomorrow’. The postposition [-si] is an allomorph of the dative case marking suffix [-si], which means ‘to’, ‘for’, or ‘after’.



### 5.2.5 Vowel Assimilation

Cases of vowel assimilation have been analyzed in the derivations given, in (15). Previously, Thomson (1983:289-9) analyzed a few instances of vowel harmony, where the verb prefix **i-** is changed to **u-** because of a preceding **u-**.

- (15) a. /kù:rā-tā/ ‘behind-to’ + /ĩ:gídā/ ‘environment’ [kúrā-tī-ígīdā] ‘turning back’  
 b. /ʃimā/ ‘air’ + /fūdā/ ‘blow’ [ʃùmù-fūdā] ‘break wind, fart’  
 c. /sù:kā/ ‘village’ + /kòrā/ ‘flee’ [sùk-ò-kòrā] ‘migrate’  
 d. /gàmm-à/ ‘sheep’ + /bùtā/- MASC [gàmm-ò-bùtà] ‘ram’

In (15-a), the locative suffix vowel [-ta] assimilates to the initial vowel [i] of the noun stem to the right. In the remaining (15b-d), the terminal vowel [a] undergoes vowel-rounding assimilation to the right because of the round back vowels in the initial syllables of the inputs. Sometimes, stem internal vowels can also assimilate at a distance, for example, in (15-b), the /i/ vowel of the noun is changed to [u] as the terminal vowel does.

Similarly, rounding assimilation of vowels is observed when nouns are inflected for definiteness. In Kunama, definiteness is marked by the independent distal demonstrative pronoun **-wámā** ‘that’, which can be suffixed or prefixed to the head noun, or the definiteness marker can also circumfix the head noun. In the following (16), the terminal vowel [a] is rounded due to the influence of the labial glide.

- (16) a. /dèd-ā/ ‘child’ + /wám-ā/ ‘that’ [dèd-òm-ā] ‘the child’  
 Child-DEF-SG  
 b. /āṇūṇ-à/ ‘thief’ + /wám-ā/ ‘that’ [āṇūṇ-óm-ā] ‘the thief’  
 Thief-DEF-SG  
 c. /dàkk-ā/ ‘woman’ + /wám-ā/ ‘that’ [dàkk-òm-ā] ‘The woman’  
 Woman-DEF-SG

d. /kī:f-ā/ ‘girl’ + /wám-ā/ ‘that’	[kīf-óm-ā] ‘The girl’
	Girl-DEF-SG

### 5.2.6 Gemination

Morphophonemic gemination in the linguistic literature is commonly referred as fake gemination. In Kunama, this is often triggered by the deletion of the terminal vowel across morpheme boundary. For instance, [ʃèbbà:rè] ‘twenty’ is derived from /ʃè:bè/ ‘ten’ and /bà:rè/ ‘two’, and this results in voiced bilabial plosive geminate. In here, the deletion of the terminal vowel[e] is exceptional because the plural suffix vowel has shown to shielding the deletion rule, elsewhere. See more examples, in (17), below:

(17) a. /míkā/ + /kādá/ ‘cross’	[mikkədā] ‘blink’
b. /fōgà/ ‘cloth’	[fōfōggà] ‘bark (of tree)’
c. /kādá/ ‘cross’ /dádá/ ‘separating’	[kóddá-dá] ‘bridge’

The voiced velar geminate, in (17-b), occurs during the reduplication of the noun to form another noun. The terminal vowel in all of the above derivations is deleted thereby allowing the geminates at the boundaries.

### 5.2.7 Degemination

Morphophonemic shortening of geminate consonants is analyzed in the following derivations (18) :

(18) a. /è-wwā/ -father + /dàkkā/ ‘woman’	[à-ēwədàkk- ā] ‘mother-in-law’
	1SG.POSS-father-SG-woman-SG
	‘My father’s woman’
b. /ānnā/ ‘God’+ /éllá/ ‘one’	[ānēllá] ‘promise (n)’

The kinship noun, in (18-a), above is derived from the first person singular possessor prefix [à-], another kinship noun with inalienable possession /è-wwā/ and the possessed noun /dàkkā/. Through this morphological process, the geminate consonant in the first kin noun is shortened. Similarly, the compound noun, in (18-b), is formed from the noun base /ānnā/ and numeral nominal /éllā/, both having geminate consonants. In all of the above derivations, the reduction of the geminates in the first inputs happens may be due to the other geminates in the second inputs. Note that the terminal vowel [a] is elided at morpheme boundary in (18-b).

### 5.3 Chapter Summary

To sum up, the motivation behind some of the Kunama morphophonological processes is not always clear. While the insertion of a slight pause at morpheme boundary may preclude the deletion of the terminal vowel, the vice-versa can also let disallowed sequences happen across boundaries as such these sequences can also be left unepenthesised. The function of some of the morphophonemic phenomena is also difficult to define; for instance, intrusive consonants can be considered as extra-segments unless we interpret them to be euphonic. In cases where post-lexical alterations cause violations to unmarked constraints, resyllabification is assumed as an important repair strategy. Similarly, an insertion of a boundary pause is also guessed to be a useful strategy used by native speakers, may be to identify nominal sentences with zero copula from nominal phrases. Notwithstanding the operational inconsistency in some of the post-lexical rules, a more detail investigation of the Kunama morphophonemics would give a better/complete picture of the languages tonal rules.

## CHAPTER SIX: TONE IN THE KUNAMA LEXICON

### 6.0 Introduction

This chapter discusses the phonology and phonetics of tone at the level of the lexicon, based on impressionistic and acoustic analyses. The first part deals with the phonology of lexical tone melodies that are prominent in underlying and surface phonology. It presents the tonal inventory attested on citation forms of major word classes, which comprise of mono-, di- and tri-syllabic words. Words of four or more syllables are not included as they mostly are compounds. The lexical function of tone is shown via minimal-pairs and -triplets. The second part of this chapter elaborates on the phonetics of lexical tone based on instrumental data of fundamental frequency (F<sub>0</sub>). In the last part of this chapter, the Kunama tonal association phenomena will be elaborated in view of Autosegmental tone theory.

Perceptual cues have been used as the primary means of identifying the distinctive tone heights and the surface tone melodies that are supposed to be combinations of the tone levels. Following pioneer tonologists, such as, Pike (1948), Goldsmith (1976), Fox (2000), Ladefoged and Maddieson (1996), Hyman (2010) and Coupe (2014), the impressionistic analysis is made to precede the instrumental analysis.<sup>34</sup> They invariably argue the precedence of auditory decision over fundamental frequency (F<sub>0</sub>) measurement. For instance, Coupe (2014:470) contends, “the relativity of pitch in tone languages is why an auditory analysis necessarily precedes the instrumental analysis.”

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<sup>34</sup> “Auditory analysis of pitch necessarily precedes the instrumental analysis, as a pitch extraction algorithm can only provide an absolute value” Pike (1948:20).

In addition, the working trend of tonologists, such as, Coupe (2014) and Hyman (2010) seem to suggest that monosyllabic words are better be worked first if one attempts to identify the pitch heights in a tone language. This is because polysyllabic words may involve sandhi perturbation, downdrift and other surface contrasts in tone. Thus, such recommendations are taken into account in the present analysis.

The impressionistic analysis is done by repeatedly listening to the recorded wordlist, in general, and the complete minimal set words that were recorded with a primary aim of analyzing distinctive tone, in particular. Tone is conventionally marked on each syllable vowel by comparing the relative pitch height difference between syllables. The height difference among the distinctive tones within monosyllabic and polysyllabic words as well as across different word length is taken into account. Due to pitch range variation across speakers, the tone marking on the words cited in the body of this paper is decided within a speaker's vocal range. When pitch height fluctuation happens on the same word within tokens of the same speaker, the analysis relies on the impression learned from the stimuli with more repetitions.

## **6.1 Tone Inventory**

Most previous studies give a marginal attention to the analysis of Kunama tone, although different phonemic tone heights have been proposed so far. Tucker and Bryan (1966), and Connell et al (2000) have reported three phonemic tone levels (High, Mid and Low). Thomson (1983 and 1989) and Bender (1996) have cited some words that are marked for high and low tones. Nikodimos (1987) indicated that Kunama is a tone language, but he provides a few minimal pairs only for grammatical tone. Banti and Nikodimos (1994) have proposed high, low and a downstep. Bender (1996) has suggested that falling tones occur only in word-final position, but later, in his Kunama-English Lexicon (Bender, 2001), he has marked non-final falling tones. Interestingly, Connell et al (2000) have given a considerable attention to the analysis of Kunama tone, and they additionally have used instrumental investigation. They have posited four surface contour tones (HM, HL, ML and MH) in spite of the three phonemic tone levels. The study of Connell et al (2000) has laid the foundation for the present analysis.

The present study shows that Kunama is a tone language with quantity contrast of vowel length and gemination. It posits three lexically distinctive tone levels (High, Mid and Low) that have been attested on citation forms. The three distinctive tone levels combine in nine ways (H.H, M.M, L.L, H.M, H.L, M.L, M.H, L.H, and L.M) on heavy syllables and on sequences of two light syllables of disyllabic words. These surface combinations are supposed to be the basic tonal melodies of Kunama, and they comprise of three level tones (H.H, M.M, L.L), three falling (HM, HL, ML) and three rising (MH, LH, LM) contour tones. Heavy syllables, in this language, are bi-moraic syllables having a long vowel, a diphthong, or a short vowel closed by a sonorant coda (a nasal or a liquid consonant). In this study, contour tones are considered as combinations of the level tones as they often surface on bi-moraic syllables. Consequently, combinations of two different level tones surfacing on adjacent syllables and on a bi-moraic syllable are considered as similar melodies. For instance, the HM falling contour tone surfacing on a bi-moraic syllable and the unit tones in a H.M sequence surfacing on disyllabic words are considered as similar melodies. By the same analogy, a HM falling contour tone on a bi-moraic syllable can take a H.HM pattern on disyllabic words, and a H.H.M or a H.M.M pattern on trisyllabic words. The phenomena have been regarded as stem-internal spreading of tones.

The Kunama tonal inventory further comprises of complex tonal melodies that are combinations of differently shaped contour tones. The most frequent form of complex melodies takes rising-falling pattern. Complex melodies have been analyzed on disyllabic and trisyllabic words, and they can be observed in two ways, depending on the length of a word. In disyllabic words, complex tonal melodies (henceforth, complex contours) presume weight units, and in Kunama these units are commonly analyzed on the penult syllable so that complex contour hosts will have CV:CV, V:CV, CVVCV and VVCV sequences. The penultimate bi-moraic syllable surfacing with one of the rising contour tones (MH, LH, LM), and the word-final syllable surfacing with any of the falling contours (HM, HL, ML) combine to give a complex contour tone melody. In often of the instances, the shape of the final fall can be predicted from the shape of the initial rising contour. For example, a MH rising contour on the penult syllable usually

ends to be a HM falling; the high tone of the final HM fall is a result of spreading of the preceding high tone of the MH rise.

On trisyllabic words, complex contour melodies are results of different level tones on each syllable, and the phenomena preclude that two same tones should not be on adjacent syllables. In addition to the common, rising-falling, pattern of complex contours, other patterns, such as, falling-rising, falling-falling and Falling-Rising-Falling, are analyzed on trisyllabic words.

The tonal melody inventory has been analysed on mon-, di- and tri-syllabic major word classes given in (1)-(25). All words are citation forms said in isolation; Kunama citation forms are nominals with the terminal vowel /a/. Thus, the verbs used for this analysis are verbal nouns. Verbal nouns are preferred to the inflected forms as they were found to be easier for elicitation and analysis. The tonal melody inventory is given, in (Table-15), below:

Table 15 Tonal melody inventory of major class words

Melody Typologies	Pattern	Major word classes			Remark
		Nouns	Adjectives	Verbs	
Levels	H.H	+	+	+	
	M.M	+	+	+	
	L.L	+	+	+	
Fallings	H.M	+	+	+	
	H.L	+	+	+	
	M.L	+	+	+	
Risings	M.H	+	+	+	
	L.H	+	+	+	
	L.M	+	+	+	
Rising-Falling	M.H.M	+	+	-	
	M.H.L	+	-	+	
	L.H.L	+	+	+	
	L.H.M	-	-	+	
	L.M.L	+	+	+	
Falling-Rising	H.L.M	-	-	+	Attested only on trisyllabic words
	M.L.M	-	-	+	Attested only on trisyllabic words
Falling-Falling	H.M.L	-	-	+	
*Falling-Rising-Falling	H.L.HL	-	-	+	Attested only on one trisyllabic word

\*lacks stronger evidence

In the subsections to follow, the distribution of the tonal melodies given above, in (Table-15), is shown on mono-, di- and tri-syllabic major word classes. Syllable structures of the words are indicated, but for reason of space, one-to-one mapping of each melodic pattern to a syllable structure is not done.

### 6.1.1 Tonal Melodies on Monosyllabic Words

The majority of Kunama monosyllabic words are CV syllables, and the vowels are claimed to be short (mono-moraic), in underlying phonology. Since Kunama word-final vowels show tendency of length, length contrast is claimed to be neutralized in final position. Word-final contour tones, therefore, are formed by virtue of the position. In account to this, the underlying high tone on monosyllabic words is realized as HM falling contour; whereas, none of the rising contours has been observed on monosyllabic (CV) words. MH and LM rising contours are observed on CVV words. The mid and low tones on monosyllabic words show typical level realizations. Consider, in (1)-(3), below:

(1) Nouns: CV, CVV

- a. M mā ‘tooth’, nā ‘meat’
- b. L bà ‘pit’
- c. MH wīá ‘day’
- d. LM biā ‘water’

(2) Adjectives: CV

HM tá<sup>-</sup> ‘slice’

(3) Verbs: CV

- a. HM bá<sup>-</sup> ‘copulate, ploughing’, ká<sup>-</sup> ‘to hate’, wá<sup>-</sup> ‘entering’  
tá<sup>-</sup> ‘killing animals for food’
- b. M nā ‘drinking’, tʃā ‘dying’, jā ‘beating (a child)’, dā ‘return, giving back’
- c. L là ‘transplanting’, wà ‘leaving off’

The high-toned monosyllabic words are found to be verbs while the distribution of high-toned nouns and adjectives is rarer in the present data. Monosyllabic nominals instead are found to be mid and low-toned.

### 6.1.2 Tonal Melodies on Disyllabic Words

All the nine way combinations of the level tones have been analysed on disyllabic words as can be observed in (4) - (6).

(4) Nouns: CVCV, CV:CV, CVVCV, VCV, V:CV, VVCV, CVC<sub>1</sub>C<sub>1</sub>V, CVC<sub>1</sub>C<sub>2</sub>V,

VC<sub>1</sub>C<sub>1</sub>V, VC<sub>1</sub>C<sub>2</sub>V (V: =long vowel, VV=diphthong, C<sub>1</sub>C<sub>1</sub>=geminate, C<sub>1</sub>C<sub>2</sub>= cluster)

- a. H.H ké:lá 'kohl'
- b. M.M ēlā 'tree', ānnā 'God', mīndā 'leg'
- c. L.L wàgà 'place'
- d. H.M bá:dā 'illness', ítā 'house', ánā 'udder'
- e. H.L tá:là 'scar', sússà 'co-wife', kújǎnà 'termite', téńkà 'flea'
- f. ML sūbà 'river', ūlā 'body', tīrā 'louse'
- g. MH tōmá 'fire', tājá 'dog'
- h. LH àtǎ 'medicine', gò:má 'beard'
- i. LM ù:dā 'mouth', dàkkā 'woman', kùndā 'forehead', dzùlā 'saliva', àùggwā 'cat'

(5) Adjectives: CVCV, CV:CV, VCV, V:CV, CVC<sub>1</sub>C<sub>1</sub>V, CVC<sub>1</sub>C<sub>2</sub>V, VC<sub>1</sub>C<sub>1</sub>V, VC<sub>1</sub>C<sub>2</sub>V

- a. H.H dzíggá 'green', 'kóǎǎ 'healthy'
- b. M.M bū:rā 'spotty (color of an ox)'
- c. L.L wìdà 'silent', bà:rà 'poor', àrà 'white'
- d. H.L ǎǎ 'thin', súlā 'brown'
- e. M.L ūmmà 'black', fǎǎ 'good, beautiful'
- f. M.H bī:bá 'red'
- g. L.H mètá 'dull'

h. L.M àndā ‘big’, bàjā ‘bad’

(6) Verbs: CVCV, CV:CV, CVVCV, VCV, V:CV, CVC<sub>1</sub>C<sub>1</sub>V, VC<sub>1</sub>C<sub>1</sub>V

a. H.H súsá ‘preparing’, ífá ‘washing (cloth, utensil)’, tá:dá ‘carve’

b. M.M kālā ‘licking’, ūtā ‘vomiting’, tādā ‘erase’

c. L.L fò:dà ‘rubbing’, là:dà ‘forget’

d. H.M nínā ‘biting’, tíkā ‘hear’, mé:dā ‘swallow’, nómā ‘hide’, ótā ‘uprooting’

e. H.L núnà ‘stealing’, tábbà ‘notice’

f. M.L fādà ‘throwing’, tōllà ‘mend’

g. M.H kō:ǰá ‘hunt’, kādá ‘cross (river)’, kōllá ‘surround’

h. L.M dù:dā ‘jumping (from a higher place)’, fèrā ‘discuss’, fù:dā ‘blow’

fè:dā ‘rise’

### 6.1.3 Tonal Melodies on Trisyllabic words

The tonal melodies explored on trisyllabic words can be described in two categories. In the first category, as can be observed in (7) - (9), level, rising and falling tone melodies are illustrated. In view of stem-internal rightward spreading of level tones, the melodies in this category approximate to the nine basic tonal melodies those are clear on disyllabic words. In the second category of trisyllabic words, as will be discussed under §6.1.4.3, complex contour tones have been analysed.

(7) Nouns: CVCVCV, CVCVC<sub>1</sub>C<sub>1</sub>V, VCVCV, VC<sub>1</sub>C<sub>1</sub>VCV, VVCVCV

a. H.H.H b́arásá ‘horse’

b. M.M.M fēfēnā ‘wing’, kāfātā ‘buttock’

c. L.L.L màkàbà ‘warthog’, dàràsà ‘giraffe’, àbìnà ‘elephant’, àmàlà ‘rain’

d. H.H.M ábǰā ‘man’

H.H.HM ákúláˀ ‘armpit’, ákkúbáˀ ‘camel’

H.M.M ágālā ‘skin’

- e. H.H.L ákkámà ‘molar’  
H.H.HL nókótâ ‘marsh’, ágítâ ‘inheritance’
- f. M.M.L āinōmà ‘hippopotamus’, kōkōbà ‘blood’, kōkōṅà ‘egg’
- g. L.L.M bòbònā ‘nose’, tàràggā ‘rabbit’, ùkùnā ‘ear’

(8) Adjectives: CVCVCV, VCVCV, CVC<sub>1</sub>C<sub>1</sub>VCV, CVC<sub>1</sub>C<sub>2</sub>VCV, VC<sub>1</sub>C<sub>2</sub>VCV

- a. H.H.H ádámá ‘sharp, fierce’
- b. M.M.M dūrūfā ‘fat’, gōggōtā ‘rough’
- c. L.L.L àfàdà ‘fat, obese’
- d. H.H.HM gánjámá<sup>-</sup> ‘hard’
- e. H.H.L álabà ‘dry’  
H.H.HL fákálá ‘yellow’
- f. L.L.M tòkònā ‘right (direction)’

(9) Verbs: CVCVCV, CVCV:CV, VCVCV, CVC<sub>1</sub>C<sub>1</sub>VCV, CVC<sub>1</sub>C<sub>2</sub>VCV, CVVCVCV

- a. M.M.M sākāmā ‘rule over, dominate’, tǎggādā ‘wake’, āssādā ‘float’
- b. L.L.L lùfòdà ‘convalesce’, gòbòdà ‘drag’, tàùkàdà ‘burst’
- c. H.M.M sákkòdā ‘crush’  
H.H.HM dóródá<sup>-</sup> ‘keep, save’  
H.HM.M líkó:ḁā ‘stumble’, fímtó:ḁā ‘twist’  
H.H.ML tókkódā ‘leak’
- d. H.H.L bíkídà ‘throw’  
H.L.L sákòdà ‘hatch’, kátòdà ‘shiver’  
HL.L.L tû:gùdà ‘shoot’,  
H.HL.L fǎfô:dà ‘decorate’
- e. M.M.L sālādà ‘spread (intr), dōròdà ‘push’  
M.L.L fǎffòdà ‘change (currency)’

f. L.L.M àbèdā ‘jump’, tùṅgùdā ‘pound’

#### 6.1.4 Contour Tones

Kunama has three falling (HM, HL, ML) and three rising (MH, LH, LM) contour tones attested on bi-moraic syllables. In addition, word-final vowels are found to be contour tone licensors because of the position that attributes a phonetic length. The other contour locations are polysyllabic words where each syllable surfaces with different level tone heights, thereby giving a contour melody to the word.<sup>35</sup> In view of this, Kunama contour tones are combination of the level tones.

##### 6.1.4.1 Bi-moraic Contour Tones

All the six contour tones (HM, HL, ML, MH, LH and LM) have been analysed on heavy penultimate syllables (CV:, CVV and V:) of disyllabic words, as observed in (10 a-f). Target hosts are in bold.

(10) Disyllabic words: CV:CV, V:CV

- a. HML     **ǰó:**dà ‘blessing’, **fú:**tā ‘lung’, **lí:**lā ‘hunger, drought’
- b. HLL     **kí:**dà ‘calling, name’
- c. MLL     **dā:**dà ‘helping’
- d. MH.HM   **fú:**fá- ‘nape of the neck’, **gē:**rā- ‘tall, long’, **fí:**dâ ‘pay’, **gō:**dâ ‘plan’
- e. LH.HL    **lí:**dâ ‘see’, **ũ:**lâ ‘wild edible root’
- f. LM.ML    **ǰü:**kā ‘life’, **wà:**dâ ‘fill’, **è:**tâ ‘relative (by marriage)’

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<sup>35</sup> Pike (1948) and Yip (2002) explained that despite typological differences from language to language, contour tones are considered to be combinations of the level tones in that language unless they occur on light syllables in all word positions.

On the trisyllabic words, in (11a-c), two falling (HM, HL) and one rising (LM) contour tones have been analyzed on bi-moraic syllables.

(11) Trisyllabic words: CV<sub>1</sub>.CV.CV, CV.CV<sub>1</sub>.CV, CVC.CV.CV

- a. H.HM.M líkóː dā ‘stumble’, ʃímtóː dā ‘twist’
- b. HL.L.L tûːgùdà ‘shoot’, tɪ̀l̀l̀dà ‘complete, finish’
- c. LM.M.ML gòːgòdā̀ ‘please’

The other contour tone hosts are <sup>36</sup>heavy-closed syllables (VC and CVC) having a short vowel nucleus and a sonorant coda. As can be observed, in (12) and (13), two rising (LH, MH) and three falling (HM, HL, ML) contour tones have been on bi-moraic syllables. Each level unit tone is realized on the nucleus and on the coda so that the rhyme of the syllable gives a contour melody.

(12) Disyllabic words: VC<sub>1</sub>.C<sub>2</sub>V

- a. LH.ML ìntā̀ ‘see’
- b. HM.L táflà ‘rock’

(13) Trisyllabic words: CVC<sub>1</sub>.C<sub>2</sub>V.CV, CVC<sub>1</sub>.C<sub>1</sub>V.CV, V.CVC<sub>1</sub>.C<sub>2</sub>V, VC<sub>1</sub>.C<sub>2</sub>V.CV,

- a. HM.M.M súŋgūdā̀ ‘movement’
- b. HL.L.L tɪ̀l̀l̀dà ‘finish’
- c. ML.L.L āŋgèrà ‘spy’
- d. M.MH.M āsāŋgā̀ ‘head’
- e. LH.H.L èŋgégà ‘chameleon’,  
LH.H.HM ìŋgídá̀ ‘detour’

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<sup>36</sup> Kunama closed syllables in general are non-final.

#### 6.1.4.2 Word-final Contour Tones

Tone-bearing ability is related to weight units, i.e. the mora, and is a phonological feature (Yip, 2002:27). Thus, only if a syllable has two moras that it bears two tones, resulting in surface contours. Conversely, in Kunama contour tones have been analysed on word-final vowels that are short in underlying forms but shown up to be phonetically longer. Word-final contour formation is found to be a frequent phenomenon, for which two propositions can be forwarded. The first proposal claims that word-final vowel length is conditioned by contour tones that need two target hosts (moras). In support of this, rising contours that surface on word-initial short vowels sometimes condition an underlying short vowel to be heard as longer, for example, **ǒrá** ‘harvest (grain)’.

The second hypothesis contends that word-final vowel length might have been phonemic in diachronic phonology of Kunama, but this might have been neutralized historically, leaving its trace behind as contour tones. Concisely, Kunama word-final vowels have been invariably heard as longer so that final length contrast is assumed to be neutralized. Consider the final contours, in (14) and (15), below:

(14) Disyllabic words: CVCV, CV:CV, CVVCV, CVC<sub>1</sub>C<sub>1</sub>V, VCV

a. HM bá:dá<sup>ˀ</sup> ‘raid’, bíbá<sup>ˀ</sup> ‘carrying (child on back)’, kǎfǎ<sup>ˀ</sup> ‘faeces’

b. HL túkkâ ‘gun’, kō:jǎ ‘hunting’, sé:dâ ‘track’, kǎ:sâ ‘abdomen, belly’

kǎlâ ‘gossip’, músâ ‘fold’, tǎkâ ‘knowledge’, āgâ ‘navel’, ājǎ ‘old (not new)’

c. ML gǎ:lǎ ‘bellows’, fōidǎ ‘whisper’, jǎbǎ ‘squeezing’

(15) Trisyllabic words: VCVCV, VC<sub>1</sub>C<sub>2</sub>VC<sub>1</sub>C<sub>2</sub>V, CVC<sub>1</sub>CV<sub>1</sub>CV

a. HM ākámá<sup>ˀ</sup> ‘incubate’

b. HL ĩ:gídâ ‘environment’

c. ML tókkódǎ ‘leak’

### 6.1.4.3 Complex Contour Tone Melodies

Complex contour tones are convex and concave tones resulting from combinations of two or more level tones on polysyllabic words (Yip, 2002:27). In Kunama, such contour tones are observed on di- and tri-syllabic words. On disyllabic words, complex contours often result from combination of simple contour tones across two heavy syllables. These combine rising contours surfacing on bi-moraic penult syllables followed by falling contours on word-final syllables. On trisyllabic words, complex contours rather are combination of two or more level tones in such a way that at least two adjacent syllables essentially surface with two different level tones. I have not attested complex contours surfacing on single heavy syllables, although tri-moraic syllables do exist in this language. As a result, such melodies are better to be referred as complex tonal melodies rather than as complex contour tones; melodies are said to be assigned at the word level.

On disyllabic words, as can be observed in (16 -a, -c and -f), the complex contours are convex tones so that they follow rising-falling pattern. The rising contours (MH, LH, LM) surfacing on bi-moraic penult syllables followed by falling contours (HM, HL, ML) on final syllables.

- (16) a. MH.HM    fū́:fá̄ ‘nape of the neck’, gḗ:rá̄ ‘tall, long’  
b. MH.HL    gṓ:dâ ‘plan’, fí́:dâ ‘pay’  
c. LH.HL    lí:dâ ‘see’, ù:lâ ‘wild edible root’  
d. LH.HM    ù:dá̄ ‘wood’  
e. LH.ML    ìntā̀ ‘see’  
f. LM.ML    fò̄:râ ‘squirrel’, wà̄:dā̀ ‘fill’, è̄:tā̀ ‘relative (by marriage)’  
            kà̄:tā̀ ‘fetuses’

In all the examples given in (16) above, except (16-e), the high or the mid tones of the final falling contours is a result of spreading of the rise, initially. Following the same rising-falling pattern, however, contour sequences may not always have the same initial

and final pitch targets. For example, in (16-a,-c and-f), contour sequences occur in a metathesis fashion, whereas, in (16 -b and-d), the lowest pitch points of the initial rising contours and the final falling contours are different. In (16-e), the LH rising contour on the initial syllable rather ends as a ML fall on the final syllable, and this can be considered as a phonetic phenomenon of declination that shows a gradual fall in the high tone pitch, as the initial rise spreads rightward stem-internally.

On trisyllabic words, the complex contours rather are combination of two or more level tones. In reference to the tones surfacing on the penult syllables, the complex contours take three different patterns; these are, rising-falling, falling-rising and falling-rising-falling. While the rising-falling pattern is parallel to the complex contour tones surfacing on the disyllabic words given in (16) above, the rest two patterns have been observed only on a few trisyllabic words. Thus, due to lack of stronger evidence, these patterns are tentatively posited in (Table-22). Except for the rising-falling pattern, as in (18), the rest two complex contour tone patterns, in (17 and 19), have been analysed only on verbs. The pattern, shown in (20), takes a more complex form, and it is observed only on one trisyllabic word, so such deviant pitch phenomenon is hoped to be clarified by future studies.

(17) Falling-rising (concave)

- a. H.L.M gíjídā ‘rub’
- b. M.L.M gūñgùlā ‘roll’, sākàdā ‘breathe’

(18) Rising-falling (convex)

- a. M.H.M tāggímā ‘heavy’, mōñgólā ‘crooked’, jīgídā ‘animal’  
M.H.HM ākámá<sup>-</sup> ‘incubate’
- b. M.H.L āntórà ‘bald’, tōkómà ‘warm, hot’, fānákà ‘season’  
M.M.HL āmādā ‘baboon’
- c. L.H.L tòjímà ‘wet’

(19) Falling-rising-falling

- H.L.HL bálà!sà ‘extinguish’

In contrast to the convex and concave contour patterns, a different sequence of tones has also been analysed on some polysyllabic words given in (20) below. This patterns combines the three tone levels on trisyllabic words, as in (20-b), whereas, on disyllabic words, an initial long contour fall and a final low tone have been observed, as in (20-a). The phenomena in both words may also be considered as pitch declination; the initial high tone pitch falls to the mid tone pitch range and then to the low tone pitch range, thereby taking a falling-falling (H.M.L) pattern.

(20) Falling-falling

a. H.M.L    ʃóːdà ‘blessing’

b. H.M.L    úgùdà ‘shake (milk)’, íggìgà ‘hiccough’

**6.1.5 Acoustic Evidence for Basic and Complex Tone Melodies**

Below, in (Figure 20-41), are sample pitch traces of the basic and the complex surface melodies discussed so far. The pitch traces may help to see the surface combinations of the distinctive tone levels (high, mid and low).

**(i) Basic Tonal Melodies**

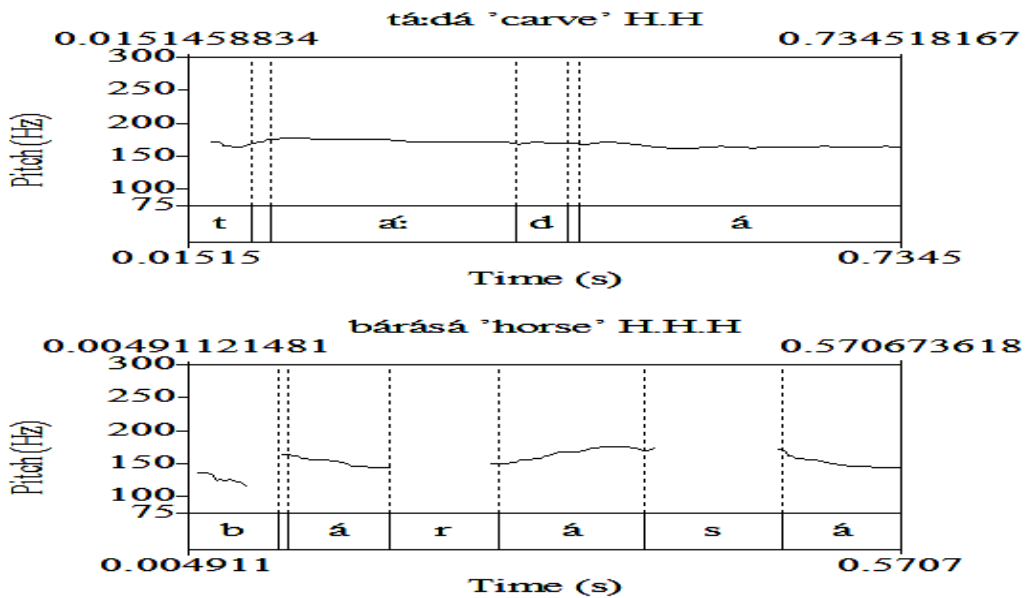


Figure 20 Pitch traces for level high tone

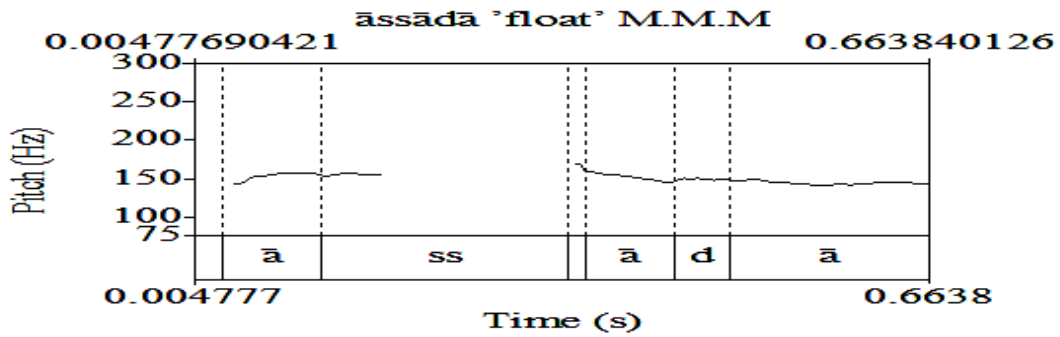
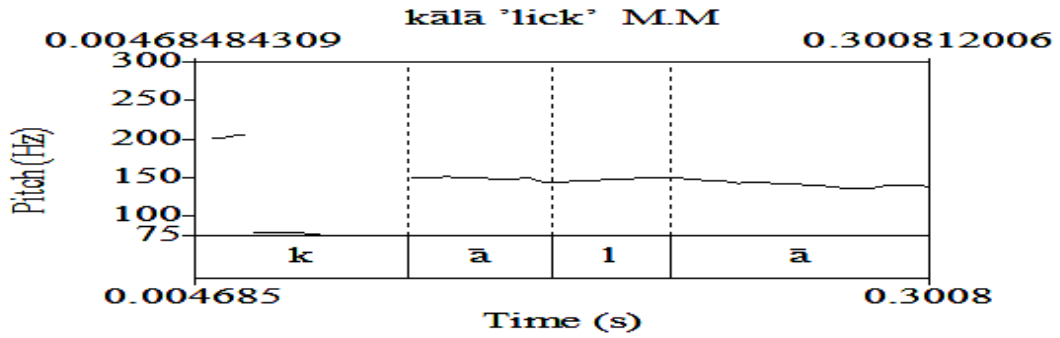


Figure 21 Pitch traces for level mid tone

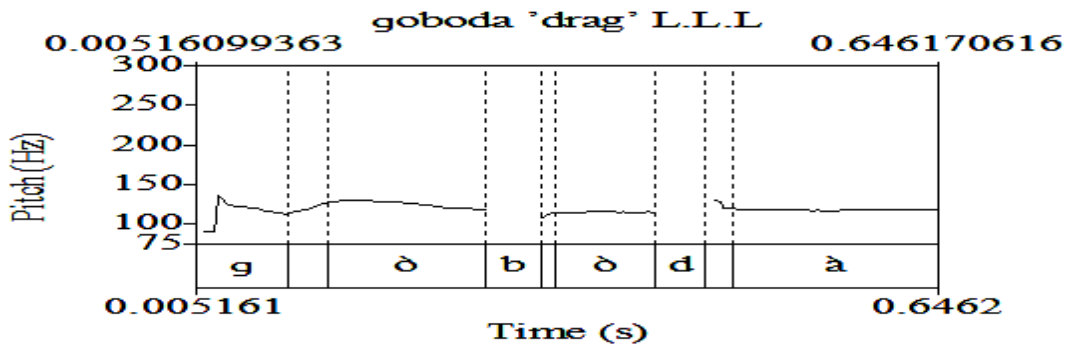
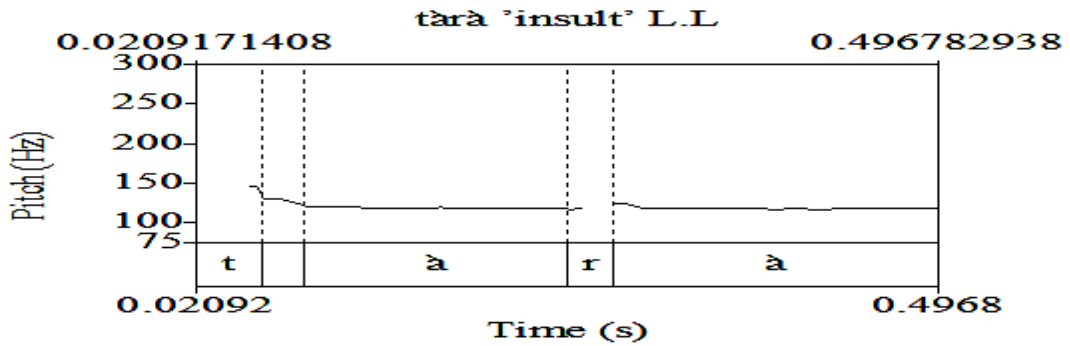


Figure 22 Pitch traces of level low tone

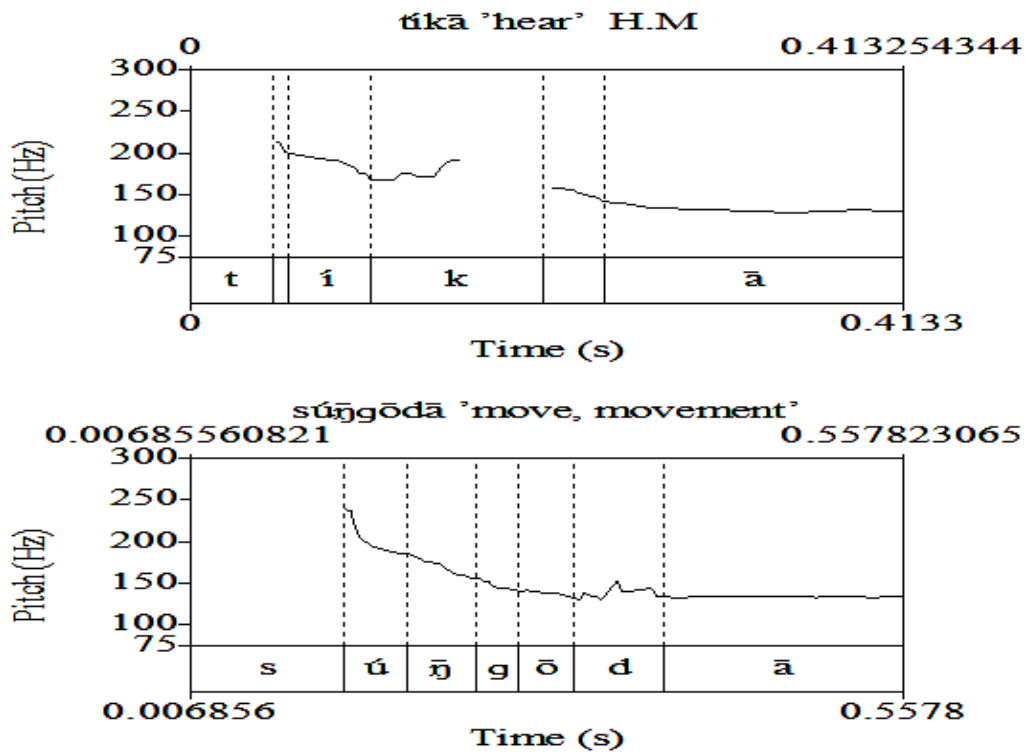


Figure 23 Pitch traces for H.M falling contour melody on polysyllables

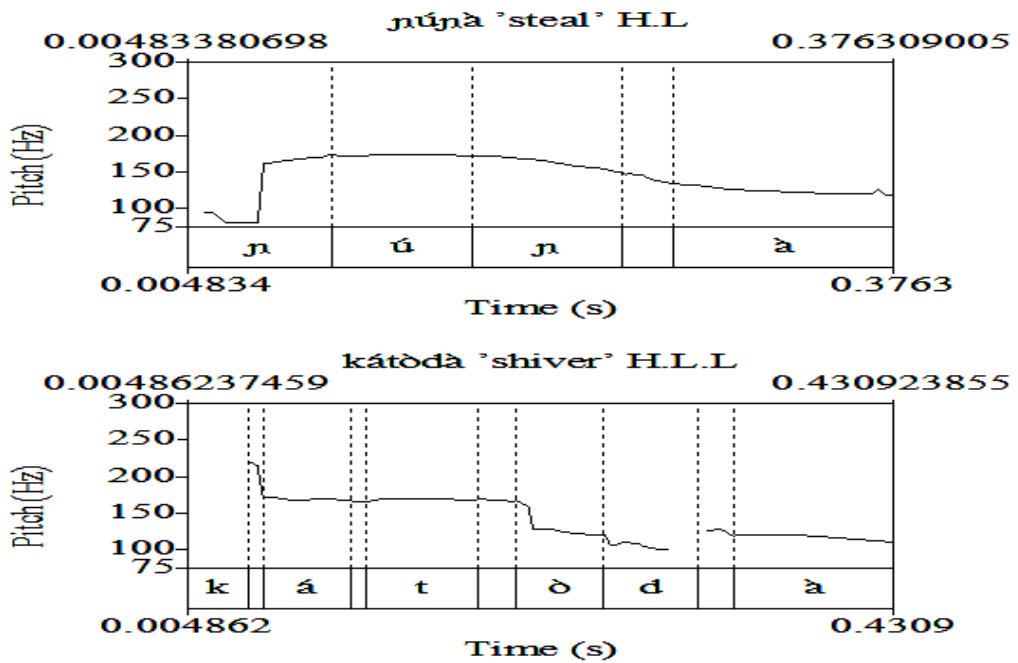


Figure 24 Pitch traces for H.L falling contour melody on polysyllables

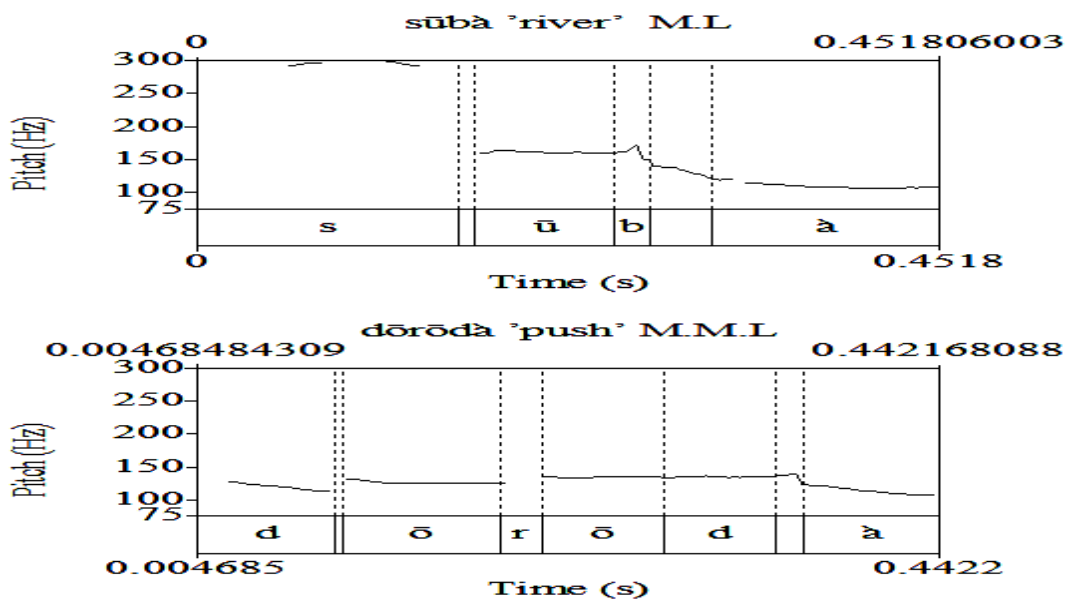


Figure 25 Pitch traces for M.L falling contour melody on polysyllables

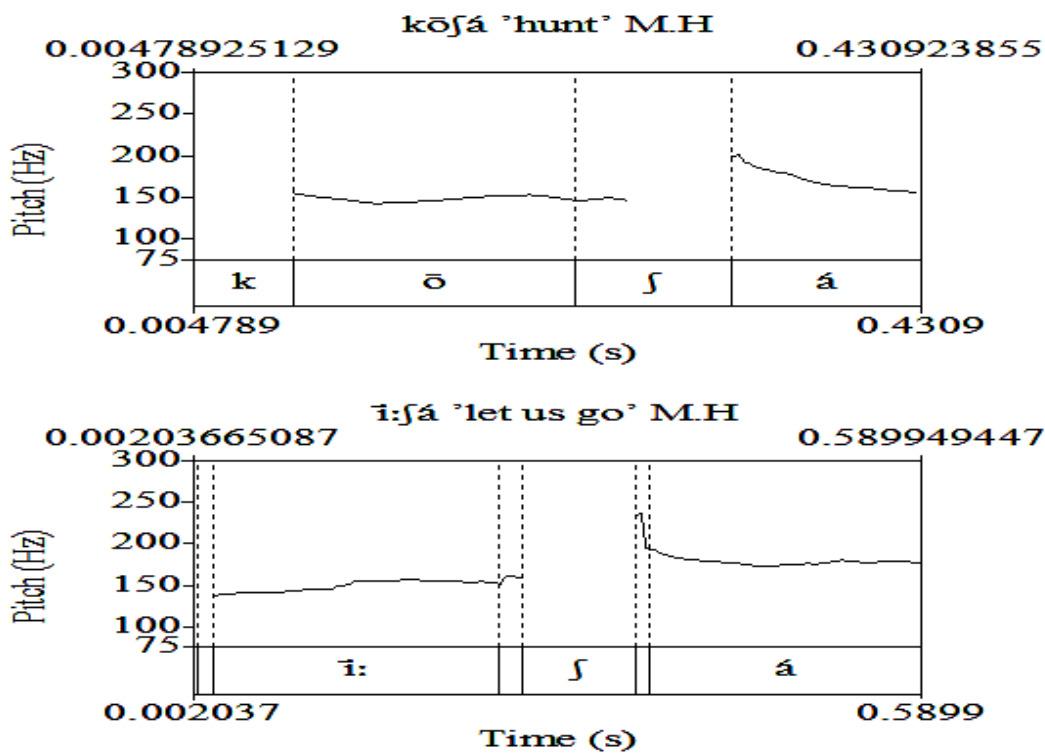


Figure 26 Pitch traces for M.H rising contour melody on polysyllables

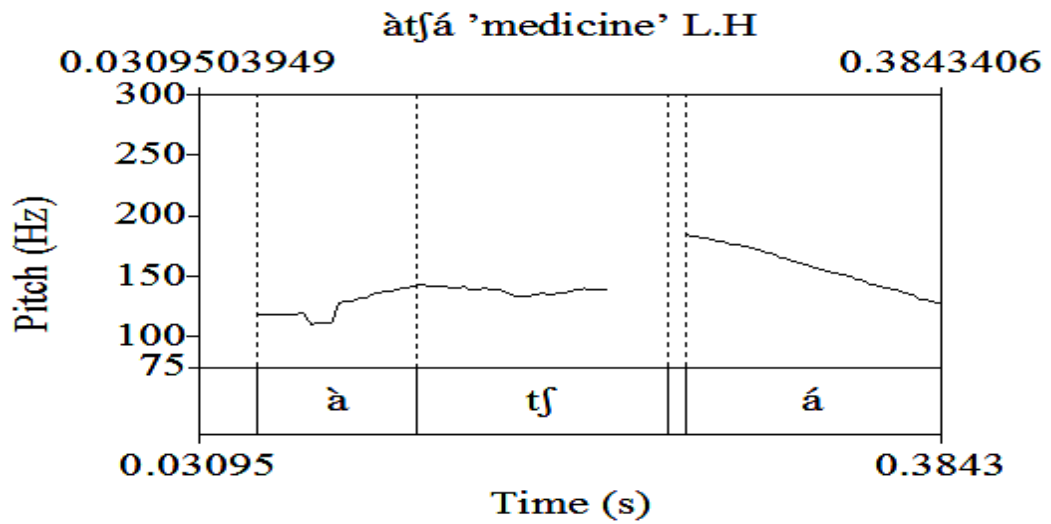


Figure 27 Pitch trace for L.H rising contour melody on polysyllables

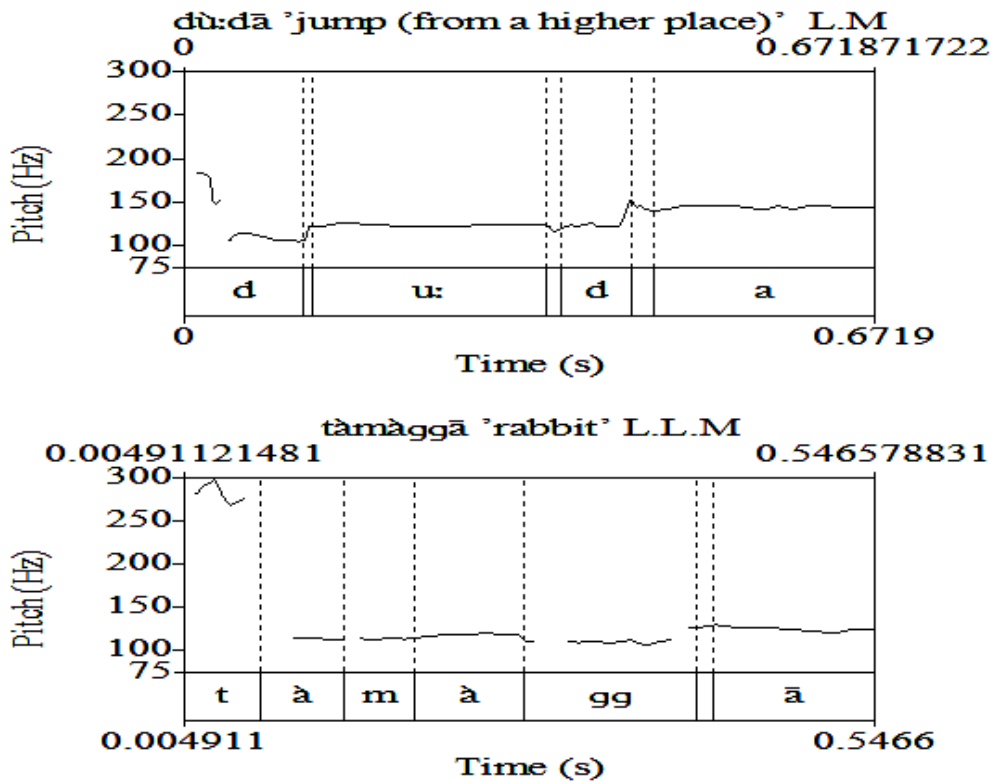


Figure 28 Pitch traces for L.M rising contour melody on polysyllables

**(ii) Complex Contour Melodies**

As has been discussed before, under §6.1.4.3, nine complex contour melodies (M.H.M, L.H.L, L.M.L, M.H.L, L.H.M, L.H.ML, H.L.M, M.L.M and H.L!HL) have been analysed on disyllabic words that have heavy syllables and on trisyllabic words. Sample pitch traces for these melodies are presented in (Figure 29-35). In obtaining the permissible melodic patterns, rightward spreading of tones (stem-internally) is used as a way out. This in turn helps to claim for the effectiveness of the OCP in the alignment of Kunama complex contour melodies. For instance, the MH.HM sequence surfacing on disyllabic words becomes permissible in view of the rise spreading so that it equates to the M.H.M sequence surfacing on trisyllabic words.

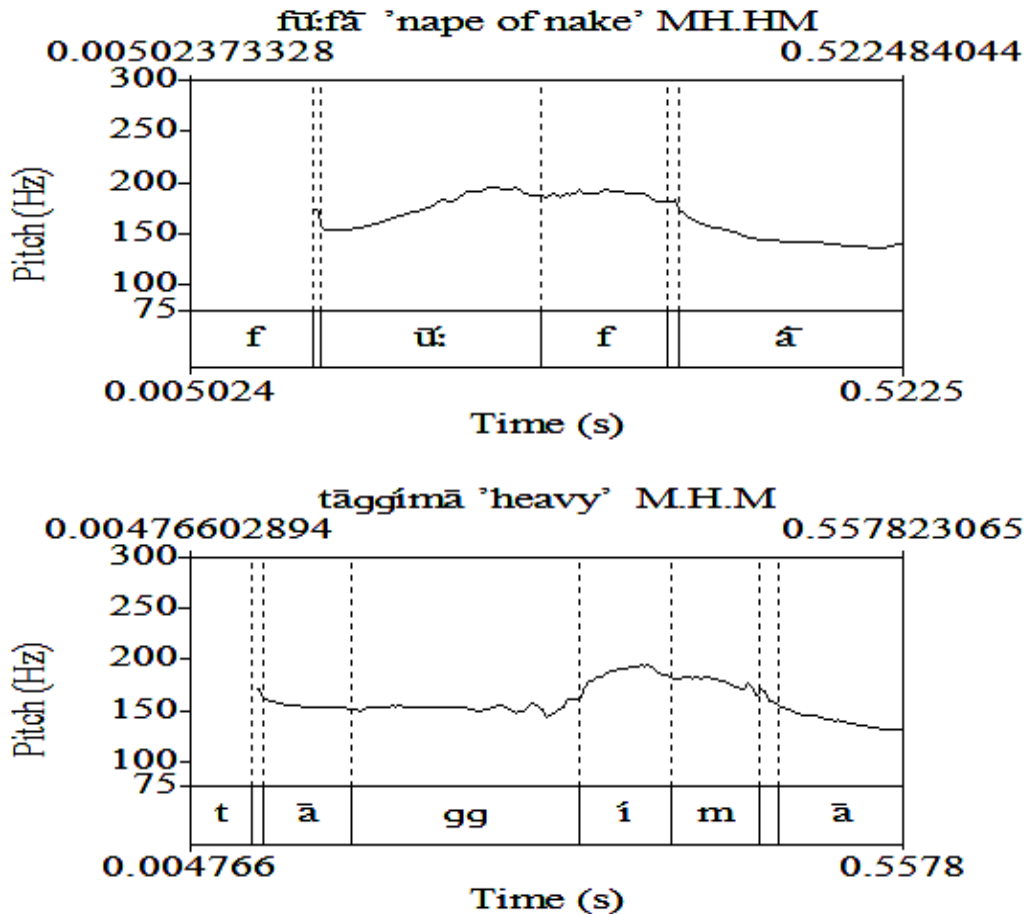


Figure 29 Pitch traces for M.H.M melody

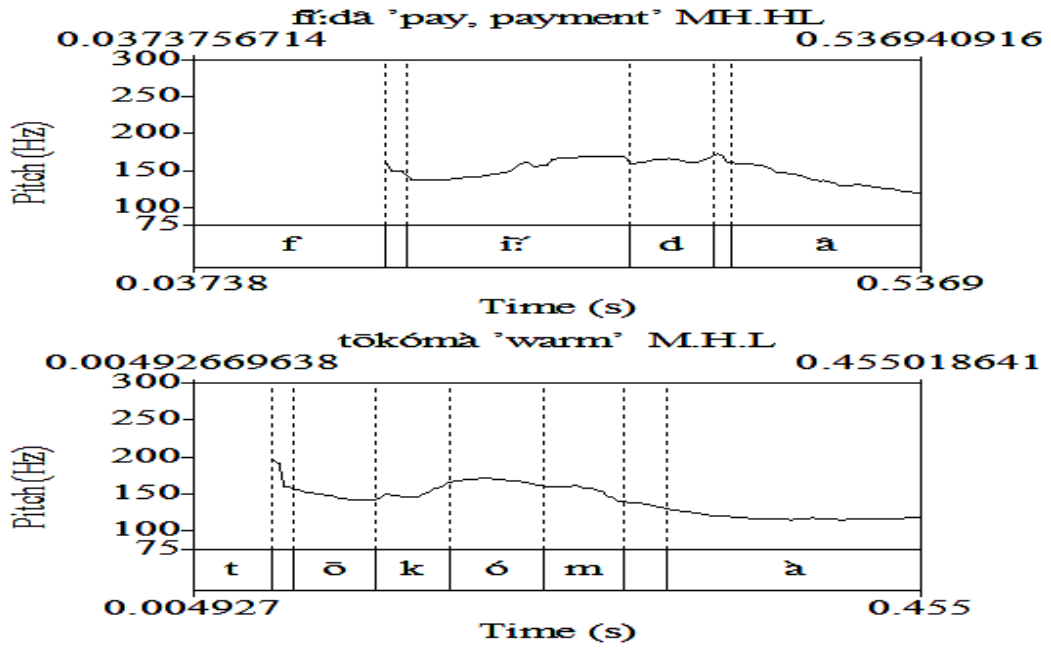


Figure 30 Pitch traces for M.H.L melody

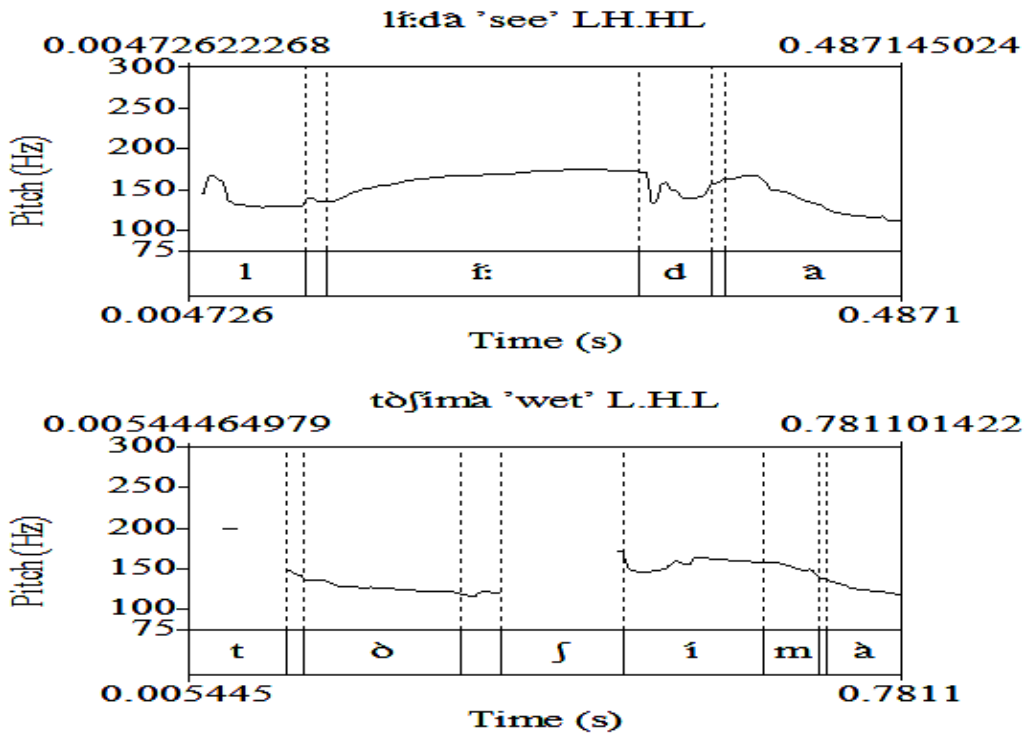


Figure 31 Pitch traces for L.H.L melody

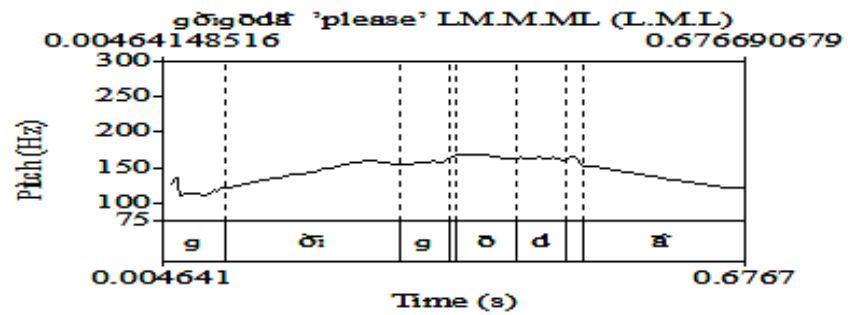
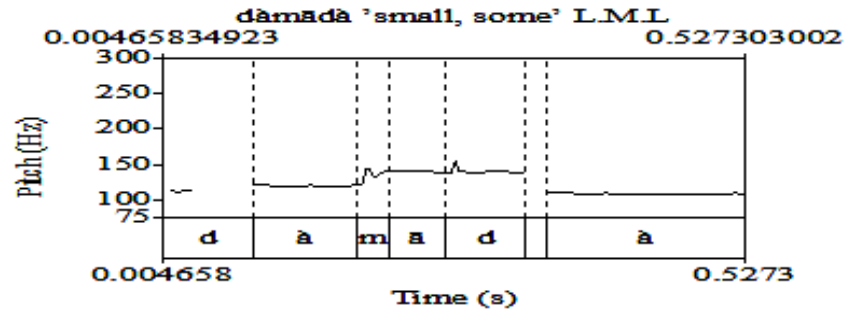
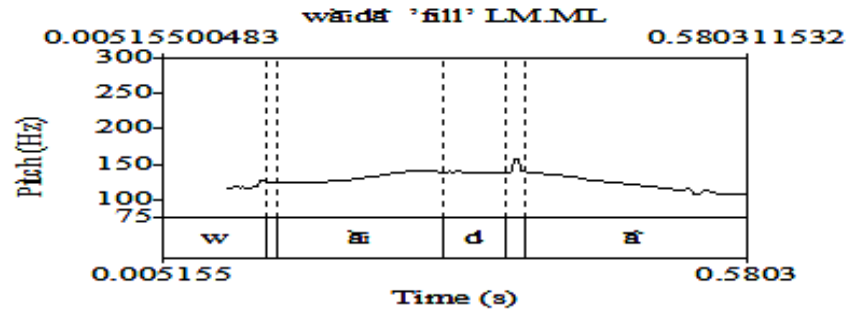


Figure 32 Pitch traces for L.M.L melody

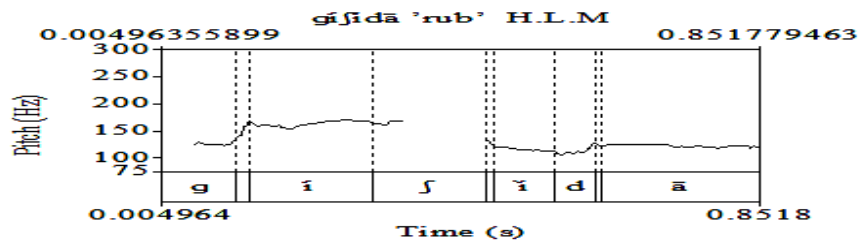
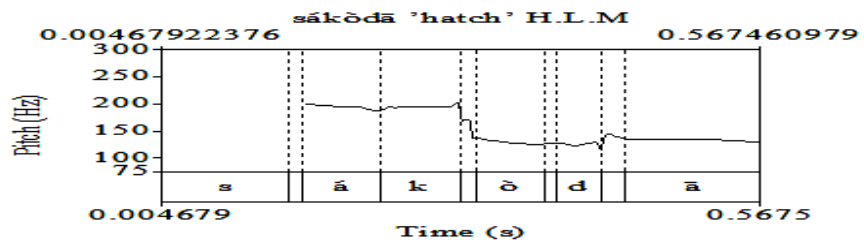


Figure 33 Pitch traces for H.L.M melody

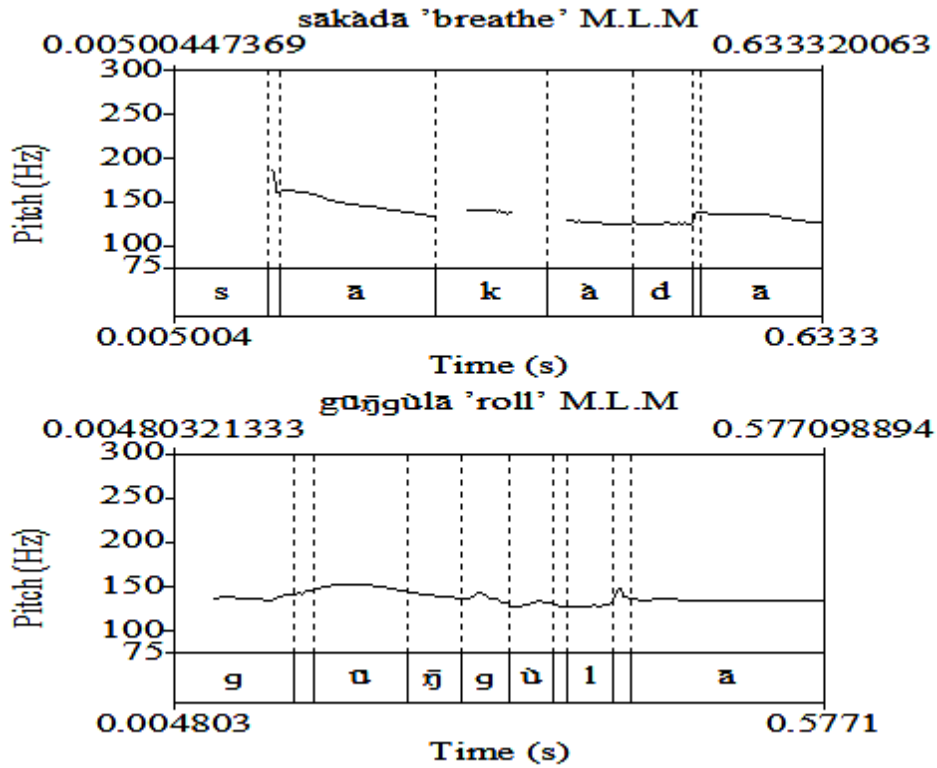


Figure 34 Pitch traces for M.L.M melody

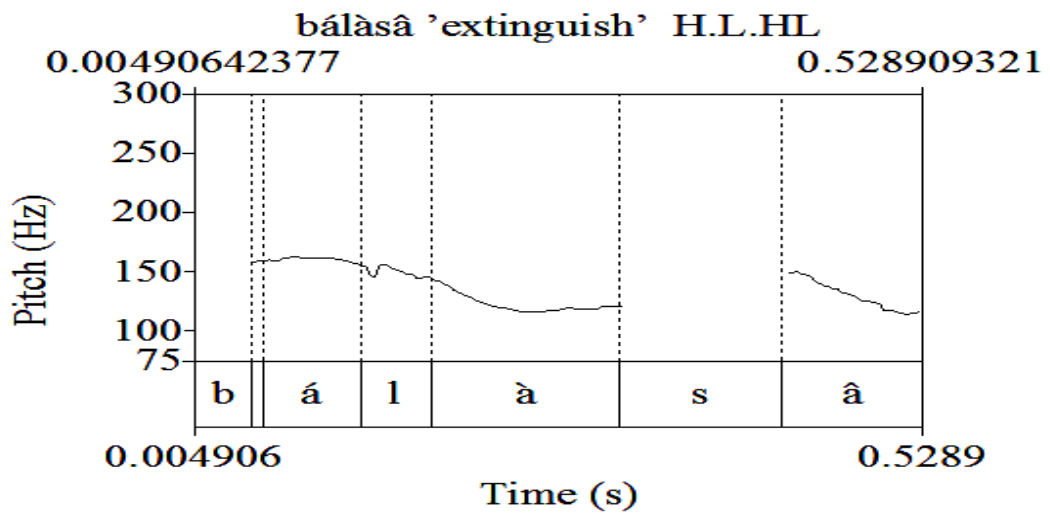


Figure 35 Pitch trace for H.L.HL melody

The complex melodic pattern, in (Figure-35), is found to be a seeming exception to the ill-formed sequences that combine two adjacent contours of the same shape. The H.L.!HL pattern has not been analyzed elsewhere. To make the phenomenon worse, this melody is even more complex than those complex melodies displayed above, in (Figure 29-34), because this deviant surface tone melody takes falling-rising-falling pattern. However, this has been analysed only on one trisyllabic verb so that stronger evidence is required to check its permissibility. On the other hand, in view of the high distribution of the mid tone, it is less likely for Kunama to have lexical high downstep. Thus, the final !HL would make a ML falling.

(iii) Contour tones surfacing on single bi-moraic syllables

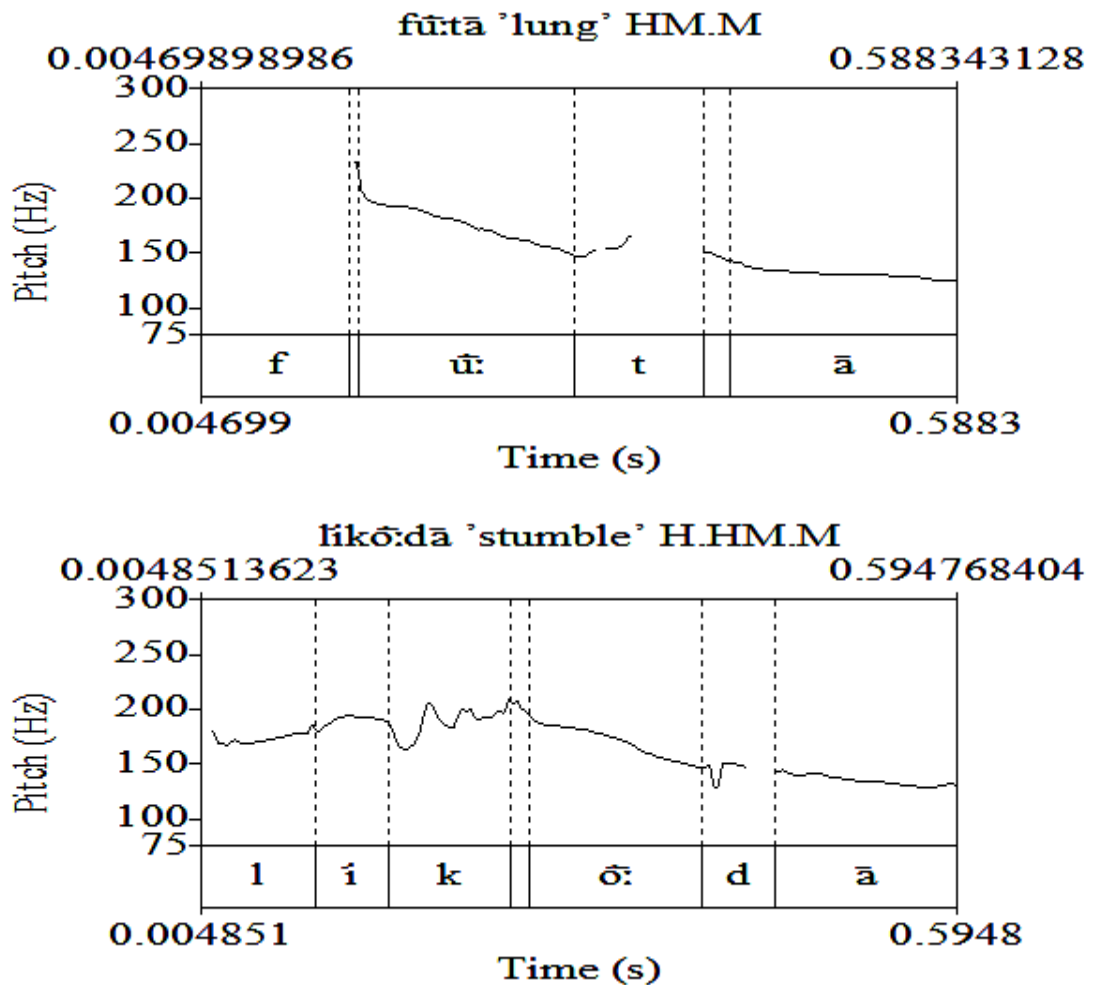


Figure 36 Pitch traces for HM falling contour

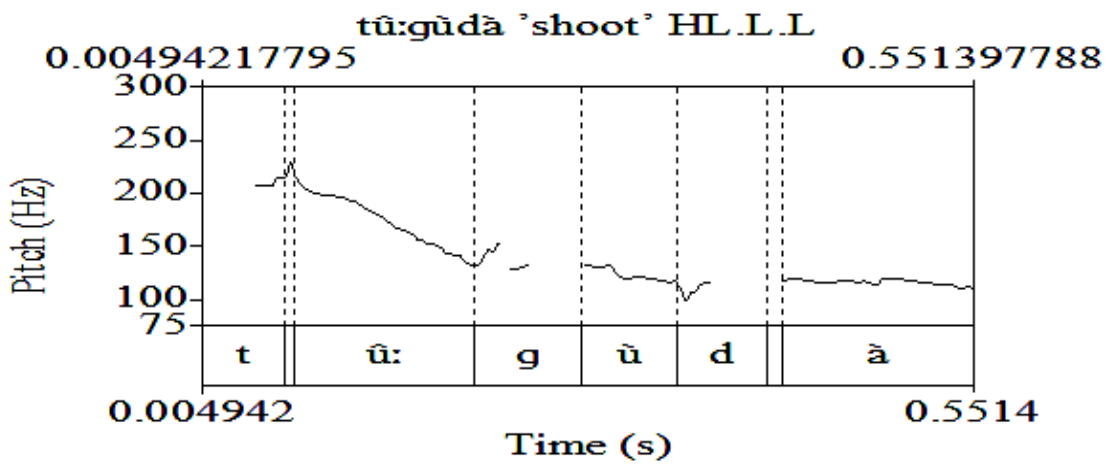
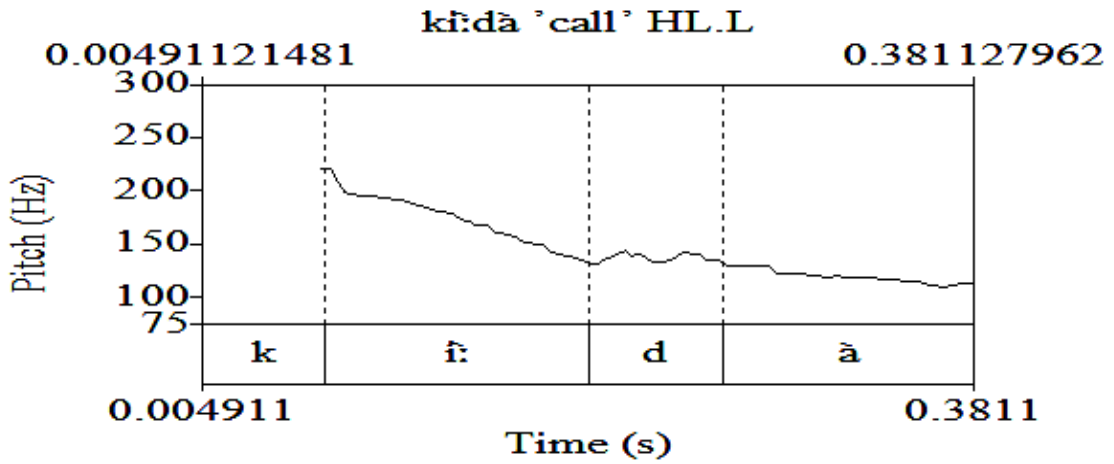


Figure 37 Pitch traces for HL falling contour

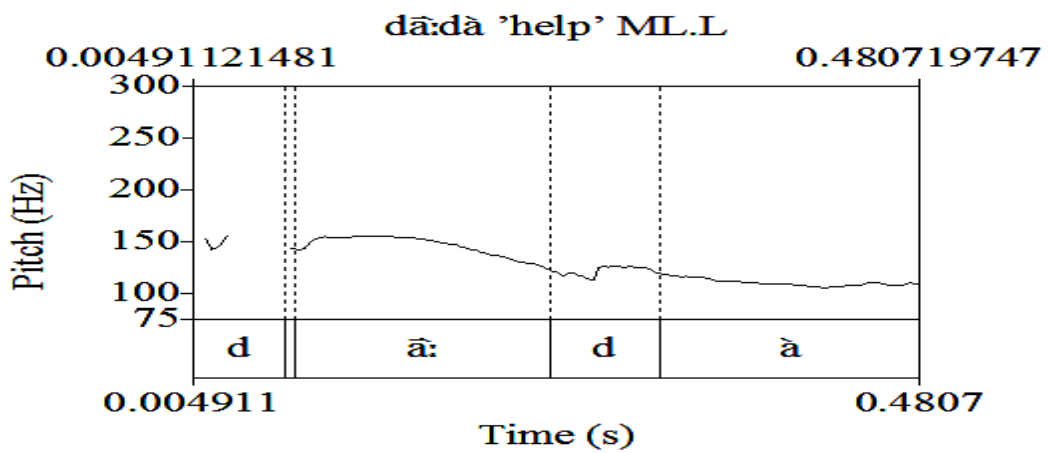


Figure 38 Pitch trace for ML falling contour

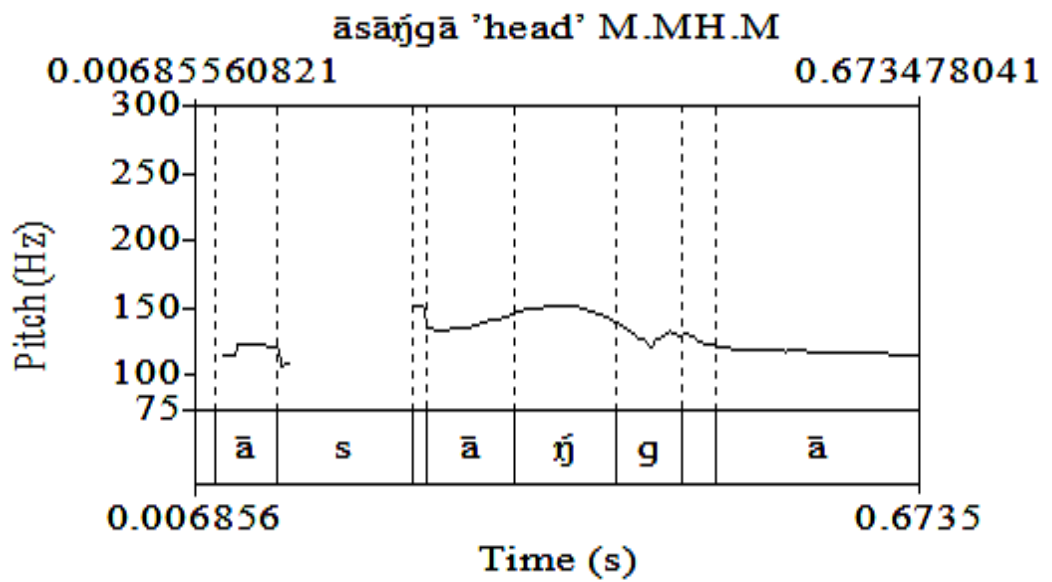
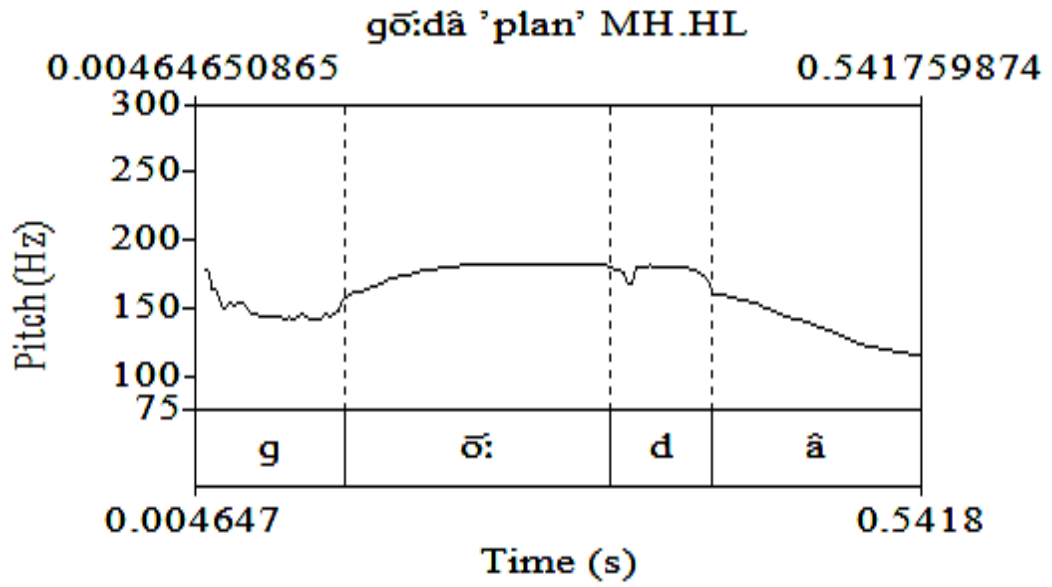


Figure 39 Pitch traces for MH rising contour

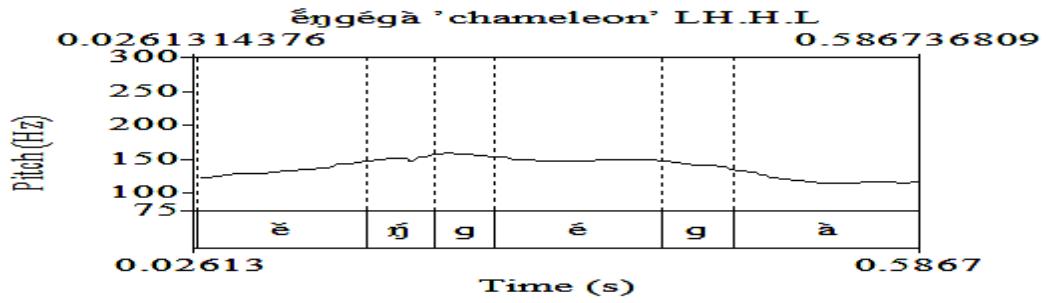
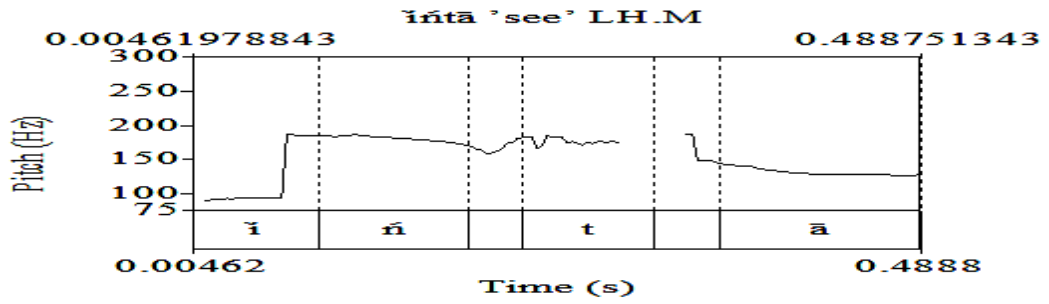


Figure 40 Pitch traces for LH rising contour

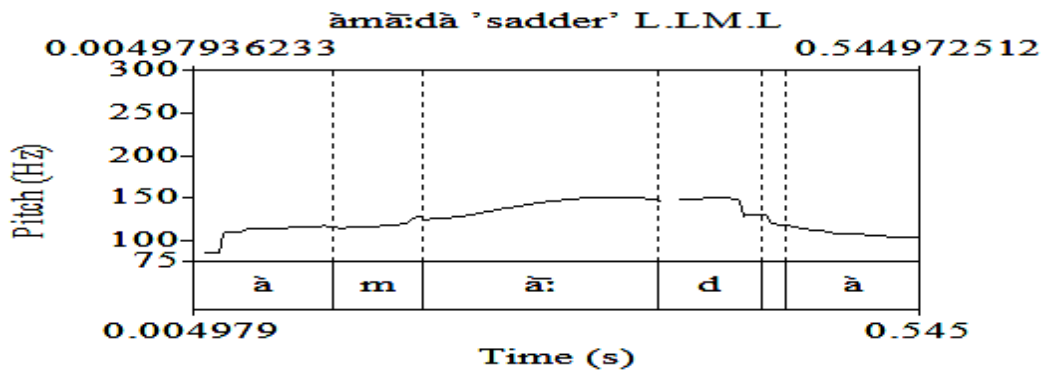
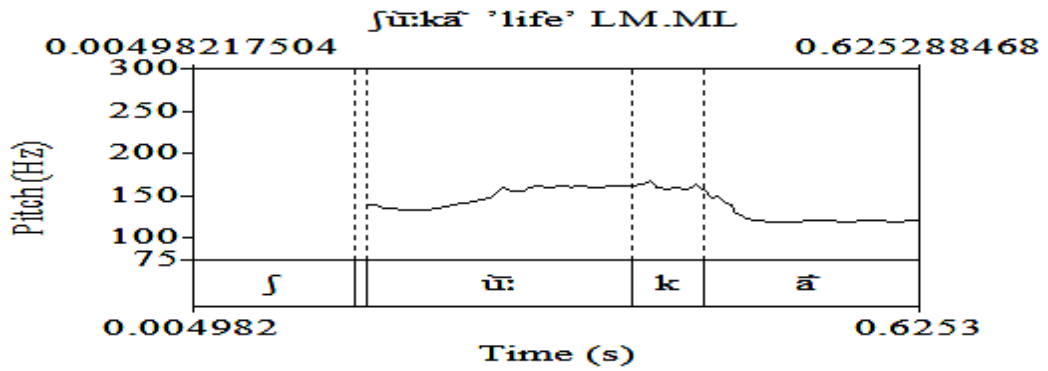


Figure 41 Pitch traces for LM rising contour tone

## 6.2 Lexical Meaning Contrast

The minimal pairs and triplets given below, in (21-25), confirm the prominence of tone to distinguish lexical meaning. These are screened from 48 complete minimal sets that comprise of mono-, di- and tri-syllabic major class words.<sup>37</sup> All words are citation forms said in isolation. It has been tried to control vowel length and gemination in all of these pairs, but stress is beyond the present scope though no evidence is found to show distinctive stress to the level of this analysis. Ultimately, minimal pairs for a two-way tone contrast are relatively common, whereas, finding minimal triplets showing a three-way tone contrast rather is difficult and is reasonable in view of other contrastive prosodies in the language.

### Minimal triplets

(21) Monosyllables: CV

a.	HM	bá <sup>ˉ</sup>	copulate, ploughing
	M	bā	dance
	L	bà	pit
b.	HM	wá <sup>ˉ</sup>	entering
	M	wā	eye
	L	wà	leaving off
c.	HM	sá <sup>ˉ</sup>	closing
	M	sā	exiting (from a house)
	L	sà	giving

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<sup>37</sup> Kunama citation forms are nominals with the singular nominal suffix /a/

(22) Disyllables: V.CV, CV:CV, V:.CV

a.	H.M	ánā	udder
	M.M	ānā	song
	L.M	ànā	hair
b.	H.HM	dá:dá <sup>-</sup>	separating
	ML.L	dā:dà	helping
	L.M	dà:dā	bead
c.	MH.HM	sā:sá <sup>-</sup>	wide
	M.H	sā:sá	learning
	L.M	sà:sā	telling
d.	H.HM	í:fá <sup>-</sup>	outside
	M.H	ī:fá	let us go
	L.M	ì:fā	brother/sister

### Minimal Pairs

(23) Monosyllables: CV

*/H/ vs. /M/*

a.	HM	ká <sup>-</sup>	to hate
	M	kā	taking

*/M/ vs. /L/*

b.	M	fā	cabbage
	L	fà	burying

(24) Disyllables: V:·CV, V·CV, CV·CV, CV:·CV, CVV·CV, CVC<sub>1</sub>·C2V

*/H/ vs. /M/*

a.	H.M	é:tā	hawk
	LM.ML	è:tā̀	relative by marriage
b.	LH.HL	ũ:lâ	wild edible root
	M.HM	ũ:lầ	locust
c.	H.M	ótā	uprooting
	M.M	ōtā	thorn
d.	H.HM	ǰūdầ	milking
	M.M	ǰūdâ	wither
e.	MH.HM	mā:rầ	bile
	M.M	mā:râ	leader, guide
f.	H.HM	búrầ	to pierce
	M.HL	būrâ	satiety (of food or drink)
g.	H.HM	sú:sầ	soup (of meat)
	M.HL	sū:sâ	standing
h.	LH.HM	ōrầ	harvesting (grain)
	M.M	ōrâ	circle, round
i.	H.ML	fúlầ	peanut
	M.M	fūlâ	crunching

*/H/ vs. /L/*

j.	HM.L	fó:ḗdà	blessing
	L.L	fò:dà	rubbing
k.	H.M	lí:lā	hunger, drought
	L.L	lì:là	oil
l.	H.HM	bádá <sup>-</sup>	thigh
	L.L	bàdà	back (body part)
m.	H.H	kóítá	leopard, tiger
	L.M	kòitā	lean against
n.	H.H	ké:lá	kohl
	L.M	kè:lā	guest
o.	MH.HL	kāílā	parrot
	L.L	kàilà	fear (n)
p.	H.HL	kúndā	salt
	L.M	kùndā	forehead
q.	LH.HL	lǐ:dā	see
	L.M	lì:dā	antelope

*/M/ vs. /L/*

r.	M.M	lā:fā	catching (an object in air)
	L.M	là:fā	gruel

s.	M.M	fā:lā	cheek
	L.M.L	fā:là	saying, proverb
t.	M.M	'mōkkā	lion
	L.L	mòkkà	mollusk
u.	M.HM	kōlá <sup>ˉ</sup>	crow
	L.L	kòlà	preventing
v.	M.HL	kōmā	to love
	L.M	kòmā	stamp (with one's foot)
w.	M.H	kō:ǰá	hunting
	L.M	kò:ǰā	washing (one's body)

(25) Trisyllables: CV.CV.CV, V.CV:..CV

*/H/ vs. /M/*

a.	H.H.HL	kébésâ	a baby (that stops suckling in a near past)
	M.M.M	kēbēsā	relative (by blood)
b.	H.H.HM	kófúlá <sup>ˉ</sup>	credit
	M.M.HL	kōfûlâ	smear (tr)

*/M/ vs. /L/*

c.	M.L.M	sākādā	breathe
	L.L.M	sākādā	divorce (v)

d.	M.H.M	ʃĩgídā	animal
	L.L.M	ʃigìdā	trap (n)
e.	M.M.M	kāfātā	buttock
	L.L.L	kàfòtā	below
f.	M.M.HM	āmā:dá̃	baboon
	L.LM.L	àmā:ḍà	sadder

Based on the present analysis on lexical tone and the minimal sets given above, in (21-25), lexical meaning is distinguished by the pitch height difference on the initial syllables of words. In the surface phonology, however, the phonemic tone level heights combine in nine ways, thereby giving a range of surface melodies.

### 6.3 The Phenomena of Pitch Height Fluctuations

In the course of the impressionistic analysis, pitch height threshold points are imagined for the three distinctive heights within a speaker's vocal range. These threshold points are used as reference frames to judge the pitch height interval fluctuation on each of the distinctive tone heights.<sup>38</sup> On this account, the high tone has been heard in an extra-high and high pitch ranges though the phenomenon varies across speakers and other contextual factors. In the perceptual pitch space, while the extra-high pitch is perceived to be far beyond the hypothetical pitch threshold point, the high pitch is supposed to happen proximal to the threshold point. The pitch dispersion phenomenon becomes clear in listening to complete minimal sets; the following sets, in (26-30), were recorded from speaker-3. The extra-high pitch is indicated by putting an exclamation mark before the target syllable, i.e. the penult syllable.

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<sup>38</sup> Connell et al (2000:33) reported that, "Investigations into factors relating to pitch scaling would constitute important work..."

- (26) a. H.HM    ɿbádáˀ ‘thigh’  
       b. H.M     bá:dā ‘illness’  
       c. M.M     bāddā ‘above, up’  
       d. L.L     bàdà ‘back’
- (27) a. MH.HM    ɿmā:ráˀ ‘thigh’  
       b. H.HM     máraˀ ‘menstruation’  
       c. M.M     mā:rā ‘leader, guide (n)’
- (28) a. H.HM    ɿsú:sáˀ ‘soup (of meat)’  
       b. H.H     súsá ‘preparing’  
       c. H.L     sússà ‘co-wife’  
       d. M.HL    sū:sâ ‘standing’
- (29) a. H.HM    ɿi:ǰáˀ ‘outside’  
       b. H.H     ǰǰá ‘washing (clothes, utensils)’  
       c. M.H     ī:ǰá ‘let us go’  
       d. L.M     ì:ǰā ‘brother/sister’

In a minimal set where the two high pitches happen to be active, lexical contrast is often marked by vowel length or gemination, for example, in (26) above, ɿ**bádáˀ** ‘thigh’ vs. **bá:dā** ‘illness’. Yet, the high tone in the former is heard with an extra-high pitch and the latter surfaces with a high pitch so that they are at surface contrast.

In spite of the high frequency of the extra-high pitch, no evidence is found to show its prominence in distinguishing lexical meaning. Thus, such pitch height changes over the same high tone are claimed to be a phonetic phenomena, which can be triggered by different factors. First, by the size of a minimal set, i.e. when the number of contrastive entries are larger than the number of the underlying distinctive level tone heights (H, M, L), native speakers have been observed while going back and pronouncing entries by re-adjusting pitch height scales. Second, by the number of contrastive heights, the pitch perception for the same underlying tone is different in two-way height contrast vs. in three-way height contrast. The third conditioning factor for the pitch height fluctuation on the same underlying tone can be related to speaker’s hyperactive production while pronouncing entries with closer meanings with an intention of pronouncing them differently.

On the other hand, in the monosyllabic sets given in (30) below, the extra-high pitch on (21a) is shown to be in surface contrast to the high pitch on (21-b and-c). But, in view of the absence of final length contrast, it seems difficult to draw the suprasegmental pattern that distinguishes the three words.

- (30) a. HM    ɿtá<sup>-</sup> ‘breaking’  
      b. HM    tá<sup>-</sup> ‘to fold’  
      c. HM    tá<sup>-</sup> ‘to slaughter’  
      d. M     tã ‘building’

#### 6.4 Distribution of Tones and Allotones

It has been discussed that Kunama has three distinctive tone levels that combine in <sup>39</sup>nine ways on the surface of polysyllables and bi-moraic syllables. While the tone levels occur on any syllable (light, heavy), contour tones occurs only on heavy syllables, which in Kunama are bi-moraic with V:, CV:, CVC, VV and CVV shapes. On surface forms, high-level tone is found to be less frequent than the mid and low-level tones, depending on word contexts of different length. For instance, the high tone on the surface of monosyllabic (CV) words shows a big drop in pitch; whereas, the mid and low tones on the same context are typically level. A surface level high tone rather is common on disyllabic words. On trisyllabic words and on word utterance-final position, the level high tone is unstable. In a sequence of high tones, the second H tone often shows some degree of lowering in pitch than the first. On the other hand, the recurring phenomena of the high tone fall on word-final syllables might need a check by eliciting words in a frame (a carrier sentence). The present study does not use a frame during lexical elicitation for the reason that was beyond the control of the researcher.

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<sup>39</sup> Connell et al (2000) posited a seven way potential of combining the three level tonemes. The present study adds LH and LM rising contour tones.

The distribution of falling contours, in general, is found to be higher than the distribution of rising contours. Among the falling contours, HM falling is more frequent than the HL falling. In relative terms, the MH rising contour tone has showed high distribution than the LH rising contour tone. On word-final syllables, rising contour tones are found to be rarer, except a few monosyllabic (CVV) words that surface with LM and MH rises. However, rising contour melodies are common on polysyllabic words that have sequences of light syllables. On a sequence of two light syllables, L.H rising melody is rarer.

The distribution of polysyllabic convex contour melodies (rising-falling) is higher than the distribution of polysyllabic concave contour melodies (falling-rising). These complex contours often occurs on CV:CV and V:CV sequences and on trisyllabic words. The most serious distributional restriction bans sequences of same shape contour tones. For example, HM.HM\* and MH.MH\* are ill formed. In the present analysis, a seeming exception to such marked sequences is observed on one trisyllabic verb surfacing with H.L.!HL pattern, as can be observed in (19) above. On this word, the final high tone is downstepped in the presence of an overt trigger, i.e. the low tone on the penult syllable vowel. This may provoke further investigation to check the presence of downstep in longer utterances.

## **6.5 Instrumental Analysis of Pitch**

This experiment aims to bring an instrumental data and elaborate the discussion on the phonemic tone levels and the surface melodies. It also helps to substantiate the claims made based on the impressionistic analysis. Perceptual decisions are relative so that, for instance, a pitch height regarded as low tone in one language or linguist would be considered for the mid tone otherwise. “Pitch in a language’s tone system is always relative and never absolute” Pike (1948:vi). Thus, to enhance the validity of perceptual decisions, experimental studies are often considered supportive. In this regard, fundamental frequency (henceforth  $F_0$ ) has been taken as the most agreed phonetic cue used by many in identifying the tone heights in a given language. Though there is no complete agreement among tonologists with regard to the validity of  $F_0$  as indicator of tone and as  $F_0$  interpretations are relative, it still is the most agreed phonetic equivalent of linguistic tone. Notwithstanding the commonly raised concern on the validity of  $F_0$ , tonologists, such as, Hyman (2010), Gussenhoven (2004), Yip (2002), Fox (2000), Bao (1999), Goldsmith (1976) and Pike (1948) suggest that  $F_0$  is the most agreed pitch indicator cue. “ $F_0$  is indeed the primary cue for the discrimination of tones in natural languages” (Yip, 2002:292). Following this, the present experiment relies on  $F_0$  measurement as the main target material. Besides, vowel duration was measured to see its interaction with pitch gliding.

### **6.5.1 Method**

In the following sections, methodological considerations are discussed.

#### ***6.5.1.1 Speakers and Data Recording***

Three male native speakers of 35, 39 and 73 years old were involved in the recording of the main wordlist. Unfortunately, it was not possible to find a female speaker for lexical elicitation. From the main wordlist, 49 complete minimal sets were separately re-recorded with the 39 years old man, who has been worked as main consultant. The words and tokens from the remaining two consultants are selected from the main wordlist recorded with them. Before we were into the recording, the consultant took time writing the available word entries in the complete minimal sets so that he was able to remember

the words easily while pronouncing. The complete minimal sets showing up to five semantic contrasts were obtained in this way. During this particular recording, extra care was taken to reduce external noise interference, and my hotel room was found to be a better place for this particular recording. A carrier sentence was not used in the recording.

#### ***6.5.1.2 Designing the Experimental Wordlist***

Complete minimal sets were the preferred targets for this experiment, with the assumption of getting more tokens as well as representative  $F_0$  readings from the tone minimal-pairs and –triplets. Out of the 49 complete minimal sets, 34 sets (6 monosyllabic, 23 disyllabic and 5 trisyllabic sets) showing a minimum of two and a maximum of five contrastive lexical meanings were selected for measurement. The variation in the number of selected minimal sets across word length is caused by the distributional gap, in the present data. The remaining 15 minimal sets were not included for being suspicious pairs for tone. However, all available word entries in the selected complete minimal sets regardless of their suprasegmental patterns (vowel length and germination) underwent  $F_0$  measurement though results obtained from such contexts are not used for the main analysis. For each word entry in the selected minimal sets, all available tokens were used for  $F_0$  measurement.

The selected complete minimal sets mainly comprise of major class words that are citation forms said in isolation. Citation forms were preferred to contextual stimuli to reduce the effect of utterance intonation on the  $F_0$  values of lexical tones. Although the choice of stimuli context has been a point controversy among tonologists, the trial test reveals that the  $F_0$  values extracted from the same word said in isolation and from longer utterances in context show considerable differences. For example, as can be observed from the pitch tracks given in (Figure-42), an underlying low tone that surfaces as a L.M rising on **dàkkā** ‘woman’ shows different pitch values. In (42-a), the pitch track represents the word said in isolation, and, in (42-b) the pitch track denotes the same word said in contextual utterance.

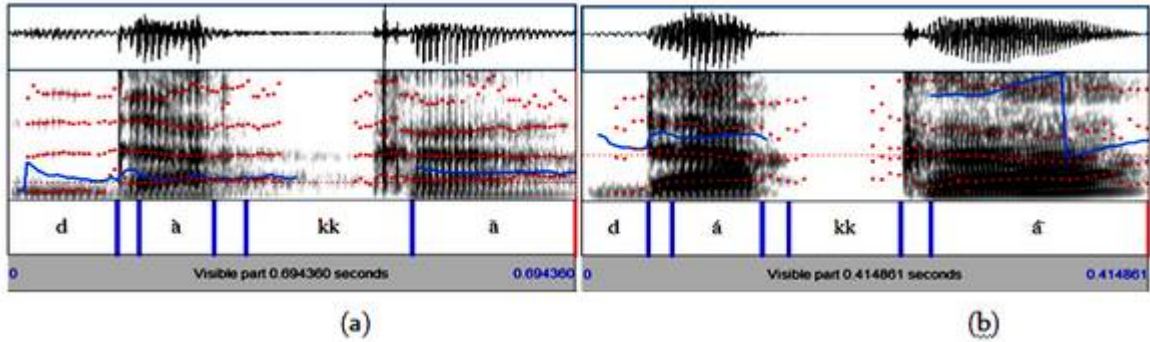


Figure 42 Sample pitch tracks of **dakkā** ‘woman’ said in isolation and in context

The pitch of the low tone in the contextual stimuli is shown to be higher than the expected pitch value of the low tone, especially on the final syllable that makes the transitional boundary with the next word or utterance final position. This rising pitch track is an indicator for higher  $F_0$  values and is assumed to be caused by the effect of contextual intonation. Concerning this, Gussenhoven (2004:45) contends, “Most tone languages will have some form of structural intonation serving different discourse purposes, such as, questioning intonation”. Hence, it is likely to get biased  $F_0$  values from contextual stimuli. That is why the present study preferred citation forms said in isolation to those said in context, thereby to get representative  $F_0$  values for lexical tone analysis.

On top of these, the selected words have different syllable structure related to weight. Light syllables have short vowels (mono-moraic) and heavy syllable have long vowels (bi-moraic). The sample selection also considered the presence of voiced and voiceless obstruents as well as sonorant consonants in onset and coda positions, thereby to see the interaction of tone and segments. See the experimental data summary, in (Table-16), below while the details are annexed.

Table 16 Experimental data distribution

Context length	No. of complete minimal sets	No. of semantically contrastive entries in all minimal sets	No. of Tokens	No. of stimulus
Monosyllabic	6	18	75	75
Disyllabic	23	71	265	530
Trisyllabic	5	10	43	129
Total	34	99	383	734

### 6.5.1.3 Instruments and Data Processing

The audio files (tokens) of every single word were extracted from the stream audio data using the **Audacity** software, thereby making each sound file accessible for further processing in PRAAT. The extracted sound files were organized and saved in separate folders and subfolder created with speakers' names, syllable count, word class and with numbered tokens. Before using each of the selected sound files, poor quality sounds were rejected from further processing to avoid spurious  $F_0$  values.

Data was processed in PRAAT version 5.3.32. This software enables to extract an overall pitch information ( $F_0$ ), vowel duration, and to plot the pitch tracks. Before processing the audio data, some of the standard values of PRAAT were adjusted. The pitch ceiling was adjusted to 300Hz that optimizes for a male voice while leaving the floor at 75Hz; PRAAT's standard range is 75-500Hz; whereas, the time step strategy was left to be the default, i.e. *Automatic* so that in view of the pitch floor value (75Hz), the time step used for pitch analysis is *0.01 second*. This implies that illustrations of the phonetic realization of each tone (pitch traces and absolute  $F_0$  values) across a time-normalised segment are taken at intervals of 10% (10ms) across the vocalic tone-bearing unit (TBU). More time is not used because the more the time step, inaccurate the pitch curves and the  $F_0$  values will be. The rest values for pitch algorithm were kept to the PRAAT standard. Then each sound file was imported to PRAAT for two important tasks: segmentation and  $F_0$  extraction.

The segmentation task was given due concern to reduce the effect of pitch perturbation on  $F_0$  readings of vowels caused by pre- and post-vocalic voiced consonants. Visual and aural inspection mechanisms were applied to demark the boundaries between vocalic and non-vocalic segments in a word properly. The former was enhanced by reading formant patterns, spectrograms and waveforms while the latter was done via repeated listening to each segmented section in *zoom out* mode. Depending on the syllable structure and the consonant context in a word, edges of vowels were trimmed so that  $F_0$  values were extracted during the steady state of the vowel formant. In the context of voiceless obstruents, boundary marking was found to be easier than in the context of voiced consonants. In the context of voiced consonants, in general, and sonorants, in particular, the boundary landmark may not easily be traced for segmentation. As a result, the accuracy of segmentation was checked via repeated aural inspection and formant pattern reading. As voicing interacts with pitch, this class of consonants has been observed perturbing the pitch during the <sup>40</sup>transitional boundaries onto the adjacent vowels. Thus, trimming the edges of vowels is essential to avoid biased  $F_0$  values, and this is the common trend for measuring  $F_0$  values (Connell and Ladd, 1990). Studies often trim as much as 10% of the beginning and end of the vowel; in more unusual cases, as much as 25% of the beginning may be trimmed (Stanford , 2008).

In the present case, the size of trimmed sections was decided depending on what was noticed in every word context. Therefore, the determinant factor for how much to trim is the complete vanishing of the consonantal effect and steady state of the vowel formants. For instance, in **lila** ‘tying’, to reduce the effect of pitch perturbation on the  $F_0$  of adjacent vowels caused by the pre- and post-vocalic liquid,  $F_0$  from the penult syllable vowel was extracted leaving 18ms behind after the vowel onset, and 28ms before the vowel offset. In the final syllable vowel, the consonantal effect is detected for about 34ms after the vowel onset so that the trimmed section is shown to be larger, as can be observed in (Figure-43). In contrast, for vowel initial words, only the voice burst at the vowel onset is trimmed, and for voiceless obstruent onsets and codas, the trimmed duration is often less than the voiced consonants.

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<sup>40</sup> A transition is a movement in the formant pattern of a vowel/sonorant due to an adjacent consonant (Davenport and Hannahs, 2005:68)

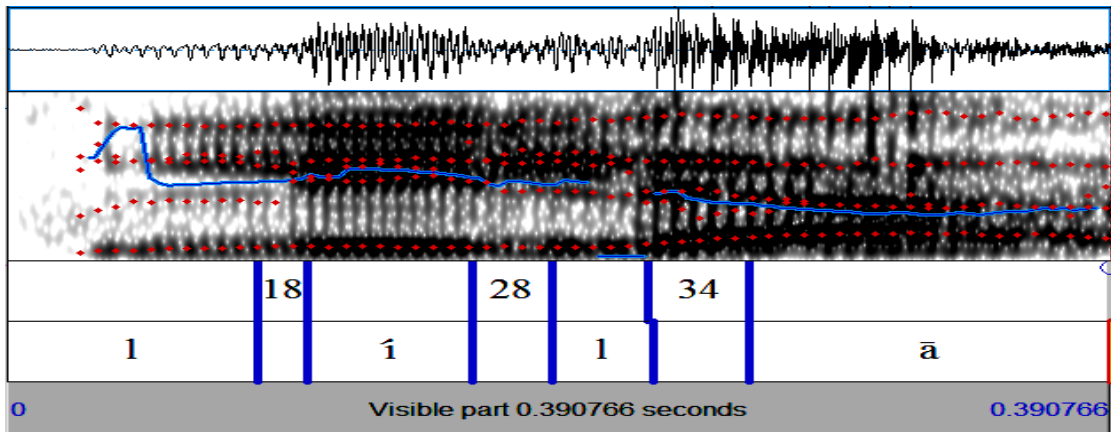


Figure 43 Sample Segmentation in PRAAT

Generally, regardless of the consonant type and syllable structure, repeated aural inspection was done before segmentation and  $F_0$  extraction. Proper segmentation helps for accurate tonal alignment as it enables to obtain representative  $F_0$  readings.

#### **Extracting pitch information**

The overall pitch information was extracted from each syllable vowel and saved in the same folder with the corresponding sound files. Vowels were made to be the preferred targets for measuring  $F_0$  as they are the most sonorous segments that could provide representative  $F_0$  values. On the other hand, Kunama sonorant consonants (nasals and liquids) have been claimed to be moraic so that they are tone bearing. Sonorant codas surfacing with an independent tonal node have been attested on heavy closed syllables (VC and CVC), but this was not observed in the experimental wordlist. Thus, vowels were made to be the sole targets for measuring  $F_0$ . Actually, word-medial voiced consonants in general have been observed to carry the pitch that continues from the preceding vowel. Finally, pitch tracks of words were plotted on the PRAAT object window and saved along with the corresponding sound files.

#### **6.5.1.4 Data Analysis Procedure**

Pitch information was extracted from tokens of three speakers, but decisions on the pitch heights of the level tones are made based on the  $F_0$  values obtained from a single speaker's vocal range. This helps to avoid wrong conclusions that will be caused by the pitch range variation among the speakers. The present analysis uses the maximum and

minimum  $F_0$  values (in Hertz) along with the standard deviations, vowel duration figures in milliseconds (ms) and computed average figures. While the average  $F_0$  figures are used to show the optimum pitch heights of the level tones within a single speaker vocal range, the maximum and minimum  $F_0$  values are meant to indicate the  $F_0$  fluctuation across tokens of the same speaker and across words of different length. Pitch tracks are used as additional evidence for the phonetic features of underlying tones.

### **6.5.2 Pitch Height Scaling and Degree of Dispersion in the Tonal Space**

Kunama has three distinctive level tones (H, M, and L) and a range of surface tonal melodies with simple and complex combination patterns. In addition, the impressionistic analysis seems to suggest that in the tonal space of Kunama, the perceptual pitch distance between the distinctive level tones varies in the context of minimal sets showing three- and two-way tone contrasts. Especially, in the higher pitch frequency region, the perceptual pitch distance between the high and mid tones is detected to be larger than the distance between the mid and low tones. This is mainly because the Kunama high tone gives two different pitch height impressions (Extra-high and high pitches). In view of this, the present study has proposed a fourth level pitch height, high rising, which is assumed as a phonetic variant of the high tone. Referring back to §6.3, the high tone is perceived both in extra-high and high pitch ranges, and this phenomenon is easily detected in the context of minimal sets. In this section, it is attempted to show how the phonemic tones (H, M, and L) spread in the pitch space by the scaling of average  $F_0$  values. This helps to explore how the extra-high pitch finds itself in the pitch space of three distinctive level tone heights.

Average  $F_0$  values were computed from monosyllabic (CV) minimal sets as pronounced by a single speaker. Monosyllabic words are preferred to polysyllabic ones with the assumption of reducing the effect of tone sandhi in polysyllabic contexts. Whereas the  $F_0$  scaling for contour tones and contour sequences is based on the  $F_0$  values obtained from disyllabic words as disyllables show both falling and rising contours as well as combination of these. Average  $F_0$  distance is observed across three tonal trajectories (onset, midpoint and offglide) throughout the duration of the target host (vowels). On monosyllabic words, since Kunama high tone does not show a level realization, its

midpoint  $F_0$  is obtained by calculating the mean  $F_0$  values from the average midpoint  $F_0$  readings of PRAAT. Whereas, average  $F_0$  figures at onset and offglide trajectories are calculated from the maximum and minimum  $F_0$  readings, respectively. The pitch height scales and the interval sizes are judged based on the common assumption that claims an interval of 20Hz is suffice to identify two tones (Yip, 2002).

Finally, pitch-scaling graphs are plotted on x-y axis based on average  $F_0$  (in Hz) and vowel duration (in seconds) figures, respectively. Since the tonal onset equates the vowel onset, the time axis starts at *0.0 second* and ends at *0.3 second*. The final time point is specified by considering the maximum average vowel duration obtained from a minimal set. On the other hand, the floor and the ceiling of the  $F_0$  values on the vertical axis are made similar to the pitch range used for a male voice in PRAAT.

#### 6.5.2.1 The Scaling of the $F_0$ Values of H, M and L Tones in Three-way Contrast

The average  $F_0$  values in (Table-17) are computed from the monosyllabic triplets given, in (26), below:

(26)	bá <sup>ˉ</sup> ‘copulate, ploughing’	wá <sup>ˉ</sup> ‘entering’	sá <sup>ˉ</sup> ‘closing’
	bā ‘dance’	wā ‘eye’	sā ‘exiting (from a house)’
	bà ‘pit’	wà ‘leaving off’	sà ‘giving’

Table 17 Average  $F_0$  values of H, M, and L tones in three-way contrast

Tones	N	Av.VD in ms	Av. $F_0$ at tonal onset	SD	M.Av. $F_0$ at tonal midpoint	SD	Av. $F_0$ at tonal off glide	SD
High	11	173.5	197.3	32.6	167.6	25.8	142.1	21.7
Mid	17	290.7	143.4	16.1	138.4	14.7	132.7	16.9
Low	15	247.3	126.7	7.2	122.1	5.7	117.4	5.6

Based on the average  $F_0$  figures given above, in (Table-17), the interval size among the three distinctive tones diminishes, in reference with the assumed 20Hz difference, as the pitch moves from the tonal onset trajectory to the tonal offglide trajectory. At the tonal onset point, the high tone reveals the highest average  $F_0$  distance of 54Hz and 71Hz from the mid and low tones, respectively. In that order, the difference lowers to 29Hz and 45Hz at tonal midpoint and appreciably lowers to 10Hz and 25Hz at the tonal offglide trajectory. Accordingly, Kunama high tone does not maintain the same initial pitch height throughout the duration of the host (vowel). Instead, it makes a rapid  $F_0$  change after the onset trajectory, thereby dropping to the lowest pitch target point at the tonal offglide trajectory. The lowest pitch target point of the high tone approximates to the final target of the mid tone; they show a difference of only 10Hz. Thus, on monosyllabic words, the underlying high-level tone is realized as HM falling contour tone. The formation of contour tones on word-final syllables in general and on monosyllabic words in particular is attributed to positional length tendency of vowels. Vowel length contrast is claimed to be neutralized word-finally so that the average duration (VD) of the vowels in all tonal contexts of the monosyllabic words are explored to be longer. Although sonority duration is shown to correlate with contour tones, word-final vowel length is supposed to be caused by the position. That is why word-final contours are treated separately from bi-moraic contours (See under § 6.1.4.2).

Comparatively, the average  $F_0$  distance between the mid and the low tone is narrower, with a difference of slightly less than 20Hz. In the three tonal trajectories respectively, the mid tone illustrates a difference of 17Hz, 16Hz and 15Hz from the low tone. As compared to the high tone, the mid and low tones are typically level. In their own terms, however, they also fall slightly by an average of 5Hz and 10Hz at the midpoint and offglide trajectories, relative to their initial average  $F_0$  heights. Accordingly, the tonal space in the lower range is crowded as compared to the higher range so that the higher range needs to be scaled. Consider the pitch-scaling graph of the three tones in three-way contrast, in (Figure-44), below:

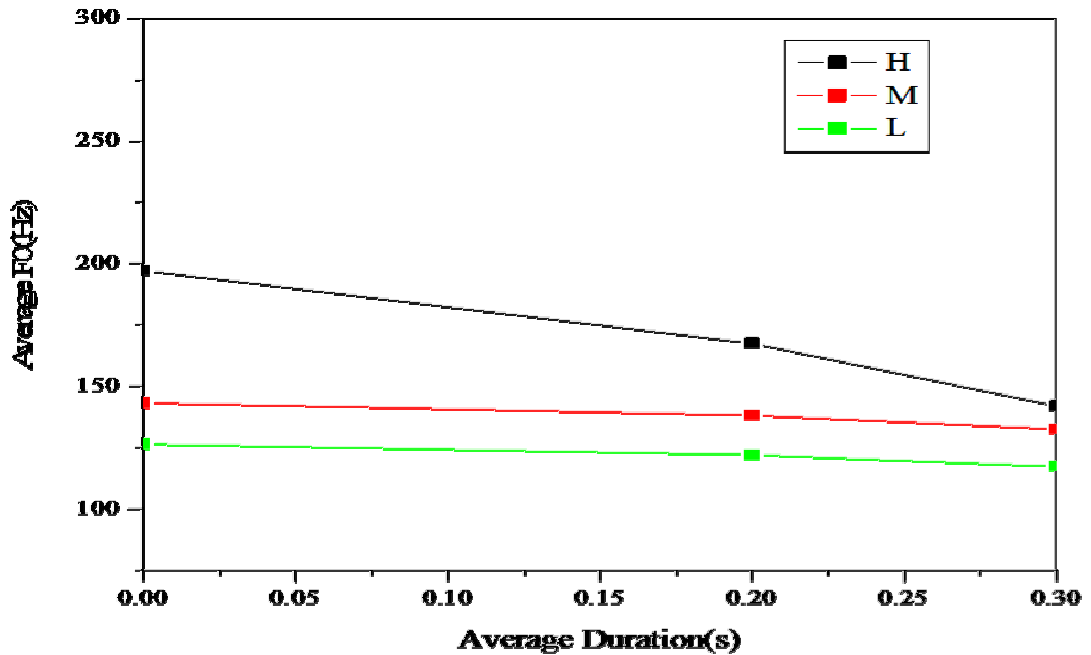


Figure 44 F0 scaling graph of high, mid and low tones in three-way contrast

The average  $F_0$  distance of the high tone from the mid tone is shown to be larger (54Hz), particularly during the tonal onset trajectory. In addition, as can be seen in (Table-27) above, the SD figures in the high tone average  $F_0$ s are also greater than the SD figures in the average  $F_0$ s of the mid and low tones. These indicate that in all three tonal trajectories, the lower and higher  $F_0$  margins of the high tone are scattered against the average  $F_0$ s. Thus, the underlying high tone will get a free zone so that it can be realized in an extra-high and high pitch range depending on the speakers' vocal range as well as other contextual factors. While the mid tone's raw  $F_0$ s are also sparsely distributed against the average  $F_0$ , the low tone  $F_0$  scores are closer to the average  $F_0$ . Mathematically, it is possible to predict the lower and higher pitch height ranges against the average values of the three tones across the three tonal trajectories, thereby to decide which of these values are worth scaling. To do so, variables for high, mid and low tones are denoted as follow:

- ✓ Average  $F_0$  at the tonal onset point= $H$ ,  $M$  and  $L$
- ✓ Average  $F_0$  at the tonal midpoint= $H1$ ,  $M1$  and  $L1$
- ✓ Average  $F_0$  at the tonal off glide= $H3$ ,  $M3$  and  $L3$
- ✓ Maximum average  $F_0$  at tonal midpoint= $H2$ ,  $M2$ ,  $L2$ ,
- ✓ Minimum average  $F_0$  at tonal midpoint = $H2_0$ ,  $M2_0$ ,  $L2_0$
- ✓ Raw maximum  $F_0$  at tonal onset and offglide = $H4$ ,  $M4$  and  $L4$
- ✓ Raw minimum  $F_0$  at tonal onset and offglide = $H0$ ,  $M0$  and  $L0$
- ✓ Tonal trajectories = $I$  (onset),  $M$  (midpoint) and  $F$  (off glide)

**The distribution of the raw  $F_0$  scores of the High tone against the average  $F_0$**

$\underline{I\ H4/H0} = (H \pm SD)$ $= 197.3 \pm 32.6$	$\underline{H2/H2_0} = (H1 \pm SD)$ $= 167.6 \pm 25.8$	$\underline{F\ H4/H0} = (H3 \pm SD)$ $= 142.1 \pm 21.7$
$\underline{H4} = 229.9\text{Hz}$	$\underline{H2} = 193.4$	$\underline{H4} = 163.8\text{Hz}$
$\underline{H0} = 164.7$	$\underline{H2_0} = 141$	$\underline{H0} = 120.4\text{Hz}$

In high register pitch, the high tone can be realized in an extra-high pitch range (197.3-229.9Hz), at the tonal onset point. In low register pitch, it can be realized in a lowered high pitch range (164.7-197.3Hz), in the same tonal trajectory. In high register voice, the high tone pitch is raised during the tonal onset trajectory and then is lowered towards the tonal offglide trajectory. In low register voice or for other contextual factors, the high tone can be realized in a lowered pitch range (164.7Hz-141-120.4Hz). This implies that the final lowest pitch target point of the high tone is dependent up on its initial pitch height. In account to this, the high tone can be scaled into extra-high and high pitches so that a four-point pitch height scale (Extra-high, high, mid and low) is proposed in the tonal space of three distinctive level tones.

### Distribution of raw F<sub>0</sub> scores of the mid and low tones against the average F<sub>0</sub>s

The F<sub>0</sub> scale of the mid tone also gives considerable interval size across all the three tonal trajectories though not much as the F<sub>0</sub> scale of the high tone. In contrast, the low tone F<sub>0</sub> values relatively are concentrated around the average F<sub>0</sub>. See (1) for the mid tone and (2) for the low tone:

(1)	$\underline{I} \underline{M4/M0} = (M \pm SD)$	$\underline{M2/M2_0} = (M1 \pm SD)$	$\underline{F} \underline{M4/M0} = (M3 \pm SD)$
	$= (143.4 \pm 16.1)$	$= (138.4 \pm 14.7)$	$= (132.7 \pm 16.9)$
	$\underline{M4} = 159.5\text{Hz}$	$\underline{M2} = 153.1\text{Hz}$	$\underline{M4} = 149.6\text{Hz}$
	$\underline{M0} = 127.3\text{Hz}$	$\underline{M2_0} = 123.7\text{Hz}$	$\underline{M0} = 115.8\text{Hz}$
(2)	$\underline{I} \underline{L4/L0} = (L \pm SD)$	$\underline{L2/L2_0} = (L1 \pm SD)$	$\underline{F} \underline{L4/L0} = (L3 \pm SD)$
	$= (126.7 \pm 7.2)$	$= (122.1 \pm 5.7)$	$= (117.4 \pm 5.6)$
	$\underline{L4} = 133.9\text{Hz}$	$\underline{L2} = 127.8\text{Hz}$	$\underline{L4} = 123.0\text{Hz}$
	$\underline{L0} = 119.5\text{Hz}$	$\underline{L2_0} = 116.7\text{Hz}$	$\underline{L0} = 111.8\text{Hz}$

The mid tone can also be realized in a raised pitch range (159.5-149.6Hz), and it can also be lowered to a range of 127.3-115.8Hz. When realized in the latter, the mid tone relatively falls finally, which is a feature of a final low tone. In contrast, the mid tone surfaces as typically level when realized in a raised pitch range. In terms of the raw F<sub>0</sub> scores, the low tone may begin with some degree of raising in pitch. For example, in the sampled F<sub>0</sub> values, the maximum raw F<sub>0</sub> is about 13Hz higher than the lowest raw F<sub>0</sub> score, at tonal onset. Nevertheless, in relative terms, the distribution of the raw F<sub>0</sub>s of the low tone is proved to be closer to the average F<sub>0</sub>, in all of the three tonal trajectories. Consider the pitch traces of the monosyllabic triplets for tone, in (Figure-45-47), below:

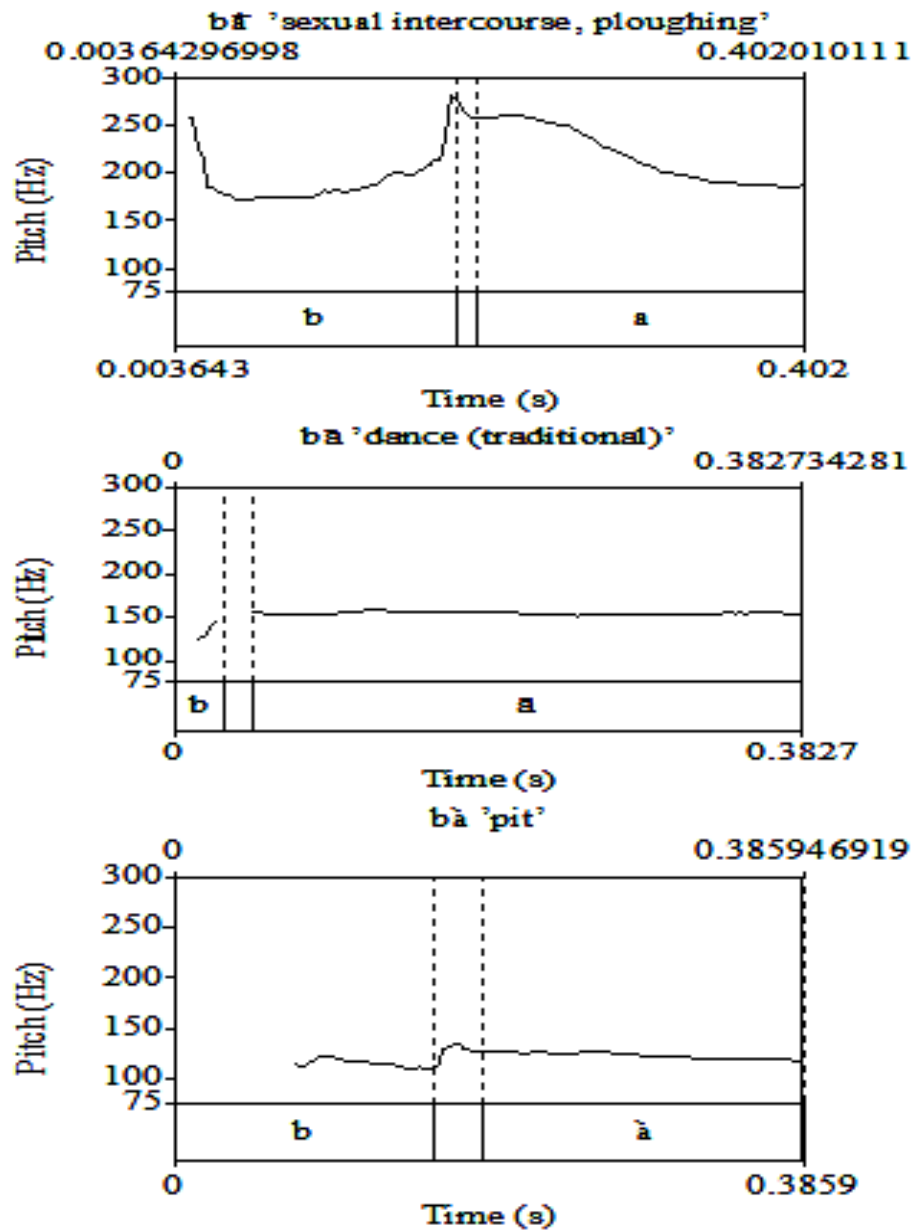


Figure 45 Pitch traces of monosyllabic minimal triplet for tone

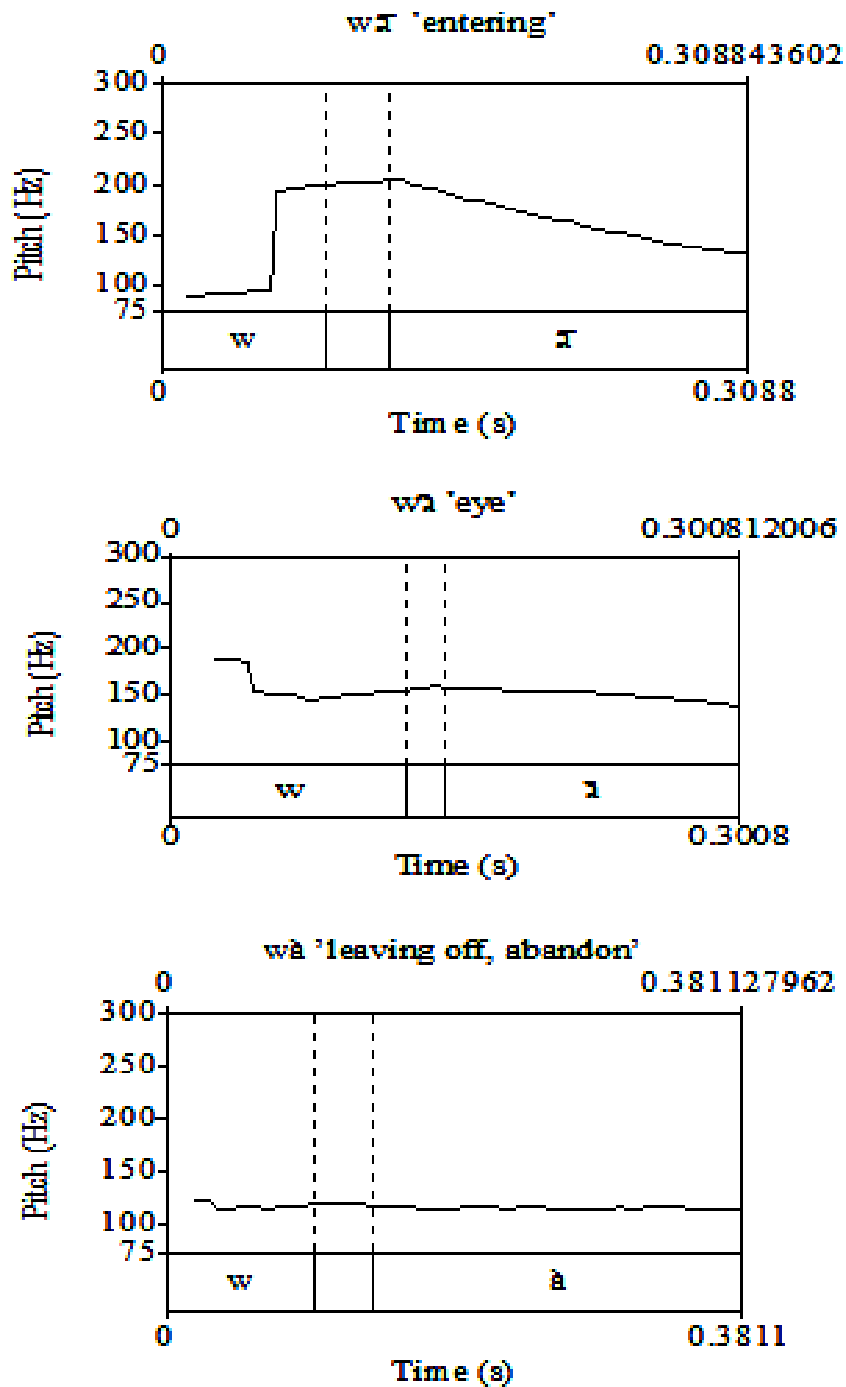


Figure 46 Pitch traces of monosyllabic minimal triplet for tone

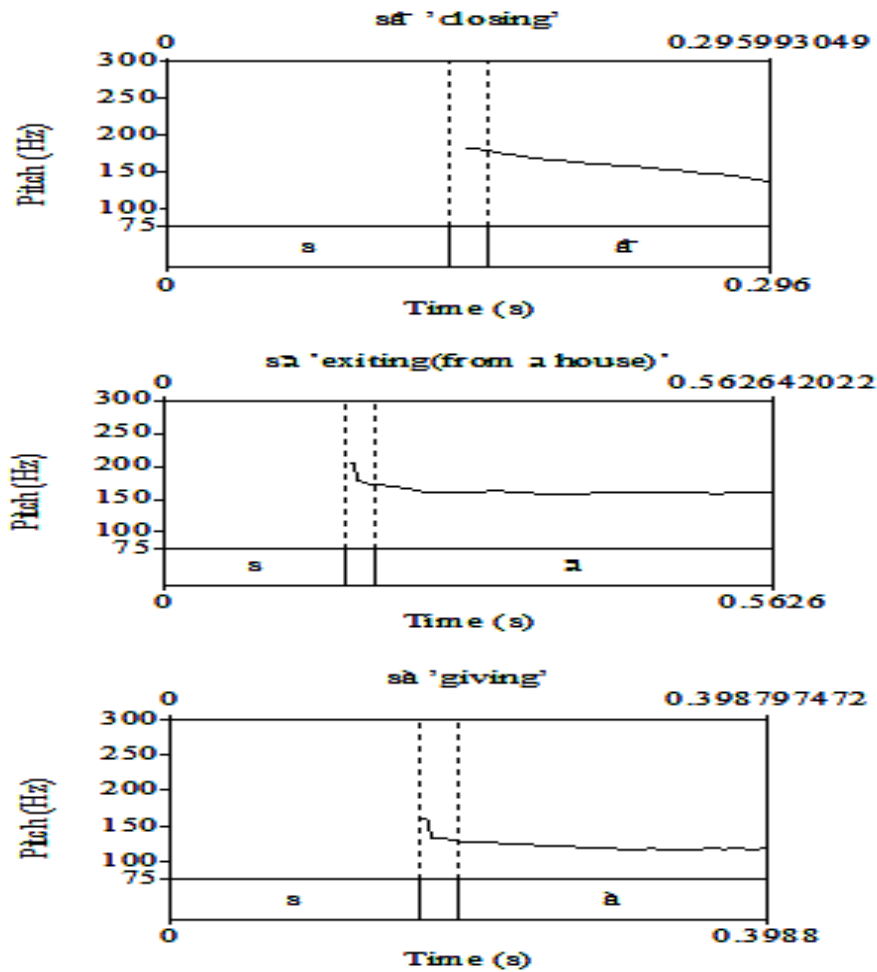


Figure 47 Pitch traces for monosyllabic minimal triplet of tone

### 6.5.2.2 The Scaling of the $F_0$ Values for H and M Tones in Two-way Contrast

By the same procedure, the average  $F_0$  figures of the high and mid tones are calculated from the minimal pairs given in (27) below, and the obtained values are presented in (Table-18).

(27) /H/ vs. /M/

ká 'hate'

kā 'taking'

Table 18 Average  $F_0$  values for H and M tones in two-way contrast

Tones	N	Av.VD	Av. $F_0$ at tonal onset	SD	M.Av. $F_0$ at tonal midpoint	SD	Av. $F_0$ at tonal offglide	SD
High	4	161	228.2	4.3	196.7	1.9	163.5	1.9
Mid	6	251	156.8	12.3	149.6	15	145	16.6

The average  $F_0$  results of the high and the mid tones in a two-way contrast are found to be larger than those in three-way contrast, as can be compared from (Table-17 and-18). When the high tone begins in an extra-high pitch range (228.2Hz), it, in turn, leaves a greater space for the mid tone. Consequently, the mid tone starts with a raised  $F_0$  at about 156.8Hz. Across the three tonal trajectories, the high tone exhibits an average  $F_0$  distance of 72Hz, 47Hz and 18Hz from the mid tone; compare these figures to those intervals analyzed in the context of three-way contrast, 54Hz, 29Hz and 10Hz, in the same order of the tonal trajectories. Therefore, in two-way contrast, the average  $F_0$  interval between the high and the mid tone is considerably larger than the same interval between the two tones, in three-way contrast. In both contexts, the difference between the intervals is found to be larger at onset and midpoint trajectories, about the same 18Hz; whereas, at the tonal offglide trajectory, the difference is lowered to 8Hz. This implies that the unwavering down trending feature of the high tone on monosyllabic words, where it is realized as HM falling contour tone. Analogically, the average  $F_0$  distance between the high and mid tones in a two-way contrast approximates the average  $F_0$  distance between the high and the low tones in three-way contrast. See the scaling graph, in (Figure-48), below:

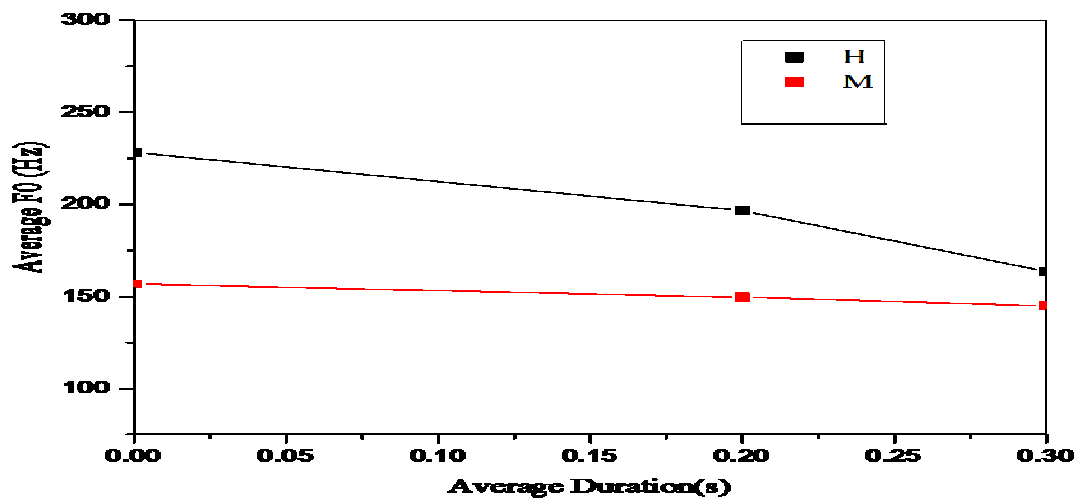


Figure 48 F0 scaling graph of high vs. mid tones in two-way contrast

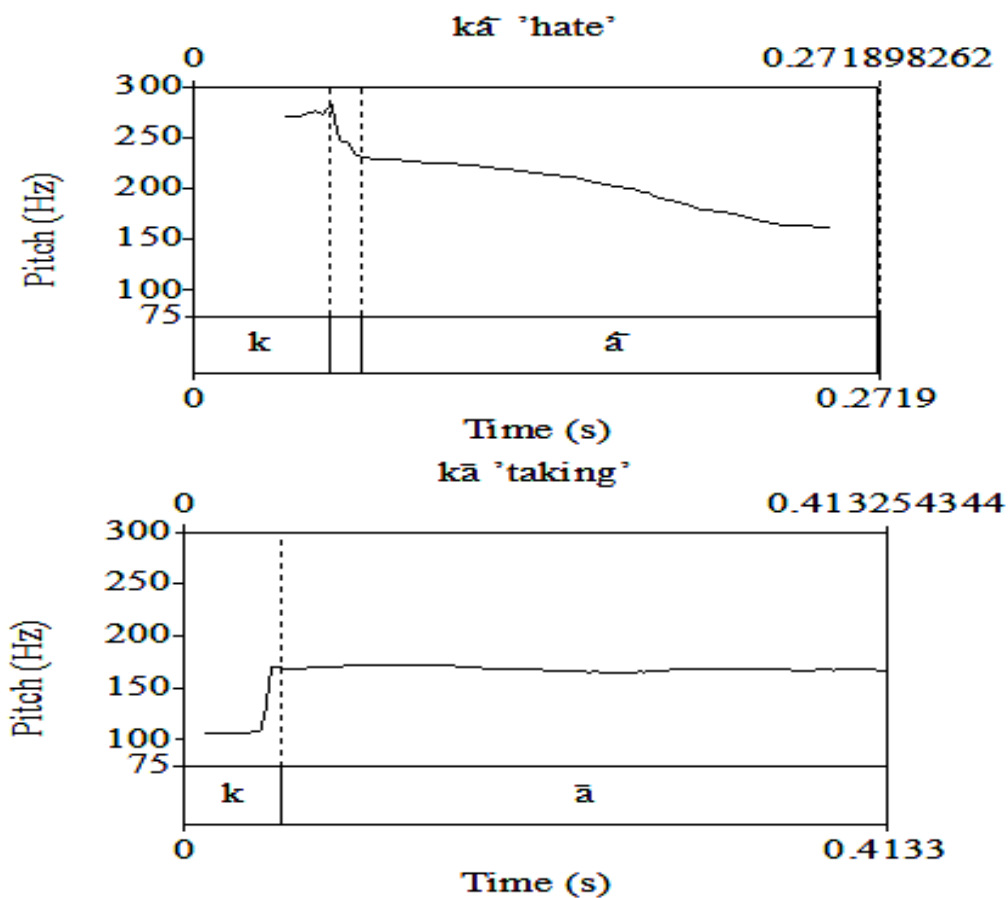


Figure 49 Pitch traces of monosyllabic words for H vs. M tones

### 6.5.2.3 The Scaling of the $F_0$ Values of M and L Tones in Two-way Contrast

The average  $F_0$  values of the mid and the low tones computed from the minimal pair, in (28), are given in (Table-19):

(28) /M/ vs. /L/

fā ‘cabbage’

fā ‘bury’

Table 19 Average  $F_0$  values of M and L tones in two-way contrast

Tones	N	Av.VD	Av. $F_0$ at tonal onset	SD	M.Av. $F_0$ at tonal midpoint	SD	Av. $F_0$ at tonal offglide	SD
Mid	3	257.3	161.3	0.5	157.6	0.2	155.3	0.1
Low	4	190.3	133.7	7.1	123.9	2.3	116.6	0.3

In the context of two-way contrast (M vs. L), as can be fetched from (Table-19) above, The magnitude of  $F_0$  dispersion between the mid and low tones is found to be larger than the dispersion of the two tones in three-way contrast. In the three tonal trajectories, the mid tone shows an average distance of 28Hz, 34Hz and 39Hz above the low tone, respectively. In three-way contrast, the average  $F_0$  intervals between the mid and the low tones (17Hz, 16Hz and 15Hz) are almost half the interval of the two tones in two-way contrast. Therefore, in two-way contrast, the Kunama distinctive tones show raised  $F_0$  and larger intervals in the pitch space.

The number of contrastive tones in a given minimal set as well as the size of a given minimal set, therefore, determines the pitch height of phonological tones, in terms of average  $F_0$  values. Accordingly, the perceptual pitch scale of the phonemic tones and the  $F_0$  scale unanimously indicate that the higher frequency region is wider and can accommodate additional pitch height. The average  $F_0$  distance between the high and mid tones is found to be larger than the average  $F_0$  distance between the mid and the low tones. This necessitates the scaling of the high tone  $F_0$  values into high rising and high

pitch. See the pitch-scaling graph of the mid and low tones, in two-way contrast, given in (Figure-50) below:

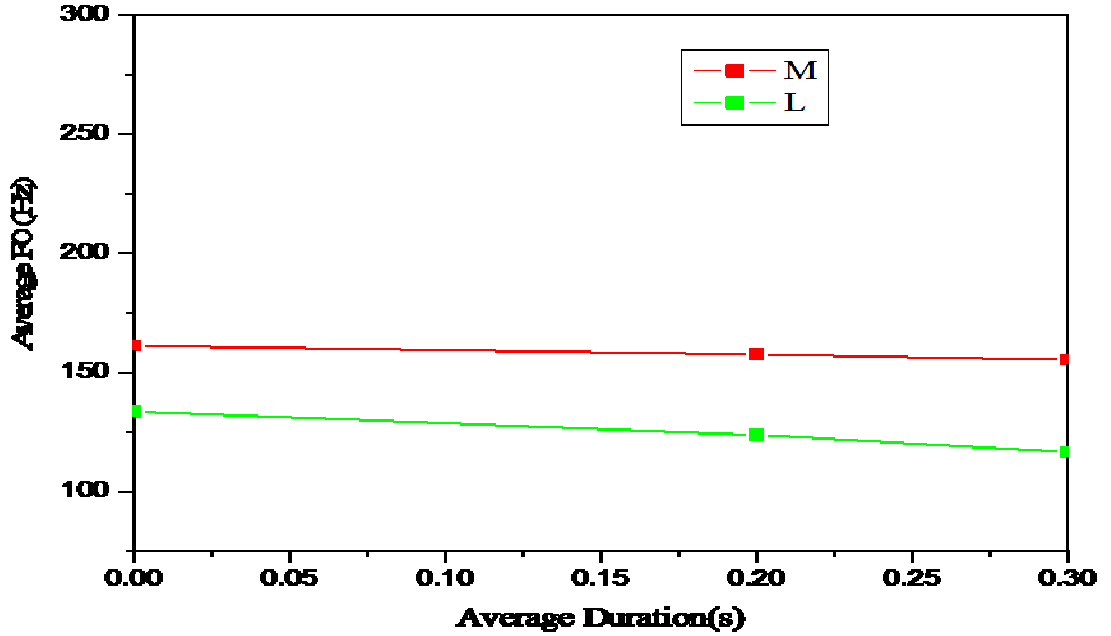


Figure 50 F0 scaling graph of mid vs. low tones in two-way contrast

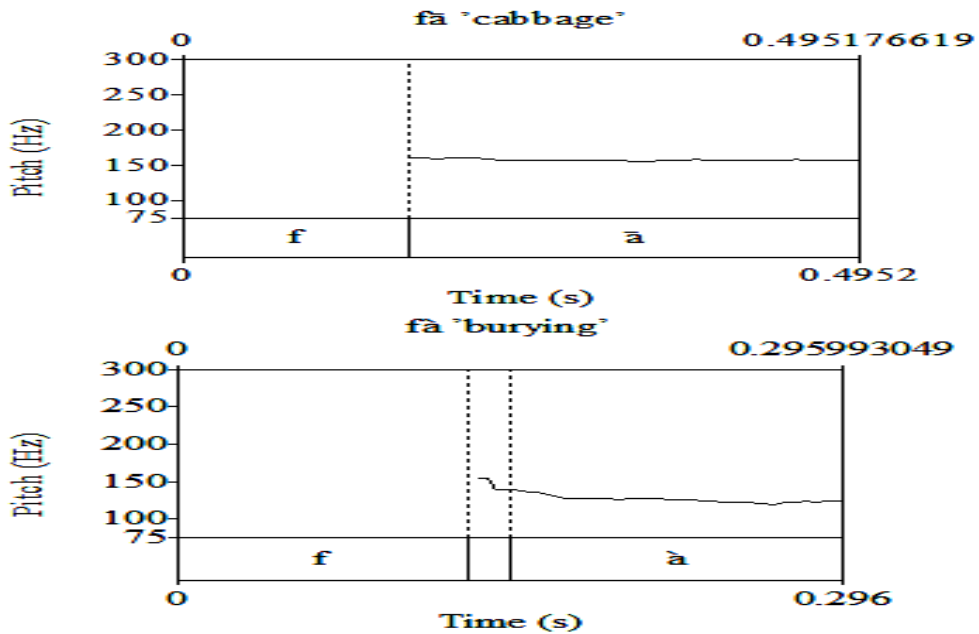


Figure 51 Pitch traces of monosyllabic minimal pairs for M vs. L tones

**6.5.2.4 The Scaling of the  $F_0$  values of the same underlying H Tone**

In the preceding sections, the  $F_0$  dispersion magnitude among the three level tones has shown to vary in the context of three-way and two-way contrasts. Comparatively, the average  $F_0$  interval between the high and mid tones is found to be larger than the average  $F_0$  interval of the mid and the low tones. As a result, the average  $F_0$  values of the high tone are worth scaling as compared to the average  $F_0$  figures of the mid and low tones. This claim can be supported by the pitch height interval of the same underlying high tone observed on the minimal set given below, in (29). This minimal set was recorded from the same speaker and was assumed that the three entries, in this set, semantically contrast for tone. However, the perceptual analysis seems to suggest that all the three entries have borne the same underlying high tone so that they were expected to provide closer  $F_0$  values. The  $F_0$  values measured from these entries are presented in (Table-20), according to the order given below, in (29).

- (29) a. tá<sup>-</sup>‘break’  
 b. tá<sup>-</sup>‘fold’  
 c. tá<sup>-</sup>‘slaughter, killing animals for food’

Table 20 Average  $F_0$  values of the high tone

Pitch Heights	N	Av.VD	Av. $F_0$ at tonal onset	SD	M.Av. $F_0$ at tonal midpoint	SD	Av. $F_0$ at tonal off glide	SD
¡High	4	174.5	217.6	29.5	189.2	24.3	152.1	16.8
High	4	168	184.4	6.3	159.7	2.9	138.7	3.5
!High	5	116	177.5	22.4	156.7	22.3	138	21

As can be read from the average  $F_0$  figures above, in (Table-30), the high tone on the three lexical entries surfaces somewhat with different pitch heights. On (29-a), the high tone is realized in an extra-high pitch range at the tonal onset trajectory (217.6Hz) then drops accordingly to 189.2Hz and 152.1Hz at midpoint and offglide trajectories. On (29-b and -c), the high tone rather reveals closer pitch heights. The extra-high pitch shows an average  $F_0$  interval of 33 and 40Hz from the average  $F_0$  of the high pitch, at the tonal

onset trajectory. Conversely, the high tone on the two entries, as in (29-b and-c) is realized within proximal  $F_0$  heights, showing an interval of only 7Hz at onset and gradually falls in the same pace on the midpoint and offglide trajectories. In addition, the final  $F_0$  target of the extra-high pitch is higher than the final  $F_0$  target of the high pitch. This may indicate that the lowest pitch target point of the high tone presumes its initial pitch height so that the higher the initial pitch, the lesser its degree of fall will be.

The phenomena observed in this minimal set context, on one hand, is a clear indication for the presence of two pitch height ranges (extra-high and high pitch) for the same underlying high tone. On the other hand, the phenomena could lead us to think of other supra-segmental pattern that distinct the three entries. In effect, two assumptions can be forwarded as to why the interval size among the average  $F_0$  values of the high tone becomes too narrow in (29-b) vs. (29-c) while it is larger for (29-a) vs. (29-b and-c); note that the three entries are supposed to be semantically different.

The first assumption is that absolute pitch may not be the only cue identifying distinctive tone heights. The variations in the pitch height range of the same underlying tone across speakers and even tokens of the same speaker may imply that contextual tone sandhi possibly enhance speakers' perception of distinctive tones. Based on native speaker's intuition, it was suggested that Kunama speakers easily differentiate such minimal set words in wider context ("talk"). This could in turn lead us to think the role of syntagmatic tone, and the issue makes a topic of future research.

The second assumption proposes that this can be caused by native speaker's misperception of splitting closer lexical meanings or mispronouncing homomorphs in a minimal set. For instance, speakers were observed while differently pronouncing segmentally the same two words that have closer lexical meanings. For example, the tone minimal pair given below, in (30), was recorded from the main consultant, and he suggested that the two lexical entries are different in meaning.

- (30)        báˀ 'sexual intercourse, copulate'  
              báˀ 'ploughing'

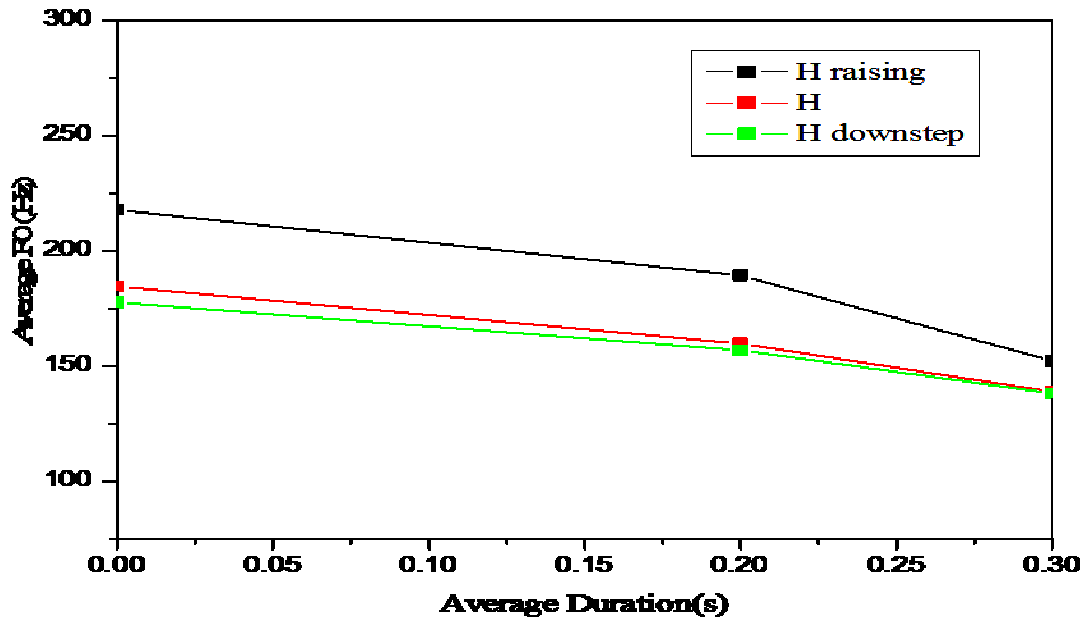


Figure 52 F0 scaling graph of the surface high tone

Later, the perceptual and instrumental analyses seem to suggest that these words have similar tone pattern, i.e. both have an underlying H tone that surface as HM falling contour. Besides, word-final length contrast is claimed to be neutralized, and the terminal vowel duration in both words is similar. As a result, this might be caused by native speakers' misconception of splitting closer lexical meanings so that it is guessed that <sup>41</sup> 'ploughing' can be a metaphorical analogy of 'sexual intercourse'. On this account, the suspicious minimal triplet for tone given above, in (29), and glossed as ('break', 'fold' and 'slaughter') are supposed to give closer meanings referring to similar actions in a continuum. In such cases, native speaker's hyperactive production, which in turn caused by semantic misperception, might give the same tonal impression but a split in F0. In the same context, the underlying H tone, therefore, is realized with extra-high and high pitches.

<sup>41</sup> Connell et al (2000:23) have glossed, bá<sup>-</sup> 'raising, ploughing, sexual intercourse', in a way that seem to support my assumption. However, tá<sup>-</sup> was glossed as 'breaking (tr.)', which is also analysed in the present work, and as 'planting, inserting' which is not evidenced in my data at all. This might be due to dialectal variation.

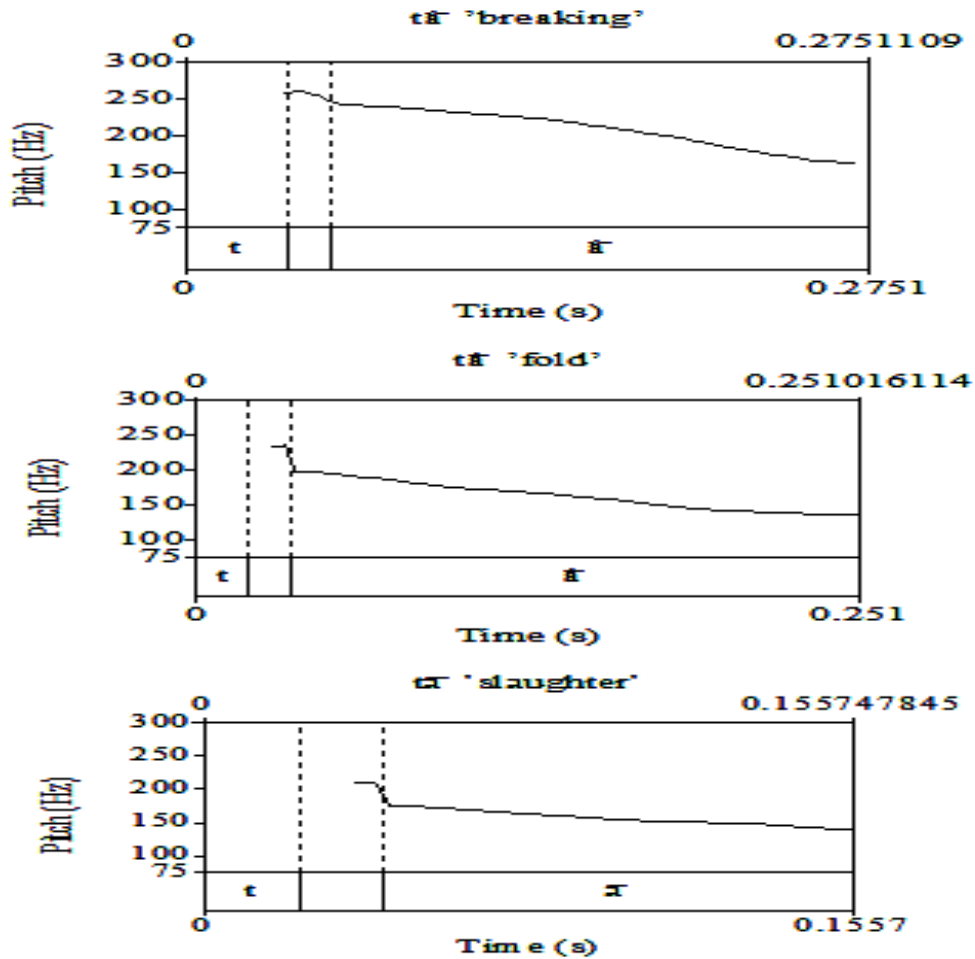


Figure 53 Pitch traces of monosyllabic pair for extra-high vs. high pitch

Based on the discussions on the average  $F_0$  values of the phonemic tones and the dispersion magnitude of the  $F_0$  values as well as the contextual variation (three-way vs. two-way contrast), a four-point pitch height scale is proposed in tonal space of three distinctive tone levels. The following  $F_0$  ranges, in (Table-21), show the lower and upper  $F_0$  margins of each surface height against the average  $F_0$  figures. To indicate the  $F_0$  changes more clearly, iconic tone letters are used in combination with tone diacritics. The iconic tone letters put the three level tones in a four-point scale, **5** indicates the highest pitch and **1** the lowest pitch. The proposed pitch height ranges should not be considered as binding, but can be used as reference in phonetic discussions of underlying tones and the surface melodies

Table 21 Average F<sub>0</sub> ranges of tones in a four-point pitch scale

Pitch Heights	Average F <sub>0</sub> ranges (Hz)		
	Tonal onset	Tonal midpoint	Tonal offglide
Extra-High (jH) 5	197.3-229.9	167.6-193.4	142.1-163.8
High (H) 4	164.7-197.3	141-167.6	120.4-142.1
Mid (M) 2	143.4-159.5	138.4-153.1	132.7-149.6
Low (L) 1	126.7-133.9	122.1-127.8	117.4-123

### 6.5.3 Surface Realization of Underlying Level Tones on Polysyllabic Words

In this section, phonetic discussion is given on the level tones and the surface melodies based on the instrumental data obtained from polysyllabic minimal sets. The proposed pitch height scale will be used as point of departure. Sample F<sub>0</sub> values, computed averages and pitch tracks obtained from di- and tri-syllabic words are considered. Besides, the standard deviations (SD) and vowel duration (VD) figures are also included in the tables. While the <sup>42</sup>SDs indicate the distribution of maximum and minimum F<sub>0</sub> values of the tones across tokens, the VDs may additionally help to see the interaction between vowel duration and pitch gliding.

#### 6.5.3.1 Surface Realizations of Underlying High Level Tone

##### Disyllables

The present analysis suggests that disyllabic words have shown all the nine basic tonal melodies (H.H,M.M, L.L,H.M, H.L, M.L, M.H, L.H, L.M) and the complex tonal melodies (MH.HM, LH.HL, LH.HM, MH.HL and LM.ML) that are sequences of simple bi-moraic contours. Most of these melodic patterns will be illustrated with instrumental data. The words used in the pitch experiment comprise of nouns, adjectives, adverbs and verbs but mention to specific class of words will be made only if any of the word classes reveals a surface melody patterns specific to that class. In consideration to the available F<sub>0</sub> values for each word, the most noticeable surface realizations are described beneath.

<sup>42</sup> All SDs in this paper are for the F<sub>0</sub> values.

The tonal patterns are represented by iconic tone letters and tone diacritics. The numbers before and after the period indicate the maximum and minimum pitch values as inferred from the F<sub>0</sub> values of both syllable vowels, from left-to-right.

- (31) *Melody-1* H.H 4.4
- |    |       |                            |
|----|-------|----------------------------|
| a. | ké:lá | kohl                       |
| b. | súsá  | preparing                  |
| c. | ífá   | washing (clothes/utensils) |
| d. | kóitá | tiger                      |

High-level surface melody is analyzed on disyllabic words in contrast to that of the high tone surfacing as HM falling on monosyllabic words. The two H tones surfacing on the words given, in (31), are realized in a lower register pitch. As to the binary register feature (Yip, 2002), the lowered high tone pitch can be specified by [+Upper, -high] register while the extra-high pitch has [+Upper, +high] register feature values. In the H.H sequence shown above, in (31-a), the second H tone is slightly lowered in pitch, by 10Hz, relative to the initial H tone. In terms of the estimated pitch height ranges, neither of the two highs shows an extra-high pitch. Similarly, the two H tones surfacing on the words given, in (33-b & -c), have exhibited a lowered high pitch though relative movement in F<sub>0</sub> is observed in the pitch of both H tones. Consider the sample F<sub>0</sub> scores obtained from high-toned disyllabic words below, in (Table-22) and the annexed F<sub>0</sub> data.

Table 22 Sample F<sub>0</sub> scores of the H tone on disyllabic words

Words	S:T	L		R		L		R		L		R	
		MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	SD	SD		
éā 'hawk'	3:2	219.3	204.2	167.7	151.5	216.4	157.1	294	281	3.9	4		
áddá' 'wild area'	3:2	195	186.3	170.8	134.8	191.9	151.4	150	140	2.2	10.7		
	3:3	175.6	160.5	163.3	149.2	171.3	136.6	185	75	4.5	5.5		
ótā 'uprooting'	3:1	214.9	201.8	168.4	146.7	210.4	150.6	139	212	4.1	5.6		
	3:3	221.3	209.3	153.1	143	217.4	145.6	165	205	3.4	2.7		
mā gā' 'hile'	2:1	189.9	169.1	185.2	159.5	184.3	173.3	168	78	6.3	8.5		
	3:4	204.5	144.6	198.1	149.2	181.9	174.1	215	96	21.7	15.9		
bádá' 'thigh'	2:1	188.8	180.6	165.6	139.9	186.6	151.7	75	56	2.3	10.3		
	2:2	188.0	177.5	167.9	140.7	185.9	154.2	78	57	3.4	10.4		
ánā 'udder'	3:1	212.1	198.5	140.9	137.9	207.4	139.5	300	208	3.8	0.9		
	3:2	212.3	198.9	160.4	137.9	207.0	141.2	307	252	4.0	4.9		
dádá' 'separating'	3:1	165.5	158.3	130.9	121.5	162.9	124.3	194	131	2.1	2.6		
	3:2	219.9	200.7	183.1	142.8	213.2	158.7	240	216	6.1	11.7		
ífá' 'outside'	3:1	203.1	198.6	173.8	142.9	201.2	153.6	202	162	1.1	9.7		
	3:2	209.2	193.4	166.6	141.9	204.9	145.6	234	184	5.2	6.5		
fē:dá 'blessing'	3:1	213.5	145.6	127.9	122.9	182	124.9	327	149	20.5	1.3		
	3:3	217.1	147.2	128.9	122.9	183	124.9	330	155	20.3	1.6		
fúdá' 'milking'	3:1	230.7	197.3	184.7	162.3	210.3	173.9	171	59	7.1	8.4		
	3:2	213.6	197.2	184.8	157.6	209.2	171.7	141	64	5.3	9.4		
līlā 'hunger'	3:1	207.9	162.5	142.2	136.9	184.6	138.4	250	157	16.4	1.7		
	3:2	203.5	158.9	140.9	136.9	178.2	138	171	147	15.2	1.1		
ū:lā 'wild edible root'	3:5	206.3	136.2	178.1	136.2	183	146.2	326	279	25.9	11.8		
	3:6	178.8	125.8	169.3	132.2	157.2	143.6	319	144	18.2	12.6		
kál:lā 'cohl'	3:3	183.7	180	174.3	169.9	181.8	171.7	229	168	1.2	1.2		
	3:4	183.7	179.9	174	170.1	181.7	171.6	236	155	1.2	1.2		
kólá 'crow'	3:1	182.8	177.4	203.6	134.4	179.6	165.6	59	247	2.1	26.5		
	3:5	166.1	162.3	184.7	143.4	164.4	164.5	59	102	1.6	14.9		
búrá 'pierce'	3:2	195.5	188.9	150.1	133.1	193.3	139.7	62	109	2.4	5.1		
	3:3	240.4	229.7	197.3	151.1	237.2	162.7	69	144	4.2	14.3		
sú:sá 'soup (of meat)'	3:1	244.3	237.2	203.6	148.9	241.2	169.4	218	159	2	16.7		
	3:2	244.4	235.5	207.2	149.3	241.1	171.2	216	157	2.2	17.5		
sā:sā' 'wide'	3:2	180.8	143.3	167.9	145.8	163.8	156.5	147	49	14.2	8.7		
	3:3	184.3	143.7	171.3	132.3	167.3	149.8	170	110	13.9	12.3		

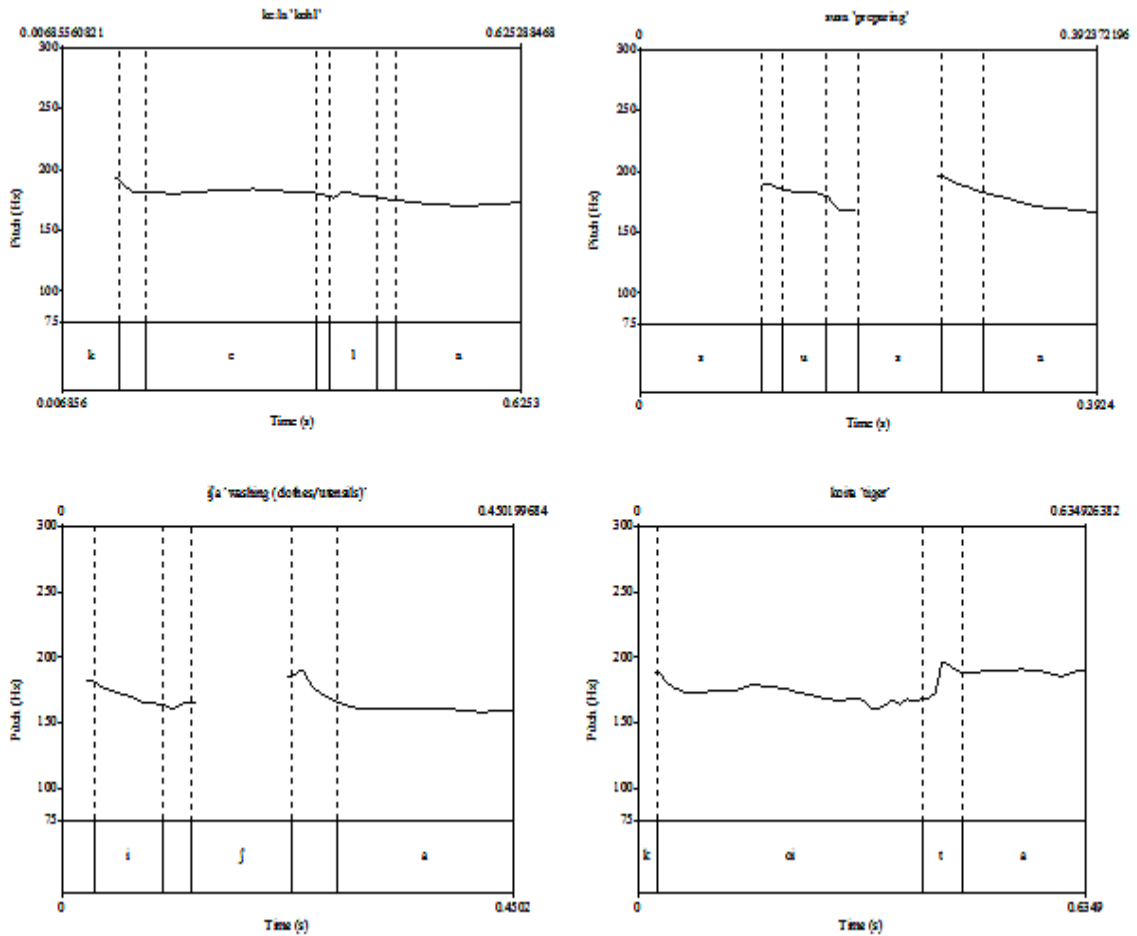


Figure 54 Sample pitch traces for H.H melody on disyllabic words

- (32) *Melody-2* H.M 5.2; 4.2
- |    |      |               |
|----|------|---------------|
| a. | é:tā | hawk          |
| b. | ótā  | uprooting     |
| c. | ánā  | udder         |
| d. | lílā | tying, bundle |

Melody-2 is composite of a typical level H tone surfacing on the penultimate syllable and a level M tone on the final syllable. As can be observed, in (Figure-55), H.M melody is commonly analysed on VCV words. In terms of pitch scaling, the high tone can be realized in both extra-high and high pitch ranges, and the mid tone can show raised or lowered pitches, across tokens of the same speaker.

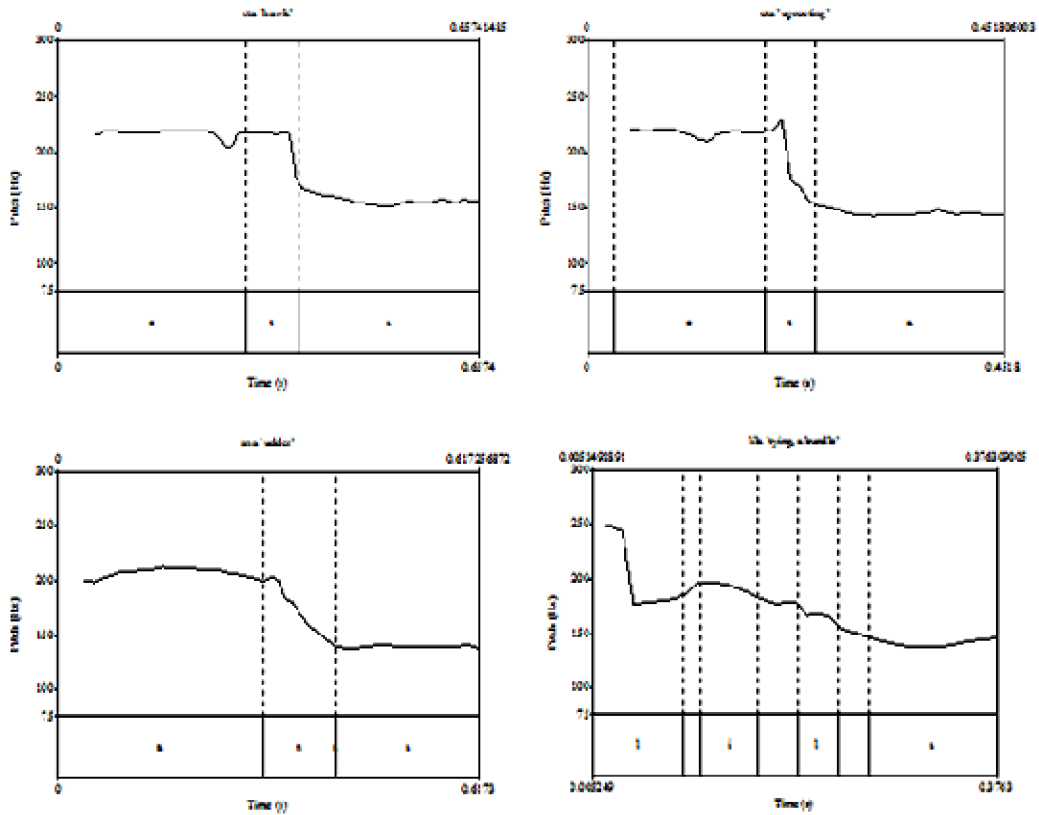


Figure 55 Sample pitch traces of H.M melody on disyllabic words

On the other hand, the H.M melody can take a different pattern on many of the high-toned disyllabic words, i.e. H.HM, as in the following (33). The mid tone on the final syllable, therefore, surfaces as a HM falling contour.<sup>43</sup> This is considered as a peak delay of the preceding H tone. In Kunama, stem-internal spreading of tones is observed to be a common pitch phenomenon; likewise, the initial H tone spreads onto the final syllable, thereby forming a falling contour on the final syllable.

- (33) **H.HM ~ H.M 5.42**
- a. bádá<sup>-</sup> thigh
  - b. dádá<sup>-</sup> separating
  - c. í:ǎ<sup>-</sup> outside
  - d. júdá<sup>-</sup> milking
  - e. áddá<sup>-</sup> wild area

<sup>43</sup> Yip (2002) referred the same phenomenon as peak delay.

- |    |                    |                |
|----|--------------------|----------------|
| f. | búrá <sup>ˉ</sup>  | piercing       |
| g. | sú:sá <sup>ˉ</sup> | soup (of meat) |

The rightward spreading of the H tone from the first syllable onto the second syllable in joining the final M tone may prove that Kunama contour tones are combinations of its level tones. The pattern, in (33), is frequent and has been analysed on major class words (nouns, adjectives and verbs). In relation to pitch scaling, on the majority of the words given, in (38) above, the second H tone is lower in pitch than the first, which is predictable and common in the realm of this work. The lowering of the high tone pitch may or may not suffice to be referred as non-automatic downstep phenomena; this has to be checked in longer utterance contexts. Tentatively, this can be considered as a phonetic phenomenon of F<sub>0</sub> lowering observed when the high tone spreads to the final syllable.

In account to the OCP that bans sequence of same adjacent tones, the H-HM surface sequence is compressed to H-M sequence. Following left-to-right spreading of the initial H tone, stem-internally, the second H tone is aligned to the same H node, in one-to-many association. On the other hand, in the context of word-medial voiceless obstruents, it seems difficult to conclude that the second H is a result of the initial H spreading. Because voiceless consonants often interrupt the pitch before it surfaces on the following vowel, it is plausible to ask whether the two H tones aligned to the same node or not. After all, pitch is a feature of voicing. For example, í:ǰá<sup>ˉ</sup> ‘outside’, the two H tones do not seem to be under the same H node. As the intervocalic voiceless fricative breaks the pitch track, the second H tone can then be aligned to a separate H tonal node. In addition, the second H tone is lower in pitch than the first, so the two may not be considered as the same H sequences. Notice the pitch traces, in (Figure-56), below:

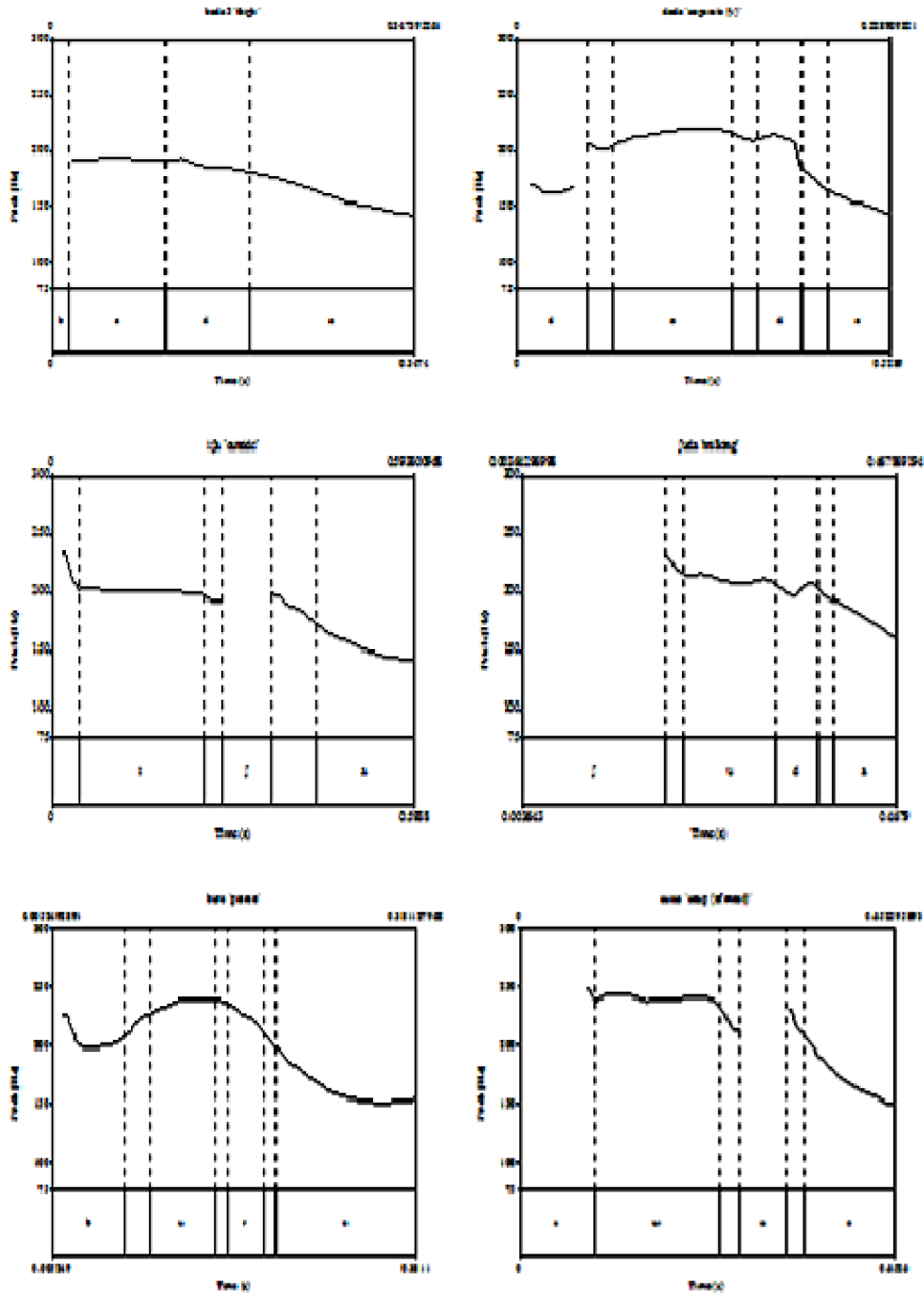


Figure 56 Sample pitch traces for H.HM melodic pattern on disyllabic words

Similarly, in **áddá** ‘wild area’, the voiced alveolar plosive geminate that surfaces with a sudden dipping pitch again breaks the initial H tone pitch from spreading to the final syllable. Besides, the pitch of the final H tone of the HM falling contour is lowered, so, in view of these, the two highs may not be aligned under the same H node. The dipping of the preceding H tone pitch on the medial geminate voiced plosive consonant might cause pitch lowering in the final H tone, or the pitch lowering might also be accounted to the depression effect of the voiced plosive, although the issue of depressor consonants needs a future investigation. See the pitch trace, in (Figure-57), below:

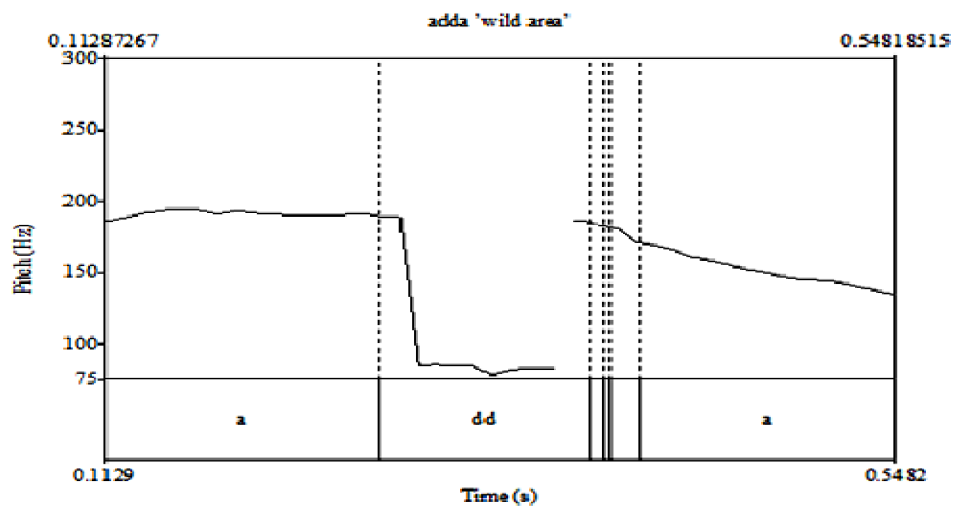


Figure 57 Sudden Pitch dipping of the high tone on a medial voiced stop

Moreover, the pitch lowering in the second H tone may evidence H tone downstepping phenomenon due to a covert L tone in between the two H tones. Yip (2002) refers this as non-automatic downstep that is caused by a floating L tone in between the high tones and is commonly attested in many West African tone languages. Similarly, Bradshaw (1999) noted that voiced consonants, which are commonly referred as ‘depressors,’ often cause H downstepping phenomenon in African tone languages. In this analysis, however, the lowering of the second H tone pitch in H.H sequences is commonly observed after voiced and voiceless consonants so that the phenomenon is shown to be sporadic. Thus, the issue requires further investigation. Despite all these concerns, the OCP seems to work for the H.HM surface sequences discussed, in (33) above, in view of stem-internal spreading of tones.



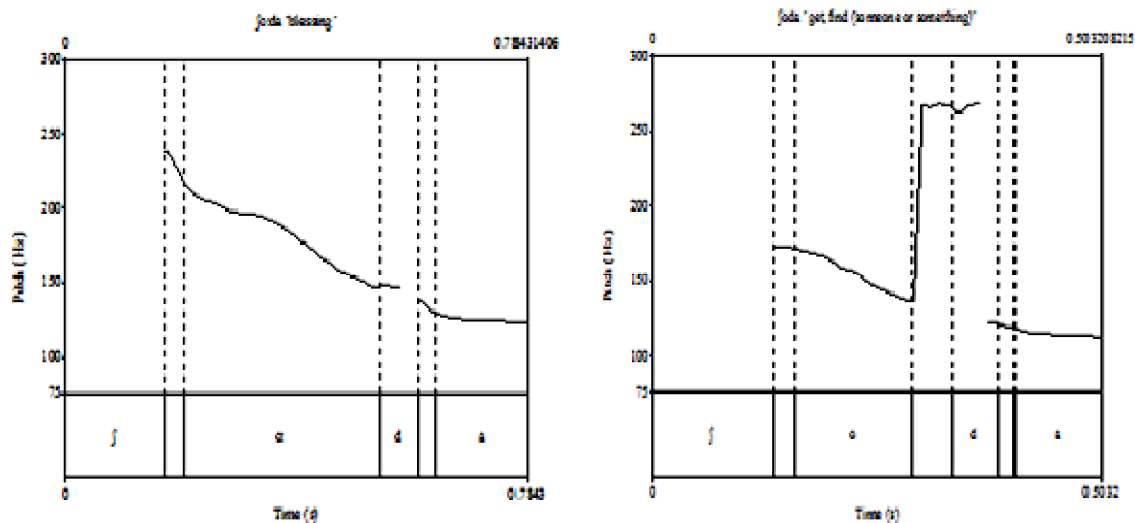


Figure 58 Sample pitch trace for HM.L melody on disyllabic words

(35) *Melody-4* HM.M 52.2~H.M li:lā hunger

The comparative difference between the  $F_0$  intervals, see (Table-28), of the unit tones in the HM falling contour discussed above, in (34), and in (35), may help to confirm the permissibility (or otherwise) of the HM.L sequence. Unlike what is observed in the context of a medial voiced plosive, in (34), the medial liquid consonant, in (35), carries the spreading pitch of the preceding HM fall so that it can be aligned to the same M tone node of the final vowel. Besides, the  $F_0$  values of the M tone of the initial fall and the final M tone are closer, so, by way of the first M tone spreading, the HM-M can be compressed to a HM pattern that obeys the OCP.

On the other hand, it may also be invalid to conclude that the two patterns (HM.L and HM.M) are necessarily different, mainly due to the relative interpretation of the absolute pitch values. It can be assumed that the final low tone can be a result of pitch lowering of the preceding M tone of the HM fall. On this assumption, both of these patterns will be compressed to the same HM sequence. The permissibility of the melodic pattern, in (34), therefore requires further investigation.

With regard to consonant context and pitch perturbation, the following pitch track illustrates that voiced consonants in general and sonorants in particular may often disturb the pitch during the next vocalic onset. In some lexical instances, the consonantal effect remains longer after the onset of the next vowel so that steady state of the pitch may not be traced early, as shown in the segmented sections of the pitch track, in (Figure-59), below:

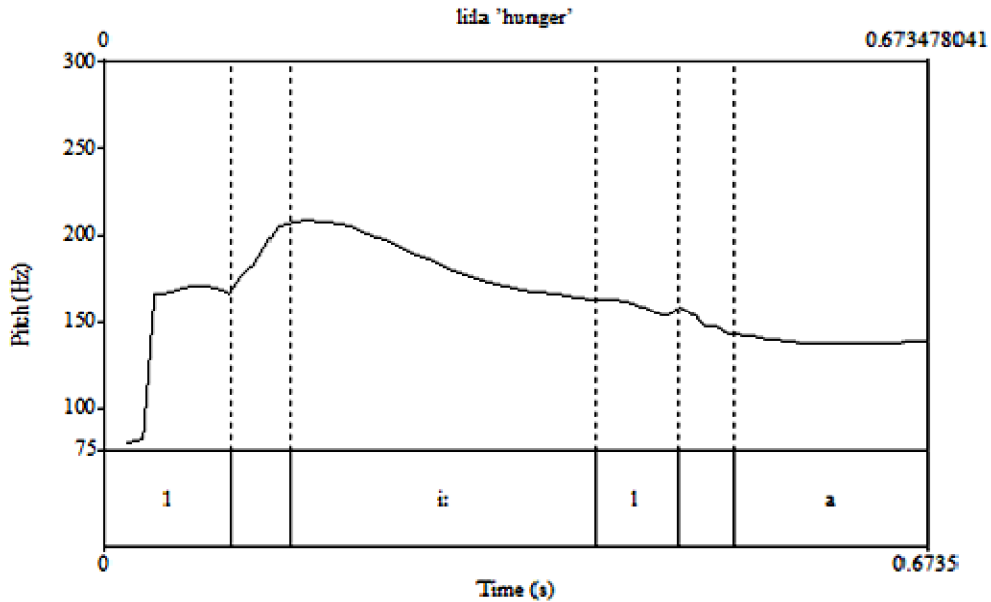


Figure 59 Sample pitch trace of HM-M melody on a disyllabic word

- (36) *Melody-5* MH.HM 24.42; 25.52 ~ M.H.M mā:rá<sup>-</sup> bile  
 sā:sá<sup>-</sup> wide  
 kāílá<sup>-</sup> parrot  
 gē:rá<sup>-</sup> long

The MH.HM surface sequence, in view of rise spreading, can be compressed to a MHM pattern so that the association convention aligns the two Hs under the same H tonal node; the latter pattern complies with the OCP. In Kunama, rising contours make a syllable heard longer as compared to falling contours. Because the initial MH rising contour, in the above examples (36), takes longer to finish, spreading of the rise is expected.

Following rise spreading, as can be observed from the pitch traces in (Figure-60), the MH.HM pattern reveals a typical bell shape tonal melody.

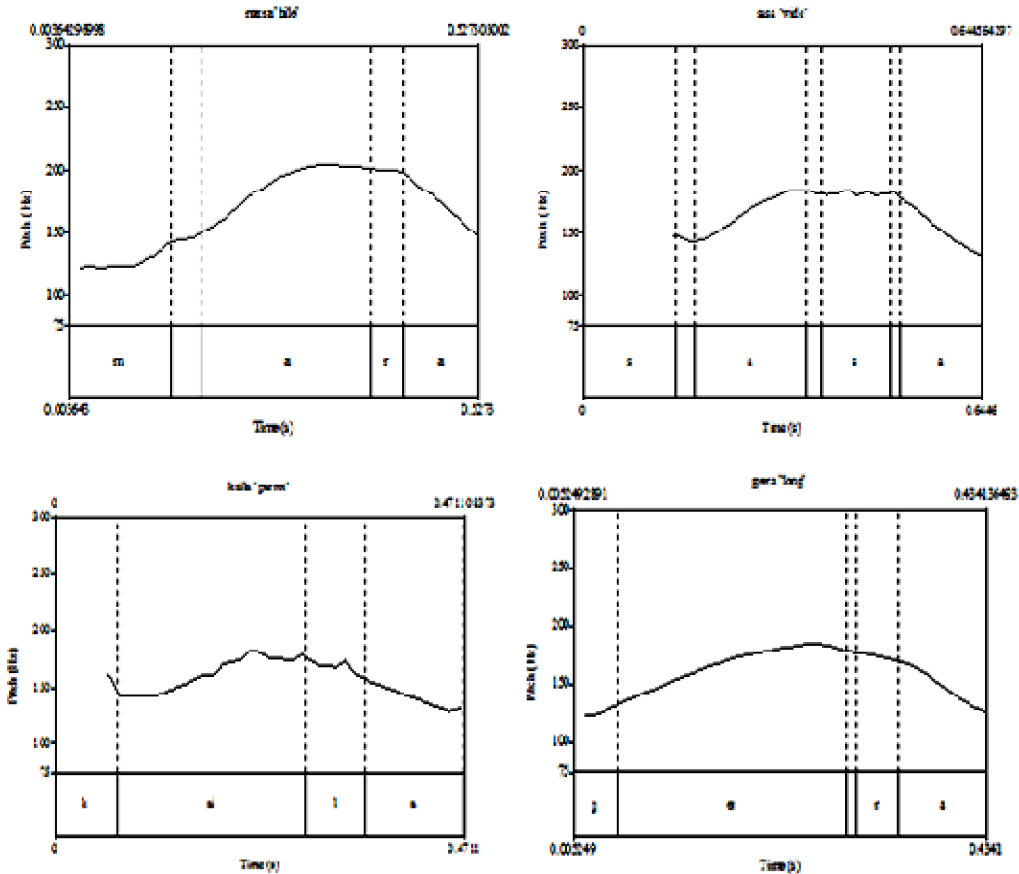


Figure 60 Sample pitch traces for MH-HM melodic pattern on disyllabic words

(37) *Melody-6* LH.HL 15.41; 14.41      ũ:lâ      ‘wild edible root’

The above surface pattern, in (37), is composed of initial rising and final falling contour tones and is found to be less frequent, in <sup>44</sup>citation forms, as compared to the MH.HM sequence. The spreading of the initial rising contour results in a second H tone, which surfaces as HL falling on the final syllable. In account to stem-internal spreading of the preceding H tone, the sequence becomes permissible as L.H.L and obeys the OCP. The delayed peak of the first H tone manifests the same pitch height on the intervocalic liquid

<sup>44</sup> All citation forms in Kunama are nominals.

consonant, but the H tone that surfaces on the final vowel, as HL falling, is lower in pitch than the first. Changes in  $F_0$  curves have been observed to be rapid during word-medial voiced consonants, in general, and during a sonorant consonant, in particular. The phenomenon is commonly observed in the environment of moraic medial consonants that often carry the peak of the preceding H tone pitch. See the pitch trace, in (Figure-61), below:

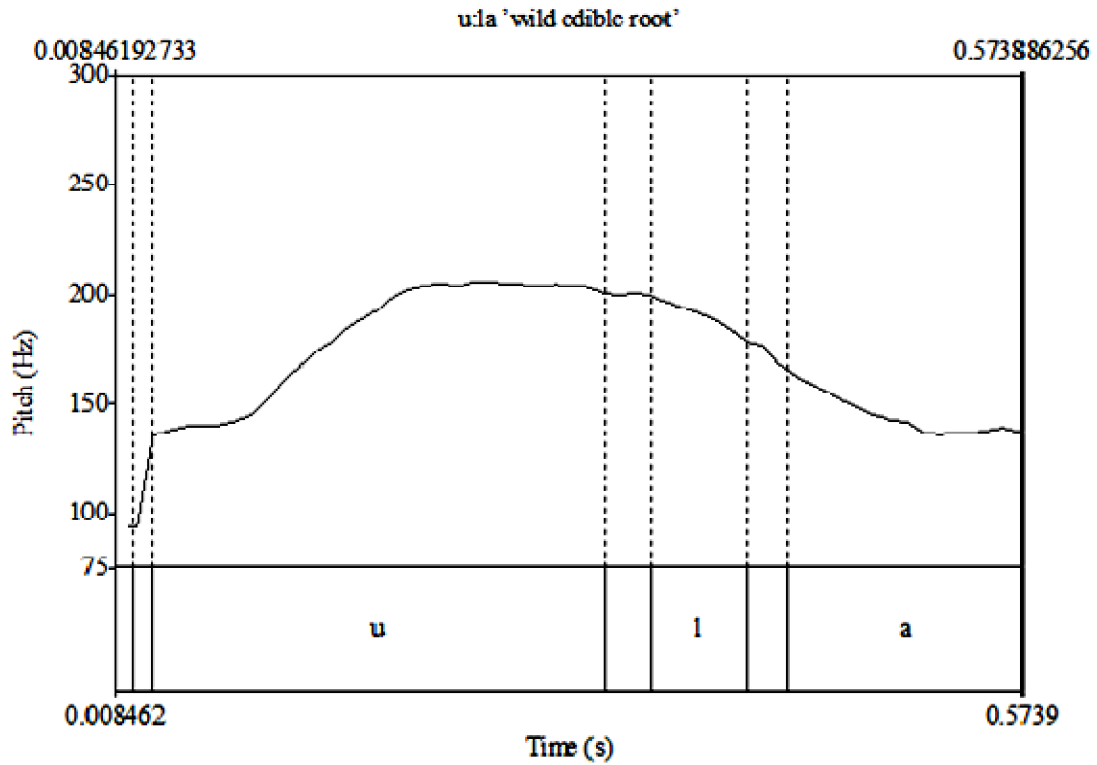


Figure 61 Sample pitch trace for LH.HL melodic pattern

Below, in (Table-23), are average  $F_0$  values for the level high tone. The values are computed from tokens of a single speaker.

Table 23 Average F<sub>0</sub> values for H level tone on disyllabic words

Position	ké:lá 'kohl	(n=3) sú:sá 'preparing'		(n=3)
	Initial	Final	Initial	Final
Tone	H	H	H	H
Mean	176.3-172.3	167.3-161.9	186.1-172.2	173.6-165.9
SD	14.8 ; 15.3	14.2 ; 16.2	4.9 ; 7.9	7.2 ; 0.9

The H tone, even in its typically level realization, shows some movement in pitch on both syllables. In relative terms, final H is lower in pitch than the initial H. Besides, the H tone becomes level when it is realized in a lowered pitch range.

Generally, in the words discussed so far, the pattern of *Melody-3* is shown to be rarer and needs stronger evidence from future studies. Among the remaining patterns, the pattern of *Melody-4* is more frequent. In H.H sequences, the second H tone shows a lowering pitch to some degree, but we cannot be sure that this suffices to make a downstep. However, a H.H sequence having both Hs realized in an extra-high pitch is a rarer phenomenon. In the instances where HH seems to manifest, the second H tone reveals additional lowering in pitch. In account to Yip's (2002) binary feature register, these two H tones can be distinguished by [+Upper, -high] and [+Upper, +high] register feature, respectively. The pulling-down effect of the pitch in the second mora drops the pitch by a certain Herz in F<sub>0</sub>. Though this is commonly considered as an evidence for downstepped H tone following another H, the present analysis does not claim for a downstep. The same phenomenon of pitch lowering is also observed on word-final M and L tones though not with an equal degree of final H tone. On the other hand, a particular class of consonants, Bradshaw (1999), can also cause pitch depression on the final H tone of a H.H sequence. Although voiced obstruents are referred as depressor consonants, the issue in Kunama requires a full-fledged comparative study in the future.

The last point worth mentioning is that word-medial nasal and liquid consonants often carry the pitch of the preceding vowel by way of continuation. However, since the pitch that surfaces on these consonants is often encoded onto the following vowels, the F<sub>0</sub> values extracted from the vowels is considered representative. For example, on mā́ rá̀

‘bile’, the medial liquid /r/ shares the same H tonal node with the preceding vowel, and the final vowel surfaces with the same H tone that results from spreading of the initial rise. Thus, the  $F_0$  values extracted from the vowels can represent the form and behavior of the surface tone melody. Word-initial sonorant consonants, however, often bear an erratic pitch while voiceless consonants, regardless of the word position, interrupt the pitch of vowels. In effect, the same melodic pattern can be depicted differently depending on the consonant context. Consider below, in (Figure-62), the difference of the same MH.HM pattern in the context of sonorant and voiceless obstruent consonants:

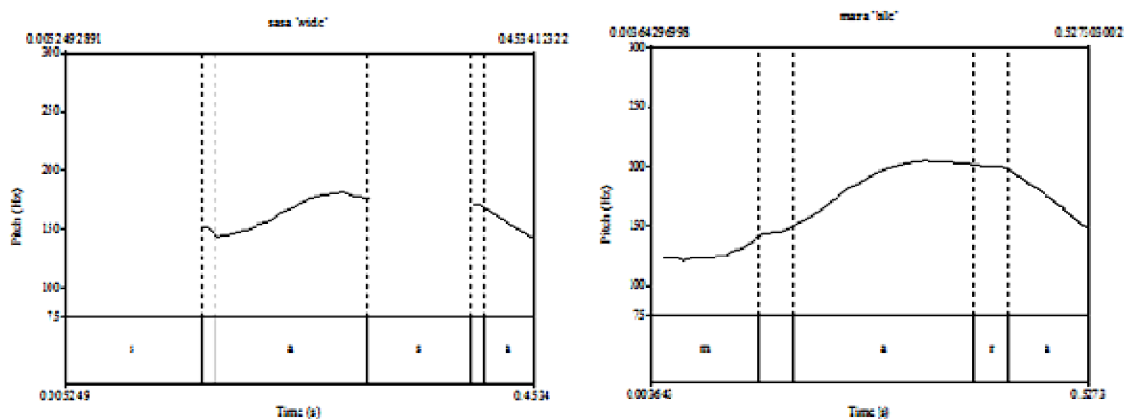


Figure 62 Pitch traces of MH.HM pattern in the context of voiced vs. voiceless consonants

### Trisyllables

On trisyllabic words, the high tone does not show a typical level H pitch. In the experimental wordlist, the final H tone on the trisyllabic words is shown to be a fall. Thus, a sequence of two level H tones is observed on the antepenult and penult syllables while the final H tone forms a HM or a HL falling contour. As has been discussed in the disyllabic words, in (31-37), that show MH.MH, LH.HL, H.HM and H.H sequences, the second H tone is supposed to be a result of spreading of the preceding H tone and will be lowered in pitch relative to the first. Though the same phenomenon persists on trisyllabic words, exceptions seem to exist as explained in the next paragraphs.

Table 24 Sample F<sub>0</sub> values of the H tone on trisyllabic words

Words	S:T	L		M		R		L	M	R	L	M	R	L	M	R
		MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	V	VD	VD	SD	SD	SD
kébésá ‘a baby ...’	3:1	201.9	194.5	198	190.3	184	128.5	198.8	194.1	144.9	67	99	231	2.6	2.7	14.8
kófúlá ‘credit’	3:2	269.6	251.4	252.6	240.6	230.2	153.9	261.2	247.2	172.6	78	86	200	5.5	4.8	20.6
	3:1	174.7	133.2	175.1	167.4	193.8	125.2	147.1	169.2	160.7	88	51	192	12.1	2.4	23.1
	3:4	198.6	194.5	257.4	234.2	197.6	152.2	196.3	247.2	165.4	54	102	170	1.5	8.1	12.8

- (38) H.H.HM 5.5.52 a. kébésá<sup>-</sup> ‘a baby (that stops suckling in a near past)’  
 4.5.52 b. kófúlá<sup>-</sup> ‘credit’

The tonal pattern given, in (38), above, is similar to the patterns discussed before, in (32). In account to stem-internal spreading of the H tone, the initial and the penultimate H tones that are both in an extra-high pitch will be condensed, and consequently the H tone of the final HM falling is expected to be realized in a lowered high pitch. In (38-a), however, the final H tone of the HM falling is in an extra-high pitch range, which is in contrast to final HM fallings surfacing on the disyllabic words, where the unit H tone is often realized in a lowered high pitch. Though the final H tone is supposed to be a result of spreading of the preceding H tone, it is striking to see the final H tone of the HM falling in an extra-high pitch range. This phenomenon, therefore, might take us to an important theoretical assumption in binary register feature geometry that arises a debate on spreading of both ‘Register’ and tone, or spreading of one without the other feature and specifies the discontinuous tone in terms of register and tone features.<sup>45</sup> Hence, the relevance of the binary register feature theory to the tonal phenomena of Kunama would make a topic of future study.

The H.H.HM sequence, in (38-b), shows that the initial H tone in a lowered high pitch, i.e. [+Upper, -high] while the medial H tone and the final H tone of the HM falling are in extra-high pitch range, i.e. [+Upper, +high]. Accordingly, in view of stem-internal spreading of tones, the H tone sequences shown above, in (38), can be aligned to the same H tonal node so that the melodic patten becomes permissible as H.M falling

<sup>45</sup> The detail about binary register feature can be read from Yip (2002).

melody. Thus, Kunama level tone sequences seemingly obey the OCP. However, the relevance of binary feature register to Kunama tonal phenomena requires further investigation.

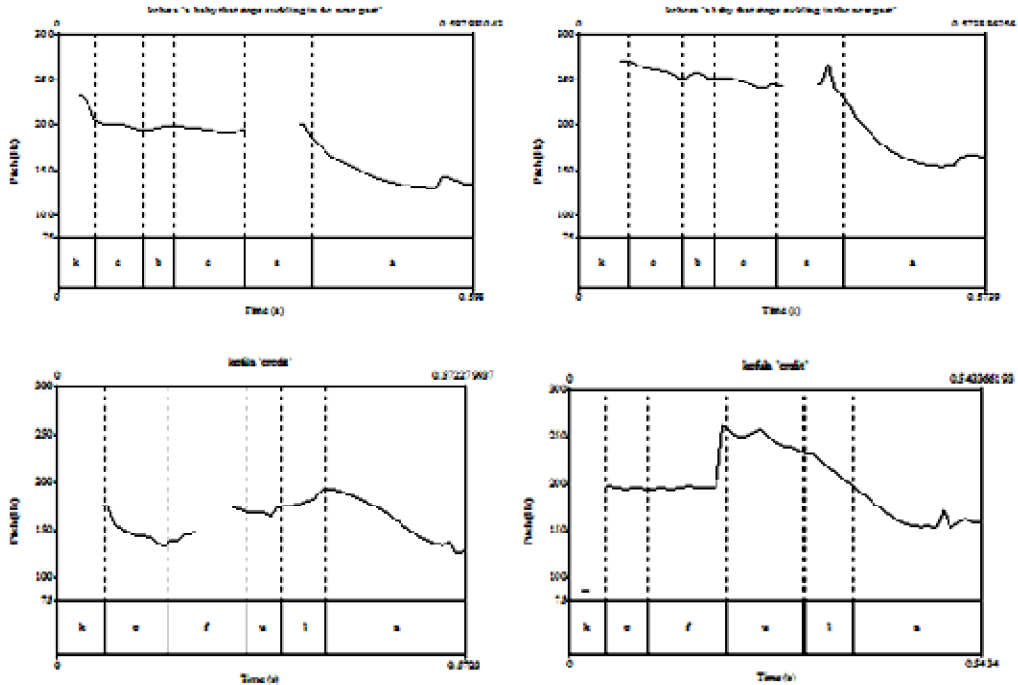


Figure 63 Pitch traces for H.H.HM pattern on trisyllabic words

### 6.5.3.2 Surface Realizations of Underlying Mid Level Tone

#### Disyllables

The underlying M tone has showed a typically level realization on disyllabic words. It can be realized in a raised and a lowered pitch range, depending on the context. At the surface of mid-toned disyllabic words, different melodic patterns have been analyzed, as discussed in the next paragraphs.

- (39) *Melody-7* M.M 2.2
- a. ānā ‘song’
  - b. ʃūdā ‘withering’
  - c. bū:rā ‘spotty (color of an ox)’
  - d. kēlā ‘counting’

In comparison to the high tone, the M tone is stable. The M.M pattern can operate in one-to-many association in view of stem-internal spreading of tones that is found to be common in Kunama.

Table 25 Sample F<sub>0</sub> values of the M tone on disyllabic words

Words	S:T	L		R		L		R		L		R	
		MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	SD	SD		
é'tā 'relative(by marriage)'	3:1	145.9	121.9	126.3	110.8	135.3	114.9	229	160	7.8	4.6		
	3:2	159.1	113.6	132.2	115.7	139.8	122.9	179	89	16.3	5.8		
ānī 'song'	3:1	148.5	140	149.4	143.3	142.9	146.8	146	200	6.9	1.7		
	3:2	169.5	165.1	172.7	165.2	167.2	167.4	97	403	1.4	1.5		
dā dā 'helping'	3:1	154.5	126.5	113.9	105.9	142.5	108.9	163	120	9.8	2.2		
	3:4	166.8	126.3	124.7	102.9	145.6	114.7	173	245	11.6	5.5		
fā'lā 'proverb'	3:2	155.2	131.8	130.2	110.6	144.3	118.9	204	152	8.5	4.2		
	3:3	157.5	138.7	134.2	109.1	149.9	119.2	178	94	7.2	8.6		
fūdā 'withering'	3:1	167.5	155.6	157.2	152.6	159.9	154.6	200	305	2.2	1.2		
	3:2	160.7	155.9	156.6	151.6	159.3	154.3	154	125	1.3	1.2		
mārā 'guide(n)'	3:2	148.6	137.9	161.9	131.3	144.4	148.0	91	181	3.6	11.1		
	3:3	148.5	137.8	162.4	131.6	144.3	148.5	94	178	3.7	11.0		
kō fā 'hunting'	3:1	151.8	143.3	168.3	157.8	147.9	162.2	120	57	3.5	3.6		
	3:2	159.2	152.3	175.1	126.6	156.3	147.5	271	142	1.9	14.7		
ū:lā 'locust'	3:2	167.6	159.3	193.8	140.7	164.1	162.2	276	141	2.9	18.8		
	3:3	156.2	152.6	171.3	151.6	154.7	165.2	279	75	1	6.7		
bū'rā 'satiety (of food or drink)'	3:1	153.8	139.1	172.5	132.8	146.3	154.7	56	136	5.5	14.8		
	3:2	155.6	139.2	173	133	147.8	156.3	64	146	5.9	15		
sūsā 'standing up'	3:1	149.3	145.6	166.5	127.8	146.9	145.8	138	141	1.1	12.2		
	3:4	143.2	139.7	171.3	129.2	140.9	149.7	200	77	0.8	15		

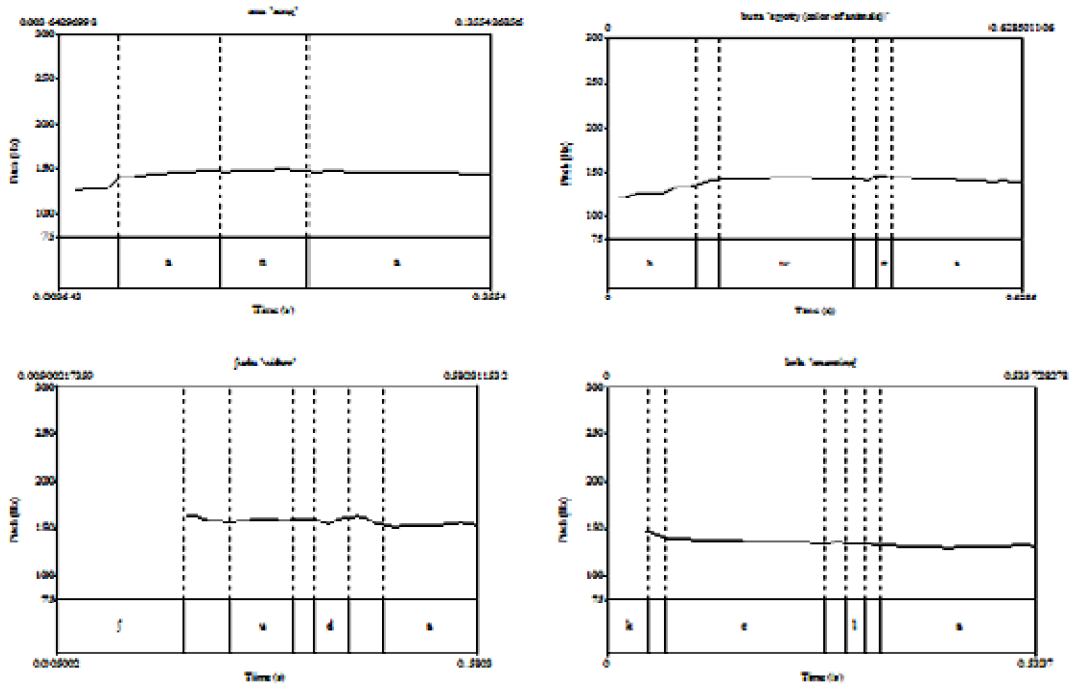


Figure 64 Pitch traces for level mid tone on disyllabic words

- (40) *Melody-8* M.HL 2.41 a. ū:lâ ‘locust’  
 b. fâlâ ‘cheek’  
 c. sū:sâ ‘standing’  
 d. kō:fâ ‘hunting’

The surface pattern given, in (40), approximates to the rising-falling sequence that is supposed to be a complex contour melody. The M tone before the H tone shows a raised pitch, and this might be because the M tone is in vertical assimilation to the H tone. As can be fetched from above, in (Table-25), the effect of the H tone pulls up the L tone on the words given, in (40), so that the final HL falling contour may not reach to its lowest destination. Consequently, the M.HL sequence on some of the words above, for example, in (40-d) was perceived as M.H rising. See the pitch traces below, in (Figure-65):

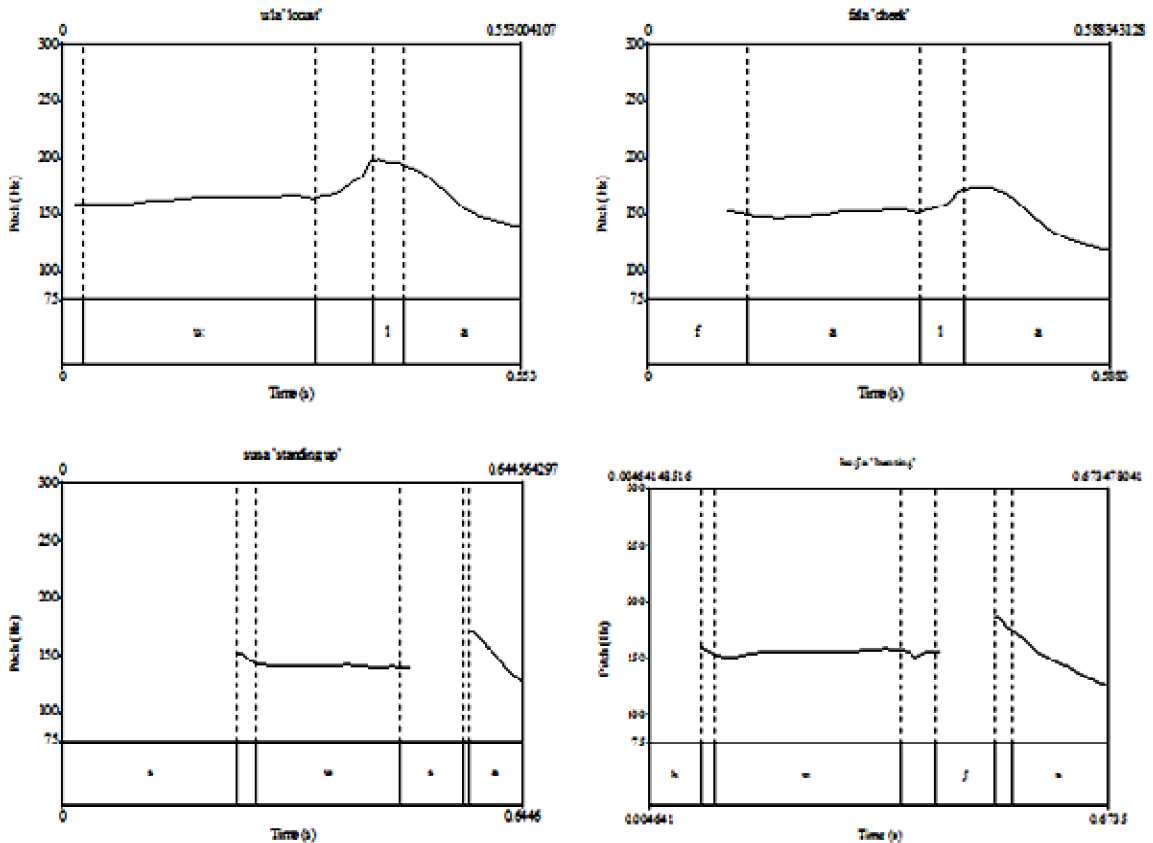


Figure 65 Pitch traces for M.HL melody on disyllabic words

- (41) *Melody-9* LM.ML 12.21 ~ LML
- a. è:ṽā`                    ‘relative (by marriage)’
  - b. fà:ṽā`                    ‘proverb’
  - c. bù:ṽā`                    ‘satiety (of food or drink)’

This tonal melody is a cluster of initial rising and final falling. The second M tone is a result of spreading of the LM rise, initially. Thus, the LM.ML sequence will be compressed to LML pattern that obeys the OCP. The L tone of the initial rise and the final fall often attain similar pitch heights. On some lexical instances, as in (41-c), the lowest pitch target points of the initial rise and the final fall may not be at equal heights. This might be because the spreading of the initial LM rise is delayed onto the final vowel thereby pulling up the final fall before its lowest pitch destination point. Consider the following pitch traces, in (Figure-66):

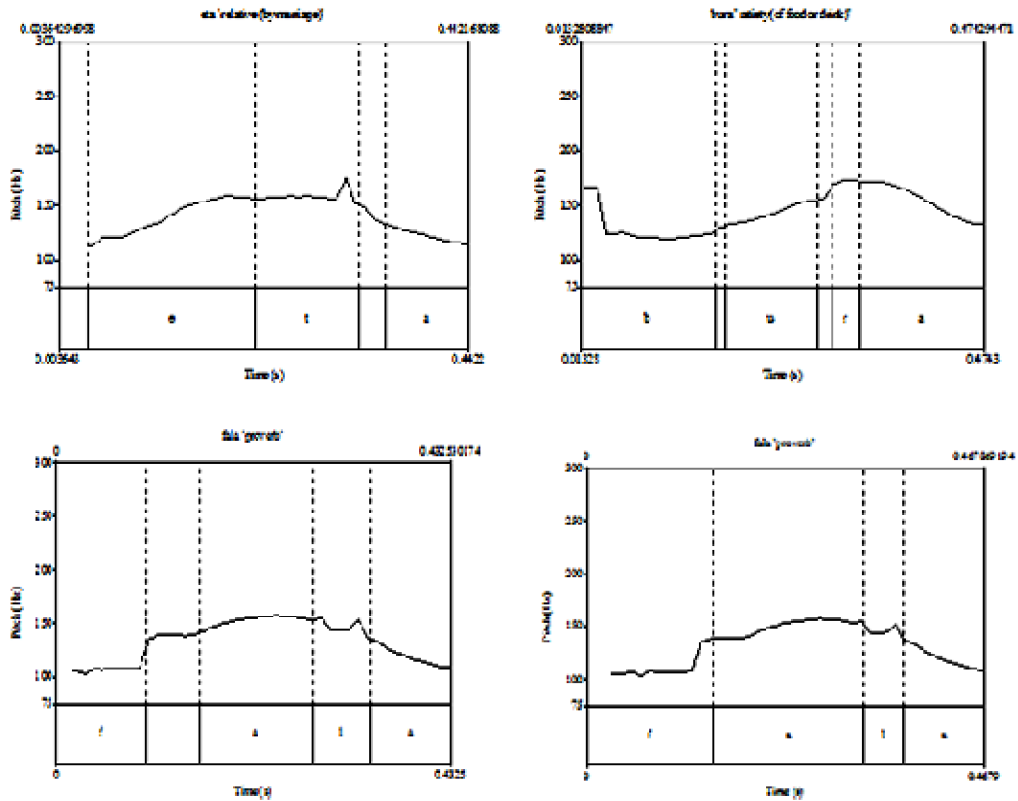


Figure 66 Pitch traces for LM.ML melody on disyllabic words

- (42) *Melody-10* ML.L ~ML 21.1 a. dā̀:dá 'helping'  
M.ML~ML b. mā̀:rā́ 'leader'

This surface sequence may take a ML.L or a M.ML pattern depending on the word context. In (42-a), the pattern combines the ML falling, surfacing on the initial bi-moraic syllable, and the low tone on the final syllable; actually, the final L tone is a result of spreading of the preceding ML falling contour. In (42-b), it takes on an initial level M tone followed by a final ML fall. In accordance with tone spreading, the permissible sequence will become a M.L falling. In the latter, the M tone on the initial syllable starts with a lowered pitch and then rises to the M tone pitch during the medial liquid and the final vowel.<sup>46</sup>The F<sub>0</sub> difference between the lower pitch point of the initial M tone and

<sup>46</sup> Hombert (1977:185) referring to Winckle (1938) noted, "F<sub>0</sub> fluctuations of less than 20Hz are imperceptible in everyday situations."

highest pitch point of the same M tone is smaller, i.e. only 10Hz, to make a LM rising contour, initially. Consider below, in (Figure-67):

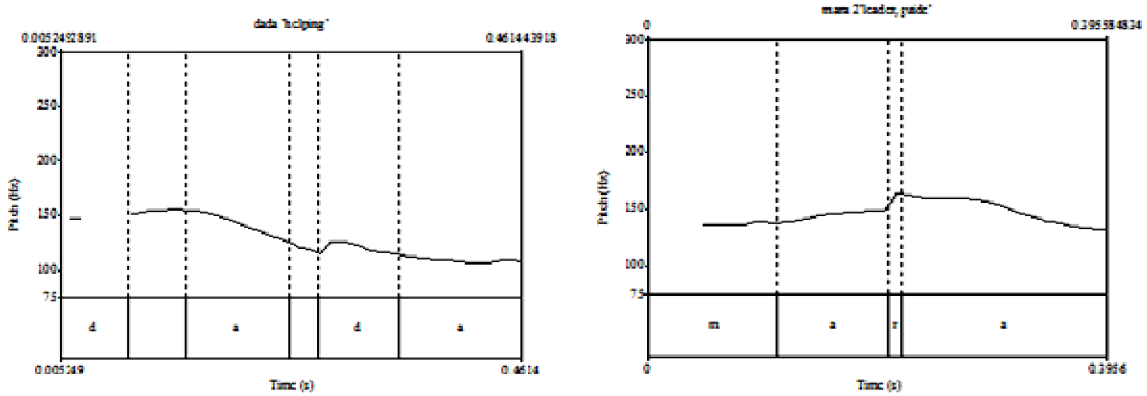


Figure 67 Pitch traces for ML.L and M.ML patterns on disyllabic words

### Trisyllables

The underlying M tone can be realized with a level pitch on some trisyllabic words though not as level as the surface M tone analyzed on monosyllabic and disyllabic words. The patterns analyzed on mid-toned trisyllabic words are discussed in the following paragraphs.

Table 26 Sample F<sub>0</sub> values of the M tone on trisyllabic words

Words	S:T	L		M		R		L		M		R		L		M		R	
		MxF <sub>0</sub>	MnF	MxF <sub>0</sub>	MnF <sub>0</sub>	Mx	Mn	AvF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	VD	VD	SD	SD	SD		
ḡigidā 'animal'	3:3	146.7	141.4	176.8	154.2	142.5	124.7	143.9	170.1	132.9	64	91	117	1.9	7.4	5.7			
kebesā 'relative'	3:1	133.7	124.9	147.3	143.5	136.1	107.3	127.3	146.1	116.9	61	49	152	3.4	1.6	8.6			
kōfūlā 'smearing'	3:1	135.5	120.4	143.8	136.9	159.4	119.9	128.4	139.4	138.8	53	65	134	5.8	2.2	12.9			
āmādā 'baboon'	3:4	135.6	132.2	178.5	163.6	187.9	166.9	133.4	167.3	177.9	57	90	144	1.5	5.5	7.9			
kāfātā 'buttock'	3:2	156	137.5	144.9	137	152	134.7	149.2	141.8	138.7	83	97	160	5.2	2.6	5.1			

(43) M-M-M 2.2.2

kāfātā

‘buttock’

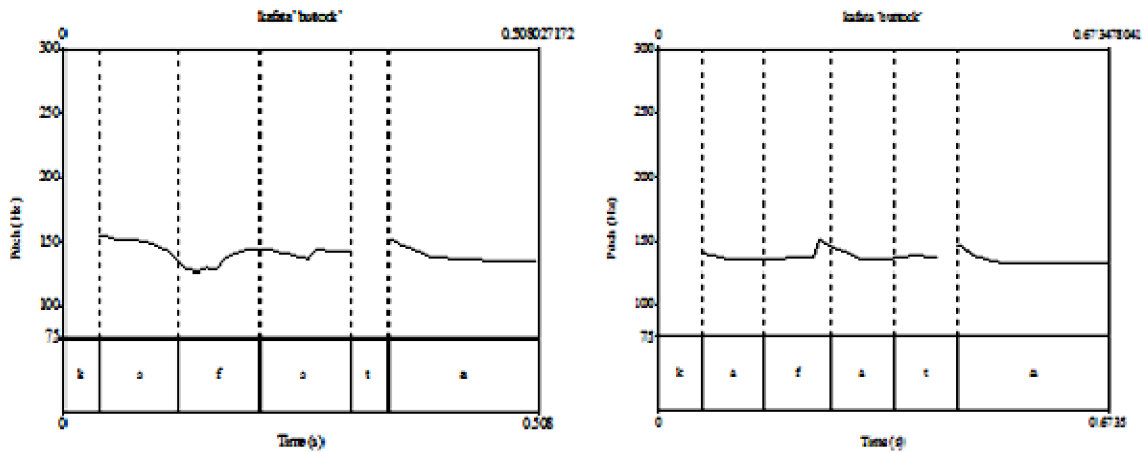


Figure 68 Pitch traces for level mid tone on trisyllabic words

(44) M.M.HM 2.2.42

a. āmā:dá<sup>-</sup> ‘baboon’

M.H.M 2.4.2

b. fīgídā ‘animal’

This pattern is similar to the MH.HM sequence analyzed on the disyllabic words, in (36), above. In view of stem-internal spreading of the M tone, the pattern shown in (44) can be compressed to a MHM sequence. In (44-b), each syllable has borne its own pitch (M.H.M) though the final M tone exhibits a falling tendency to some degree, which is a common behavior of all final level tones. Notice, in (Figure-69), below:



(46) *Melody-11* L.M.HL 1.2.41 kòfùlâ ‘smearing’

The pattern, in (46), is a bit complex as it combines the three level tones on a sequence of three light syllables though the final H tone makes a HL falling. In left-to-right association, this pattern gives a ladder shape melody. Phonetically, final HL falling contour is a default M tone, as inferred from the average  $F_0$  figures given, in (Table-26).

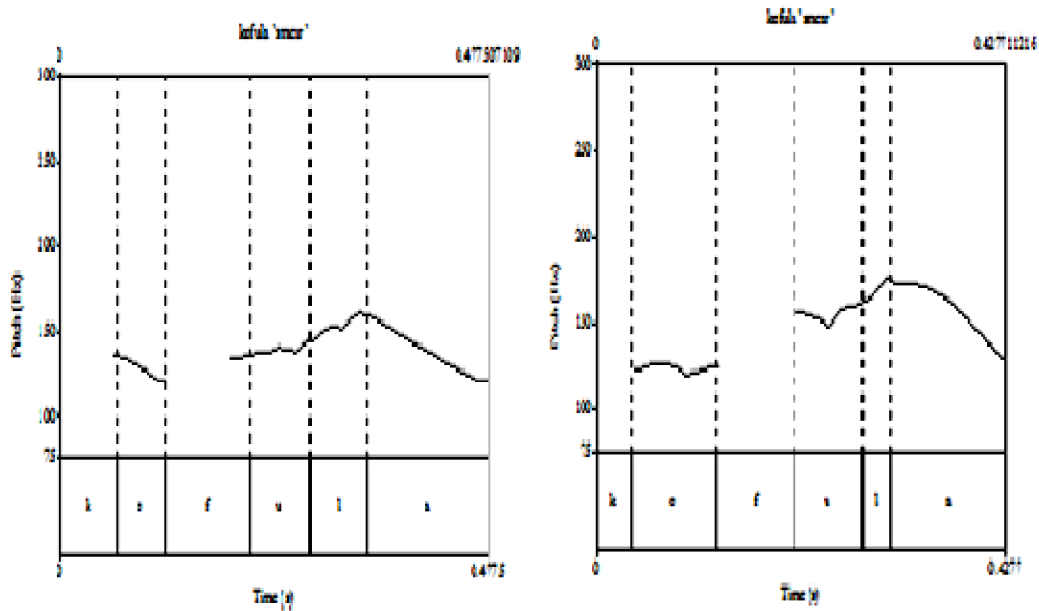


Figure 71 Pitch traces for L.M.HL melody on trisyllabic words

Comparatively, the level mid tone is stable on disyllabic words than on trisyllabic words. Based on the average  $F_0$  values given below, in (Table-27), the pitch movement is relatively appreciable on the trisyllabic words, especially in the final syllable. The average  $F_0$  values for the final HL falling contour in **āmā:dâ** ‘baboon’ show a narrow interval of only 22Hz. This interval size rather is optimum for ML falling contour, but the phenomenon is an indicator of pitch scaling that shows the  $F_0$  fluctuation even across tokens of the same speaker.

Table 27 Average F<sub>0</sub> values for M level tone on di- and tri-syllabic words

ānā ‘song’		(n=4)		jūdā ‘wither’		(n=3)	
Position	Initial	Final		Initial		Final	
Tone	M	M		M		M	
Mean	156.7-159	160.3-154.7		162.9-156.3		156.9-152.3	
SD	14.5 ; 12.1	13.3 ; 12.1		3.9; 0.9		0.3 ; 0.6	
kāfātā ‘buttock’		(n=5)		āmādā ‘baboon’		(n=5)	
Position	Initial	Medial	Final	Initial	Medial	Final	
Tone	M	M	M	M	M	ML	
Mean	144.6-135.9	143.4-136.1	146-134	148.1-145	151.5-148.9	156.7-133.3	
SD	13;8.9	3.9;2.1	4.8;1.4	11.5 ; 10.9	10.4 ; 11.7	30.3 ; 16.7	

### 6.5.3.3 Surface Realizations of Underlying Low Level Tone

#### Disyllables

On the surface of low-toned disyllabic words, L.L and L.M patterns have been analyzed. The scaling of the low tone pitch can be noticed from the distribution of the sample F<sub>0</sub> scores given, in (Table-28), below.

Table 28 Sample F<sub>0</sub> values for the L tone on disyllabic words

Words	S:T	L		R		L		R		L		R	
		MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	SD	SD		
òtá 'thorn'	3:1	130.5	125.2	116.1	107.5	127.5	111.5	244	130	1.7	2.7		
	3:2	129.9	122.9	132	119.6	127.2	121.7	279	220	2	3.1		
kòitá 'supporting'	3:1	130.3	122.1	136.9	127.6	127.5	132.2	234	157	2.9	3.4		
	3:4	121.2	106.6	126.5	116.9	111.4	119.9	232	192	3.8	2.9		
àná 'hair'	1:1	127.4	118.9	122.5	117.8	122.2	119.7	78	99	3.7	1.6		
	3:3	116.2	114.3	130.8	123.4	114.9	127.7	159	253	0.6	2.2		
dàdà 'bead'	3:1	125.8	121.1	123.7	121.1	123.6	122.1	184	197	1.4	0.6		
	3:2	136.9	131.9	133.8	126.7	135	130.7	154	160	1.6	1.6		
i:jā 'brother/sister'	3:2	131.3	124.9	142.4	140.5	128.3	141.4	316	234	1.7	0.5		
	3:3	131.4	121.6	145.5	140.5	128.3	141.6	314	245	1.7	0.9		
jō:dà 'rubbing'	3:2	102.9	96.8	117.7	114.6	100.9	116.5	293	69	1.7	1.2		
	3:3	112.9	107.5	120.4	115.1	109.6	117.8	338	69	1.8	1.8		
bàdà 'back'	3:2	122.1	120.7	130.9	127.6	121.7	129.5	73	125	0.5	1.1		
	3:1	122.3	120.8	131.0	126.5	121.8	129.4	85	114	0.5	1.5		
lilà 'oil'	3:3	130.4	126.3	125.6	120.7	129.6	122	220	176	0.6	1.2		
	3:6	134.3	128	132.2	121.6	130.6	128.1	195	213	1.9	2.9		
kòjā 'giving birth'	3:1	126.1	110.1	126.9	122.3	117.5	125.7	44	110	5.3	1.1		
	3:2	117.6	108.6	126.9	122.3	113.9	125.6	44	115	4.3	1.2		
kè:là 'guest'	3:1	124.8	109.1	110.1	106.5	112.9	108.6	157	102	4.2	1.3		
	3:5	132.6	124.1	140.4	134.6	126.8	137.8	237	240	2.7	1.2		
kòlà 'preventing'	3:5	129.3	121.8	125.2	120.7	126.6	122.8	51	181	2.9	1.3		
	3:6	123.6	117.1	128.5	126.9	121.5	127.7	61	128	2	0.4		
kàilà 'fear (n)'	1:2	128.2	117.7	133.7	123.4	119.8	126.3	128	67	2.9	4.7		
	3:2	113.9	99.2	116.4	109.3	103.3	114.3	226	114	4.1	2.2		
sà:sà 'telling'	3:1	123	116.8	138.3	131.7	119.9	133.7	189	101	1.3	2.1		
	3:2	140.9	116.8	135.9	131.8	121.2	132.9	163	162	4.6	0.9		
ùlà 'body (of human)'	3:2	133.9	117.7	119.2	113.7	125.3	116.4	109	125	5.3	1.9		
	3:5	138.5	131.1	124.7	115.1	133.3	119.3	72	178	2.4	3.1		

- (47) *Melody-12 L-L* 1.1
- a. àná 'hair'
  - b. dà:dà 'bead'
  - c. lilà 'oil'
  - d. bàdà 'back'
  - e. kòlà 'defending'
  - f. ùlà 'body'
  - g. òtá 'thorn'

In some of the lexical items given above, in (47), the perceptual pitch and the obtained F<sub>0</sub> values do not much. For instance, the word in (47g) was heard with a mid tone pitch; where as, the F<sub>0</sub> values rather indicates a low tone pitch.

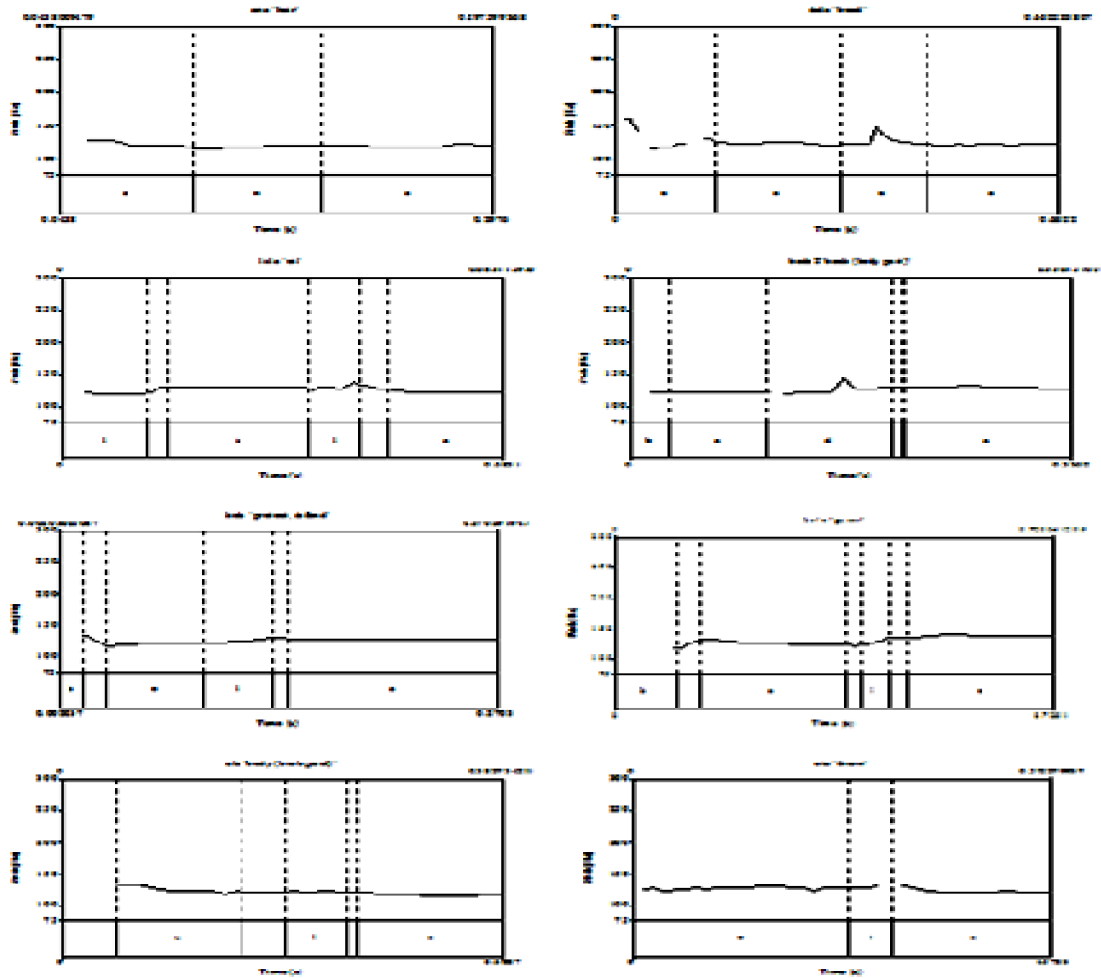


Figure 72 Pitch traces for level low tone on disyllabic words

- (48) *Melody-13* L.M 1.2
- a. ì:ǎ      ‘brother/sister’
  - b. sà:sā      ‘telling’
  - c. kòitā      ‘lean against’
  - d. kàilā      ‘fear’
  - e. kòǎ      ‘giving birth’
  - f. ǎ:dā      ‘rubbing’



Table 29 Sample F<sub>0</sub> values of the L tone on trisyllabic words

Words	S:T	L		M		R		L	M	R	L	M	R	L	M	R
		MxF <sub>0</sub>	MnF	MxF	MnF	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	VD	S	S	S
			i	i	i									D	D	D
ʃiqalā 'trap(n)'	3:1	127.5	110	1222	1103	129.8	109.9	121.5	116.8	119.9	69	83	126	6.9	5.4	6
	3:3	134.2	119.4	135.3	127.4	135.7	133.3	126.3	131.9	134.7	59	96	123	6.5	2.6	0.7
	3:4	138.5	132.6	130.1	120.4	142.2	138.4	135.6	127	140.3	38	61	116	2.5	3.2	1.2
āmāḏā 'sadder'	3:2	127.7	110.1	151.2	131.7	110.2	103.4	116.2	145.4	106.3	97	149	71	4.8	6.3	2.2
	3:4	116.9	110.1	151.2	138.6	108	103.6	114.9	147.5	105.7	73	106	56	1.9	4.3	1.8
	3:3	117	84.9	151.2	129.9	108	103.6	111.3	144.9	105.7	146	154	56	9.7	6.9	1.8
kaf Ōta 'down'	3:1	133.9	124.4	∅	∅	141.2	114.5	127	∅	125.6	130	∅	89	2.6	∅	9.9
	3:2	132.9	124.5	∅	∅	136.7	114.6	126.8	∅	122.8	126	∅	73	2.3	∅	7.8

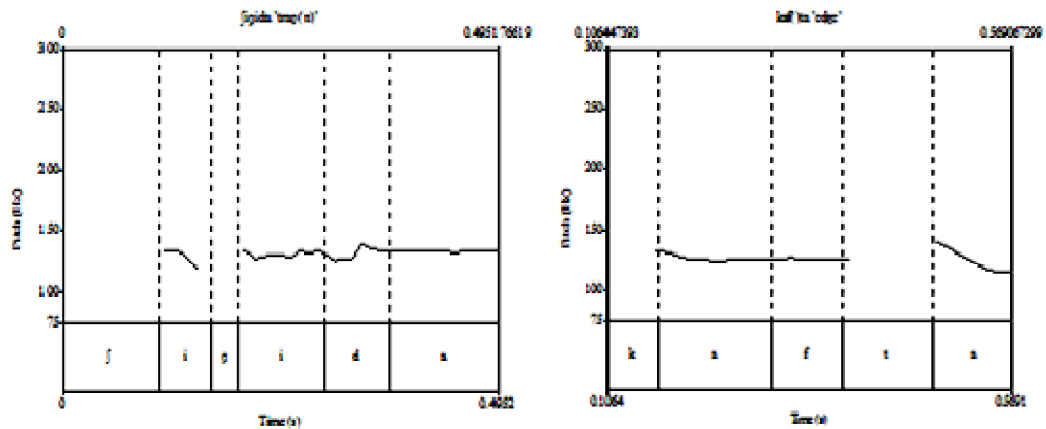


Figure 74 Pitch traces for level low tone on trisyllabic words

(50) L.L.M.L 1.12.1 àmāḏā 'sadder'

The above pattern, in (50), is similar to the LM.ML sequence that surfaces on disyllabic words given before, in (41). In (50), however, the spreading of the initial L tone creates a LM rising contour on the penult syllable while the final L tone shows up as level. The LM rise makes the vowel to be heard as longer than otherwise is short in the underlying form. If the LM rising had been formed on underlying long vowel, we would see the result of the rise spreading, on the final syllable, as ML falling. In account to this, this pattern becomes permissible as LML sequence. See the pitch traces, in (Figure-75), below:

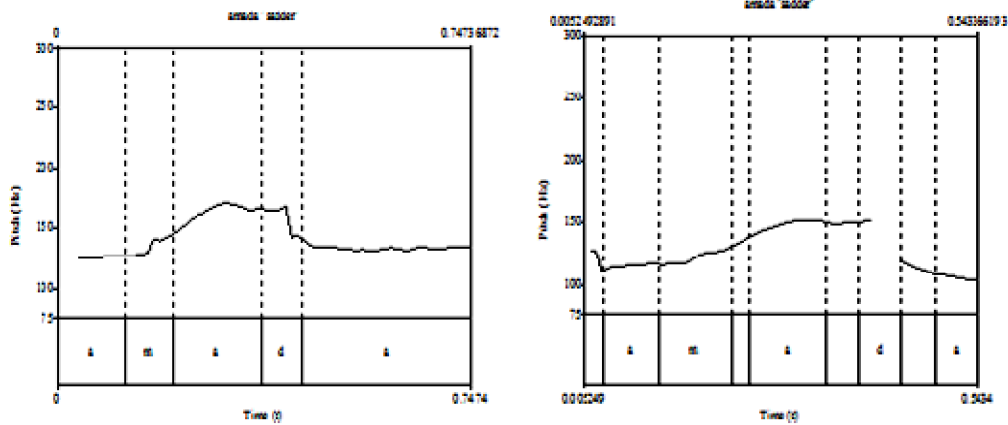


Figure 75 Pitch traces for L.LM.L pattern on trisyllabic words

Table 30 Average F0 values for L level tone on di- and tri-syllabic words

	dàdà 'bead' (n=4)			jò:dà 'rubbing' (n=7)		
Position	Initial		Final	Initial		Final
Tone	L		L	L		L
Mean	132.9-128.5		133.9-126.9	101.9-106.7		115.3-110.3
SD	4.9 ; 4.9		7.3 ; 4.7	4.4 ; 4.9		4.6 ; 4.7
	ànà 'hair' (n=7)			kàilà 'fear' (n=4)		
Position	Initial		Final	Initial		Final
Tone	L		L	L		L
Mean	132.9-124.5		138.1-128.8	128.4-114.4		127.8-121.3
SD	11.6;10.5		15.1;12.9	11.6 ; 10.9		7.8 ; 8.2
	jìgìdà 'trap(n)' (n=5)			kàftà 'edge' (n=3)		
Position	Initial	Medial	Final	Initial	Medial	Final
Tone	L	L	L	L	L	L
Mean	134.6-121	128.3-119.8	137.3-130.2	133.3-124.5	126.9-125.1	138.6-114.5
SD	4.5 ; 9.6	5.4 ; 7.9	5.1 ; 12.2	0.5;0.2	0.3;0.4	2.3;0.1

Kunama Low tone exhibits falling tendency in spite of its level realization. Unlike the mid tone, the Low tone pitch falls in word-final position, sometimes it glides to the lowest pitch range. Despite this, if one has to see typical level surface tones in the language, the low and the mid tones relatively make better witnesses. The lowest F<sub>0</sub> values are recorded due to the low falling surface realization of underlying low tone in all word positions, but word final falling of the low tone appeared to be noticeable.

#### 6.5.4. Analysis of F<sub>0</sub> Values of Bi-moraic and Word-final Contour Tones

The overall analysis so far reveals that Kunama has six contour tones that surface on bi-moraic syllables. Kunama contour tones have been claimed to be combinations of the level tones for some reasons observed in the present data. Firstly, the contours are analyzed on bi-moraic syllables, except that falling contours are formed on word-final short vowels that are licensed for hosting contours by the position, which often makes them phonetically longer. Secondly, in post lexical phonology, contour tones do not spread as a unit; instead, either of the unit tones in the cluster spreads. In terms of distribution, falling contours appeared more commonly than the rising ones in Kunama.

The discussion in the sections to follow envisages the forms and behavior of each contour tone via average F<sub>0</sub> values obtained from repetitions of di- and tri-syllabic words. The sampled words are those showing relatively a noticeable change of pitch within a syllable. As to most linguistic literature, such as, Yip, (2002), a difference of 20Hz or more between the level tones has been commonly considered suffice to identify any two tonal heights so that they form a contour tone.

##### 6.5.4.1 *Falling Contours*

Falling contours (HM, HL and ML) are found to be more frequent than rising contours, particularly on word-final syllables. Each of these falling contour tones are detailed separately based on average F<sub>0</sub> values and representative pitch traces. Once again, tone letters are used along with the tone diacritics to represent the pitch movements clearly.

###### 6.5.4.1.1 HM Falling Contour Tone

The High-Mid falling contour appears more frequently than the remaining falling contours (HL and ML). The following words, in (51) and (52) are sampled for having more repetitions so that they are used to compute the average F<sub>0</sub> and vowel duration values presented, in (Table-31), below.

- (51) a. CVCV    bádã<sup>-</sup> H.HM 4.42                    ‘thigh’  
      b. CV: CV    jó:dã    HM.L 42.1                    ‘get, find (someone or something)’

(52) CVCVCV kòfùlá<sup>-</sup> L.M.HM 1.2.42 ‘smearing (tr)’

Table 31 Average F<sub>0</sub> values for HM falling contour tone on di- and tri-syllabic words

	bádá <sup>-</sup> ‘thigh’		(n=5)		jò.dà ‘find ( someone or something)’ (n=5)	
Position			Final	Initial		
Tone	H		HM	HM	L	
Mean	186.4-181.9		169.1-140.2	178.2-146.3	126 -114.2	
SD	8.8 ; 9.1		10.9; 1.9	6.1 ; 9.1	7.7 ; 2.4	
VD			112ms	103ms		

	kòfùlá <sup>-</sup> ‘smear (tr)			(n=5)	
Position				Final	
Tone	L	M	HM		
Mean	133.4-125.3	152.8-165.3	177.5-146.4		
SD	4.1;6.2	11;13.7	13.8;21.4		
VD				138ms	

In (51-a), the HM falling contour surfacing on the final syllable shows an average F<sub>0</sub> interval of 29Hz between the level unit tones. Relative to the 20Hz interval reference, this interval size is appreciable to identify the pitch gliding from H to M. In terms of the average F<sub>0</sub> scale, the final H tone of the fall, resulting from spreading of the preceding H tone, is realized in a lowered pitch range, and which is a common phenomenon in Kunama. In (50-b), the bi-moraic penult syllable has borne a HM falling contour that shows an average F<sub>0</sub> interval of 32Hz between the unit tones. The average duration of the host vowel (103ms) is again larger than the average duration of short back-mid vowels, i.e. 72ms. The HM falling contour formed on the final syllable of the trisyllabic word given above, in (52), also shows a closer average F<sub>0</sub> interval between the unit tones, i.e. 31Hz. Thus, in all three contexts, the interval sizes between the H and the M tone are considerably large to make the HM falling. Comparatively, however, these figures are smaller than the same interval obtained from monosyllabic words (See under §6.5.2 above). Similarly, the average durations of the contour host vowels in all the three words are shown to be long vowel cues; note that final length contrast is neutralized in Kunama.

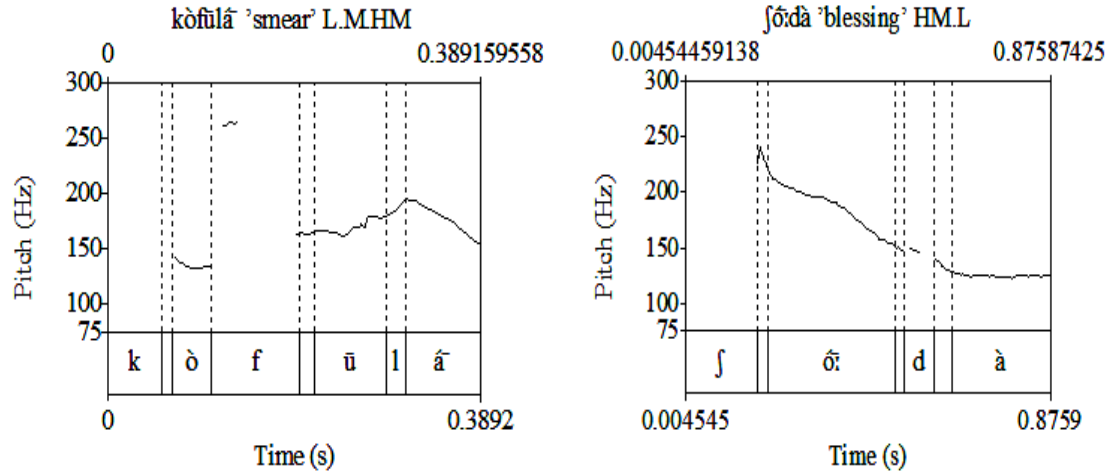


Figure 76 Representative pitch traces for HM falling contour tone

#### 6.5.4.1.2 HL Falling Contour Tone

In the experimental wordlist, HL falling contour has been observed only on word-final syllables. Of those, three words are sampled to calculate the average  $F_0$  values, in (Table-32), below:

- (53) a. CV:CV bádâ H.HL 4.41 ‘raid’  
 b. CV:CV kò:jâ M.HL 2.41 ‘hunting’
- (54) CVCVCV kófùlâ H.H.HL 4.5.41 ‘credit’

The average  $F_0$  intervals between the H and L tone units of the final HL falling contour, in (53-a & -b), are found to be 49Hz and 33Hz, respectively. The former is found to be justifiable while the latter is closer to the interval size between H and M tone units. This is because the H tone of the HL falling, in (53-b), is realized in a lowered pitch (165Hz) despite that the L tone  $F_0$  is rightly reasonable, i.e. 132Hz. For the same reason, the average  $F_0$  interval between the unit level tones of the HL falling, in (54), is diminished to 37Hz though the L tone unit again suggests a permissible  $F_0$  height of 133Hz. Based on these, it can be assumed that the pitch height interval size among the level tones will get narrower in polysyllabic contexts.

Table 32 Average F<sub>0</sub> values of HL falling contour tone on di- and tri-syllabic words

kō:fâ 'hunting'		(n=4)		bádâ 'raid'		(n=4)	
Position		Final				Final	
Tone	M	HL		H		HL	
Mean	150.1-143.4	165.3-132.4		172.9-163.8		183.3-134.9	
SD	13.6 ; 12.4	17.9 ; 17.4		0.1 ; 3.1		1 ; 3.4	
VD		102ms				186ms	

kófúlâ 'credit' (n=4)				
Position		Initial	Medial	Final
Tone		H	H	HL
Mean		171.6-155.2	198.8-185.8	170.7-133.1
SD		28.8;35.7	54.7;45.9	33.1;17.8
VD		60ms		120ms

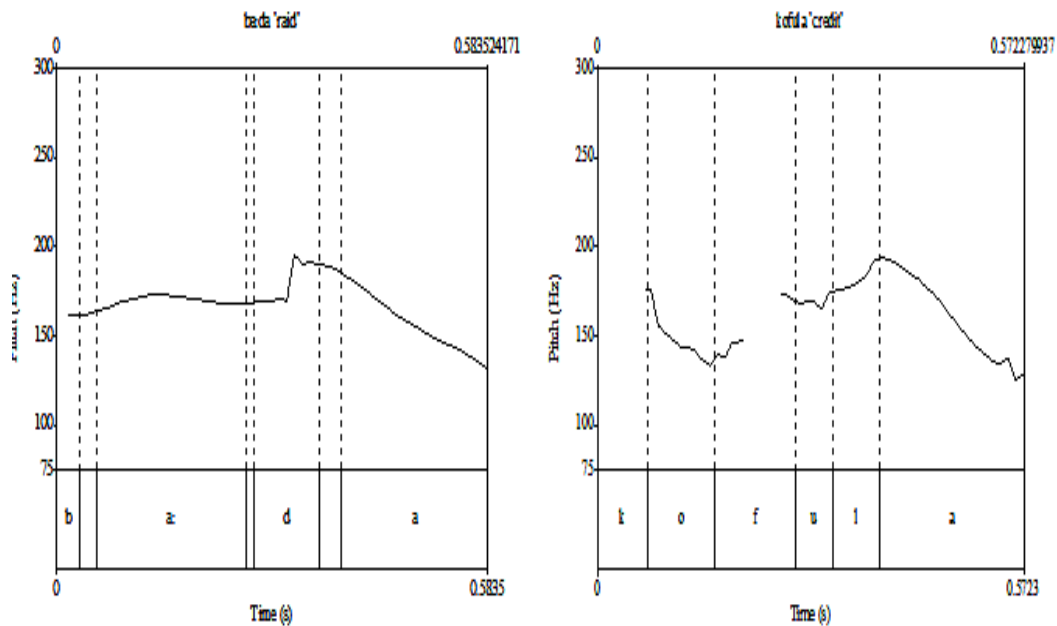


Figure 77 Representative pitch traces for final HL falling contour tone

6.5.4.1.3 ML Falling Contour Tone

In the experimental contexts, non-final ML falling contour is analyzed only on one disyllabic word having a long vowel on the penult syllable. The remaining words given below, in (55) and (56) have borne final ML falling contour.

- (55) a. CV:CV dā:dà ML.L 21.1 ‘helping’  
 b. CV:CV lí:lā` H.ML 4.21 ‘tying, bundle’
- (56) a. CVCVCV fīgídā` M.H.ML 2.4.21 ‘animal’  
 b. CVCVCV kēbēsā` M.M.ML 31.3.31 ‘relative (by blood)’

Table 33 Average F<sub>0</sub> values of ML falling contour tone

līlā ‘tying’		(n=8)		dā:dā ‘helping’		(n=5)	
Position		Final		Initial			
Tone	H	ML		ML		L	
Mean	182-173.2	141.7-128.5		163.2-129.2		122.4-108.3	
SD	17.3 ; 12.9	7.4; 9		7.3 ; 6.2		5.1 ; 6.4	
VD		104ms		166ms			
fīgídā ‘animal’		(n=6)		kēbēsā ‘relative (by blood)’		(n=3)	
Position	Initial	Medial	Final			Final	
Tone	M	H	ML	M	M	ML	
Mean	167.9-153	184.4-168.1	143.6-127.3	164.1-134.8	159.3-155.3	158.3-126.5	
SD	25.6; 26.6	40.4 ; 37.1	20.6 ; 16.9	13.7; 8.6	11.2 ; 10.9	12.3 ; 12.9	
VD	70ms	74ms	100ms	73ms		198ms	

The average F<sub>0</sub> interval between the unit tones of the initial ML falling contour, as obtained from (55-a), is 34Hz. A similar interval for word-final ML falling is obtained from (56-b), which reads 32Hz. This interval is lowered to 13Hz and 16Hz in (55-b) and (56-a), respectively so that the pitch gliding phenomena on these two contexts do not seem convincing to form a ML falling.

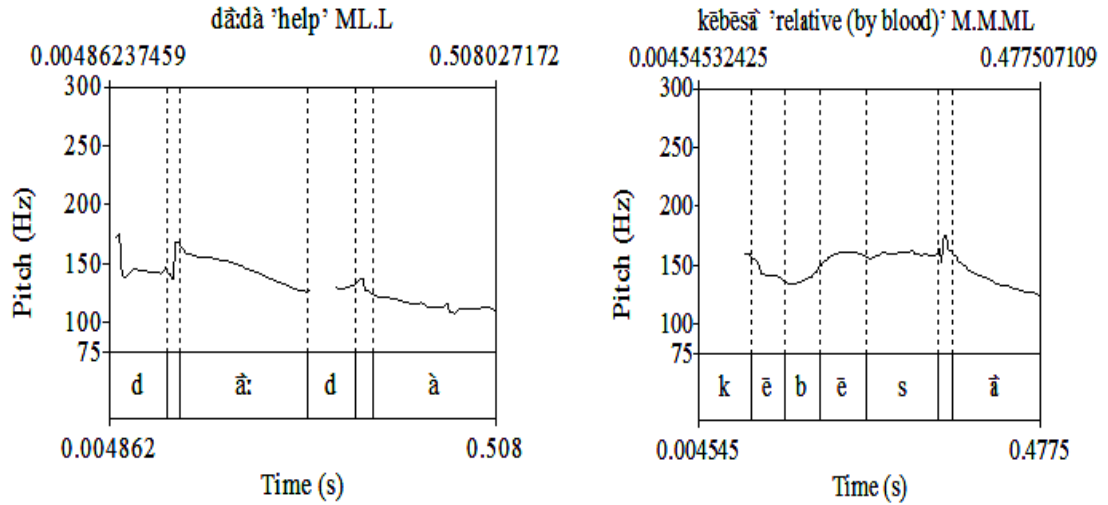


Figure 78 Representative pitch traces for ML falling contour

#### 6.5.4.2 Rising Contours

Three rising contour tones (MH, LH and LM) have been analyzed often on non-final bi-moraic syllables. Word final syllable rises are not observed on citation forms said in isolation while rising melodies are common on polysyllables. In what follows, phonetic discussions are given on each of these.

##### 6.5.4.2.1 MH Rising Contour Tone

Among the three rising contours, MH rising has shown to be frequent, especially on disyllabic words with CV:CV and V:CV sequences.

- (57) a. CV:CV    mǎ:rá̃<sup>-</sup>    MH.HM 24.42                    ‘bile’  
       b. CV:CV    sǎ:śá̃<sup>-</sup>    MH.HM 24.42                    ‘wide’  
       c. CV:CV    gǎ:řá̃<sup>-</sup>    MH.HM 24.42                    ‘long’

Based on the average  $F_0$  values given below, in (Table-34), the interval size between the M and H tone units of the MH rising contour is considerable, i.e. 41Hz , in (57-a) and 39Hz , in (57-b). Besides, the M tone values of the initial rises and the final falls are found to be proximal, which additionally indicates that Kunama contour tones are combination of its level tones. Besides, the average durations of the MH host vowels of both words are 196ms and 166ms, respectively, which stand for a long vowel cues; note

that the average duration of the short /a/ vowel is 93ms while of the long /a:/ is 179ms. Hence, rising contours take longer to finish and make vowels to be heard longer.

Table 34 Average F<sub>0</sub> values for MH rising contour tone on disyllabic words

	<b>ma rá</b> ‘bile’	<b>(n=6)</b>	<b>saśá</b> ‘wide’	<b>(n=4)</b>
<b>Position</b>	<b>Initial</b>		<b>Initial</b>	
<b>Tone</b>	<b>MH</b>		<b>HM</b>	
<b>Mean</b>	145.4-186.1	180.9-139.7	143.3-182.7	170.7-138.4
<b>SD</b>	12.2 ; 18.7	17.6 ; 14.9	0.4 ; 1.9	5.3 ; 7.2
<b>VD</b>	196ms	114.7	161ms	84ms

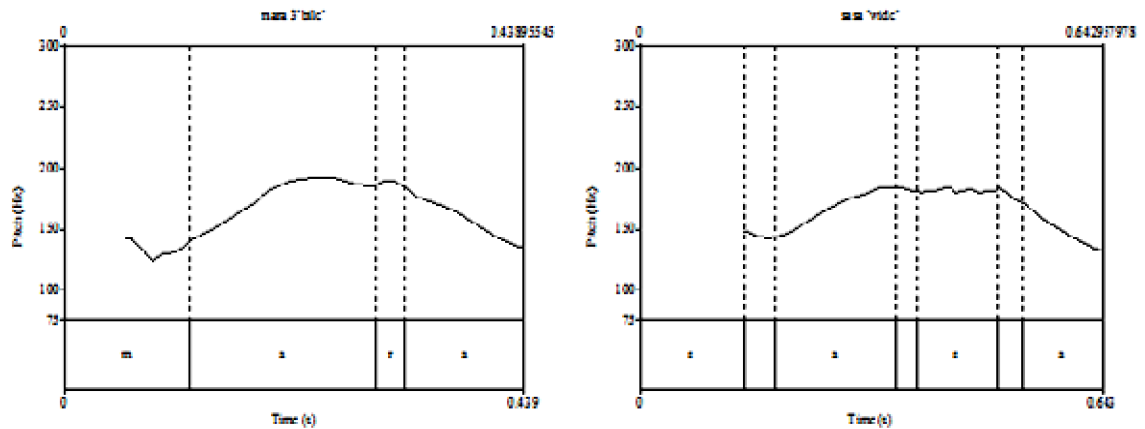


Figure 79 Representative pitch traces for initial MH rising contour tone

#### 6.5.4.2.2 LH Rising Contour Tone

Previous analysis of Connell et al (2000) has showed only the M tone before the H tone. The present analysis, however, proves the presence of LH rising contour on initial bi-moraic syllables and on some polysyllabic words.

- (58) a. V:CV      ů:lâ LH.HL 15.41      ‘wild edible root’  
 b. V:CVCV      ĭ:gídâ LH.H.H 15.5.41      ‘environment’

The average F<sub>0</sub> intervals between the L and H unit tones of the initial LH rising contour tone are big enough to show the pitch change from the lowest to the highest pitch point. In (58-a), the interval size is shown to be 70Hz, and in (58-b), it is 97Hz. In the former,

the final HL falling contour tone on average falls to 134Hz, and in the latter, the lowest point of the final HL is 121Hz. Thus, the lower pitch points of the rise and the fall are compatible and are rightly in the expected pitch range of the L tone. The average F<sub>0</sub> values of the H tone units, rather, indicate the gradual lowering of the H tone pitch from the peak of the initial rise to the final fall. Consider the F<sub>0</sub> values, in (Table-35), and the pitch traces, in (Figure-80), below:

Table 35 Average F<sub>0</sub> values for initial LH rising contour tone

	ǔ:lâ 'wild edible root' (n=6)		ĩ:gídâ 'environment'		
Position	Initial		Initial		
Tone	LH	HL	LH	H	HL
Mean	128.2-198.3	170.3-134.9	94.1-191.6	190.4-185.2	170.34-121.30
SD	15.8 ; 13.6	4.3 ; 1.9	48.5	2.4	5.1
VD	282ms	170ms	167ms		103ms

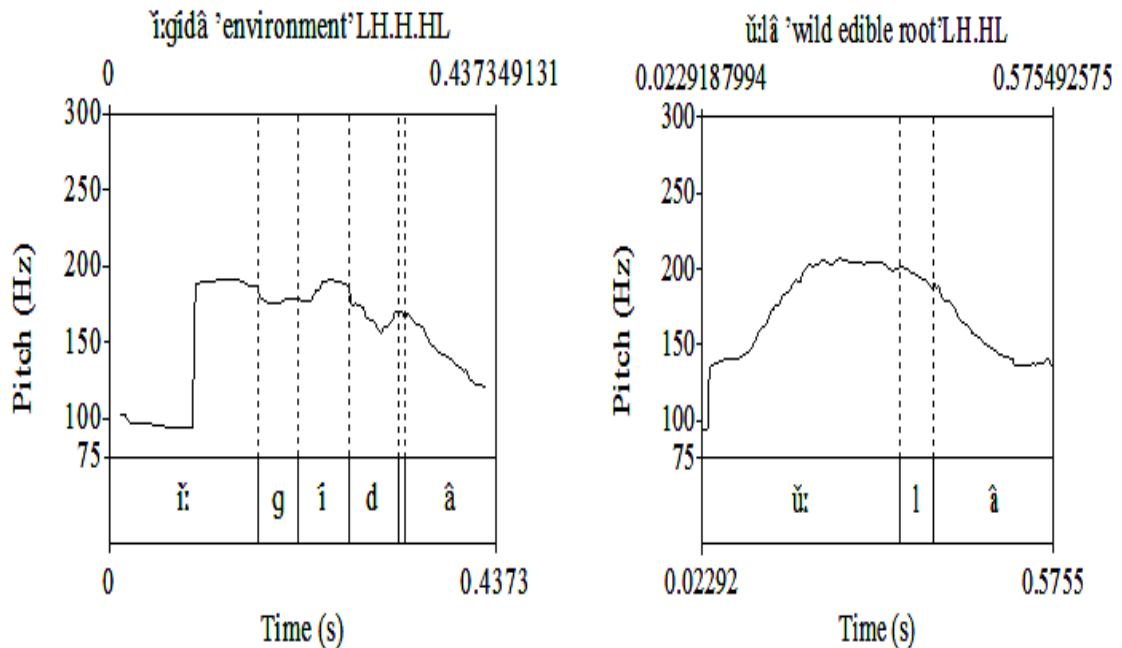


Figure 80 Representative pitch traces for initial LH rising contour tone

6.5.4.2.3 LM Rising Contour Tone

This rising contour tone is often analyzed on initial bi-moraic syllables of disyllabic words and on the medial syllables of fewer trisyllabic words. The average F<sub>0</sub> intervals between the L and M unit tones in both contexts given, in (59), is large enough to form LM rising contour formation.

- (59) a. V:CV      è:ṭā́ LM.ML 12.21      ‘relative (by marriage)  
           b. VCV:CV    àmà:ḍà̀ L.LM.L 1.12.1      ‘sadder’

Table 36 Average F<sub>0</sub> values for LM rising contour tone

	è:ṭā́ ‘relative (by marriage)’ n=5)		àmà:ḍà̀ ‘sadder’ n=5)		(n=5)
Position	Initial		Middle		
Tone	LM	ML	L	LM	L
Mean	117-153.9	135.8-113.5	108.8-121.2	137.7-155.1	114-109.2
SD	4.5 ; 7.3	4 ; 4.1	14.7 ; 5.7	7.4 ; 8.7	11.9 ; 12.6
VD	208ms		134ms		

As can be observed from above, in (Table-36), the interval between the L and the M tone units ensure the formation of LM rising contour in both words. In (59-a), the unit tones exhibit a difference of 37Hz in forming the LM rise on the initial bi-moraic syllable; whereas, the spreading of the rise to the final syllable does not maintain the same pitch height and is a common phenomenon that manifests in stem-internal spreading of tones. The interval size between the level unit tones, in (59-b), of the LM rising contour surfacing on the medial bi-moraic syllable is found to be 18Hz, which still is justifiable to form the LM rising contour. In both of the words, the final low tone reaches to the lowest pitch points that are compatible to the starting pitch points of the LM rise. See the pitch traces, in (Figure-81), below:

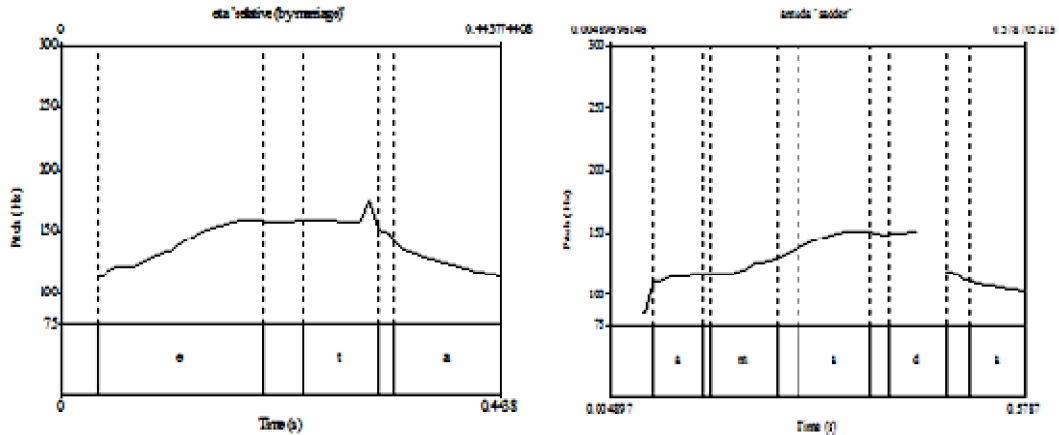


Figure 81 Representative pitch traces for LM rising contour tones

### 6.5.5 The Scaling of the F<sub>0</sub> values of Contour Tones and Contour Combinations

In this section, F<sub>0</sub> scaling graphs for simple and complex contour tones are sketched based on the F<sub>0</sub> scores obtained from disyllabic words. For the complex contour tones, CV: CV and V: CV words that surface with an initial rising contour and a final falling contour are considered; whereas, for simple contour tones, the F<sub>0</sub> values obtained from initial bi-moraic syllables are considered. However, the average F<sub>0</sub> values for the HL falling contour are computed from the raw F<sub>0</sub> scores extracted from word-final syllable vowels as initial HL is not observed in the selected experimental contexts. As a result, the H tone F<sub>0</sub> value is expected to be lower than the values of the H tone of the initial HM falling contours.

Table 37 Average F<sub>0</sub> values for contour tones

Contour	N	Av. VD	Av. F <sub>0</sub> (at onset)	SD	Av. F <sub>0</sub> (at off glide)	SD
<b>Tones</b>						
MH	9	183.8	141.8	3.3	184.3	14.9
LH	7	282	128.2	15.8	198.3	13.6
LM	5	208.2	117.0	4.5	153.9	7.3
HM	10	191.8	194.7	18.1	149.1	8.7
HL	6	105.2	168.8	11.2	135.4	17.7
ML	10	171.2	158.2	10.4	126.0	9.6

Based on the above data, in (Table-37), the average  $F_0$  value of the high tone of the initial HM falling (194.7Hz) is higher than the average  $F_0$  value of the high tone in the final HL falling, i.e. 168.8Hz. In the latter, the H tone is lowered by 26Hz from the H tone in the former. This clues that in longer utterances a downstepped high tone might exist in Kunama and the issue can make a topic for future investigation. The other point worth mentioning is that rising contours take longer to finish than falling contours though both are represented in the same time interval (0.0-0.3 seconds), as in (Figure-82) below . The time range is fixed inclusive of only the tonal onset time at 0.0 s that is parallel to the onset of the host vowel, and the maximum average duration of the host vowels noted in the selected words. As in (Table-37) above, the maximum average duration (282ms) is found from the host vowel of the LH rising contour so that the final (0.3s) time is inclusive of this value.

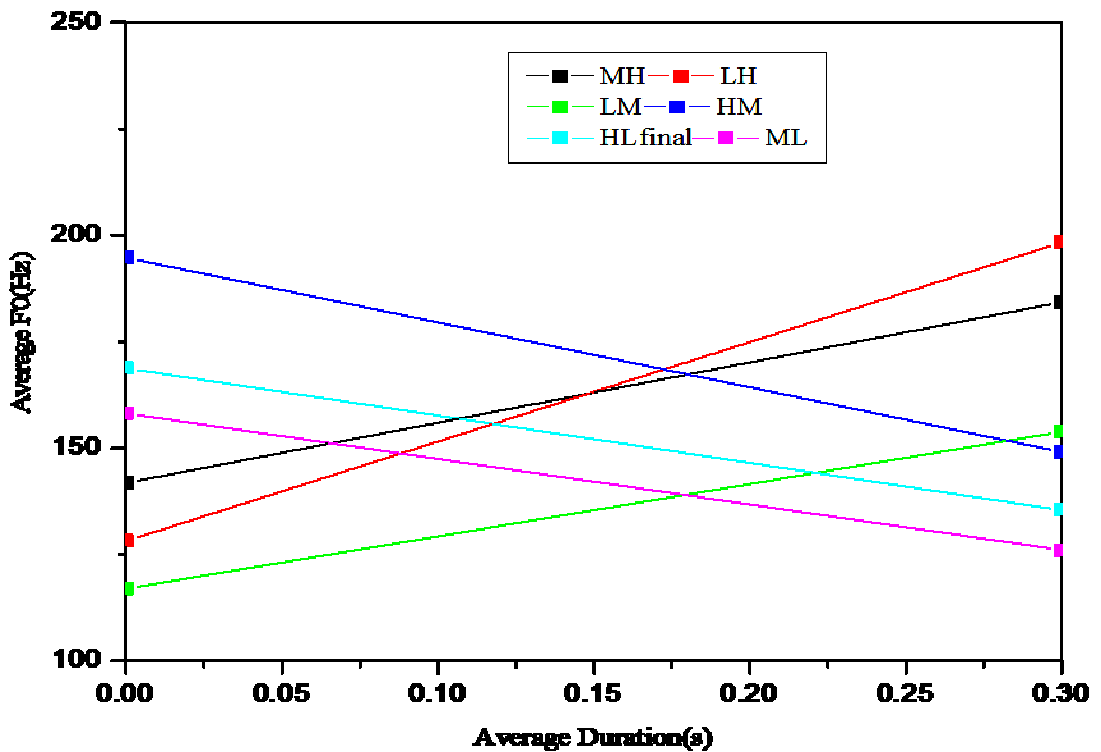


Figure 82 F0 scaling graph of contour tones

The average  $F_0$  values computed for the complex contour melodies are presented as follow, in (Table-38). Notwithstanding the occurrence of other complex rising-falling combinations, the discussion in here considers only the patterns observed on the experimental stimuli. These occur in a metathesis fashion, MH.HM, LH.HL and LM.ML, and the lowest target pitch points of the initial rises and the final falls are considerably proximal.

Table 38 Average  $F_0$  values for complex (rising-falling) contour melodies

complex contours	Initial rising						Final falling					
	N	Av.vd	Av. $F_0$ onset	SD	Av. $F_0$ offglide	SD	Av.vd	Av. $F_0$ onset	SD	Av. $F_0$ offglide	SD	
MH.HM	9	183.8	141.8	3.3	184.3	14.9	103.1	175.9	15.0	136.9	10.2	
LH.HL	7	282	128.2	15.8	198.3	13.6	169.7	170.3	4.3	134.9	1.9	
LM.ML	5	208.2	117.0	4.5	153.9	7.3	130.2	135.8	9.7	113.5	2.4	

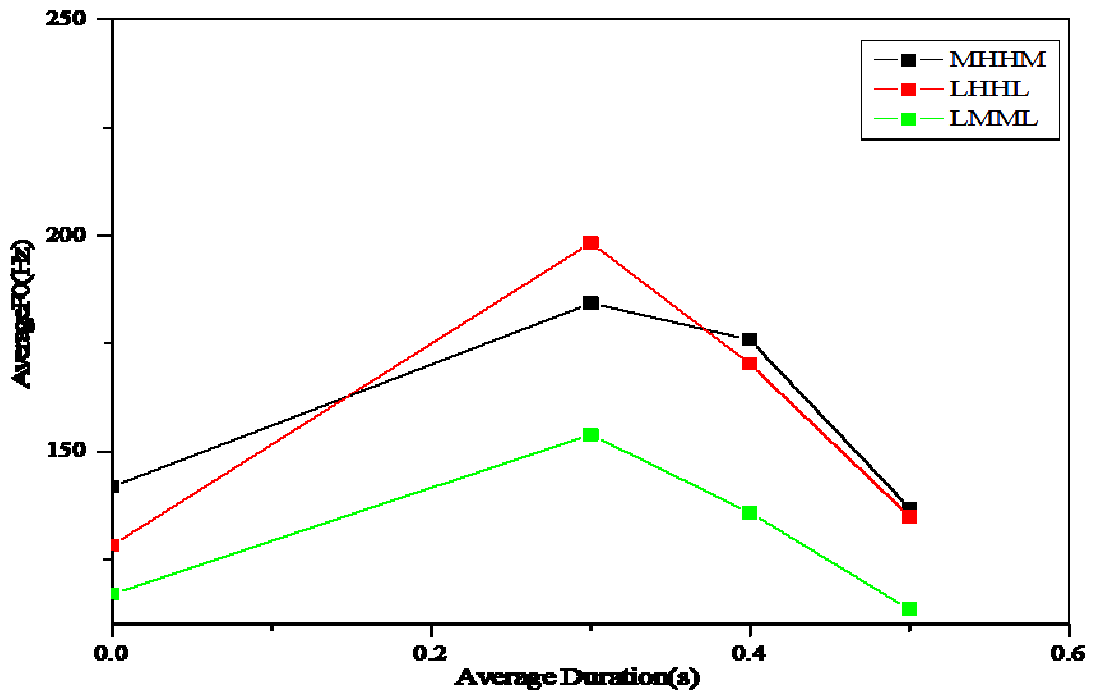


Figure 83  $F_0$  scaling graph of complex (polysyllabic) contours

The time range used in drawing the  $F_0$  scaling graph of the complex contour melodies, in (Figure-83), assumes inclusive of the average duration of the rises and the falls. The two transition points, at the center of (Figure-83), happen during the medial consonants and join the peak of the initial rises and the final falls. The assumed duration time for the medial consonants is a bit exaggerated, i.e. *100.00 ms*, and this is assumed to represent the span of each complex contour melody within the same interval time points.

## **6.6 The Tonal Geometry of Kunama**

This section elaborates on the geometry of lexical tone melodies, in Kunama, based on the so far discussion and the tenets of auto-segmental tone theory. It mainly illustrates how the tonal and segmental tiers relate to each other in the context of Kunama lexical tone melodies, and thereby establishing the Tone Bearing Unit (hereafter TBU). These two points in unison, then, draws the geometry of Kunama tone.

### **6.6.1 Autosegmental Phonology and the Geometry of Kunama Tone**

Autosegmental phonology is concerned mainly with the issue of phonological feature representation (Odden, 1996). It claims that phonological representations are built up from a range of phonological features that are independent of each other. Accordingly, tonal features are independent of other phonological features, for example, the TBU. The issue of representation then leads to the notion of tonal geometry that visualizes the association of tones-to-segments and draws on the segments to which tones are linked. The only constraint in auto-segmental representation of phonological features is that association lines may not cross (Cassimjee, 1992:12). Therefore, the concept of tonal geometry is considered as a means of displaying the phonological representation of tone and TBUs, which are independent of each other, according to the association convention of auto-segmental tone theory.

The geometry of tone (Odden, 1996:448) “answers two central questions: where do tones link in phonological representations? And what features define tones?” While the first question looks into the association convention of tones, the second specifies the TBU in a tone language. Auto-segmental theory resolves a number of puzzles in tonology, for example, first it justifies the association of contour tones, and second, it represents

floating tones despite losing their host through deletion so that the theory solidifies the fact that tones are independent of segments (Odden, 1996). The former is relevant to the ongoing discussion and helps to represent the association of lexical tone melodies and the TBU on two independent tiers; whereas, the latter will be cited in the next chapter that treats the tonal phenomena at phrase level grammar.

### **6.6.2 The Tone -Bearing Unit (TBU)**

A tone-bearing unit (TBU) is the element in the syllabic structure to which tones associate; this may for example be the syllable, the vowel, the morpheme or the mora (Yip, 2002: xxi) and (Gussenhoven, 2004:29). The essence of the TBU, Gussenhoven (2004:29), is to explain the number of tonal contrasts that are possible on one syllable and to explain how tones distribute themselves over a word. Pertinent to the TBU in a tonal language, different views have been forwarded. Among others, Yip (2002) and Bao (2000) argue the syllable as the TBU, Hyman (1984) considers the mora as the TBU, and Woo (1969) claims the segment in the rhyme as the TBU. Thus, cross-linguistic variations do exist in defining the TBU in a tone language, and consequently, the present analysis attempts to propose the optimal candidate for the TBU of Kunama and presents arguments in favor of that.

The mora is claimed to be the TBU in Kunama. Referring back to Chapter 4, phonological weight specification has been shown to be a relevant parameter in defining the syllable structure of Kunama. This parameter entails the number of moras in a syllable determines its weight, and the concept is central to the moraic theory of (Hyman, 1985). Under this notion, not only the segments in the onset and the rhyme but also mora units represent a syllable. While short vowels are mono-moraic, long vowels and diphthongs are bi-moraic. Beside, sonorant codas (liquids and nasals), in Kunama, add to the weight of a syllable. According to Broselow (1995), as cited in Roberts (2005:4), “Mora is a minimal phonological timing unit that is related to the rhyme so that it refers to a minimal phonological unit of length”. Accordingly, Kunama lightweight syllables have one mora i.e. a short vowel only (CV) or a short and a non-sonorant coda (CVC, VC). The heavy weight syllables have two moras with either of these, i.e., a long vowel (V:, CV:), a diphthong (VV, CVV) or a short vowel closed by a sonorant coda

(VS, CVS); (S stands for a sonorant coda). Note that word-final vowels and monosyllabic words (CV) are positional contour licensers. In what follows, two arguments are presented to defend the choice of the mora as being the TBU:

### i. Tonal association

When Kunama associates tonal melodies to the segmental tier, it counts the mora not the syllable though there are also plenty of unambiguous cases where the syllable count matches the mora count and as such to the number of possible melodies. Consider, in (60) below:

- |             |                           |       |
|-------------|---------------------------|-------|
| (60) a. H.M | itā ‘house’               | V.CV  |
| b. H.L      | ɲúnà ‘stealing’           | CV.CV |
| c. M.L      | sūbà ‘river’              | CV.CV |
| d. M.H      | kādá ‘crossing (a river)’ | CV.CV |
| e. L.M      | bàjā ‘bad’                | CV.CV |

All the words above, in (60), have the same syllable and mora count, i.e. two, and the syllables are all light. Thus, the melody association follows a one-to-one pattern and does not change the configuration whether one takes the syllable or the mora count. In the following (61-63), however, the melody association is guided by the mora count, instead of by the syllable count because the syllable and mora counts do not correspond.

- |              |                                      |                   |
|--------------|--------------------------------------|-------------------|
| (61) a. HM.L | fū:̄tā ‘lung’                        | CV:̄. CV          |
| b. HL.L      | kî:dà ‘calling’                      | CV:̄. CV          |
| c. ML.L      | dā:dà ‘helping’                      | CV:̄. CV          |
| d. MH.HM     | fū:̄fǎ̄ ‘nape of the neck’           | CV:̄. CV          |
| e. LH.HL     | lî:dâ ‘see’, ũ:lâ ‘wild edible root’ | CV:̄. CV, V:̄. CV |
| f. MH.HL     | fî:dâ ‘pay’                          | CV:̄. CV          |
| g. LM.ML     | fò:̄râ ‘squirrel’                    | CV:̄. CV          |

(62)	a. LM	biā ‘water’	CVV
	b. MH	wīā ‘day’	CVV
	c. MH.HM	kāílá <sup>ˀ</sup> ‘tiger’	CVV.CV
(63)	a. LH.ML	íntā̀ ‘see’	VS.CV
	b. HM.L	táflà ‘rock’	CVS.CV
	c. M.MH.M	āsā́ngā ‘head’	V.CVS.CV
	d. LH.H.HM	íngídá <sup>ˀ</sup> ‘detour’	VS.CV.CV

In (61), the words are disyllabic but having three moras so that the association of the possible melodies on the segmental tier is guided by the mora count. This is irrespective of the curious case of word-final vowels. In (62-a & -b), the monosyllabic words are bi-moraic and have borne two level tones resulting in rising contours. Once again, in (63), the sonorant codas are moraic so that they will assume an independent tonal node.

## ii. Contour tones

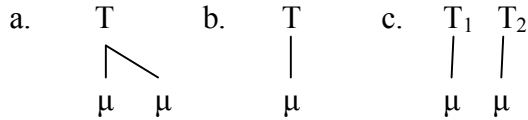
If the syllable were the TBU, we would anticipate contour tones to associate to a light syllable, particularly in non-final position. But, this is not the case in Kunama. While level tones can occur anywhere, contour tones surface on bi-moraic syllables, as in (61-63) above, or they occur on a sequence of two light syllables, as in (60). Tonal association diagrams are given in forthcoming sections.

### 6.6.3 Autosegmental Association of Lexical Tone Melodies

The association convention can satisfy the well-formedness condition in Kunama tone alignment if it is restated as, all moras are associated with at least one tone; all tones are associated with at least one mora, and association lines do not cross. Fox (2000:219), referring to Goldsmith (1976), explains the association convention, “There is a simple relationship between tones and vowels, with each vowel having its tone; but they can have more complex relationships, which show two tones associated with one vowel, and two vowels sharing one tone.

Therefore, the representation have two parallel ‘tiers’, the segmental tier and tonal tier linked by ‘association lines’”. The following association models, in (64), are proposed to represent the lexical tone melodies of Kunama:

(64) Syllable ( $\sigma$ ) mora ( $\mu$ ) T (tone) subscripts denote different level tone heights



The model, in (64-a), stands for level tone melodies surfacing on bi-moraic syllables as well as on sequence of two light syllables, and it operates in one-to-many fashion in consideration to stem-internal spreading of tones. Mono-moraic syllables will take the association model, in (64-b). Contour tone melodies surfacing on single bi-moraic syllables or on two adjacent light syllables can be represented as in (64-c).

The tonal association is guided by mora count not by syllable count, as can be observed from the following sketch, in (65). The words are disyllabic and having a bi-moraic penult syllable (CV:).

(65) a. mā:r-á<sup>-</sup> ‘bile’

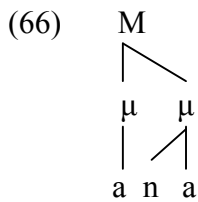


The penult syllable has two moras that are associated to two tones, so the mora count exactly matches to the number of tones. Thus, the TBU is the mora. The nasal onset consonant is under the  $\mu$  tiers, sharing the tonal node of the first mora. Voiceless obstruents in the same position are not represented in the same way while voiced obstruents in the coda position can be assumed under the  $\mu$  tier and sharing the tonal node of a preceding mora. Consider below, in (65-b), the tonal association model for a bi-moraic syllable with a voiceless fricative onset:

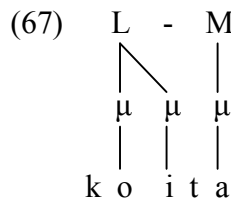
b. sā:ˈs-áˉ ‘wide’



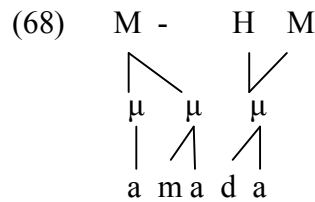
The tonal association is guided by left-to-right convention, and the tone-to-mora alignment is one-to-one and one-to-many; whereas, many-to-one mapping does not work in Kunama, except for word-final mono-moraic vowels that enjoy positional license for contour tones. Kunama word-final vowels and vowels of monosyllabic (CV) words are short in underlying form, but they often exhibit phonetic length. In the following association diagrams, three tiers are embodied, namely, the tonal, the mora and the segmental tiers. Sequences of the same level tones are associated in one-to-many fashion in view of stem-internal spreading of tones that has been indicated to be common in Kunama. Based on these, the association of the basic and complex melodies is represented as follows, in (66-94):



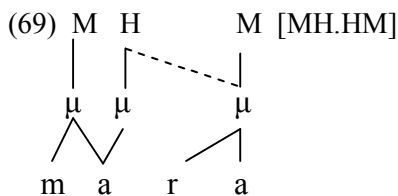
ānā ‘song’



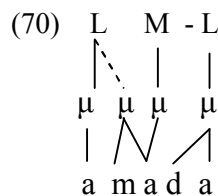
kòitā ‘lean against’



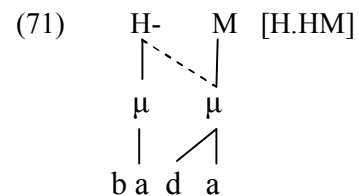
āmādáˉ ‘baboon’



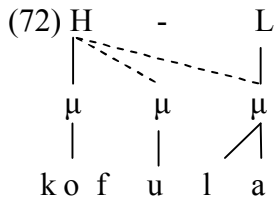
mā:ˈráˉ ‘bile’



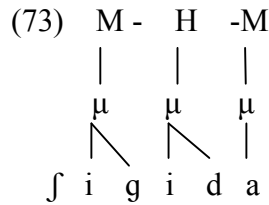
àmàˉdà ‘sadder’



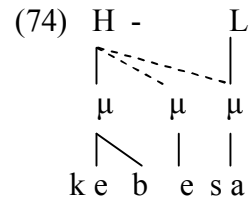
bádáˉ ‘thigh’



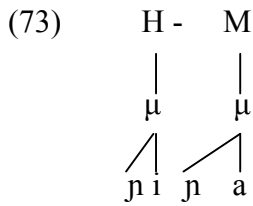
kófúlâ ‘credit’



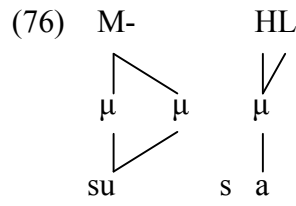
fīgídā ‘animal’



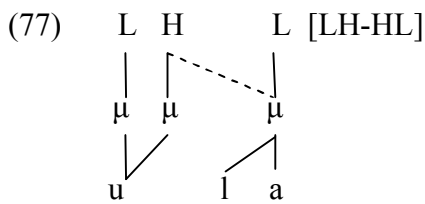
kébésâ ‘a baby that stops suckling in a near past’



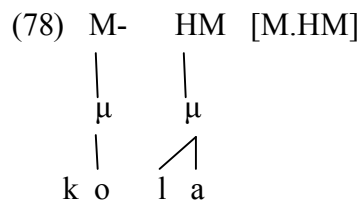
níjā ‘biting’



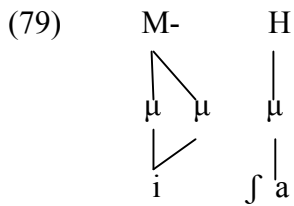
sū:sâ ‘standing up’



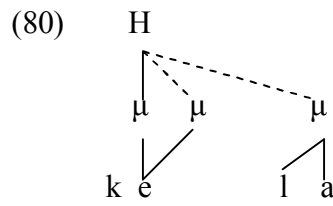
ũ:lâ ‘wild edible root’



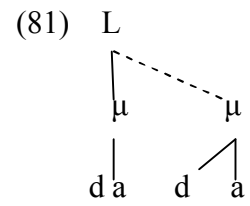
kōlā ‘crow’



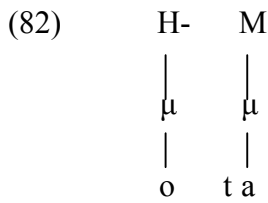
ī:fá ‘let us go’



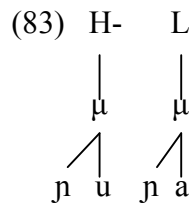
ké:lá ‘kohl’



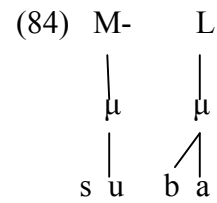
dàdà ‘bead’



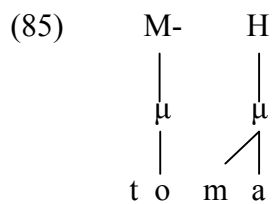
ótā ‘uprooting’



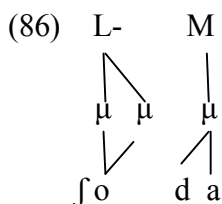
níjā ‘stealing’



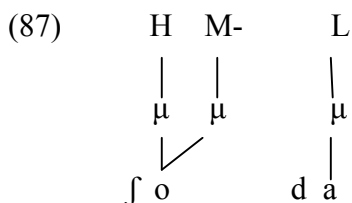
sūbà ‘river’



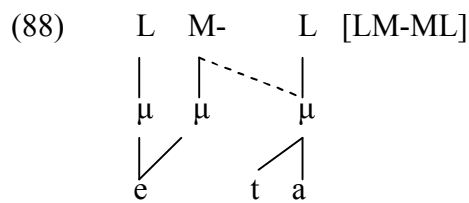
tōmá 'fire'



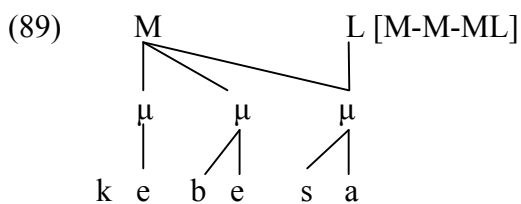
fò:dā 'rubbing'



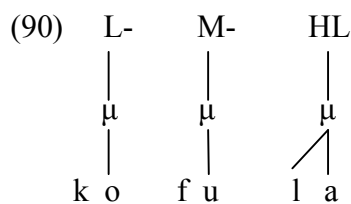
fò:dā 'blessing'



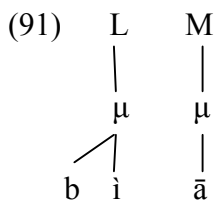
è:tā 'relative (by marriage)'



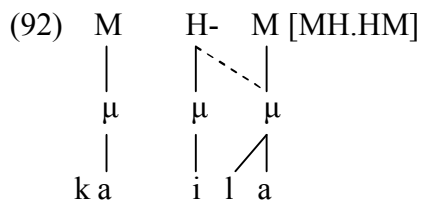
kēbēsā 'relative (by marriage)'



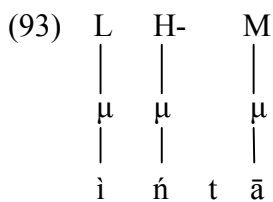
kòfūlá 'smearing (tr)'



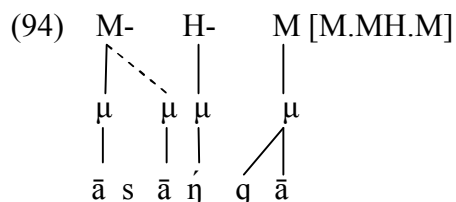
biā 'water'



kāilá 'parrot'



ín.tā 'see'



āsāṅgā 'head'

## 6.7 Chapter Summary

In summary, Kunama is a register tone language whose phonemic tones are level. Yet the considerable number and distribution of its surface contour tones as well as complex (polysyllabic) contour melodies might make Kunama to be captivating from a typological point of view. The language has three (H, M, L) phonemic level tones that combine in all nine possible ways (H.H, M.M, L.L; HM, HL, ML; MH, LH, LM) on the surface of bi-moraic penult syllables of disyllabic words, and on sequence of two light syllables. Word-final vowels are contour licensers by virtue of the position, so they are underlyingly mono-moraic and final length is claimed to be neutralized, in Kunama. In effect, the complex (polysyllabic) contour melodies combine penult bi-moraic rises and final falls. The common complex contour melodies (MH.HM, LH.HL, LM.ML) follows rising-falling (convex) pattern and occur in a metathesis fashion. The lowest F<sub>0</sub> margins of the initial rises and the final falls are compatible though this is not always true. These complex tonal melodies become permissible, as MHM, LHL and LML, in account to stem-internal spreading of tones; for example, the second H tone is the result of spreading of the initial rise so that it cannot be aligned to an independent H tonal node.

The other issue discussed, in this chapter, is pitch scaling and factors related to it. In account to the mentioned factors thereof and other unknown reasons, F<sub>0</sub> fluctuations do exist over the same underlying tones and within a single speaker's vocal range. The average F<sub>0</sub> dispersion is found to be appreciable for tones of the higher frequency region. Accordingly, a four-point pitch height scale (extra-high, high, mid and low) is claimed to occur in the Kunama tonal space of three distinctive level heights. Although no evidence is found to show the phonemic status of the extra-high pitch, pitch scaling is shown to be important in understanding Kunama tone production. In contrast, the auditory assumption of a non-automatic lexical downstep of the high tone does not get instrumental data support. Besides, in view of the high distribution of the mid tone, the claim for lexical H downstep is finally rejected. However, the phenomena of automatic H downstep in longer utterances might need future investigation.

Finally, the TBU of Kunama is the mora, and quantity of the mora count in a word determines the number of possible tone melodies in that word. While one-to-one and one-to-many mapping of mora-to-pitch persist, many-to-one association works only for word-final contours.

## **CHAPTER SEVEN: TONE IN THE KUNAMA GRAMMAR**

### **7.0 Introduction**

This chapter explores tone as a meaningful grammatical entity. First, it presents minimal pairs for grammatical tone. Second, it discusses tonal phenomena observed at phrase level grammar. Connell et al (2000) have analyzed the tonal phenomena in inflectional processes, such as, number and definiteness. The present study, therefore, tends more to investigate the form and behavior of tone in compound, nominal and verb phrase formations. It, however, does not cover the analysis of tone in all aspects of the Kunama grammar, so future studies are hoped to fill this gap.

### **7.1 Evidence for the Grammatical Function of Tone**

The present analysis suggests that tone is grammatically distinctive though a three-way tone height contrast is not recorded. Instead, the high tone appears in contrast to either to the mid or low tone. The clearest evidence for the grammatical function of tone is commonly observed in possessive constructions. In these contexts, grammatical number of the possessor is tonally marked.

#### **7.1.1 Tonal Marking of Possessor Number**

In a range of possessive constructions, grammatical number in the possessor is identified by the tone on the possessive affix. While the high marks plural possessor, the low tone indicates singular possessor. Before dealing with possessive tone, the supra-segmental patterns of independent personal pronoun paradigm are given, in (Table-39), below. Unlike in possessive pronouns, tone does not seem to contrast independent personal pronouns in Kunama Shukre. Instead, gemination distinguishes dual persons from the plural persons. Dialectal variations do exist, for example, the Kunama Marda, dual forms are distinguished by a high tone while Tika and Barka identify the dual forms by gemination (Thomson, 1983:294).



c. **ì**-ww-ā

3SG POSS-father-SG

‘His/her father’

**í**-ww-ā

3PL POSS-father-SG

‘Their father’

### 7.1.1.2 Number Marking in Possessive Suffixes

The same role of tone is observed in noun possession where the possessor suffix carries the distinctive tones. In the first person possessor, the possessor vowel is embedded in the possessive suffix, **-àŋā**, which is attached to the possessed noun stem, as in (2-a). Thus, the distinctive tonal morphemes are surfacing on the initial person vowels in the possessor suffix. While the H tone marks plural possessor, the L tone indicates a singular person possessor. In the rest of the possessor persons, only the person vowels are changed, as can be observed, in (2-b) and (2-c), below. In noun possessive constructions given in the following (2), the possessive suffix is infixes between the possessed noun stem and the number suffix vowel so that the pattern is possessed (D)-possessor (R)-number of possessed. This pattern is in reverse to the pattern shown in kin term possession above, in (1). Singular possessors are in the left column, and the plural possessors are in the right column while the tonal targets are in bold.

- (2)
- |                                   |                                |
|-----------------------------------|--------------------------------|
| a. /sānd- <b>à</b> ŋ-ā/ [sāndàŋā] | /sānd- <b>á</b> ŋ-ā/ [sāndáŋā] |
| Donkey-1SG POSS-SG                | Donkey-1PL POSS-SG             |
| ‘My donkey’                       | ‘Our donkey’                   |
| b. /sānd- <b>è</b> -ā/ [sāndèjā]  | /sānd- <b>é</b> -ā/ [sāndéjā]  |
| Donkey-2SG POSS-SG                | Donkey-2PL POSS-SG             |
| ‘Your donkey’                     | ‘Your donkey’                  |
| c. /sānd- <b>ì</b> -ā/ [sāndìjā]  | /sānd- <b>í</b> -ā/ [sāndíjā]  |
| Donkey-3SG POSS-SG                | Donkey-SG-3PL POSS-SG          |
| ‘His/her donkey’                  | ‘Their donkey’                 |

Other segmental changes observed in the output surface structure of (2-b) and (2-c) are the insertion of the palatal glide to fill the empty onset of the number suffix vowel [-a]. The insertion of the glide ensures word-final CV syllable structure, which is unmarked in Kunama.

### 7.1.1.3 Number Marking in Verbs

Grammatical number in the verb is marked by tone. In the following (3), the high tone on the object person prefix to the verb identifies plural number, and the low tone marks a singular patient.

- |     |    |                        |  |                  |
|-----|----|------------------------|--|------------------|
| (3) | a. | bāmbā à-nt-kè          |  | bāmbā á-nt-kè    |
|     |    | NOM 1SG-see-AO         |  | NOM 1PL-see-AO   |
|     |    | ‘Bāmbā saw me’         |  | ‘Bāmbā saw us’   |
|     | b. | bāmbā è-nt-kè          |  | bāmbā é-nt-kè    |
|     |    | NOM 2SG-see-AO         |  | NOM 2PL-see-AO   |
|     |    | ‘Bāmbā saw you’        |  | ‘Bāmbā saw you’  |
|     | c. | bāmbā ì-nt-kè          |  | bāmbā í-nt-kè    |
|     |    | NOM 3SG-see-AO         |  | NOM 3PL-see-AO   |
|     |    | ‘Bāmbā saw him/her/it’ |  | ‘Bāmbā saw them’ |

### 7.1.2 Tonal Marking of Inclusive and Exclusive Possessor

Tone distinguishes inclusive and exclusive possessor as shown in the following (4). The H tone on the noun possessor suffix identifies inclusive possessor in the first person plural, as in (4-b) while the L tone marks exclusive possessor in the first person plural, as in (4-a).

- |     |    |   |  |    |                                     |
|-----|----|---|--|----|-------------------------------------|
| (4) | a. | /sānd-ì-ŋg-ā/ [sāndìŋgā]                        |  | b. | /sānd-í-ŋg-ā/ [sāndíŋgā]            |
|     |    | Donkey-1PL EXCL-SG                              |  |    | Donkey-1PL INCL-SG                  |
|     |    | ‘Our donkey (belongs to me and my family only)’ |  |    | ‘Our donkey (belongs to all of us)’ |

### 7.1.3 Tonal Marking of Intensity on Attributive Adjectives

The example given below, in (5), is a near-minimal pair for grammatical tone as vowel length is found to be distinctive as well. This is observed in NP formations, where adjectives occur in attributive function. In Kunama NPs, adjectives come following the head noun and carry the distinctive tonal and length morphemes. In citation form said in isolation, the adjectival base carries a mid tone and a short vowel, /fǎfǎ/ ‘beautiful’, and it inflects for degree as [fǎ:fǎ], which contrasts to [fǎfǎ]. Now examine the grammatical meaning contrast marked by vowel length and tone in deriving the NPs, in (5-a & -b):

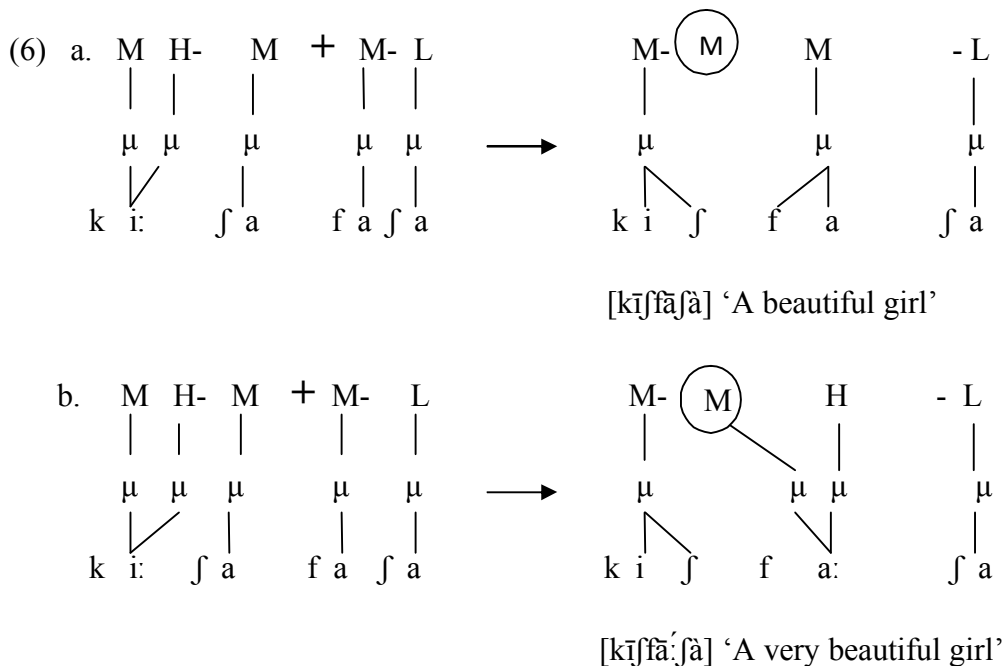
- (5) a. /kī́:f-ǎ/ ‘girl’ + /fǎf-ǎ/ ‘beautiful’ → [kī́fǎfǎ] ‘A beautiful girl’  
           MH.M     + M.L                           → [M.M.L]
- b. /kī́:f-ǎ/ ‘girl’ + /fǎf-ǎ/ ‘beautiful’ → [kī́fǎ:fǎ] ‘A very beautiful girl’  
           MH.M     + M.L                           → [M.MH.L]

The NP, in (5-b), inflects for degree due to the high tone and the long vowel surfacing on the penult syllable of the adjectival base, which contrasts to the NP, in (5a), by the mid tone and the short vowel. Thus, while the high tone and the long vowel are intensifier morphemes, equivalent to ‘very’. The mid tone and the short vowel denounce the grammatical intensity.

On the other hand, when the two nominal bases concatenate in forming the NPs, some tonal changes have been made following the deletion of the terminal vowels at both boundaries. As a result, at the surface of the outputs, the tonal contrast is shown up as if it is between the M tone and the MH rising contour tone. First, the mid tones float in both boundaries. Second, the floating mid tone, in (5-b), is re-linked to the next vowel mora, and thereby forming the MH rising contour. In (5-a), however, re-linking of the floating mid tone is not observed because of the same mid tone on the next vowel, and the phenomenon is considered as tone neutralization. The other tonal phenomenon observed, in (5-a), is contour simplification that changes the initial MH rising contour of the noun to a mid tone, due to shortening of the vowel.

Similarly, in (5-b), the floating M tone is re-linked to the adjacent target host, one-step to the right i.e. to the penult syllable vowel of [fā:fā]. It joins the intensifier H tone morpheme and forms a MH rising contour. The original M tone on penult syllable vowel of the target input, /fāfā/ ‘beautiful’, is difficult to trace. Thus, either it is neutralized due to the re-linking of the floating M tone or it is overridden by the grammatical H tone morpheme. The latter assumption sounds more plausible so that grammatical tones override lexical tones if the two meet on the same host. Once again, the same MH rising contour is simplified to the mid tone, in (5-b), and consequently, the output surfaces with a M.MH.L tonal melody. This surface melody seemingly violates the OCP for showing two adjacent M tones so that re-linking of a floating tone is more important than the OCP.

Lastly, as in (5-b), the re-linking of the floating M tone does not delink the grammatical H tone morpheme, instead, it joins to form the MH rising contour. This goes against what has been observed in other derivations that show shifting of a high tone following the re-linking of a floating M tone. See under § 7.2.1.2 below. This might be because the high tone, in here, is a grammatical morpheme; as such, its displacement may affect the grammatical meaning of the resulting NP. In the following diagrams, in (6-a & -b), the tonal association of the grammatical melodies is represented:





before the initial mid tone of the possessed noun. The issue, therefore, requires further investigation.

## **7.2 Tonal Processes**

Tonal processes (also morphotonemics) refer to changes in a tonal feature triggered by morphophonemic and morphosyntactic processes (Evans, 2009). Such tonal phenomena in Kunama are commonly observed across morpheme boundaries, often following the deletion of the terminal vowel and sometimes in the presence of the terminal vowel. In the former, tonal changes are triggered by the re-linking of a floating tone while, in the latter, changes are caused by tone spreading across morpheme boundaries. Tonal processes in Kunama, therefore, occur in a rule ordering fashion.

Tonologists, such as, Yip (2002:132) give typologically characterization to African tone, “The most striking property of African tone languages is its mobility”. However, Kunama tone is analyzed to be stable as input tones survive despite losing their host through deletion. If tone mobility has to be mentioned in Kunama, it is found to be local or bounded. This includes re-linking of floating tones, and the shifting and then docking of the H tone onto a TBU, one-step rightward as well as spreading of the M tone across word boundaries. To the level of the present data, longer distance mobility, i.e. two/three syllables away from the original host, of tones is not observed. Connell et al (2000) have reported that Kunama tone is stable, for which tonal melodies on the output are directly derived from input morphemes. In what follows, each of the tonal processes are discussed:

### **7.2.1 Tone Shifting**

Tone shift (or displacement) phenomenon is explained as “input tones move off its host towards other syllables” Yip (2002:89). Likewise, Kunama input H tones have been observed while shifting to an adjacent TBU, one-step rightward. Depending on the length of the resulting output, the H tone shifts either to a word-final TBU or to a penult syllable TBU of the output surface structure. The displacement of the high tone is caused by spreading of the mid tone and re-linking of a floating mid tone across morpheme boundaries. First, the H tone shifts when delinked by a spreading M tone across

morpheme boundaries and docks onto the next available host. Second, the H tone also shifts the same way when a floating M tone re-links to the H tone host. However, the shifting phenomenon is not observed on the M and L tones. In the subsections to follow, the shifting of the H tone is discussed separately depending on the two triggering phenomena.

### 7.2.1.1 *Shifting of the H Tone Following Spreading of the M Tone*

The H tone shifts to an adjacent TBU to the right as delinked from its host by a spreading M tone across morpheme boundary. Spreading of the M tone is observed when the terminal vowel deletion ceases to happen, as can be observed, in (8), below. Mwita (2008) has reported a similar phenomenon in Kuria language of the Bantu family, spoken in Kenya. The tone shift rule in Kuria spreads tone across a stem boundary to an initial vowel of the stem causing a shift in all subsequent tones in the stem. In Kunama, however, spreading of the mid tone at morpheme boundary is shown displacing only the high tone, one-step to the right.

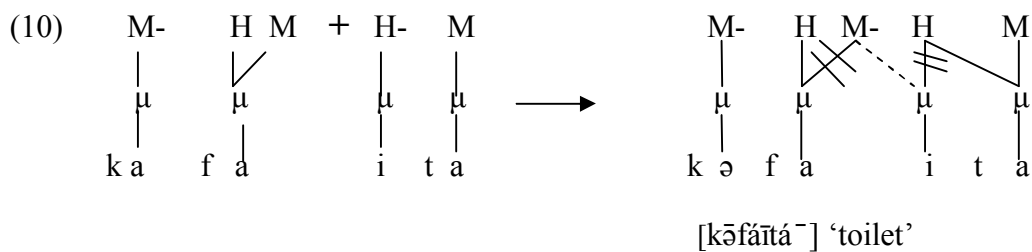
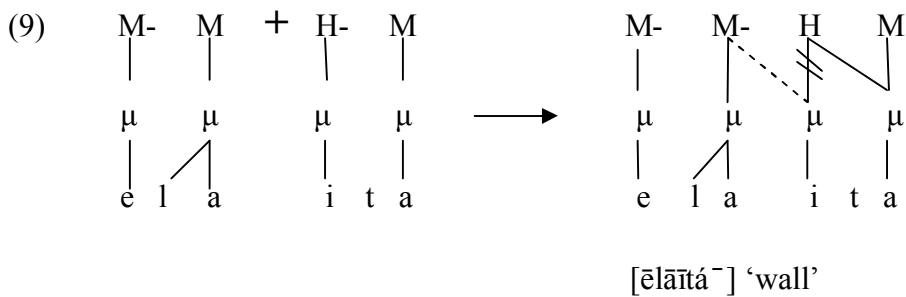
(8)	a. /ùkā/ ‘urine’ + /ítā/ ‘house’	[ùk <sup>w</sup> ā í <sup>ˉ</sup> tá <sup>ˉ</sup> ] ‘bladder’
	L.M + H.M	L.M.M.HM
	b. /kāfǎ <sup>7</sup> / ‘feaces’ + /ítā/ ‘house’	[kǎfǎ í <sup>ˉ</sup> tá <sup>ˉ</sup> ] ‘toilet’
	M.HM + H.M	M.H.M.HM
	c. /sēnā/ ‘grass’ + /ítā/ ‘house’	[sēnā í <sup>ˉ</sup> tá <sup>ˉ</sup> ] ‘hut’
	H.M + H.M	H.M.M.HM
	d. /ēlā/ ‘tree’ + /ítā/ ‘house’	[ēlā í <sup>ˉ</sup> tá <sup>ˉ</sup> ] ‘wall’
	M.M + H.M	M.M.M.HM

In deriving the compound nouns, in (8a-d), the mid tone of the terminal vowel spreads to the following vowels that already have a lexically specified underlying high tone. The spreading M tone then delinks the H tone from its original host while the H tone docks onto the final syllable mora that already have an underlying mid tone. Since this is the

last surviving host, the high tone joins the pre-associated M tone of the final TBU and forms HM falling contours. Hence, word-final TBUs as the last surviving hosts are observed to accommodate extra tones, and this phenomenon in the linguistic literature is referred as right edge effect.

A different property of tone spreading that needs a word of explanation is noticed, in (8-b), above. The final syllable vowel of the first input noun /**kāfá**ʔ ‘faeces’ has HM falling contour tone, and when it joins the other noun, only the mid part of the fall spreads to the following mora. This strengthens the claim that Kunama contours are combination of its level tones. With regard to this, Snider and Hulst (1993) noted that in a tone language, in which contours tones are composites of the level tones, only one or the other part of the cluster spreads i.e. the contour as a unit does not spread.

The autosegmental association of the surface grammatical tone melodies discussed, in (8), above is shown in the following (9) and (10). In left-to-right association, the diagrams represent the spreading of the M tone across morpheme boundary, the delinking of the H tone from its original host and docking onto the final TBU, and the formation of a HM falling contour on the output final TBU. In effect, association lines are deleted and inserted.



### 7.2.1.2 *Shifting of the H Tone following Re-linking of a Floating M Tone*

Floating tones are underlying tones without underlying segments that resulted due to deletion (Hyman, 1975). In Kunama, following the deletion of the terminal vowel, floating tones have been observed while re-linking to an adjacent syllable TBU, or one-step-to the right. Floating tones often displace the original tonal root node from their underlying hosts, but sometimes they join them creating a contour tone. In the following (11), displaced H tones have been observed to dock onto the final syllable TBU and creating a contour tone with the original tone of the target host. However, contour formation happens if this TBU is word-final. Because this is the last surviving host, contour formation is the only survival mechanism for the unit tones. Depending on the length of the output, as in (11b), the H tone shifts to the penult TBU, where the original M tone is neutralized before another M tone on the final syllable vowel. As a result, penultimate contour is not observed.

- |      |    |  |                                   |
|------|----|--|-----------------------------------|
| (11) | a. | /dèdā/ ‘child’ + /itā/ ‘house’         | [dèdītá̃] ‘uterus’                |
|      |    | L.M + H.M                              | L.M.HM                            |
|      | b. | /ùkā/ ‘urine’ + /ágālā/ ‘skin’         | [ùk <sup>w</sup> āgālā] ‘bladder’ |
|      |    | L.M + H.M.M                            | M.M.H.M                           |
|      | c. | /kòkōbā/ ‘blood’ + /ádzā/ ‘running’    | [kòkōbādzá̃] ‘bleeding’           |
|      |    | L.M.M + H.M                            | L.M.M.HM                          |
|      | d. | /bénā/ ‘upper arm’ + /filā/ ‘swelling’ | [bénfí:lā] ‘muscle’               |
|      |    | H.M + H.M                              | H.MH.M                            |
|      | e. | /mā:rá/ ‘bile’ + /itā/ ‘house’         | [mā:řitá̃] ‘gallbladder’          |
|      |    | MH.HM + H.M                            | MH.M.HM                           |

In (11-a & -c) above, the floating M tone re-links to the following TBU, one-step right, by displacing the original H tone of the second input initial. The displaced H tone then docks onto the final TBU of the output surface. Since this target TBU is word-final, the

displaced H tone joins the M tone that is pre-associated to the final TBU and forming a HM falling contour. As has been explained before, extra tones are accommodated by the output final mora, and this is in turn attributed to positional length of word-final vowels.

On the contrary, in (11-b), the displaced H tone docks onto the penultimate syllable vowel, one-step to the right. As the head of the compound noun (second input) is trisyllabic, the resulting surface output is quadri-syllabic. In effect, the H tone is not expected to dock onto the final TBU of the output, i.e. two-step rightward, so that we do not see HM falling contour surfacing on the penultimate syllable of the output. Instead, the displaced H tone shows up as level high tone though its peak is delayed onto the following liquid consonant. Hence, the M tone pre-associated to the penultimate syllable mora (the target host of the displaced H tone) is absorbed before the original M tone of the final syllable vowel. Hyman and Schuh (1974), as cited in Yip (2002:102), noted tonal absorption (as a sub-case of OCP) triggers fusion of identical tones. Over all, this phenomenon implies that extra tones are often tolerated by output final TBUs.

The phenomena shown above, in (11-d & -e), are a bit different and require further explanation. In the former, the floating M tone is re-linked to the following vowel mora as usual, but without displacing the H tone. Instead, it joins the original H tone of the target host so that MH rising contour is formed at morpheme boundary.

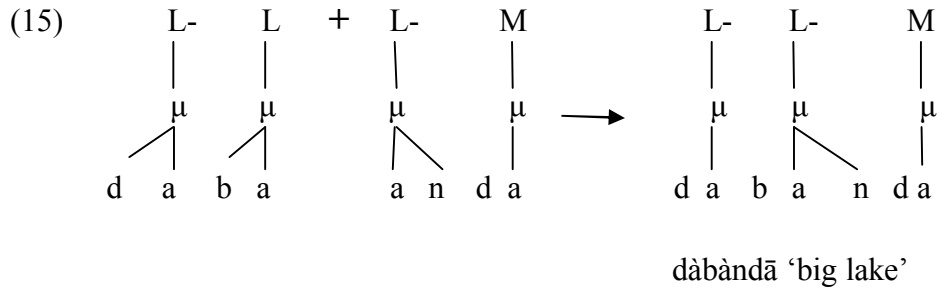
In (11-e), the final vowel of the non-head input (left) has borne HM falling contour, but when it undergoes deletion, only the mid part of the HM fall floats and re-links to the next vowel. Since the H unit is a result of spreading of the preceding MH rise, stem-internally, it cannot be considered as an independent H tonal node. The peak delay of the MH rise is still surfaces on the medial liquid [r], on the surface of the output. Yip (2002:92) explains, “Contour spreading is functionally motivated because of the difficulty of finishing a rise within a single syllable.” Along the way, the spreading of the H tone in Kunama is a way of avoiding sequence of two Hs thereby complying with the OCP constraint. In account to this, the tonal association for rising-falling sequences assigns one H tonal node for the two Hs. As a result, we cannot claim for the floating



In the nominal phrases given above, in (13-a & -c), the M tones of the terminal vowels float due to losing their host in boundary hiatus. However, the system does not completely leave off these vowels; instead, they leave the length trace behind so that the floating M tones are re-linked to the adjacent TBUs that both have original L tones. Hence, ML falling contours are formed at both boundaries. In the same way, the floating H tone, as in (13-a), is re-linked to the next TBU but without displacing the original L tone of that target host so that HL falling is formed at the boundary. The length trace left behind the floating terminal vowels seemingly accommodates the ML fallings in (13-b & -c); whereas, the HL falling in (13-a) might be tolerated by the medial CVC of the surface output. The nasal consonant coda carries the L tone pitch that continues from the HL falling of the nucleus.

On other derivations below, in (14), different tonal phenomena are observed. In (14-a), the floating L tone is neutralized before another L tone pre-associated to the adjacent TBU. In Kunama, therefore, same tones may not survive if they meet on the same target, but the phenomenon requires further examinations. For instance, when two H tones meet on the same host, as to Connell et al (2000), the effect is visible through the strength of the H tone pitch that signals an extra-high pitch. The present study does not confirm the same phenomenon on lower register tones (M and L). See below, in (15), the autosegmental association of the resulting tonal process in (14-a).

- |      |    |                                 |                              |
|------|----|---------------------------------|------------------------------|
| (14) | a. | /dàbà/ ‘lake’ + /àndā/ ‘big’    | [dàbàndā] ‘big lake’         |
|      |    | L.L + L.M                       | L.L.M                        |
|      | b. | /làgā/ ‘land’ + /sénā/ ‘grass’  | [làgā sénā] ‘grassland’      |
|      |    | L.M + H.M                       | L.M.H.M                      |
|      | c. | /fōgà/ ‘cloth’ + /ūmmà/ ‘black’ | [fōgà ūmmà] ‘ a black cloth’ |
|      |    | M.L + M.L                       | M.L.M.L                      |



On the remaining two NPs above, in (14-b & -c), the surface melodies are the direct copies of the input tones; the terminal vowels are not deleted in both of these due to the insertion of a slight boundary pause.

### 7.2.3 Low Tone Plateauing

Low tone terracing (or plateauing) refers to the abrupt flattening of underlying high and mid tones on the output surface. When high- and mid-toned words are juxtaposed in forming nominal compounds or phrases, as in the following (16), the high and mid tones of the constituent inputs may get a low tone register throughout. This phenomenon creates a low tone plateau or terrace. Note, (cf. *sā:sá* 'learning'), and *ko-* is an instrumentalizer prefix and is underlyingly toneless. Toneless morphemes copy the tone of the stem.

- (16) a. /kō-sāsá/ 'learning' + /ítā/ 'house' [kòsàsà ità] 'school'
- M.M.H + H.M → L.L.L.L.L
- b. /ítā/ 'house' + /éllá/ 'one' [itèllà] 'one house'
- H.M + H.H → L.L.L.L
- c. /ēlā/ 'tree' + /éllá/ 'one' [èlèllà] 'one tree'
- M.M + H.H → L.L.L

The phenomenon of low tone plateau may depend on speaking tempo, so it requires further investigation.

#### 7.2.4 Tone Assimilation

The following nouns, in (17), inflect for definiteness as infixed within the distal demonstrative pronoun /wámā/ ‘that’. The underlying H tone of the definite morpheme assimilates rightward to the L stem tones. Note, (cf. sà:sā ‘telling’), and [a-] is a nominalizer prefix used to form agent nouns and is underlyingly toneless.

- |      |  |                             |
|------|--|-----------------------------|
| (17) | a. /wámā/ ‘that’ + /dàkkā/ ‘woman’     | [wà dàkkòmà] ‘that woman’   |
|      | H.M + L.M                              | L.L.L.L                     |
|      | b. /wámā/ ‘that’ + /ùgā/ ‘stone’       | [wā ùgòmà] ‘that stone’     |
|      | H.M + L.M                              | M.L.L.L                     |
|      | c. /wámā/ ‘that’ + /à-sà:sā/ ‘teacher’ | [wà àsàsòmà] ‘that teacher’ |
|      | H.M + L.L.M                            | L.L.L.L.L                   |

The definiteness marker and its trace that is left behind as the round back vowel [o] are high-toned. In all of the cases above, the high tone assimilates to the low tones of the stem nouns to the right, either fully (as in 17-a & -c) or partially (as in 17-b). The type of assimilation is regressive or anticipatory, and the phenomenon implies that low stem tones affect high affixal tones.

In contrast, when the low-toned near demonstrative pronoun modifies high-toned nouns, as in the following (18), the high stem tones are lowered to mid tone in partial assimilation to the low tone of the modifier to the left. The type of this step-down assimilation is progressive. This further proves that the low tone regardless of its host (an affix or a stem) affects other tones, especially the H tone which is more unlike to it.



### 7.3 Chapter Summary

In summary, the discussion in this chapter indicated that tone plays decisive role in marking grammatical number of a possessor, in a range of possessive constructions, and of person object in verbs. Tone also identifies inclusive vs. exclusive possession and genitive vs. copula constructions despite that the present analysis in this regard is not thorough. Concerning the morphotonemics of Kunama, this study covers only those processes detected at phrase level grammar, particularly in derivational contexts, such as, compounding and nominal phrase formation. These include, spreading and floating of tones across word boundaries, relinking of floating tones, shifting and docking of the H tone, contour formation both at word boundaries and at right edges of outputs, low tone plateauing and tone assimilation. At the melodic level of the grammar, some of the tonal phenomena reveal OCP compliant tone patterns. For instance, while the M tone spreads to the TBU across word boundaries, it is not delinked from its original host and thereby creating adjacent but tautosyllabic M.M strings. Besides, the L tone terrace phenomenon seemingly violates the OCP. These imply that tone spreading and terracing are more important than the OCP. Morphosyntactic tone in general and verbal tone in particular needs the attention of future researches. Finally, three points can be made about the behavior of Kunama tone, in post-lexical phonology. First, the Kunama morphotonemics is shown to be word boundary phenomena, and it often follows the deletion of the terminal vowel. Second, the tonal processes occur in an ordering fashion. Third, typologically, Kunama tone can be characterized by its stability, whereas its mobility is observed to be local or bounded.

## **CHAPTER EIGHT: PHONOLOGICAL ADAPTATION OF LOANWORDS IN KUNAMA**

### **8.0 Introduction**

This chapter observes the phonological adaptation of loanwords in Kunama. It particularly focuses on exploring the Kunama strategies used to adjust the shape of borrowed terms, in accordance to its phonotactics, and the mapping of sound segments to the sound system of the borrowing language. These take us to see the extent to which the Kunama phonotactic constraints maneuver on loanwords, and thereby to reflect on the introduction of foreign sounds as well as a speech tradition, if any, to Kunama via borrowed terms or language contact. Directly or indirectly, most of the loanwords in the present data are Tigrinya origin, so the Tigrinya phonology is used as a benchmark for analyzing the loanword adaptation strategies.

### **8.1 Background to the Kunama Contact Situation**

Kunama is an endangered minority language that has long been in contact with speakers of Tigrinya, Italy, Arabic and Swedish. Some anthropological studies, such as, Alexander (1982) indicated that Swedish missionaries, Italians and Arabs had been in the Kunama area, especially in Eritrea where the major Kunama tribe lives. Thomson (1983) reported that some section of the Kunama tribe lives in Sudan. Thus, the Kunama people were in contact with speakers of other languages in addition to speakers of Tigrinya. For geo-political reason, however, the Kunama Shukre community has been aligned to the Tigrinya speaking people for the last 26 years. In account to these, while a considerable number of loanwords in the present data are Tigrinya origin, some of those ultimately belong to other languages, aforementioned. Therefore, there exist to be direct and indirect borrowings in Kunama. This issue is beyond the scope of the present study, and this analysis is not suffice to conclude as if Kunama borrowed the non-native Tigrinya words directly from other languages.

In addition, the vector of borrowing might seem difficult to trace for some loanwords unless we assume the origin of such loanwords to be Tigrinya, as a major language of the area. For instance, etymological suggestions given by Kunama elders, particularly on place names, require further investigation in historical linguistics. Disregarding the reservation on the vector of borrowing, the considerable number of borrowed words in the present data could suggest that Kunama is expanding its lexicon via direct and indirect borrowings.

## **8.2 The Driving Force behind the Adaptation Process**

Irrespective of their ultimate origin, borrowed terms are reformed by different strategies operating in the adaptation process. The rationale behind the adaptation process emanates from the differences of the two languages, at general and specific levels. At general level Kunama and Tigrinya belongs to two different language families; Kunama is a Nilo-Saharan language while Tigrinya belongs to the Afro-asiatic family languages. At specific level, they have different phoneme inventories, syllable structure and phonotactics, and phonetic feature differences are expected to exist between shared sounds, in the two languages. Sometimes, it is hard to find out the reason behind the adaptation of sound segments, especially in vowel mapping. Before discussing the adaptation strategies, the Tigrinya phonemes inventory is overviewed in comparison to the Kunama phonemes inventory, in the following paragraphs.

Tigrinya is a North Ethio-Semitic language spoken in Northern Ethiopia and Eritrea. Following Buckley (1997), Tigrinya has seven phonemic vowels without length distinction. Kunama has five phonemic vowels with length distinction and two phonetic vowels [i, ə]. Phonologically, Kunama owes five of the Tigrinya phonemic vowels while the high-close central vowel phoneme /i/ of Tigrinya has only a phonetic status in Kunama. Kunama lacks only the mid-central vowel /ʌ/ of Tigrinya.

### **Tigrinya Vowel inventory**

i	ɨ	u
e	ʌ	o
	a	

Buckley (1994:1)

The two languages show much difference in their consonant inventories. Tigrinya has twenty-nine consonants with geminate forms (Shosted and Rose, 2011) and (Alhassani, 2009). Kunama (Shukre), whereas, has only eighteen consonant phonemes, and the glottal fricative consonant /h/ has a marginal status. Kunama, therefore, lacks ejectives /t', k', k'w, s', tʃ'/, the glottal stop/ʔ/, the pharyngeal fricative /ħ/, the glottal fricative /h/, voiced fricatives, the voiceless bilabial /p/ and some other foreign sounds entered to Tigrinya.

### **8.3 The Gateway into the Kunama Lexicon**

Kunama citation forms are nominals and end often with the singular nominal suffix [a]. Before exploring how sound segments and segment combinations are adapted to Kunama, the two most predictable strategies that operate on any borrowed term will be discussed. These adaptation strategies pave the gateway for borrowed terms to join the Kunama lexicon. The first strategy that invariably operates on loanwords is forcing borrowed terms to take the shape of Kunama basic forms, i.e. nominal form. Accordingly, consonant final borrowed terms are adapted with epenthesis of the nominal vowel suffix [a], after the final consonant. This strategy ensures the unmarked CV syllable in the final position of rephonologized forms. The second strategy is replacement of other final vowels of loanwords with [a], and it again obliges borrowed terms to take the form of Kunama citation form. These two strategies are supposed to be primary despite other changes made on non-final segments of loanwords. The other adaptation strategies that work on non-final segments include, substitution, deletion, retention, and breaking consonant clusters, and these will be discussed in later sections.

### 8.3.1 Epenthesis of [a] on Consonant Final Loanwords

Consonant final loanwords are forced to satisfy the permissible structure of word-final syllables, in Kunama. Since word-final closed syllables are marked in Kunama, CVC borrowed terms are adjusted so that the rephonologized forms become in CVCV shape. The epenthesis of [a] supplies a nucleus to final consonants of loanwords and calms the constraint violation raised by loanwords that end in a consonant. See examples below, in (Table-40):

Table 40 Word-final epenthesis of [a]

Tigrinya Form	Gloss	Kunama Rephonologized Form	Epenthetic Vowel
/fanus/	lamp	[fānūsā]	[a]
/mʌgʌz/	saw (n)	[mḗgḗzā]	[a]
/ʔasʌr/	footprint	[āsōrā]	[a]
/kʔʌlm/	color	[kḗlēmá]	[a]
/ruz/	rice	[rúzá]	[a]
/bun/	coffee	[bùnā]	[a]
/televizín/	television	[tèlèbìdʒinā]	[a]
/tʔutʔ/	cotton	[tù:tā]	[a]
/mʌʃkot/	window	[mḗskōtá]	[a]
/mʌʔsʔid/	sickle	[màʃiddā]	[a]
/lʌmin/	lemon	[lḗmīnā]	[a]
/mes/	honey beer	[mḗsā]	[a]
/dihab/ <sup>48</sup>	gold	[dḗhábā]	[a]

<sup>48</sup> Tigrinya does not know this word with the present gloss, so it is likely to be Arabic origin. With this gloss, the Tigrinya word /wʌrkʔi/ ‘gold’ is adapted as [wḗrkā] in Kunama.

On the other hand, the constraint violation caused by loanwords with a final glottal stop /ʔ/ can also be resolved via deleting this foreign consonant instead of inserting [a]. This phenomenon is observed in one loanword, /minbaʔ/ ‘weep’ adapted as [ĩmbá], where the deletion of the glottal stop satisfies the unmarked word-final CV syllable.

### 8.3.2 Substitution of other Word-final Vowels

Final vowels of loanwords if different from /a/ will be replaced by the Kunama singular suffix[a] during the adaptation process, as in (1), below:

(1) <i>Original form (Tigrinya)</i>	<i>Kunama Form</i>	<i>Gloss</i>
/tĩnbaħo/	[tũmbàk <sup>h</sup> à]	tobacco
/komidΛrΛ/	[kòmìdèrā]	tomato
/wΛrk’i/	[wērkā]	gold
/ʃΛħanΛ/	[ʃá:ná]	plate
/bahiri/	[bēhārā]	sea

In line with these, borrowed terms with final /a/ will enter to the borrowing language without a word-final change, for example, /manka/ ‘spoon’~ [mànkà], /lama/ ‘razor’~ [lāmā]. However, other subsequent changes can be made on non-final vowels of borrowed terms though it is difficult to know whether these changes are triggered by the substitution of the final vowel or not. For instance, /ʔitro/ ‘pot’ is adapted as [òtèrā], the substitution of the Tigrinya /i/ by Kunama /o/ may urge us to think whether this is triggered (or not) by the substitution of the final /o/ vowel, in the Tigrinya word, by the Kunama nominal suffix vowel /a/. This can make an issue for further research. Similar changes will be discussed in the following section:

## 8.4 Vowel Adaptation

The most noticeable vowel adaptation strategy is substitution. The adaptation process shows the substitution of both foreign and non-foreign vowels, and “Substitution is a term used in linguistics to refer to the process or result of replacing one item by another at a particular place in a structure” Crystal (1997) as cited in Mheta and Zivenge (2009:158). The discussion on vowel substitution, here after, will consider only the mapping of non-final vowels of loanwords.

The term ‘substitution’, in this study, is used to explain any exchange of vowels, and it shows three different scenarios, in Kunama. The first scenario of vowel substitution goes with the very definition of the term ‘substitution’ and explains the replacement of other final vowels of borrowed terms by the Kunama nominal suffix [a]. As has been discussed under §8.3 above, this substitution occurs at a specific position and is predictable. In the second scenario, foreign vowels are substituted by the native vowels based on phonological or phonetic approximation. The third way of vowel substitution looks into an exchange within shared vowels i.e. vowels known to both languages. The latter two scenarios are not predictable. Since the first scenario of vowel substitution is discussed above, the remaining two scenarios will be detailed in what follows.

### 8.4.1 The Substitution of Tigrinya Central mid Vowel /ʌ/

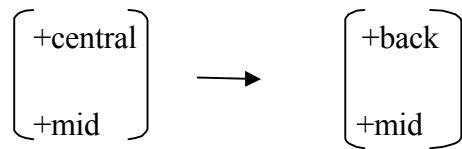
The central mid vowel /ʌ/ in Tigrinya terms is shown to be replaced by any one of these Kunama vowels, namely, [ə], [i], /o/ and /a/. Vowel feature mapping and examples are given below, in (2-10); target vowels are bold.

(2) /ʌ/ → [ə]

$$\begin{bmatrix} +\text{central} \\ +\text{mid} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{central} \\ +\text{mid} \end{bmatrix}$$

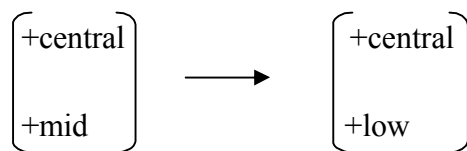
(3) <i>Tigrinya form</i>	<i>Kunama form</i>	<i>Gloss</i>
/mʌʃkot/	[mḁskōtá]	window
/ʔasʌr/	[ḁsḁrâ]	footprint (of animal)
/mʌgʌz/	[mḁgḁzā]	saw (n)
/komidʌrʌ/	[komidḁra]	tomato
/hasʌma/	[ḁsḁmâ]	pig
/sʌgʌn/	[sḁgḁnà]	ostrich
/kʰʌʌm/	[kḁlḁmá]	color

(4) /ʌ/ → [o]



(5) <i>Tigrinya Form</i>	<i>Kunama Form</i>	<i>Gloss</i>
/dʌrho/	[dḁ:rā]	chicken
/ʃʌhona/	[ʃḁkíná]	hoof

(6) /ʌ/ → [a]

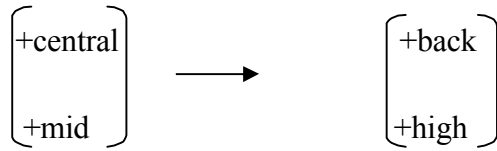


(7) <i>Tigrinya Form</i>	<i>Kunama Form</i>	<i>Gloss</i>
/ʃʌhanʌ/	[ʃáná]	plate
/dʌbʌna/	[dāmḁnā]	cloud

/fʌrʌs/                      [b'árásá]                      horse

An exception to the vowel mappings shown above is the substitution of the Tigrinya central mid vowel /ʌ/ by the Kunama [u] vowel, as shown in (8) and (9) below:

(8)        /ʌ/        →        [u]



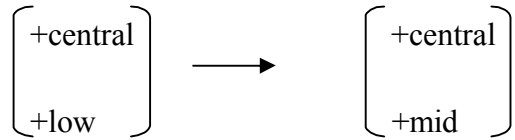
(9) <i>Tigrinya Form</i>	<i>Kunama Form</i>	<i>Gloss</i>
/sʌlam/	[sūllūmā]	peace

Though the feature mapping above, in (8), shows no similar phonological feature between /ʌ/ and [u], this substitution still is justifiable in the sense that /ʌ/ can also be specified by the feature [+back].

Based on the data given above, in (2-6), the substitution of the central mid vowel /ʌ/ by the Kunama schwa is a phonetic approximation that preserves the source vowel in the features [+central, +mid]. In Kunama, [ə] is a phonetic vowel that replaces short /a/, /e/ and /o/ vowels, in unstressed positions; note that the present analysis is based on the phonemic transcription of words of the source language. Conversely, the mapping of the Tigrinya central mid vowel /ʌ/ to the Kunama [i], [o] and [a] is based on phonological feature/s approximation, although the number of similar features varies across the substitute vowels. At least one common feature is preserved in all of the vowel mappings, except for the substitute [u] of Kunama.

In the same manner, the Tigrinya central low vowel /a/ can be substituted by [ə] despite it is known to the Kunama vowel inventory. See, in (10) and (11):

(10) /a/ → [ə]



(11) <i>Tigrinya Form</i>	<i>Kunama Form</i>	<i>Gloss</i>
/baḥiri/	[bəḥārā]	sea
/maḥilla/	[məḥālā]	oath

The mapping of /a/ to [ə] is again a phonetic approximation. Kunama speakers do the same when pronouncing native words, where /a/ occurs in short unstressed positions. Thus, the adaptation of Tigrinya /ʌ/ and /a/ as Kunama [ə] may imply that Tigrinya vowels in general are short and these two vowels, in the loanwords above (11), are in unstressed positions. Had it not been for the asymmetry of the vowel mapping, the two vowels are expected to be adapted as Kunama /a/. Since /a/ and [ə] have one common phonological feature [+central], it is possible to argue that the adaptation is not still arbitrary.

#### 8.4.2 Substitution within Shared Vowels

The third scenario of vowel substitution, in Kunama, shows an exchange over shared vowels i.e. vowels known to both languages. Tigrinya and Kunama have five phonemic vowels in common /i, e, o, u, a/ while the central high-close vowel /i/ has a phonetic status in the borrowing language. Nonetheless, this comparison disregards the phonetic differences of two same sounds in different languages; this is expected to be a cross-linguistic fact as well. In account to this, Kunama has shown to replace, for example, /i/ with [o] despite having /i/ so that the adaptation process in Kunama will operate not only on foreign sounds but also on those sounds that are known to its inventory. Consider the data, in (Table-41), below:

Table 41 Vowel Substitution

Tigrinya Form	Gloss	Tigrinya Vowel/s	Kunama Rephonologized Form	Kunama Vowel Substitute(s)
/ʃʌhona/	hoof	/o/	[ʃõkíná]	[i]
/tinbaño/	tobacco	/i/	[tũmbàk <sup>h</sup> à]	[u]
/dʒubba/	pocket	/u/	[dʒēbā]	[e]
/ʔasa/	fish	/a/	[ī:sá]	[i:]
/tihuʔan/	bedbug	/i/ /u/	[tõk <sup>h</sup> ānā]	[o] [a]
/bahiri/	sea	/i/	[bõhārā]	[a]
/jikina/	traditional beer cup	/i/	[səkānā]	[ə]
/ʔitro/	pot	/i/	[õtērā]	[o]

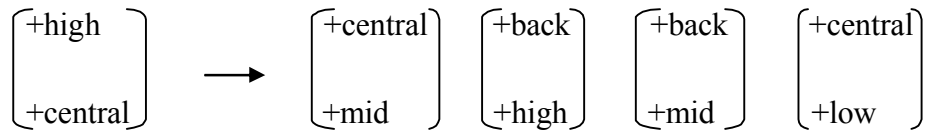
As can be fetched from (Table-41) above, the vowel transformation is not carried out in a one-to-one mapping of phonological features between the substituted and the substitute vowels. This might be due to acoustic feature differences expected to exist between the shared vowels across both languages, or it can also be because the Kunama way of loanword adaptation is conservative.

Accordingly, Kunama /i/ while they lack a single common phonological feature substitutes Tigrinya /o/. The former is [+front, +high], whereas, the latter is [+back, +central]. They are negatively similar for being [-low] so that this substitution is phonetically grounded. Such phonetically grounded sound mappings might be accounted for Kunama speakers' unfaithful perceptions of sound segments in L2 inputs, or Kunama speakers perceive phonetic differences of phonologically the same vowels, in their L1 and L2. In view of that, speaker's phonological knowledge in L2 may not always matter in sound based adaptations. In other loanword instances above, in (Table-41), Tigrinya /i/ is adapted as Kunama [u], [o] and [a]; in common, /i/ and /u/ have [+high] feature, /i/ and [o] have [+mid] and /i/ and [a] have [+central]. These mappings, in contrast, are

phonologically determined approximations, in which the vowel of the donor language and the vowels of the recipient language have shown at least one common feature.

Tigrinya /u/, in /dʒubba/ and /tiḥuʔan/, is substituted by Kunama /e/ and /a/ vowels respectively. Besides, /a/ of the donor language, in /ʔasa/, is adapted as Kunama [i:] that is shown to be long. The length attribution by the borrowing language might compensate the deletion of the initial glottal stop consonant in the Tigrinya word. In contrast, since the two vowels have nothing in common, we can assume this substitution as arbitrary, i.e. based on native speaker's perceptual approximation. The only possible speculation to the arbitrary substitution of /a/ with [i:] is that Kunama speakers might have used this strategy as avoidance of homomorph. Kunama has *āsā* 'dig'; hence, if the Tigrinya word, /ʔasa/ 'fish', is adapted only with the deletion of the initial glottal stop, the re-phonologized form will be homomorphic to *āsā* 'dig'. This assumption, however, will be invalid as Kunama is used to identify native homomorphs by its suprasegmentals. Consider the following, in (12-14), vowel feature mapping diagrams:

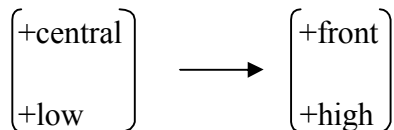
(12) /i/ → [ə] [u] [o] [a]



(13) /o/ → [i]                      /u/ → [e]



(14) /a/ → [i:]



As can be observed from the phonological feature comparison above, in (12-14), the Tigrinya central high vowel /i/ is mapped to four different vowels in the recipient language, and except [ə], all the rest substitutes are phonemic vowels in Kunama. The

adaptation of /i/ to the rest of the vowels except to [o] seems phonologically motivated and has at least one common phonological feature. However, the mapping of the Tigrinya /i/ to the Kunama back mid round vowel [o] is operated without a common phonological feature between the two vowels so that this is assumed to be due to speaker's unfaithful perception of the L2 vowel.

Overall, the vowel mappings observed in the Kunama loanword adaptation process is shown to be asymmetrical. Kunama applies both phonetically and phonologically grounded approximations of vowels. To make a sound conclusion, however, a full-fledged study is required. For instance, Chang (2008) and Lin (2009) suggested three main approaches that account for the adaptation and processing of sound-based loanword adaptation strategies: the Perception (Phonetic) Approach, the Phonology Approach and the Phonetic-Phonology Approach. To find out the approach that better accounts for the adaptation of loanwords in a particular language, language specific observations are appreciable.

## **8.5 Consonant Adaptation**

The consonant inventories of Tigrinya and Kunama exhibit much difference as compared to their vowel inventories. This difference, therefore, makes the point of departure in analyzing the main adaptation strategies of consonant sounds. The consonant adaptation strategies include: substitution, deletion and retention. The deletion strategy totally drops strange consonants while the substitution tactic replaces both foreign and non-foreign segments. In what follows, each of these strategies is discussed:

### **8.5.1 Substitution of Ejective Consonants**

Tigrinya has five ejectives /t', k', k'w, s', tʃ'/ while the Kunama consonant system lacks ejective sounds. As a result, the homorganic counterparts in Kunama replace ejective consonants of borrowed terms, and this approximation is phonologically driven. Consider the following examples, in (Table-42):

Table 42 Consonant Substitution

Tigrinya Form	Gloss	Tigrinya Ejectives	Kunama Re-phonologized Forms	Kunama Consonant Substitute(s)
/ʃant'a/	bag	/t'/	[səntá]	[t]
/ʔalʌk'ti/	leech	/k'/	[ālōkā]	[k]
/sanduk'/	box	/k'/	[sàndùkā]	[k]
/k'ʌlʌm/	color	/k'/	[kəlōmā]	[k]
/t'ʌrmuz/	bottle	/t'/ /z/	[tərmùsā]	[t] [s]
/mʌʔs'id/	sickle	/s'/	[mafidda]	[ʃ]
/t'ut'/	cotton	/t'/ /t'/	[tù:tā]	[t] [t]
/s'ʌgʌm/	problem	/s'/	[təgəmə]	[t]

All ejective consonants of the source language are invariably substituted by the voiceless obstruent consonants of the borrowing language. The Tigrinya ejective plosives, /t'/ and /k'/, are adapted as Kunama plosives [t] and [k], respectively; whereas, the ejective fricative /s'/ of the source language is replaced by the palatal fricative consonant [ʃ] of Kunama rather than by the alveolar fricative [s], which is homorganic to the alveolar fricative ejective /s'/ of Tigrinya. This approximation seems phonetically driven because Kunama [ʃ] is noisier than [s] so that the former is phonetically closer to the alveolar ejective /s'/ than the latter.

On the other hand, inconsistency is observed in the adaptation of the Tigrinya voiced alveolar fricative /z/ that is missing in Kunama. This consonant sound in some loanwords is shown to be substituted by the Kunama voiceless alveolar fricative [s], as in [tərmùsā] so that the adaptation is based on phonological feature similarity in place and manner of articulation, both are alveolar fricatives. Whereas, in some other borrowed terms, such as, [rúzá] the Tigrinya voiced alveolar fricative consonant /z/ is retained during the adaptation process of Kunama despite the variation across native speakers. Since the borrowing language lacks voicing in its fricative series, the retention of this

sound might be accounted for a difference in the degree of bilingualism among the consultants.

In another instance of loanword adaptation, /televiʒin/ as [tèlèbìdʒinā], voiced fricative consonants (the voiced labio-dental fricative /v/ and the voiced palate-alveolar /ʒ/) that are foreign to Kunama are adapted as /b/ and /dʒ/, respectively. Note that Kunama lacks voiced fricatives. The substitution of /v/ by /b/ imagines their similarity in voicing and place of articulation; both sounds are voiced labials. The adaptation of /ʒ/ as /dʒ/ is because these two are analogous in voicing and place of articulation. In both cases, the consonant adaptation disregards to mapping the consonants by manner of articulation. Therefore, the consonant adaptation strategy seems to be phonologically driven and predictable as compared to the unpredictable scansion observed in the adaption of vowels.

### 8.5.2 Substitution of the Pharyngeal Fricative Consonant /ħ/

The pharyngeal fricative sound is missing in Kunama, and consequently, it is replaced either by the voiceless velar plosive consonant /k/ or by the post-velar [k<sup>h</sup>] of Kunama.

(15) <i>Tigrinya Form</i>	<i>Kunama Form</i>	<i>Gloss</i>
a. /tiħuʔan/	[tōk <sup>h</sup> ānā]	bedbug
b. /ʃħhona/	[ʃōkíná]	hoof
c. /tinbaħo/	[tùmbàk <sup>h</sup> ā]	tobacco

In (15-a & c) above, /ħ/ is transformed to [k<sup>h</sup>], whereas, in (15-b), /ħ/ is substituted by the plain velar [k]. The post-velar realization of the glottal fricative is common among Kunama Shukre speakers, and the phenomenon has been analyzed as tendency of velar weakening, in Kunama.

On the other hand, the pharyngeal fricative /ħ/ in some loanwords given, in (16), below is substituted by the glottal fricative [h], which has been claimed to be marginal in Kunama (shukre).

(16)	<i>Tigrinya Form</i>	<i>Kunama Form</i>	<i>Gloss</i>
	a. /baħiri/	[bəhārā]	sea
	b. /diħab/	[dəhàbā]	gold
	c. /maħilla/	[məhālā]	oath
	d. /ħakim/	[hākīmā]	health professional

In (16-a, -c & -d) above, the pharyngeal fricative consonant /ħ/ in the Tigrinya words is adapted as the glottal fricative consonant /h/. The former is unknown to the Kunama consonant inventory so that its replacement is not a strange phenomenon. The choice of /h/ by the adaptation process, however, seemingly contradicts to the marginal status of the glottal fricative consonant, in Kunama Shukre. In some loanwords, the glottal fricative consonant undergoes both the deletion and substitution strategies (see under §8.5.4 below). The inconsistency in the adaptation of /ħ/, therefore, encourages us to forward two propositions. First, the Kunama phonology might have known the glottal fricative sound, but through time, this consonant is reduced to have a marginal status in synchronic Kunama. Second, the glottal fricative consonant might have entered to the borrowing language through Semitic loanwords of Tigrinya and/or Arabic. Note that the glottal fricative consonant /h/ and the post-velar [k<sup>h</sup>] have been perceived overriding the Kunama voiceless velar plosive, especially in fast speeches. This phonetic phenomena, thus, has been analyzed as tendency of velar weakening.

The loanword, in (16-b), above is Arabic origin and is adapted to Kunama without a change made on the glottal fricative consonant /ħ/. To the level of the present loanword data, it is difficult to go beyond what has been said about the status of the glottal fricative consonant in Kunama Shukre.

### 8.5.3 Substitution within Shared Consonants

Among the consonants that are known to both languages, the loanword adaptation process applies a swapping strategy in between the sibilants, /ʃ/ and /s/, and among the labial consonants, /b/, /m/, and /f/. See, in (17), below:

(17)	<i>Tigrinya Form</i>	<i>Kunama Form</i>	<i>Gloss</i>
a.	/ʃikina/	[səkənā]	Traditional beer cup
b.	/fʌɾʌs/	[bérásá]	horse
c.	/mʌʃkot/	[māskōtā]	window
d.	/dagʊʃʃa/	[dāgūʃʃā]	millet (rainy season)
e.	/dʌbʌna/	[dāmēnā]	cloud

The voiceless palatal fricative /ʃ/ in the Tigrinya words is substituted by the voiceless alveolar fricative [s], as in (17-a), and the vice-versa is shown in (17-c). In contrast, the same consonant exchange is not observed, in (17-d), where the geminate palatal fricative /ʃʃ/ in the Tigrinya word is retained in the adapted form.

Labial Consonant exchanges are also observed, in (17-b & -e). In the former, the voiceless labio-dental fricative consonant /f/ in the Tigrinya form is replaced by the Kunama voiced bilabial plosive consonant [b], in the Kunama form. In the latter, the voiced bilabial stop consonant /b/ of the Tigrinya form is transformed to the bilabial nasal [m], in the borrowing language. This swapping strategy in consonant adaptation is driven by phonological feature similarity of the substituted and the substitute consonants in place of articulation so that the adaptation process is principle governed.

### 8.5.4 Deletion of /ʔ/, /h/ and /h/

The adaptation process deletes foreign consonants though inconsistency is noticed on some of these consonants. The deletion strategy strongly operates on the glottal stop consonant /ʔ/. In Tigrinya, the glottal stop occurs both as singleton consonant and as unit of a cluster. In contrast, the deletion of the pharyngeal and glottal fricative consonants is

shown to be inconsistent and unpredictable. Nonetheless, the following loanword examples, in (18), reveal the deletion of these consonants during the adaptation process:

(18)	<i>Tigrinya Form</i>	<i>Kunama Form</i>	<i>Gloss</i>
	a. /ħasΛma/	[āsōmā]	pig
	b. /dΛrħo/	[dō:rā]	chicken
	c. /ʃΛħanΛ/	[ʃá:ná]	plate
	d. /mΛʔs'id/	[màʃiddā]	sickle
	e. /tiħuʔan/	[tōk <sup>h</sup> ānā]	bedbug
	f. /ʔasΛr/	[āsērā]	footprint
	g. /ʔitro/	[òtērā]	pot

In (18-b) above, the glottal fricative consonant is completely dropped while adapted to Kunama. The /h/ exists as part of the medial [rh] cluster, and before adaptation, the word has CVC.CV syllable strings. The deletion of /h/ changes the initial closed CVC syllable into an open CV syllable in the rephonologized form. Besides, length is attributed to the initial syllable vowel while adapted to Kunama, may be as avoidance of homophonous; Kunama has **dōrá** ‘put’. Likewise, in (18-a), the deletion of the pharyngeal fricative leaves the antepenultimate syllable with an empty onset so that the initial CV syllable<sup>49</sup> of the Tigrinya word is changes to a V syllable in the Kunama form. The same deletion of /ħ/, in (18-c), causes reduction in syllable count, i.e. the medial CV of the Tigrinya form is totally dropped, so the original CV.CV.CV syllable string is changed to CV.CV in the adapted form. The deletion of the onset seemingly triggers the deletion of the nucleus. On the other hand, it can be assumed that the nucleus is not totally dropped; instead, it leaves its trace behind so that the adapted form has [ʃá:ná] a long vowel on the penult syllable. Had it not been for compensatory lengthening, the adapted form would

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<sup>49</sup> Buckley (1997:68-9) reported the basic syllable types of Tigrinya to be CV and CVC and also mentioned as if his argument is similar to the traditional views of Leslau (1941) and Ullendorff (1955). As a result, word-medial clusters, as in mΛskirΛt, are hetrosyllabic giving CVC.CV.CVC syllable shapes to this word.

have been [ʃɛ́ná]. The realization of the schwa in Kunama phonetically represents short [a] in unstressed syllable.

The glottal stop /ʔ/ is deleted in all of the adapted forms given above, in (18d-g). In (18-d), the glottal stop occurs as unit of the medial stop-ejective cluster, and its deletion seemingly triggers other changes on the adapted form, [məʃiddā]. While the alveolar fricative ejective of the [ʔsʰ] cluster is mapped to the palatal fricative consonant [ʃ] in the Kunama form, the word-final alveolar stop singleton consonant /d/ in the Tigrinya word is transformed to the alveolar plosive geminate [dd]. This is considered as a compensation to syllable weight reduction, which results from cluster reduction. The CVC.CVC sequence of the Tigrinya form is changes to CV.CVC.CV sequence, in the Kunama form.

Similarly, the glottal stop singleton consonant in the loanwords shown above, in (18-e, -f and -g) is deleted during the adaptation process. In effect, closed CVC syllables and initial CV syllables in loanwords are adjusted to CV or V syllable of Kunama due to consonant deletion and epenthesis strategies. For instance, in (18-e), the CV.CV.CVC sequence is transformed to CV.CV.CV in the rephonologized form, in which the final CVC structure is reduced to CV structure. In the same way, the initial CV syllable, in (18-f), is changed to the V syllable structure. The final CVC, in the Tigrinya form, is changed to CV.CV due to word-final epenthesis of [a]. The CVC.CV sequence, in (18-g), is adapted as V.CV.CV following the deletion of the initial glottal stop and the word-medial cluster [tr] epenthesis.

Before closing the consonant deletion scenario, a non-foreign consonant deletion is analyzed in one loanword shown, in (19), below:

<i>(19) Tigrinya Form</i>	<i>Kunama Form</i>	<i>Gloss</i>
/minbaʔ/	[ɪmbâ]	cry, weep

The adaptation process deletes the initial bilabial nasal /m/ and the final glottal stop /ʔ/. The former is known to the consonant inventory of Kunama, so it is difficult to find out the phonotactic reason behind the deletion of the nasal consonant.

### 8.5.5 Word-initial and -Medial Cluster Epenthesis

The Kunama phonotactics does not allow a sequence of three consonants and severely restricts word-initial consonant cluster. Accordingly, a foreign term with an initial cluster is predictably epenthesised when adapted to the borrowing language, as in the following (20).

(20)	<i>Tigrinya Form</i>	<i>Kunama Form</i>	<i>Gloss</i>
	/kri/	[kírā]	rope, thread

This is supposed to be of Tigrinya origin, but it is completely nativized in Kunama so that consultants do not recognize its being a borrowed term. The epenthesis strategy breaks the initial consonant sequence while the deletion strategy shortens the geminate liquid. Hence, the CC<sub>1</sub>C<sub>1</sub>V sequence of the Tigrinya form is changed to a CV.CV sequence in the Kunama form.

Word-medial consonant cluster epenthesis is also observed in two borrowed terms. In the phonology, Kunama core clusters are pre-nasalized sequences despite a range of derived sequences analyzed following post-lexical alterations. Since Kunama clusters are hetro-syllabic, any sequence of two consonants is repaired through re-syllabification.

Among the Kunama core clusters, the present data do not specifically show a [tr] sequence while [rt] cluster is analyzed in a single word, /sārtá/ ‘string, tendon’. Whereas, obstruent-sonorant and sonorant-obstruent sequences have shown to be possible; for instance, [fr] is recorded in one native word, /āfrīḡā/ ‘red pepper’. Therefore, [tr] and [rt] clusters in the Tigrinya inputs are potentially possible in Kunama, but they are broken by the epenthetic vowel when adapted to Kunama. See (Table-43) below:

Table 43 Word-medial Epenthesis (breaking consonant clusters in loanwords)

Tigrinya Form	Gloss	Kunama Rephonologized Form	Epenthetic vowel (s)
/ʃɪnkurti/	onion	[ʃɪŋgúrítā]	[i]
/ʔitro/	pot	[òtərā]	[ə]

As can be observed, in (Table-43), above, the first loanword contains two word-medial clusters, left-to-right, [nk] and [rt]. When adapted to Kunama, the [nk] sequence is retained, except that it undergoes homorganic and voicing assimilation, i.e. [ŋg]. In the present data of Kunama Shukre, the alveolar nasal consonant /n/ undergoes homorganic assimilation only before the voiced velar plosive so that the [nk] sequence in the Tigrinya word is mapped to the [ŋg] cluster while adapted to Kunama. Since pre-nasalized consonant clusters are unmarked in Kunama, the [nk] sequence is adapted unepenthesised; whereas, the [rt] cluster is broken with the insertion of the front high close vowel [i]. Similarly, the [tr] sequence in the second borrowed term (Table-43) is epenthesised by the schwa while adapted to Kunama.

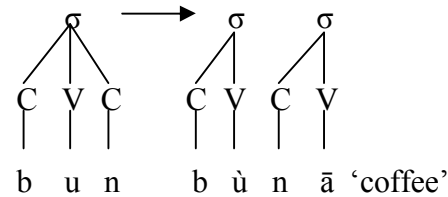
### 8.6 Rephonologized Forms and Resyllabification

The Kunama adaptation strategies cause changes in syllable shape and syllable count so that the adapted forms necessitate resyllabification. Tigrinya syllable has an obligatory onset and nucleus but an optional coda, and consequently, its basic syllables are CV and CVC; synchronic Tigrinya has no distinctive vowel length (Buckley, 1997:68). In contrast, the Kunama syllable has an obligatory nucleus and optional margins, and its basic syllables are V, CV, VC, and CVC. In view of phonological weight that is related to vowel and consonant length, diphthongs and moraic consonants, Kunama has a richer inventory of syllable structures. The Kunama phonotactics severely restricts word-final closed syllables (VC and CVC).

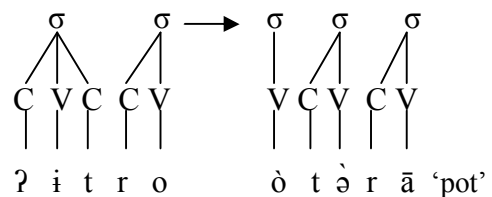
In account to the syllable structure and phonotactics differences of Tigrinya and Kunama, sample syllabifications of the Tigrinya words<sup>50</sup> and re-syllabification of adapted forms are shown below, in (21-23). A three-tiered syllabification tree is used, the syllable tier, the skeletal tier and the segmental tier, based on the CV-tier syllabification model. The syllabification comparison uses the loanwords that are adapted through consonant deletion and vowel epenthesis because the substitution strategy does not often cause syllable structure change on the source language inputs.

(21) **Word-final epenthesis** (22) **Word-medial epenthesis and initial consonant deletion**

CVC → CV.CV

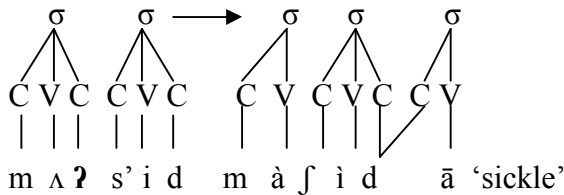


CVC.CV → V.CV.CV

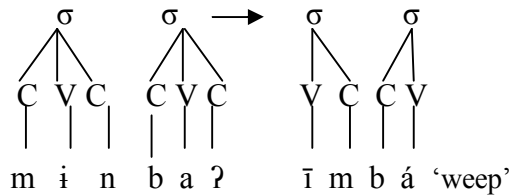


(23) **Consonant deletion and word-final epenthesis**

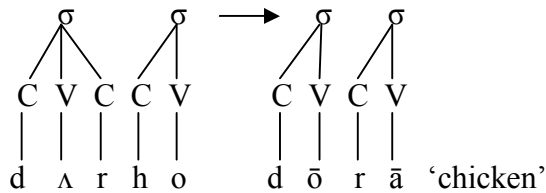
a. CVC.CVC → CV.CVC.CV



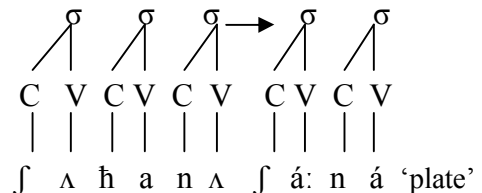
b. CVC.CVC → VC.CV



c. CVC.CV → CV.CV



d. CV.CV.CV → CV.CV



<sup>50</sup> In syllabifying the Tigrinya words, much is learned from Buckley (1994 & 1997) and Shosted & Rose (2011). In addition, Tigrinya words are transcribed in consultation with Amanuel Kebede, a native speaker of Tigrinya and a PhD candidate in Linguistics, at Addis Ababa University.

The resyllabification process targets mainly at final CVC syllables in the words of the source language. Since this is the most marked syllable structure in word-final position of Kunama, all loanwords with final CVC are adapted so that the coda is resyllabified as onset to the final CV syllable of the rephonologized forms, in view of word-final epenthesis of [a]. In (23-b), the marked final CVC is resyllabified as the glottal stop, /ʔ/ coda is deleted during the adaptation process. Non-final CVC syllables of the donor language are resyllabified following consonant deletion and vowel epenthesis, in unwanted cluster, strategies. In (23-b), the deletion of the initial nasal consonant causes the initial CVC of the Tigrinya form to be re-syllabified as initial VC of the rephonologized form. In (23-a), the initial CVC is changed to CV, following the deletion of the medial glottal stop. Similarly, in (22) and (23-c), the CVC sequences are resyllabified following the changes made by the adaptation process. Overall, the marked CVC syllable structure, in word-final position, is invariably adjusted by the different adaptation strategies; whereas, non-final CVC syllables in the Tigrinya forms may/may not be reshaped depending on the consonantal and cluster context therein.

## **8.7 The Degree of Loanword Nativization**

During lexical elicitation, consultants were used to mention whether a specific word is Kunama native or foreign. On the other hand, consultants also failed to comment on the origin of some words that are claimed, by the present study, to be borrowed terms. This is supposed to be because foreign words are completely nativized by the Kunama adaptation process. In the following paragraphs, phonological and morphophonemic evidence are given to show the total assimilation of some borrowed terms, in Kunama.

### **8.7.1 Phonological/phonetic Evidence**

The loanword adaptation process completely nativized some borrowed terms so that foreign flavors are not detected on those words. Consequently, it appears difficult to trace the vector of borrowing even for the Kunama speakers. Consider, in (24), below:

(24) <i>Tigrinya Form</i>	<i>Kunama Form</i>	<i>Gloss</i>
a. /tʰutʰ/	[tù:tā]	cotton
b. /krri/	[kírā]	thread, rope
c. /krri/	[kī:rā]	weaving
d. /tsʰʌgʌm/	[tágōmā]	problem
e. /tʌnkol/	[tʰnkōlā]	mischief
f. /hakʰi/	[hākā]	truth
h. /ʃikina/	[səkənā]	traditional cup (to drink water/alcohol)
i. /fʌrʌs/	[bʰrásá]	horse

All the words given above, in (24), pass through the necessary adjustment while adapted to Kunama. Although the other words discussed so far are adapted in similar ways, these are selected because consultants were not able to recognize whether they are borrowed or native to Kunama. Besides, some of the loanwords, (24-a, -b, & -c) were selected for vowel length measurement at the start of the present analysis. For instance, **tū:tā\*** ‘thread (n)’ and **kī:rā** ‘weaving’ were selected for being favorable contexts for long vowel stimuli, [u:] and [i:]. The duration of /u:/ and /i:/, extracted from these words, reads 262ms<sup>51</sup> and 287ms<sup>52</sup>, respectively; these values represent Kunama long vowels. In addition, consultants argue for some words, for example, those in (24-h & -i), to be of Kunama origin. Previously, Bender (1997:85) cited the words in (24-b & -c) to show vowel length contrast.

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<sup>51</sup> sampled from Speaker-1 Token-3

<sup>52</sup> Sampled from Speaker-3 Token-3

In a nutshell, the Kunama loanword adaptation process is shown to be strict enough to nativize loanwords. This way enables the language to utilize borrowed terms in forming new words, and thereby expanding its lexicon.

### 8.7.2 Morphophonological Evidence

The rephonologized forms, discussed throughout the preceding sections, have entered to the Kunama morphology. They can easily be juxtaposed to native words and underwent the morphophonemic rules of the language. See the examples, in (25), below (\* indicates the forms in the source language) :

(25) Surface forms of derivations	underlying and surface forms of adapted words	native words
a. [bərəs-kí:fã] ‘colt’	/bárásá/[bərásá] ‘horse’ + /kí:fã/ ‘girl’	
horse-DIM	/fʌɾʌs/*	
b. [dōrì-fĩnnā] ‘hen’	/dō:rá/[dō:rá] ‘chicken’ + /'fĩnnâ/ ‘female, daughter’	
chicken-FEM	/dʌɾho/*	
c. [fɪŋgùrìtārà] ‘garlic’	/fɪŋgùrìtā/[fɪŋgùrìtā] ‘onion’ + /àrà/ ‘white’	
onion-white	/fɪnkurti/*	
d. [bəhār-ūdā] ‘beach’	/bāhārā/[bəhārā] ‘see’ + /ùdā/ ‘mouth, door’	
sea-mouth	/baħiri/*	
e. [ɪs-ē-bīnâ] ‘catching fish’	/ɪ:s-â/[ɪ:s-â] ‘fish’ + /bīnâ/ ‘hold’	
fish-PL-catch	/ʔasa/*	

The noun phrases given above, in (25a-d), are derived from adapted forms and native words. In all of these, the terminal vowel is deleted across the boundaries so that borrowed terms conform to the morphophonemic rules of the borrowing language. Similarly, in the formation of the verb phrase, in (25-e), the adapted noun inflects for grammatical number with the suffixation of the plural suffix vowel [e] and joins the verb

base, which is native to Kunama. In this case, the deletion strategy ceases to operate on the plural morpheme [-e].

### 8.8 The State of Phonological Influence

The loanword adaptation strategies have operated as per the phonotactics of the borrowing language. Sound segments whether they are native or nonnative to Kunama are adapted by both phonological and phonetic approximations. In the realm of the present analysis, thus, the adaptation process does not seem to be permeable to foreign terms and sounds despite the majority of Kunama Shukre speakers being bilingual in Tigrinya, and Tigrinya being the most vital language among the Kunama Shukre, outside the home environment. Concerning the intrusion of foreign sounds, the retention of the Tigrinya voiced alveolar fricative /z/, in some of the rephonologized forms, can be mentioned as evidence. However, even the retention of /z/ varies across the consultants who are assumed different in L2 knowledge. The following loanwords, in (26), were recorded from the main consultant, and the Kunama forms show the retention of the voiced fricative consonant:

(26) <i>Tigrinya Form</i>	<i>Kunama Form</i>	<i>Gloss</i>
a. /ruz/	[rúzá]	rice
b. /tʰarmuz/	[tʰərmùzà] ~ [tʰərmùsā]	bottle
c. /mʌgaz/	[məgāzā]	saw (n)

In contrast, other consultants were recorded replacing the Tigrinya voiced-alveolar fricative /z/, in the words above (26), by Kunama voiceless alveolar fricative /s/. Hence, speaker's degree of bilingualism and the effect of this on the phonological adaptation of loanwords, in general and the mapping of sound segments, in particular, will be an issue of future research. The present study rather is concerned about Kunama speakers' persistent use of the glottal fricative consonant /h/ and the post-velar [k<sup>h</sup>], in contexts where the voiceless velar consonant /k/ occurs. In view of the marginal status of the glottal fricative consonant /h/ in Kunama Shukre, Kunama speaker's tendency of glottalizing the voiceless velar consonant, in native words, is supposed to be an

introduction of a speech tradition from Tigrinya speakers, who used to glottalize velar consonants.

## 8.9 Chapter Summary

The overall discussion, in this chapter, suggests that the Kunama loanword adaptation process applies both predictable and unpredictable strategies. These strategies are geared towards adjusting sound segments and syllable shapes of loanwords, according to the Kunama sound system and phonotactics. The predictable strategies include, the epenthesis of the Kunama nominal vowel [a] in consonant final loanwords, and the substitution of other final vowels of loanwords by [a]; both of these operate in word-final position. The former is driven by the constraint on word-final closed syllables of Kunama while the latter is motivated by the requirement of Kunama citation forms. Kunama citation forms are nominals ending with the singular suffix [a]. The unpredictable strategies (substitution, deletion and retention) maneuver the mapping of sound segments, regardless of sounds being foreign or non-foreign to Kunama, in non-final positions of borrowed terms.

The vowel adaptation of Kunama is asymmetrical. First, sometimes it is not clear that vowel mappings are whether phonologically or phonetically driven. Second, both of these strategies are observed to exist. For instance, the adaptation of Tigrinya /ʌ/ as Kunama [ə] is claimed to be a phonetically grounded mapping, as this approximation is argued to be based on native speaker's perceptual approximation. The adaptation of Tigrinya /ʌ/ as Kunama /a/, whereas, seems phonologically grounded, and this change is guessed to account for Kunama speaker's knowledge of the source language.

Similarly, the adaptation of most foreign consonants is phonologically motivated and the adaptation strategies applied on this class of sounds are predictable. Thus, foreign consonants (ejectives, pharyngeal fricative and the glottal stop) in words of the donor language will either be deleted or be substituted by Kunama consonants. The consonant scansion, in general, is assumed to be phonologically grounded. While the substitution strategy consistently operates on ejectives and the pharyngeal fricative, the deletion strategy inevitably applies on the glottal stop. Phonetically grounded consonant

mappings are rarely observed; for example, the adaptation of Tigrinya /s'/ as Kunama /ʃ/, instead of as /s/, can be a phonetically grounded approximation.

Generally, the Kunama adaptation process seems conservative as such it completely nativizes borrowed terms and is expanding its lexicon.

## CHAPTER NINE: SUMMARY AND CONCLUSION

This dissertation presents the descriptions of the segmental and non-segmental phonology of Kunama, a Nilo-Saharan dialect cluster spoken in Western Eritrea and Northern Ethiopia. The documentation part was done in ELAN 4.8.1, and it provides an annotated multimedia corpus that comprises the names and description of the Kunama cultural artifacts as well as short tales. The study uses primary data recorded from speakers of the Kunama Shukre dialect, spoken by an isolated minority group living in Tahtay Addi Yabo Woreda of Northwestern Zone of the Tigray Regional State, Ethiopia. The Kunama Shukre population is estimated to be 5000-6000. The study has applied both impressionistic and instrumental data analyses methods. In the subsequent paragraphs, the main findings of the study are summarized chapter by chapter and conclusions are drawn.

Chapter 1 provides an overview of four major issues: the language background, ethnography, the sociolinguistic situation of the Kunama language, with a focus on the Shukre dialect, and critical review of previous linguistic analyses of the language and/or its dialects. The Kunama language is one of the Nilo-Saharan languages that have earned little attention from previous linguists. In view of the considerable number of its dialects (eight), little has been known about Kunama linguistics, in general and the suprasegmental phonology, in particular. The Kunama people live in a double periphery and claim to be indigenous to the historic areas in Northern Ethiopia and Eritrea. The society is matrilineal and with clan based social structure. Kunama has rich cultural heritages of tangible and intangible sorts. Despite Kunama's ample linguistic and cultural treasures, the vitality of these has been critically diminishing, across a longer time span. This study, therefore, is intended to contribute some linguistic facts about the Kunama language.

Chapter 2 presents the phonemic and phonetic consonants inventory of Kunama (Shukre). It provides articulatory description of the consonant sounds and shows the distributional pattern of each. Kunama (Shukre) has eighteen consonant phonemes and two labialized velar allophones. The glottal fricative /h/ consonant is claimed to be a

marginal, in the Shukre dialect, with no/ rarer distribution to no minimal pair. Other phonetic consonants but with irregular distribution have been detected. Distributionally, Kunama has no word-final consonant while all consonant phonemes occur in word-internal environment. The alveo-lateral liquid /r/ never occurs word-initially, whereas, the velar nasal consonant occurs word-initially and –medially as singleton. However, word-medially, the velar nasal /ŋ/ rather shows high distribution as member of the homorganic nasal-plosive cluster [ŋg]. All consonant phonemes have geminate counterparts, except /dʒ/, /r/ and /ŋ/, and geminates occur only word-medially. Gemination is phonemic and plays both lexical and grammatical roles. To conclude, the consonant inventory of Kunama is found to be simple, in terms of size and type of consonants.

Chapter 3 is devoted to the description of vowel sounds, based on impressionistic and acoustic analyses. Five phonemic vowels with length distinction have been attested. Two phonetic vowels [ī] and [ə̄] are found to be frequent, and these occur replacing the basic short vowel phonemes, /i/ and /a, e, o/ in unstressed positions. The acoustic analysis of vowel quality shows no appreciable difference (mean F1 and F2) between the short and long vowels, except that they exhibit much distinction in duration. On average long vowels are double the duration of their longer counterparts. The mean formant values of each length pair are shown to be compatible as such both short and long vowels occupy the periphery of the vowel space. Nonetheless, relative degree of centralization is observed on some of the short vowels, and this can be accounted to the length distinction. Along with these, four diphthongs [au, ia, oi and ai] are recorded while the language shows a potential for sequences of three vowels (triphthong). Vowel length is contrastive both lexically and grammatically. In conclusion, as compared with other Nilo-Saharan languages, the vowel inventory of Kunama is simple. Kunama compensates this by length quality contrast and thereby using ten phonemic vowels.

Chapter 4 gives the description of the phonotactics and syllable structure of Kunama. The Kunama phonotactics allows a sequence of two consonants (CC), only word-medially but bans sequences of three consonants (CCC) at all. By implication, the phonotactics disallows more than one consonant word-initially and does so to geminates.

In contrast, vowel and diphthongs can occur word-initially and all words end with a vowel. Accordingly, Kunama consonant clusters and geminates are heterosyllabic. The consonant clusters are classified as core and non-core, depending on productivity and frequency in non-derived lexical items. Core clusters follow a general sonorant-obstruent pattern, in which the pre-nasalized (NC) sequences are the most frequent clusters; whereas, liquid-obstruent (LC) and liquid-nasal (LN) sequences are less frequent. The latter, nonetheless, can be assumed under core clusters, as they are productive in non-derived lexical items. The non-core clusters take obstruent-obstruent (CC) pattern and are less frequent in non-derived words, but they occur across morpheme boundaries following post-lexical alterations.

The Kunama syllable has an obligatory nucleus and optional margins. Its basic syllable structure template is (C) V (C) and gives two open (V, CV) and two closed (VC, CVC) syllables. Onset and coda slots are filled maximally by a single consonant so that the language does not have complex margins. By the same analogy, Kunama clusters and geminates are heterosyllabic. However, the Kunama phonotactics and the constraints thereof do not dictate the preference of onset to coda and the vice-versa. This is assumed to be the only gap in the language's phonotactics. Kunama syllables can also be classified by another and most relevant parameter, i.e. phonological weight. The prominence of vowel and consonant length, the considerable distribution of diphthongs as well as the presence of moraic consonant codas (liquid, nasals) make the weight parameter relevant to define the syllable structure typology of Kunama. Phonological weight presumes quantity of the mora in the rhyme units (nucleus and coda) of a syllable. Kunama light syllables are mono-moraic, and its heavy syllables are bi-moraic. In reference to weight, presence and absence of coda and quality of coda consonants, Kunama syllables are classified into four types. These are: light-open (V and CV), light-closed (VC and CVC), heavy-open (V:, VV, CV: and CVV) and heavy-closed (VS and CVS). While C stands for non-sonorant codas, S stands for a sonorant (nasal, liquid) coda that are moraic and add to the weight of that syllable. Super heavy (tri-moraic) syllables in VVN shape occur rarely; whereas, tri-moraic syllables in CVVC, CV:S and CV:C shapes have not been found. (N stand for a nasal coda). In terms of distribution,

closed syllables (VC and CVC) in general are marked word-finally while VC is additionally marked in word-medial position; whereas, CV is unmarked.

Post-lexical alterations can trigger constraint violations, and which necessitate resyllabification. The resyllabification process repairs such violations in different ways, such as, re-aligning surviving segment to vacant syllable slots, making unassociated obstruents to be extra-syllabic and creating a syllabic liquid [l]. To cap it all, the Kunama phonotactics and its constraints manage the syllabification process by themselves, except that the syllabification of intervocalic singleton consonants, as onset of the following syllable, is done in accordance to the Onset first principle. On the other hand, the Kunama cluster phonotactics and the syllabification of clusters are wellformed and conform to the SSP.

Chapter 5 treats phonological and morphophonological processes. Vowel nasalization and homorganic nasal-plosive cluster assimilation are observed to be the common phonological processes, in Kunama. The morphophonemics, rather, embraces a range of post-lexical alterations, these are, terminal vowel deletion, vowel and glide epenthesis, glide formation, vowel rounding assimilation, consonant intrusion, gemination and degemination. Among others, the deletion of the terminal vowel [a] is most predictable, especially in boundary hiatus, and this often paves the way for the other rules to apply, such as, vowel epenthesis and gemination. On the other hand, the deletion of the terminal vowel ceases to happen with an insertion of a slight pause at morpheme boundary, and it may not operate on other quality vowels, for example, on the plural suffix [-e]. Thus, the deriving force behind the Kunama morphophonemic processes is not always clear. Following post-lexical changes, constraint violations may arise across morpheme boundaries. In such instances, new syllable boundaries on the surface of outputs can be traced via insertion of a slight pause insertion and resyllabification. Sometimes, the deletion and epenthesis rules seem predictable and circumvent disallowed segment sequences. While the terminal vowel deletion is inevitable as avoidance of boundary hiatus, vowel epenthesis sometimes operates to prevent marked CCC sequences as well as unwanted CC sequences, at morpheme boundary. To conclude, the morphophonemic

rules are often responsible for most of the tonal phenomena to occur, in this language. Hence, they help to understand the form and behaviour of post-lexical tones.

Chapter 6 discusses tonal phonology and phonetics based on impressionistic and instrumental data analyses. Three phonemic tone levels (high, mid and low) have been attested. They combine in nine ways (H.H, M.M, L.L, HM, HL, ML, MH, LH and LM) on the surface of bi-moraic syllables and on sequences of two mono-moraic syllables. The basic melodies of Kunama, therefore, comprise of three levels, three falls and three rises. On sequences penult bi-moraic syllables and phonetically longer word-final vowels as well as on trisyllabic words, a range of complex patterns have been analyzed. The commonly attested complex (polysyllabic) contour melodies are combinations of rising and falling contours. They are bell shape melodies in MHM, LHL, LML, MHL and LHM patterns. Contour tone licensing is based on sonority space, i.e. phonological weight of a syllable and is related to the mora count of the rhyme constituents in a syllable. Long vowels, diphthongs and a short vowel with a sonorant (S) coda, thus, are claimed to be the main licensors of contour tones. In terms of structure, contour tones have been analyzed on CV:, V:, VV, CVS and VS syllables. However, word-final vowels and monosyllabic (CV) words are supposed to be positional contour licensors.

The analysis of pitch scaling suggests that the high tone can be realized in an extra-high and high pitch ranges with an appreciable interval magnitude, in terms of average F0 values. Accordingly, a four-point pitch height scale is proposed to exist in the tonal space of three distinctive tone levels.

The last part of this chapter discusses the tonal geometry of Kunama in accordance with the tenets of autosegmental phonology. First, the mora is claimed to be the TBU, in Kunama, for which arguments are presented to defend this claim. Second, autosegmental tone association diagrams are proposed to represent lexical melodies of Kunama. The melodic association is represented via three independent tiers: the tonal tier, the TBU tier and the segmental tier. The tone-to-mora alignment operates in left-to-right convention, wherein, one-to-one and one-to-many associations are shown to be representative of Kunama tone. Many-to-one association, rather is found at the right most edge where

word-final contours are formed on underlyingly short vowels by virtue of the final position. Word-medial voiced consonants in general are assumed as daughter nodes of the vocalic mora and aligned to the same tonal node of the adjacent vowels. Besides, there are also cases where sonorant codas (nasals and liquids) are aligned to independent tonal nodes. As sonorant consonants are moraic, they are supposed to add to the weight of that syllable in the coda position. In view of the persistency of stem-internal spreading of Kunama tones, the possible lexical melodies are supposed to be upto the OCP. Sequences of the same level tones, therefore, are claimed to operate in one-to-many association.

Chapter 7 comes up with the analysis of grammatical tone. Tone is a grammatical morpheme and marks number of the possessor, in a range of possessive constructions, as well as person object in verbs. Besides, tone distinguishes inclusive vs. exclusive possessors as well as genitive vs. copula. Tone can be an intensifier morpheme in NP formations where adjectives occur in attributive function and carries contrastive tones. On the other hand, a three height tone contrast is not recorded in the grammar while two height contrasts (high vs. low and high vs. mid) are common.

The second part of the chapter discusses the tonal processes that have been analyzed in derivational contexts, such as, compounding, nominal phrase and nominal sentence formations. The salient tonal processes include, spreading and floating of tone across morpheme boundary, re-linking of floating tones, high tone shifting and docking, contour formation and simplification, low tone plateauing, and tone assimilation. Most of these processes takes place in rule ordering fashion and sometimes triggered by morphophonemic deletion of the terminal vowel and elsewhere in the absence of the terminal vowel deletion. At the melodic level of the grammar, the phenomenon of low tone plateau creates OCP compliant sequences; whereas, mid tone sequences across morpheme boundary are accounted to spreading of the mid tone so that such sequences are not supposed to contradict to the OCP.

At last, the nature of the present study tends more to the analysis of lexical tone and tone in phrase level grammar, so morphosyntactic tone, in general and tone in verb conjugations, in particular will make a topic of future research.

Chapter 8 elaborates on the phonological adaptation of loanwords. Kunama applies different strategies to adjust the shape of borrowed terms and to adapt sound segments. In adjusting the shape of loanwords, Kunama applies two predictable strategies. The first is word-final epenthesis of the singular nominal vowel [a] in consonant final borrowed terms, and the second is the replacement of other final vowels of loanwords with [a]. These strategies make borrowed terms take the shape of Kunama citation form and avoid word-final closed syllables that are marked in Kunama. Following these are adaptation strategies that operate on sound segments, such as substitution, deletion and retention. While Tigrinya ejective consonants and the pharyngeal fricative /ħ/ invariably undergo the substitution strategy by phonological approximation, the glottal stop of the borrowing language inevitably undergoes the deletion strategy. However, the substitution strategy on some foreign consonants, such as, the voiced alveolar fricative /z/ is shown to be inconsistent across speakers. The vowel adaptation is rather found to be unpredictable and the mapping of vowels to the borrowing language is found to be asymmetrical. It is unclear whether the vowel mapping is phonetically or phonologically driven. Deletion of a foreign consonant is another consistent adaptation strategy, for example, Tigrinya loans having a final glottal stop are adapted with the deletion of this sound instead of epenthesising [a]. The glottal stop, in any position of the Tigrinya loanwords, is deleted through the adaptation process. In contrast, the mapping of the pharyngeal and glottal fricative /ħ/ and /h/ consonants in the Tigrinya borrowed words is found to be sporadic. Sometimes both consonants can be elided during the adaptation process, and else where, they are unanimously mapped to /h/, [k<sup>h</sup>] or [k]. To the level of the present analysis and data size, the Kunama adaptation process is analyzed to be conservative as such it completely nativizes borrowed terms. In effect, Kunama is expanding its lexicon, and. Accordingly, new terminologies of science and technology can easily be developed, and thereby to support the revitalization effort (Kunama mother tongue education) that has already been started in the Kunama Shukre community.

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## APPENDICES

### Appendix-I Wordlists

In this section, Kunama-English (Part-I) and English-Kunama (Part-II) wordlists are presented. In the former, the Kunama words are arranged according to the order of their initial sounds in terms of their sequence in place of articulation (starting with the lips to the velum). Thus, word-initial consonant sounds will appear in this order: **b, m, w, f, d, t, n, s, l, ɲ, ʃ, dʒ, tʃ, j, g, k, ŋ** and **h**. Vowel initial words are arranged according to the horizontal position of the tongue: front (**i, e**), central(**a**) and back(**u, o**) vowels. In the latter, the words are arranged in the English alphabetical order based on their initial symbols. The abbreviations used to indicate the grammatical classes of the entries are denoted below; they are bold and italicized.

*n*=noun, *v*=verb, *adj*=adjective, *adv*=adverb, *np*=noun phrase, *vp*=verb phrase, *pr*=pronoun, *dt*=determiner, *on*=ordinal number, *cn*=cardinal number

#### Part-I Kunama-English Wordlist

<b>b</b>	bāddā fōgā <i>n</i> shirt
bā <i>n</i> dance (traditional)	bāddā lā <i>adv</i> upward
bà <i>n</i> pit	bāddā ŋādā <i>v</i> floating
bā <i>v</i> harvesting coffee beans	bāddā ʃindā <i>n</i> thunder
báˀ <i>v</i> copulate, ploughing	bāddā ùdā <i>np</i> upper lip
bá tītīmà <i>n</i> hole	bādūmmā <i>n</i> clay
bàdà gī:rà <i>n</i> spine, backbone	bāgānā gādā <i>v</i> contradict
bá:dā <i>n</i> illness, disease	bāhārā <i>n</i> sea, ocean
bá:dáˀ <i>n</i> raid	bāhārā ùdā <i>n</i> beach
bádáˀ <i>n</i> thigh	bàidà <i>n</i> barren woman
bādā <i>n</i> back (of body)	bājā <i>adj</i> bad, ugly
bá:dākōsā <i>n</i> curse	bālā <i>v</i> be lost
bá:dākōsá tárá <i>v</i> cursing	bālāsá <i>v</i> disappear
bāddā <i>adv</i> above	bànànā <i>n</i> banana

bàrà *adj* poor  
 b́arásá *n* horse  
 b́arásá kǐjǎ *n* coft  
 bà:ṛè *cn* two  
 básā dādā *v* hoe  
 básā *v* make smooth  
 bàjǐkùllà *n* army  
 bátā *v* overtake  
 bātjǎ *v* fighting  
 bāùdā *n* bark (of a tree)  
 bē:nâ filā *n* muscle  
 bē:nā *n* upper arm  
 biā dāṅgōdā *vp* boil water  
 biā dūdā *v* swim  
 biā fānākā *n* rainy season  
 biā gōdá *v* draw water  
 biā íráwá *n* spring water  
 biā *n* water  
 biā sālēlā *n* waterfall  
 biātā *n* butterfly  
 biā ùffǎ làgā *np* island  
 bī:bá *adj* red  
 bībá bídá *n* flame  
 bíbá *v* carry (a child) on back  
 bíbǐ kǐjǎ *n* baby  
 bíbǐ nā jǎ *v* kicking a baby  
 bídá *n* iron  
 bídá tēdá dá *n* hammer  
 bídá tēdá *n* blacksmith  
 bíjǎ *n* worm  
 bīkā kādā *v* blink  
 bílá *n* forest  
 binā binā *v* hold

binā dādā *n* handle  
 bīnā *v* accept, receive  
 binā *v* join  
 bǐjǎbābā *n* farmer  
 bǐjǎbā *v* cultivate, farm  
 bǐjǎ *n* farmland  
 bóbá *n* root  
 bōbā *n* tortoise (of water)  
 bòbònā *n* nose  
 bōdzōlá *n* hunchback  
 búbā *n* flower  
 búbījǎ *adv* every  
 búbījē *adv* all  
 búbūrā *v* accumulate  
 bùdà *v* crow (as rooster)  
 bǔllúká *n* valley  
 bùnā *n* coffee  
 búṅgá *n* dust  
 bū:rā *adj* spotty (color of an ox)  
 būrā *n* satiety (of food or drink)  
 búrā *v* piercing  
 būrdzǎjǎ *v* blowing (horn)  
 būrdzâ *n* horn (musical instrument)  
 bûtā kǐjǎ *n* bull  
 bûtā *n* ox (general term)

## **m**

mā *n* tooth, beak  
 mā àrà *np* white tooth  
 mā:rā *n* bile  
 mā rā itā *n* gallbladder  
 mábbátā tá *v* revenge  
 māgāzā *n* saw

māggūbā *n* ankle  
 mǎhālā *n* oath  
 mǎidā ōkā *adv* well (greeting)  
 mājá *n* cripple  
 mǎkábà *n* warthog  
 mǎkālā *n* cheek  
 mālā *n* leprosy  
 málá *v* finish, complete  
 mǎlidijā *n* truth  
 māmā *adj* bitter  
 mǎnkà *n* spoon  
 mǎngállá *n* rainbow  
 mārā *n* leader, guide  
 mǎrá *n* menstruation  
 mǎrǎrātā *n* semen  
 māsā *n* spear, war  
 māsā bǎtǎ *vp* fighting with spear  
 māsāmā kǐǎ kǐǎ *np* nephew  
 mǎǎiddā *n* sickle  
 mǎskōtá *n* window  
 mé:dá *v* swallow  
 mēnā *n* throat, Adam's apple  
 mēnā tǔkká *n* goiter  
 mēsā *n* mead, honey beer  
 mētǎ *adj* dull  
 mǎkādá *v* blink  
 mímímímímā *adj* sour (of lemon)  
 mǎmǎntǎ *adj* sour (of alcohol)  
 mǎmǎntǎ ná *adj* stink, smell (of  
 fermented alcohol)  
 mǎindā *n* leg, foot  
 mǎindósósá *n* naming ritual of Kunama  
 mǎntǎ *v* cut (tr), decide

mǎntǎ mǎntǎ *adj* pieces  
 mōdá *v* quarrel  
 'mōkkwā *n* lion  
 mōkkwā *n* molluc mollusk  
 mólá *adv* morning  
 mōǎgólá *n* danger  
 mōǎgólá *adj* crooked  
 mōsā *dt* every  
 mōǎ *n* mane  
 mōsè *dt* many, all  
 múdzá *cn* hundred  
 múdzè bǎ:rè *cn* two hundred  
 múdzé kússúmē *cn* five hundred  
 múlá *v* plucking (feathers)  
 mǎlǎ tǎbè *np* good afternoon  
 mú:sá *v* fold  
 mǎtǔgǔssē *vp* it is rotten  
 mǎtǔngǔlā *n* trunk (of a tree)

## W

wā *n* eye  
 wà *v* leaving off  
 wǎ ǎmǎná *n* eyelid  
 wā *v* coming  
 wá *v* entering  
 wǎ:ǎ *adj* full  
 wǎ:ǎ *v* fill  
 wǎgà *n* place  
 wǎlǎdā *v* hang up  
 wámā *pr* that  
 wámā tá *adv* there  
 wǎtǎǎ *n* eyebrow  
 wǎ *n* day

wīākūrà ìsùmà **n** west  
wīākùrà ìttòrimā **n** east  
wīākùrà **n** sun  
wīākūrā tōrā **n** sunrise  
wīàlèlìdà **n** sunshine  
widà **adj** silent

## **f**

fā **n** cabbage  
fà **v** burying  
fādā lá **v** avoiding, driving away  
fādā **v** throw, drop (tr)  
fādàbà **adj** intelligent  
fādābōdā **adj** be wise  
fāfālā já **v** flapping  
fāidā **n** mat  
fākālā **adj** yellow  
fākkàrà **v** admire  
fākkārā **v** startle, surprise  
fākkē` **adj** others  
fālā **n** cheek  
fālā **n** saying, proverb  
fānākā **n** time, season  
fānèdā **n** announcement  
fānnádá **adj** be rich  
fānūsā **n** lamp  
fāfā **adj** beautiful, good  
fāfōdā **v** decorate  
fātūrā **n** breakfast  
fāūdē` **dt** abundant, many  
fèdā **v** rise up (intr), stand  
fèfènā já **v** flap (wing)  
fèfènā **n** wing

fènnù sùbè **np** good morning  
fidà **n** payment  
filá` **n** abscess  
fi:lā **n** rat  
filá` **v** swell (intr)  
fitìtìdā **v** fly  
fódā **v** polish  
fòfòggà **n** bark (of tree)  
fòfòngòlā **n** skin (of fruit)  
fōgā kòlā **vp** undress  
fōgā kòtā **vp** wear cloth  
fò:gā` **n** cloth  
fōgā tīrá **v** sewing cloth  
fōgādā **adj** wrong  
fōgādā sá **v** judge  
fōidā **n** whistle  
fōidā **v** whisper  
fònfòrā **n** flute  
fòrà **n** squirrel  
fòrōdā **v** sacrifice (for God)  
fówwā mīntfā **v** circumcise (male)  
fū:fā` **n** nape  
fùdā **v** blow  
fúfá` **n** termite hill  
fúlā **n** peanut  
fūlā **v** crunch  
fùlùfùlùmā **adj** fresh complexion, smooth  
fū:nà **n** crocodile  
fūrā **v** plunder (a town)  
fūrā **v** snatch, seize  
fùtā **n** lung  
fūtjā **v** skinning (animal)

**d**

dā **v** return, give back  
dàbà àndā **n** big lake  
dàbà **n** lake  
dábēdā **adv** be late  
dàbòdijā **v** haggle  
dàdà **n** bead  
dā̀: dā̀ **v** helping  
dádá **v** separating  
dàgàdàgàdā **n** beggar  
dàgàdà **v** beg (for money)  
dāgāsā **n** doorway  
dāggà **adv** side  
dāggà ìdà **v** approach  
dàggà mmū **v** lie down!  
dāgū̀f̄f̄ā **n** millet (rainy season)  
dāhàbà **n** gold  
dàkkā āngā **np** my wife  
dàkkā **n** woman  
dāmādā **dt** small, few  
dāmādā k̄j̄f̄ā **dt** very small, a few  
dāmānā **n** cloud  
dāmmā **n** snake  
dāmmā nj̄nā **vp** bite (of snake)  
dānā **n** fat  
dārādā **v** see  
dàràsà **n** giraffe  
dārībā itá̄ **n** compound (of house)  
dārmā **adv** dusk, twilight  
dāf̄adà **v** calm (oneself)  
dàtā b̄b̄ijā **pr** everything  
dāùdā **n** scarcity

dèdā itá̄ **np** uterus  
dèdā **n** child  
dèdā wálā **vp** nursing the baby  
dēndērā **n** clitoris  
dēndērā tá **vp** excision of the clitoris  
dērā **v** tear (tr)  
dēsā **n** liver  
dìbā **n** village  
dìginā **n** wedding (ceremony)  
dīmādīmā **adv** always  
dīngūl **n** prophet  
dòlòkà **n** tortoise (of land)  
dōrā dā **v** save, keep  
dōrā k̄j̄f̄ā **n** chick  
dō:rā **n** chicken  
dōrā f̄innā **n** hen  
dōrā **v** put  
dōrōdā **v** push  
dúdā **n** smoke  
dùdā **v** jumping (from a higher position)  
dùffā **n** leaf  
dūmā āngā dinā **n** husband/wife  
dūmā itá̄ **n** kitchen  
dūmā m̄inā **v** marry  
dūmā **n** clay  
dūndūnā **n** fog  
dūrūfā **adj** fat  
**t**  
tá̄ **v** breaking  
tā **n** slice  
tá̄ **v** folding  
tá̄ **v** slaughter (animal)

tábbá <i>v</i> notice	tāukàdà <i>v</i> burst
tábbá éllá <i>adv</i> at once	tēdā <i>v</i> castrate
tábīlā <i>n</i> road, path	tēnkā <i>n</i> flea
tābilā fātàgàrà <i>n</i> crossroad	tèrā <i>n</i> month
tàdà <i>v</i> buying	tèrā <i>n</i> moon
tàdà <i>v</i> cancel, erase	tèrā lèlidà <i>n</i> moonlight
tádā <i>v</i> carve	tètèrā <i>n</i> splinter, sliver
tàfā <i>v</i> add, increase	tibbībā <i>adj</i> straight
tāffā <i>v</i> fasten, bind (load)	tifòdā <i>v</i> spit
táffīammū <i>dt</i> the whole of something	tī:kā́ <i>n</i> place name
tāgā <i>n</i> threshing-floor	tíkā <i>v</i> hear
tágādā <i>v</i> wake up (intr)	tíkā gātá <i>n</i> south
tàgàmā <i>n</i> problem, trouble	tikā lèdà <i>np</i> cane, walking stick
tàgàmā ìbìfā <i>vp</i> resolving a problem	tīrā <i>n</i> python
tāggīmā <i>adj</i> heavy	tílā <i>n</i> louse
tàgìdā <i>adj</i> expensive	tííndādā <i>n</i> bell
tāgīdā <i>n</i> weight	tííndādā jā <i>v</i> ringing (bell)
tāītā <i>n</i> arm	tííllādā <i>v</i> finish, complete
tājā <i>n</i> dog	tīngīrā mū mīnā <i>v</i> rape
tākā <i>v</i> know	tīngūrīdā <i>v</i> deepen
tákàfā <i>n</i> duck	tīrā <i>v</i> sew
tàkidā <i>n</i> spark	tííngā <i>n</i> partridge
tálā <i>n</i> scar	tíròtā <i>n</i> slave
táflā <i>n</i> rock	títā <i>v</i> see
tàllādā <i>v</i> loosen	títímā <i>adj</i> narrow
támā <i>adj</i> new	tōfā <i>n</i> anus
tàmàggā <i>n</i> hare	tōkānā <i>n</i> bedbug
tāngādā <i>n</i> storm	tókkódā <i>v</i> leak (tr)
tà:rà <i>n</i> insult	tókōmā <i>n</i> hot weather
tà:rà <i>v</i> insult	tòkòmā-ttā <i>n</i> fever (not malaria)
tàrmùzā <i>n</i> bottle	tòkònā <i>adv</i> right (direction)
tāùdā <i>v</i> enlarge	tōlā <i>n</i> cliff
tāùdā <i>v</i> growing (plants, children)	tóllā <i>v</i> join, put together, mend, repair

tōmá *n* fire  
tómā údā *np* firewood  
tórá *v* turn over  
tóʃimā *adj* wet  
túdā *v* kneel  
túgʷá *n* knee  
tūgùdà *v* shoot  
tūkāʃā *n* heron  
tūkkʷá *n* gun  
túkūbā *n* feather  
túkúrá *adj* deep  
tùnbàkà *n* tobacco  
tùnbàkà *n* tobacco  
túnkúʃá *n* top, highest point, summit  
tùṅgùdā *v* pound  
tùṅgùdā dādā *n* mortar, pounding pot  
tùṅgùdā dādā kīʃā *np* pestle,  
tù:tā *n* cotton  
túttúná *n* leprosy

**n**

nā *v* drink  
nābùlà *n* grave  
nābùlà wāgā *n* cemetery  
nāfōdàkà *v* used up  
nāfōsùnà *adj* important  
nāidā *v* soak  
nāidādā *n* alcohol (general)  
nànàdà *n* nature  
nánô *qw* who?  
nāùdā *v* carry (in arms), picking up  
nè:nà *v* intercede, mediate  
nībīrá *n* needle

nídá *v* sink, subtract  
nókótá *n* marsh  
nòṅòṅòṅómā *adj* soft

**s**

sā *n* gift  
sá̄ *v* closing, shutting (tr)  
sā *v* giving  
sādā *n* poison  
sādā *v* poison (a person)  
sādā itá̄ *n* tribute (a house)  
sādāllā *n* demon, evil spirit  
sàkādā *v* divorce  
sākāmā *v* rule over, dominate  
sākēdā *n* shelter, nest  
sākādā *n* breathe  
sākòdā *v* hatch  
sālādā *v* spreading (of a disease, fire)  
sàlāṅgòdā *v* deceive  
sālēdā *v* sweep  
sāllè *cn* four  
sāmā māsāmké *vp* I sent the sibling  
sàmàrà mmù *adv* be together  
sāmēdā *n* messenger  
sammada *adj* unripe  
sāná *n* work  
sāná *v* making  
sāná fōgā *n* robe (man's gown)  
sándá *n* basket  
sāndā *n* donkey  
sàndùkā *n* box  
sāṅgā *n* bone  
sà:rà *n* billy-goat

sārā *n* half  
 sārtá *n* string  
 sā:sá<sup>-</sup> *adj* wide  
 sà:sā *v* learning  
 sàsā *v* telling  
 sāsā īdá *v* imitating  
 sásá īdá *v* widen  
 sàsālā *n* fiancé/fiancée  
 sàsālā āṅgā *np* my fiancé/fiancée  
 sàsālā kòbinā *v* engaged, betrothed  
 sàssā *n* comb  
 sàttè *cn* three  
 sàùitā *n* wind  
 sàùitātā *v* blowing (of wind)  
 sáūrōdā *v* drawing (picture)  
 sēdā *n* desire  
 sé:dā *n* track (of animals)  
 sédá *v* look for  
 sègènā *n* ostrich  
 sègètā / sèkètā *n* shoulder  
 sèggā *adj* left (direction)  
 sèkènā *n* Traditional beer cup  
 sēllā *n* shadow  
 sēllāsī *adv* tomorrow  
 sēllāsī ūtùdā *adv* day after tomorrow  
 sèmmà *n* bee  
 sèmmà ítā *n* beehive  
 sèmmājá *v* sting (bee)  
 sēnā *n* grass, weeds  
 sēnā fāīdā *n* thatch  
 sēnā ítā<sup>-</sup> *n* hut  
 sēnāmā *v* weeding

sèrā *n* neck  
 sèrā sèrā mā *adj* shy  
 sèsā bēīdā *adj* be torn  
 sèsègà *n* bamboo  
 sésúmmé *v* abstain  
 sògā *n* chest  
 sò:là *n* virgin  
 sòlòbā *n* bride/bridegroom  
 sūbā *n* river  
 sūbā dōgōnā *np* river bank  
 sūdā *n* night, sleep  
 sūdā fānākā *adv* afternoon  
 sūdā kāwā *n* evening meal  
 sūdūbā *v* crush (tr)  
 sūdūbā *v* sleep, taking nap  
 sūdūbā ārāntā *n* bed  
 sūdūbā ítā<sup>-</sup> *n* bedroom  
 sùgùnèdā *v* caress  
 sùkā kōrā *vp* migrate from (an ethnic area)  
 sùkā *n* country, ethnic area, market  
 sùllūmā *n* peace  
 sùllūmā sá *v* greet  
 sùllūmā sùdā *n* good night  
 sùṅgúdā *n* movement  
 sùṅgúdā *v* move (intr)  
 súlā *adj* brown  
 sū:sā *n* tree name  
 súsá *v* preparing  
 sū:sā *v* standing  
 sú:sá<sup>-</sup> *n* soup (of meat)  
 sússā *n* co-wife  
 sússā kījā *n* bastard, illegitimate child

**r**rúzá *n* rice**l**là *v* transplantlābā *v* dry out (clothes), wipe offlābātā *n* riblà:dà *v* forgetlā:fā *v* catching (an object in air)lāfā fòfòngōlá *np* kernel (of corn, maize)làfā` *n* maizelà:fā *n* souplàfā òikèdà *vp* harvesting maizelàgā àìòkòmà *np* barren landlàgā arà *n* limelàgā búbíjā *pr* everywherelàgā já *v* sacrificelàgā lēlìdà *adv* dawn (before sunrise)làgā *n* earth, land, soillàgā sēnà *np* grasslandlàgā tòtòmà *n* fertile soillàgā tǔlā *n* worldlàkàdà *v* remainlàkōdá *v* chewlàkùdà *v* kneadlāmā *n* razorlāngālāngā mā *adj* weak, lazylàǰǰā *n* goatlēdā *v* burn (intr), blaze, light (fire)lélátā *v* sow, plantlēlèdà *n* lightlèmīnā *n* lemonlídā *n* antelopelí:dā *v* seelíkódā *v* limplí:lā *n* hunger, droughtlí:lā *n* oillílā` *v* tyinglílā fānàkà *np* dry seasonlílìdā *adj* restlesslílìdā *v* hasten, hurrylílìdīnā *adj* eloquentlílìlìlīmā *adj* be blunt, dulllí:sā *n* heiferlōbājā *v* clearing land for plantinglùǰòdā *v* convalesce**ɲ**ɲā *n* meatɲá ētā *n* eagleɲátātā *n* butcherɲèlā dèndèrā *n* palateɲè:lā *n* language, tongueɲè:rā *n* lie (falsehood)ɲíɲā *v* bitingɲúmā *v* hide (tr)ɲúɲā *v* stealing**ʃ**ʃā *n* birthʃābā *n* juiceʃābā *v* squeeze, stirʃābā kìnakē *vp* get well, recoverʃādāʃādāmmū *adv* sometimesʃàkè nèdà *v* accuseʃánā *n* plateʃānfā *n* beeswax

ʃàrā *n* argument  
 ʃàrā *v* argue  
 ʃāʃā *n* wound  
 ʃēbè ánálà éllā *cn* eleven  
 ʃēbè bā:rè *cn* twenty  
 ʃēbè *cn* ten  
 ʃēbè éldàùdā *cn* ninety  
 ʃēbè kōnsàttè *cn* eighty  
 ʃēbè kōntābā:rè *cn* seventy  
 ʃēbè kòntállé̄ *cn* sixty  
 ʃēbè kùssùmè *cn* fifty  
 ʃēbè sàllè *cn* forty  
 ʃēbè sàttè̄ *cn* thirty  
 ʃēbèrā *adj* stink, smell (bad)  
 ʃékādā *v* slide  
 ʃènkòllā *n* hoe  
 ʃèngòdā *v* kiss  
 ʃídā *v* freeze  
 ʃídā *v* roasting  
 ʃìgídā *n* animal  
 ʃìgídā *n* trap  
 ʃìgídātá *v* trapping  
 ʃìgìdè ágàlà *np* hide of animals  
 ʃīmā *n* tail  
 ʃīmá tódā *v* twist  
 ʃīmàlà *n* air (breathed)  
 ʃínā *n* dirt  
 ʃínā *n* vagina  
 ʃínā dādā *n* broom  
 ʃínā ná *adj* dirty  
 ʃínnā *n* Kunama traditional mat

'ʃínnā̄ *n* female, daughter  
 ʃíṅà *adj* thin  
 ʃíṅgádā *v* spit  
 ʃíṅgùrītā *n* onion  
 ʃíṅgùrītā ārā *np* garlic  
 ʃíʃáwā *n* sand  
 ʃíʃímā *n* cold weather  
 ʃíʃʃídā *v* fry  
 ʃódā *n* blessing  
 ʃòdā *v* be slow  
 ʃòdā *v* getting (someone or something)  
 ʃò:dā *v* rubbing  
 ʃòdābā *v* blessing  
 ʃòddā *n* money  
 ʃòfā *n* hump (of cow)  
 ʃòkínā *n* hoof  
 ʃòkkā *n* fence  
 ʃòkkā já *v* fence in  
 ʃòkkādā *v* strip off (bark)  
 ʃònkòllā *n* hoe  
 ʃòṅgòdā *n* smile  
 ʃòṅgòdā *v* smiling  
 ʃòrā *n* beard  
 ʃúdā̄ *v* milking  
 ʃūdā *v* withering  
 ʃūkā *n* soul, spirit (of living person)  
 ʃùkkā *n* bird  
 ʃùkkā íkīmā *np* claw of a bird  
 ʃùlù fādā *n* sorcerer/witch  
 ʃùmùfùdā *v* break wind, fart  
 ʃùndā *n* star  
 ʃùttā *adv* down

### **dʒ**

dzābùrà *n* steer  
dzágābā lālā *n* potter  
dzēbā *n* pocket  
dzēndzā *n* placenta  
dzíggá *adj* green  
dzīngá *v* threshing (grain)  
dzīrá *n* game  
dzīrá tate *np* musical instruments  
dzìrgà bádá *n* malaria  
dzìrgà *n* mosquito  
dzūlá *n* saliva

### **tʃ**

tʃā já *v* extinguish  
tʃā *n* death  
tʃā jùkà *np* spirit of a dead person  
tʃā ùsùlà *n* funeral  
tʃā *v* die  
tʃítʃírá *v* shine  
tʃótʃá *v* fry, roast

### **j**

jā fādā *v* killing, murder  
jā *v* kicking, beating, whip  
jāwā *v* grind  
jòkè *v* come

### **g**

gābàlà *n* monkey  
gādā biā *n* flood  
gādā *v* walk, go, move  
gādzībā *n* face  
gādzōdā *v* pray  
gāfūdā *v* barter, exchange (of goods)

gāidā *v* stoop  
gā:lá *n* bellows  
gālādā *n* axe  
gālāwá *n* grasshopper  
gàllà *n* year  
gàmmà bùtā *n* ram  
gàmmà kìfā *n* sibling (of sheep)  
gàmmà *n* sheep  
gānbēdá *n* leftovers  
gáńgámá *adj* hard  
gássē *n* travelers  
gàssùdā *v* annoy, disturb  
gāsūdā *n* shame  
gēdā *v* belch  
gēgādzá *n* sword  
gē:rá *adj* tall, far  
gē:rá-ídā *v* lengthen  
gígá *adj* blue  
gīgā *n* hiccough  
gì:rā *n* horn  
gíjídá *v* massage  
gōbōdā *v* drag, pull  
gō:dá *n* plan  
gōdā *v* pour  
góggōtá *adj* rough  
gōgōdā *v* please, satisfy  
gòlā *n* honey  
gōlá *n* mead, honey beer  
gòlàgòlà *v* harvesting honey  
gómá *n* green pepper  
gòmā *n* beard, hair (of maize)  
gòmā jōrā *n* beard  
gōmātá *v* advise

gùbbà *n* bat  
gūdzá *n* stick  
gùgàrà *n* trouser  
gùnbēdā *adj* spoiled food (intr)  
gùnùdà *n* sound, voice  
gúṅgúlá *v* coil (rope)  
gū:rá *v* chase

## **k**

kā *v* taking  
ká̄ *v* hate  
kàbàrà *n* news  
kàbbēllā *n* hat  
kàbūdā *v* cover  
kādádā *n* bridge  
kādā *v* cross  
kāfá̄-ítá̄ *n* toilet  
kāfá fā *v* defecate  
kāfá fùdā *n* diarrhea  
kāfá̄ *n* faeces  
kàfàtā *adv* below  
kāfātā *n* buttock  
kāffā lá lā *n* potter  
kāffā *n* mud  
kāfògà *n* dress (female cloth)  
kàilā *n* fear  
káílá *n* parrot  
kàìlìdā *n* scabies  
kàìlìdā *v* scratch  
kákādā *adv* inside  
kákkádá *v* tighten (tr)  
kàkùṅnā *n* testicle  
kàkùṅnā t̄fērārā *n* spider

kākūnt̄fērārā ítā *n* spider's web  
kàlà *v* denying  
kálā *v* lick  
kālāmá *n* color  
kāmàtā *n* cave  
kámīdá *v* wink (eye)  
kāmmā *n* bone marrow  
kāmmīnā *adj* strong (physically)  
kāmmīnā *n* strength  
kárādā *v* cackling  
kájá *v* return(tr), giveback  
kāsá bìbilā *n* stomachache  
kā:sá *n* abdomen, belly  
kāj̄f̄f̄ā ìdā sà *v* answer, reply  
káfúkâ *n* rag  
kātā *n* fetus  
kātākètā kèlā *np* stranger  
kátódâ *v* shiver, tremble  
kàùkâ *n* crow  
kāwā *n* flour  
kāwālā *v* bake (in ashes)  
kē fākèllè *np* other men  
kébésá̄ *n* a baby (that stops suckling in a near past)  
kēbēsā *n* relative (by blood)  
kékā *n* truth  
kēkātā *v* clapping  
kékémâ *adj* clean  
kēlā *v* counting  
kèlā bīnáná *n* host  
kè:lā *n* guest  
ké:lá *n* kohl  
kèmā *n* scorpion

kìbirā <i>adj</i> patient	kōfūnfúrá <i>v</i> rolling
kî:dà <i>n</i> name	kōítá <i>n</i> leopard
kî:dà <i>v</i> calling (someone)	kòitā <i>v</i> lean against
kìmā <i>n</i> hair	kōjā <i>v</i> fall (intr), stumble
kímè <i>pr</i> we (INCL)	kōjā ké <i>adj</i> cheap (price)
kìnā <i>n</i> sorghum	kójá kīfā kē <i>v</i> defeated
kī:rā <i>v</i> weaving	kōkātá <i>v</i> be pregnant
kírā <i>n</i> thread	kōkēlá <i>v</i> ask, request
kīfā <i>n</i> sibling (female)	kōkkā <i>n</i> hatred
kīsībá <i>n</i> duty, obligation	kòkòbā <i>n</i> blood
kòā āndā <i>np</i> adult person	kòkòbā ádzā <i>v</i> bleeding
kòā āngūdē <i>np</i> some men	kòkòbā sártā <i>np</i> blood vessel, vein
kòā ārà <i>np</i> Whiteman	kòkòbā ùt̄fùkè <i>v</i> coagulate, clot
kòā bádá <i>np</i> sick person	kòkòpā <i>n</i> egg
kòā bājā <i>np</i> stupid person, corrupt	kòkòpā āngā fètā <i>np</i> eggshell
kòā búbijà <i>pr</i> everybody	kòkòpā bíbá <i>n</i> yolk of an egg
kòā büt̄fā <i>n</i> crowd (of persons)	kòkòpā fādā <i>vp</i> laying egg
kòā lūfá <i>adj</i> honest	kōlá <i>n</i> crow
kòā <i>n</i> man, person	kòlà <i>v</i> preventing, defending
kóbīná <i>v</i> believe	kòllā <i>n</i> friend
kòbīná bīná <i>v</i> hope	kòllā <i>v</i> surround
kòbùbùrā <i>n</i> herd (of cattle)	kòllè <i>adj</i> equal
kóddímā <i>dt</i> enough	kōmā <i>v</i> stamping (with one's foot)
kòdògòsā <i>n</i> labour	kōmá̄ <i>v</i> loving
kōfā <i>n</i> pus	kòmā <i>n</i> umbrage, offence
kōfālā <i>v</i> copulate, sexual intercourse	kōmaldà <i>n</i> end
kòffògèdà <i>v</i> turn	kòmaldà <i>on</i> last
kòfòlā <i>v</i> tired	kōmidārā <i>n</i> tomato
kòfòlā sākādā <i>v</i> panting	kòminkè <i>v</i> imitate
kófúlā <i>n</i> credit	kómmā <i>v</i> deny
kōfúlā <i>v</i> smear (tr)	kònā <i>n</i> hand
kófúlā kā <i>vp</i> taking credit	kònā āñfùllà <i>n</i> pointing finger
kófúlā sā <i>v</i> borrowing	

kònā kābātā *n* bracelet  
 kònā kīfā *n* finger (of hand)  
 kònā lè òdā *adj* generous  
 kònā sèggā *n* south  
 kónkē *v* burn  
 kònsàttè *cn* eight  
 kòntàbàrè *cn* seven  
 kòntàllè *cn* six  
 kòṅgàdā *v* groan (with pain)  
 kòrā *v* flee  
 kōrā *v* suck  
 kórīdā *v* scratch  
 kōsá *n* cough  
 kòfā *v* giving birth  
 kōfá *v* hunting  
 kōfá *v* washing one's body or hand  
 kōsādā *v* coughing  
 kòsàsā *v* teaching  
 kòsàsā itá *n* school  
 kòsèdà *n* door  
 kòfèrā *n* ethnic group, clan  
 kójfīfā *v* diminish, melt (intr)  
 kòsòdā *n* journey  
 kōfōdā *v* say goodbye, take leave off  
 kòsòsònā *n* tradition, custom  
 kójfjá *adj* healthy  
 kójfōmmū *adv* never  
 kòtākā *n* acquaintance  
 kòtātā *v* be proud  
 kòtjā *v* fighting  
 kòttā *n* seat  
 kòttàbā *v* sit

kòttābā ārāntā *n* chair  
 kòwwā bīnā *v* inviting  
 kūbbājā *n* cup  
 kūbūlā *n* drum  
 kūddādā *n* fork (in path)  
 kūjā *n* sky  
 kūlētā *n* plank  
 kūllūdā *n* darkness  
 kùlùdā *v* fade  
 kūndá *n* forehead  
 kùndā *n* salt  
 kújŋjá *n* termite  
 kūrā *n* back(of something)  
 kúrā tā ígīdā *vp* turning to back  
 kūrālā *adv* to back  
 kùssùmè *cn* five  
 kūtā *n* breast  
**ŋ**  
 ŋādā *n* food  
 ŋādā súsá *vp* preparing food  
 ŋādā *v* eating  
 ŋāŋgārā já *vp* cutting a fruit into pieces  
 ŋāŋgārā *n* gravel  
 ŋàŋà *n* mosquito  
 ŋāŋgīfā *n* branch (of a tree)  
 ŋòŋà *n* frog  
 ŋùrùdā *v* growl (of dog)  
**h**  
 hākā *n* truth  
 hākā mmū *adv* really, truly

**i**

íbā *n* twin  
 íbifā *v* untie, solve  
 ídā *v* going down  
 īddīrā *adj* courageous, brave  
 īdē *adv* again  
 íggīgā *n* hiccough  
 íggīgā *v* hiccough  
 ígídá *n* environment  
 ījjá *n* grinding stone  
 íkállē *qw* how many?  
 íkánō *qw* which?  
 íkè *v* arrive  
 íkédāmū *qw* how?  
 íkīdí *qw* when?  
 īkīmā *v* nail  
 īkītá *qw* where?  
 īlibākē *vp* it becomes dry  
 ílíké *vp* it becomes ripe  
 ílīngādā *v* wink (eye)  
 ílòdā *v* walk  
 ílōdá *v* wander  
 ímè *pr* they (PL)  
 ímmè *pr* they two (DUAL)  
 ínbā āngā *n* uncle (mother's brother)  
 īnbá *v* weeping  
 īnfá *n* nasal mucus, snot  
 íntā *v* see  
 īngā lā āngā *adv* alone  
 īngīdā *v* detour  
 í:fā̄ *adv* outside

isā bīnā *v* fishing  
 í:fā *n* brother/sister  
 ī:sā *n* fish  
 ífá *v* wash (clothes, utensils)  
 īfá *vp* let us go  
 ífīdā *v* spread out  
 īfīgīdā *v* swing  
 īfīgōlā *n* neighbor  
 íf:kúllā *n* bag  
 ítā àiniā *np* owner of a house  
 ítā *n* house  
 ítā ùffā *np* floor of a house  
 ítātā *vp* building a house  
 ítātātā *n* domestic servant  
 itètā *adj* short, near  
 ītīdā *n* belongings  
 ittādinè *n* family  
 ì-wwā *np* his/her father

**e**

é *adv* yes  
 ēbā ānjūnā *n* prostitute  
 ēbā ātjā *adj* impotent  
 ēbā *n* penis  
 èggādā *n* load, burden  
 ékkēnā bīnā *v* begin  
 ékkénā *on* first  
 ékkēnā wāgā *np* starting place  
 ēlā āndā *np* big tree  
 ēlā gālā *np* woodwork  
 ēlā gālā *v* carve  
 ēlā kīnā tā làgā *np* open place  
 ēlā màgā *n* fruit

ēlā *n* tree  
 ēlāgā *n* seed  
 ēlāitá̄ *np* wall of a house  
 ēlāmàgā fā *vp* pick (fruit)  
 èldàudè *cn* nine  
 éllá̄ *cn* one  
 éllálā sā *n* agreement  
 éllásāsā *vp* be the same  
 éllálá fābà *v* agree  
 ēmālā *n* rubber  
 émè *pr* you (PL)  
 émmè *pr* you two (DUAL)  
 ènā *pr* you (SG)  
 ēnèngà ábífā *n* father-in-law  
 ēnèngà *np* your mother  
 èjéjā *n* chameleon  
 étā *n* hawk  
 è:ṭā̄ *n* relative by marriage  
 ētēngānā *n* fireplace  
 ètètā *adj* short  
 è-wwā *np* your father  
**a**  
 àbā *pr* I  
 ābājā *n* enemy  
 àbàngàlā *n* harp  
 ābārā *adj* poor  
 àbàrmā *on* second  
 ābēdá *v* jump  
 ābìnā mā *np* elephant's tusk  
 àbìnā *n* elephant  
 ābīfā āngā *np* my husband  
 ábífā *n* man

ābīfā *np* his husband  
 ābūrā *n* rich man  
 ābūrūkā *n* dove  
 ādā gilà *n* firstborn  
 ādā gījā *n* old person  
 ādā mùdā *adj* angry, hot (of a person)  
 ādā òiá *v* ruminate, chew cud  
 àdàbà *n* harvest season  
 ádámá *adj* fierce, sharp  
 āddā dōdā *v* frighten  
 áddā̄ *n* wild area  
 'áddā *n* son  
 áddā̄-sāndā *n* zebra  
 àdùbùtā *n* rooster  
 ádzá *v* running  
 á-èwwā-dàkkā *np* mother-in-law  
 āffánání *n* snail  
 āfōgādā *adj* guilty  
 āfrīngā *n* red pepper  
 āgā bājā *n* tattoo, incision (facial)  
 àgā *n* navel  
 ágālā *n* skin  
 āgāsā *adj* middle  
 āgāsā sī *adv* at centre  
 àgègàlā *n* snow, ice  
 ágítá *n* inheritance  
 ágítá *v* inherit  
 āgùdā dādā *n* ladder  
 āgùdā *v* going up  
 ágúlā *n* swarm (of bees)  
 āìfā būrā *n* inebriation  
 āìfā *n* beer (traditional)  
 āìfā òidā *v* ferment (alcohol)

àilā *n* cow  
 áilēwā *n* moth  
 āinā āddā *np* my brother  
 āinā āngā *pr* myself  
 āinā kīfā *np* my sister  
 áiná *n* ash  
 āinīā *pr* him/herself  
 āinīē *pr* themselves  
 āinō *qw* what?  
 āinōmā *n* hippopotamus  
 āìkōmā *adj* light (not heavy)  
 àjà *n* mountain  
 ājā *n* dream  
 àjàtùnkùfā *np* summit of a mountain  
 āji *pr* nothing  
 ājī kīfā ájjānā *pr* nobody  
 ájjá *adv* no  
 ájjādā *v* refuse  
 ákāmā *v* incubate, set(on eggs)  
 ākkā āddā *np* sibling (male)  
 ākkā kàilā *n* coward  
 ākkā kàilā dzádzá *vp* flee, run away  
 ákkāmmā *n* molar  
 ākkēlá *n* senile person  
 ākkōrūgā *adj* jealous  
 ákkúbá *n* camel  
 àkònsàttā *on* eighth  
 àkòntállā *on* sixth  
 ákòntùbàrà *on* seventh  
 ākōfā *n* hunter  
 ākòtā *n* sesame seed  
 àkùbìnā *n* captive

ákúlā *n* armpit  
 àkùrā *n* punishment  
 àkùrā já *v* punishing  
 àkùssùmā *on* fifth  
 ālā ibīfā *n* garden  
 ālā òngòtò *n* lizard  
 álabā *adj* dry  
 àlàbà *v* selling  
 àlàbiā *n* price  
 ālāfādā *v* miscarriage  
 ālākā *n* leech  
 ālālōdā *n* justice  
 ālfā *cn* thousand  
 álílā *v* cook  
 ālílā fādā *adj* impatient  
 àllàdā *n* odour, smell  
 āllālāmā *adj* stink, smell (bad)  
 āllātā *n* metal pot  
 āllē *adv* here  
 ámā *adj* sweet  
 ámā *n* taste  
 àmā *pr* this  
 àmàdā *n* sadder  
 āmādā *n* baboon  
 ámādōdā *v* condole  
 āmādōdā tāggimā *n* sorrow  
 āmàlà *n* rain  
 āmāntōdā *v* admit (to a wrong)  
 ámāngādā *adj* corrupt  
 âmē *pr* we (EXCL)  
 āmimā *n* taste  
 āmmā *v* laugh

ámme <i>pr</i> we two (DUAL)	ānnā èsò <i>n</i> thank
āmmōkìfā <i>n</i> orphan	ānnálākōfōdā <i>n</i> awe, reverence (for God)
ámmūnā <i>n</i> charcoal	āntānā <i>n</i> fly
ānā <i>n</i> front (something)	āntórá <i>adj</i> bald
ánā <i>n</i> udder	ānūnā <i>n</i> thief
àná ‘hair’	āūngá <sup>-</sup> <i>n</i> hyena
ānā ídá <i>v</i> step	àṅā <i>v</i> possess (1SG POSS)
ānītātā <i>n</i> chief, headman	àṅgàdā <i>adj</i> be different
ānā kífā <i>n</i> top	āṅgāfitā <i>n</i> mud wasp
ānā <i>n</i> song	āṅgērā <i>n</i> spy
ānādā <i>v</i> look after’	āṅgērā <i>v</i> spy on
ànakòilá <i>vp</i> shave	āṅgillā <i>n</i> sugarcane
ànakòjā <i>vp</i> cut (hair)	àṅgògòlā <i>n</i> brain
ānālā <i>adv</i> forward, ahead	àrà <i>adj</i> white
ānānā <i>v</i> singing	ārāgōṅgōssē <i>np</i> it grows mould
ānbākā <i>n</i> crevice	ārāṅfā <i>n</i> orange
àndā <i>adj</i> big	árántā mīndā fūndā <i>np</i> north
àndā kádā <i>adj</i> very big	ārdā <i>n</i> intestine
āndīrá <i>n</i> shin	ārmā <i>n</i> shield
āndzērā mù lèlā <i>vp</i> stab(with a knife)	ájá <i>adj</i> old (not new)
àndzèrà <i>n</i> knife	āsā <i>v</i> dig
āndzīlā <i>n</i> shin	ājā kífā <i>n</i> calf
ānèṅmīsāmā <i>np</i> aunt (mother’s sister)	ājā mīnā <i>n</i> mad person
ānfūrá <i>n</i> young man	ājādā <i>adj</i> fat, thick
ánkātā <i>n</i> lower	àsàllā <i>on</i> fourth
ánkātā òdā <i>v</i> respect	āsāmā <i>n</i> pig
ánkātā sá <i>v</i> bow (as in greeting)	àsàndī <i>adv</i> yesterday
ānkètòsùmā <i>n</i> splendor, glory	àsàndī ūtùdā <i>adv</i> day before yesterday
ànkòràdā <i>n</i> medicine	āsāṅgā <i>n</i> head
ànkòràdinā <i>n</i> traditional healer	āsāṅgā ānā <i>np</i> hair of head
ānnā <i>n</i> God	àsàṅgà ṅàdā <i>np</i> headache
ānnā èllá <sup>-</sup> <i>n</i> promise, ring	āsāṅgā sāṅgá <i>n</i> skull

āsārā *n* footprint (of human)  
 āfārādā *n* bangle  
 āsāsā *n* teacher  
 àsàttà *on* third  
 āfèbà *on* tenth  
 àfimmà *n* demon, evil spirit  
 áfínbílá *n* ant  
 áfīnǎ *qw* why?  
 àfīfīnà *n* army ant, soldier ant  
 ājkàwà *n* rubbish  
 ājkōssē *vp* it becomes rotten  
 ājkōsùmà *v* rot  
 ássádá *v* floating  
 áfǎ *adv* olden times  
 āfǎ àndā *n* story (tale)  
 áfǎkōskè *v* it becomes rot  
 āsūgā *n* shoe, sandal  
 ásúmá *cn* million  
 áfúrá *adj* straight  
 átá *v* lead, guide  
 ātá *v* open  
 àtākā *v* notice  
 àtèrèbà *n* trader  
 àtòròdā *adj* selfish  
 átǎfǎ *n* corpse  
 áttāmā *adv* today  
 áttāmú *adv* now  
 āttǎfǎdá *v* sneeze  
 àttòdà *v* sleep (deep)  
 àùbiā *adj* empty  
 àùggā *n* cat  
 āùgā kǎfǎ *n* kitten

āùkā *n* sweat  
 āùkā didā *vp* he sweat  
 àùrā *n* word, talk  
 àùsà *n* milk  
 àùsā ātǎfǎ *n* curdled milk  
 áūtá *n* bush  
 āwàdà *n* night  
 áwèdà *v* step  
 āwwā āddá *n* uncle(father's brother)  
 āwwā mīsāmā kǎfǎ *n* cousin

## u

ūdā *n* edge  
 ùdā *n* lip, mouth, door  
 údā fākā *v* chopping wood  
 údā fǎ *v* fetching firewood  
 ùdà màkàlā *np* lip  
 ú:dā *n* wood  
 ùffā *n* heart  
 ùffā ādzá *vp* palpitating (of the heart)  
 ùffā ìnā *adj* kind  
 ùffā mánā *n* faint-hearted  
 ùgā *n* stone  
 ùgà nǎngārā *np* gravel stone  
 úgúdá *v* shake (tr)  
 ùgùngā *adj* (be) naked  
 ùkā *n* urine  
 ùkā āgálā *n* bladder  
 ùkā dzūrā *v* urinate  
 ùkā ìtá *n* bladder  
 ùkū dādā *n* namesake  
 ùkùnā *n* ear  
 ùkùnā bütā *n* thumb

ùkùnā kāfá *n* earwax  
 ùkùnā kūjā *n* elbow  
 ùkùnā kūtītǎ *n* earring  
 ùkùnā tēmà *adj* deaf  
 ũ:lá *n* wild edible root  
 ũ:lā *n* locust  
 ùlà kīmá *np* hair of the body  
 ùlà *n* body  
 ũmmā *adj* black  
 ùmmādā *n* bundle  
 ùmmādā *v* wrap up  
 ũmmālā *adj* blind  
 ũmmālā sá *v* to be blind  
 únū *pr* 3SG  
 ũnūkìfā *n* kidney  
 ùsùlà *n* law, order  
 ũsūná *n* polygamy  
 ũtā *n* vomit  
 ùtǎrà *v* flowing  
**o**  
 òbià *n* grandparent  
 òddōmā *n* day time (not night)  
 òidā *v* pull  
 òidā mājā *v* stretching

òikèdā *v* opening, uncovering  
 òiné *pr* those  
 òiniòdiā *n* inhabitant, resident  
 òinōdā *v* live  
 òkkómālā *adv* under, below  
 òlàfādā *v* decrease (intr), reduce  
 òláfādā *v* drive away  
 òllijā *v* follow  
 òrā *n* round  
 òrā *n* waist  
 órá sūkā *n* rural area  
 òrmōfā *n* tooth stick  
 òrōbā *n* noon  
 órōbā sī *np* at noon/daytime  
 ótā *v* uprooting  
 òtā *n* thorn  
 òtārā *n* pot (for water)  
 òtōgōnā *n* heel  
 ótǎwā *np* account of war

## Part-II English-Kunama Wordlist

### a

a few <i>dt</i>	dámínkífê	alive <i>adj</i>	ōīnā ōdā
abandon <i>v</i>	wà	all <i>dt</i>	būbìjê
abdomen (external) <i>n</i>	kā:sá	allow, permit <i>v</i>	kōkēlā
abscess <i>n</i>	fīlā	alone <i>v</i>	īṅgālāṅà
abundant <i>adj</i>	fāùdê	alter, change (tr) <i>v</i>	gāfūdā
accept, receive <i>v</i>	bīnâ	always <i>adv</i>	dīmàdimà
account (report) <i>n</i>	sāmá	amusing, funny <i>adj</i>	fūlūfūlūmā
accumulate <i>v</i>	būbūrā	and <i>cj</i> -tè	
accuse <i>v</i>	fākènàdà	angry <i>adj</i>	àddà mùdà
acquaintance <i>n</i>	kōtākā	animal <i>n</i>	ḡígidā
Adam's apple <i>n</i>	mēnā	ankle <i>n</i>	māggūbā
add <i>v</i>	táfá <sup>-</sup>	ankle ring, bangle <i>n</i>	āḡārādà, āḡālādà
admire <i>v</i>	fākkàrà	announce <i>v</i>	fànèdà
admit (to a wrong) <i>v</i>	āmāntōdā	announcement <i>n</i>	fànèdà
adult <i>n</i>	kā āndā	annoy, disturb <i>v</i>	gàssūdā
advise <i>v</i>	gōmātá	answer, reply <i>v</i>	kāḡḡídā-sà
after <i>adv</i>	kū:rā	ant <i>n</i>	āḡā bilá
afternoon <i>n</i>	súdā fānākā	antelope <i>n</i>	lī:dá
again <i>adv</i>	īdē	anus <i>n</i>	tō:fā
agree <i>v</i>	élálláḡābā	apply (ointment), besmear <i>v</i>	kōfūlā
agreement <i>n</i>	ēllālā-sā	approach <i>v</i>	dāggidà
air (breathed) <i>n</i>	fīmàlā	argue <i>v</i>	fērā
alcohol (general) <i>n</i>	nāidādā	argument <i>n</i>	fērā
		arm <i>n</i>	tāitá

armpit *n* ákúlā  
 army ant, soldier ant *n* ājā jinnā  
 army *n* bàjkuállā  
 arrive *v* ikè  
 article of clothing, clothes *n* kírā  
 ascend, go up *v* āgùdà  
 ashes *n* áíná  
 ask, request *v* kōkēlá  
 avocado *n* àbòkàdā  
 avoid *v* fādā ōlá  
 awake, alert *v*  
 awe, reverence (for God) *n* ánná-lā kōjōdā  
 axe *n* gālādā  
**b**  
 baboon *n* āmādā<sup>ˉ</sup>  
 baby *n* bìbikījā  
 back (of something) *n* kūrā  
 back *adv* bàdā  
 backward (direction) *adv* kūrā-tá  
 bad *adj* bājā  
 bag *n* íjkuállā  
 bake (in ashes) *v* kāwālā  
 bald *adj* āntórá  
 bamboo *n* sèsègà  
 banana *n* bànànà  
 bark (as dog) *v* bāūdā  
 bark (of tree) *n* fòfòggà

barren (of land) *np* làgà jòkòmà  
 barren (woman) *n* bàidà  
 barter, exchange (of goods) *v* gāfūdā  
 basket *n* sándá  
 bastard, illegitimate child *n* süssā kījā  
 bat *n* gùbbà  
 bathe, wash oneself *v* kō:jā  
 beach *n* bāhārā ūdà  
 bead *n* dādà  
 beak, bill *n* mā  
 bear (child), give birth *v* kòjā  
 beard *n* gòmā jōrā  
 beat *v* jā  
 beautiful *adj* fājā  
 bed *n* sūdübā ārāntā  
 bedbug *n* tōkānā  
 bedroom *n* sūdübā itá  
 bee *n* sèmmà  
 beehive *np* sèmmā itā<sup>ˉ</sup>  
 beer (traditional) *n* àifā  
 beeswax, bee-bread *np* jānfā  
 before *adv* ānā  
 beg (for money) *v* dàgàdà  
 beggar *n* dàgàdàgàdà  
 begin *v* ékkénā bīnā  
 beginning *n* ékkénā wāgā  
 behind *adv* kūrātā-mmū

belch <i>v</i> gē:dā	blow (of wind) <i>v</i> sāvītātā
believe <i>v</i> kōbíná	blow (with mouth) <i>v</i> fū:dā
bell <i>n</i> tílíndādā	blow away (intr) <i>v</i> fūdā
bellows <i>n</i> gā:lá	blow nose <i>vp</i>
belongings <i>n</i> ītīdā	blue <i>adj</i> gí:gá
bend down, stoop <i>v</i> gāidā	blunt, dull <i>adj</i> mèttà
bend, crook, curve <i>v</i> móngólá <sup>ˉ</sup> īdā	body <i>n</i> ùlà
beside <i>adv</i> dārgālē-mmū	boil (water), bubble up <i>vp</i> bià dāngōdā
between <i>adv</i> āgāsā-sī	bone marrow <i>n</i> kāmāmā
big <i>adj</i> àndā	bone <i>n</i> sāṅgā
bile, gall <i>n</i> mā:rá <sup>ˉ</sup>	born <i>adj</i> fā
bird <i>n</i> fūkk <sup>wā</sup>	borrow <i>v</i> kófúlāká
bite <i>v</i> nínā	bottle <i>n</i> tər̀mùzà
bite (snake) <i>v</i> nínā	bottom <i>n</i> káfàtà
bitter <i>adj</i> māmā	bow (as in greeting) <i>v</i> ànkātāsá
black <i>adj</i> ūmmà	box <i>n</i> sàndùkā
blacksmith <i>n</i> bīdā tédá	boy <i>n</i> áddà
bladder <i>n</i> ūkā āgálá, ùkā ītá <sup>ˉ</sup>	bracelet <i>n</i> kònā kábātā, āfālādà
bleed <i>v</i> kòkòbā ādzá	brain <i>n</i> àṅgògòlā
bless <i>v</i> fódàbā	branch (of tree) <i>n</i> ṅàṅgīfā
bless, praise (someone) <i>v</i> ànkātā-sā	break (tr) <i>v</i> bá <sup>ˉ</sup>
blessing <i>n</i> fò:ḍà	break wind, fart <i>vp</i> fùmà fūdā
blind <i>adj</i> ūmmālā-sá	breakfast <i>n</i> fātùrā
blind person <i>np</i> ūmmàlā	breast <i>n</i> kūtá
blink <i>v</i> mīkā kādá	breath <i>n</i> fùkā
blood <i>n</i> kòkòbā	breathe <i>v</i> sákādā
blow (horn) <i>v</i> bürdzājá	bride <i>n</i> sòlòbā

bridge <i>n</i> káddādā	caress <i>v</i> sùgùnèdā
bring up (a child) <i>vp</i> dèdā tāūdā	carry (child) on back <i>v</i> bí:bá
brook, stream <i>n</i> bīā sēlēlā	carry (in arms) <i>v</i> nāūdā
broom <i>n</i> fīnā dādā	carry on head <i>vp</i> ásánǵá-sí nāūdā
brother (elder/younger) <i>n</i> āinā áddā	carve (wood) <i>v</i> ēlā gālā
brown <i>adj</i> sú:là/sú:rà	castrate <i>v</i> tēdā
build <i>v</i> tā	cat <i>n</i> àùggā
bull <i>n</i> bùtā kīfā	catch (object in air) <i>v</i> lāfā
bundle <i>n</i> ùmmādā, līlā	cave <i>n</i> kàmàtā
burn (intr), blaze <i>v</i> lè:dà	cease, stop <i>v</i> sū:sā
burn <i>n</i> tálà	cemetery <i>n</i> nàbùlā wāgā
burst <i>v</i> tāùkàdā	chaff <i>n</i> fī:ná
bury <i>v</i> fā	chair <i>n</i> kóttābā ārāntā
bush country, rural area <i>np</i> órá sūkā	chameleon <i>n</i> éngēngā
bush <i>n</i> áūtá	charcoal <i>n</i> ámmūjā
butcher <i>n</i> jātātā	chase <i>v</i> gū:rā
butterfly <i>n</i> bíātājā	cheek <i>n</i> fālā
buttock <i>n</i> kāfātā	chest <i>n</i> sògā
buy <i>v</i> tādā	chew <i>v</i> làkōdā
<b>c</b>	chick <i>n</i> dōrá kīfā
cackle (as of chicken) <i>v</i> kárādā	chicken <i>n</i> dōrá
calf <i>n</i> āfā kīfā	chief, headman <i>n</i> ānītātā
call (someone) <i>v</i> kī:dà	child <i>n</i> dèdā
calm (oneself) <i>v</i> dāfādā	chin <i>n</i> gò:mā
camel <i>n</i> ákkúbá	chop into pieces <i>v</i> ú:dā fākā
camp, encampment <i>n</i> sù:kā/sùgā	circumcision (male) <i>n</i> fówwā mīntfā
cane, walking stick <i>n</i> tiklè:dà	clan <i>n</i> kòfèrè

clap (hands) <b>v</b> kēkātá	copulate, have sexual intercourse <b>v</b> bá <sup>ˉ</sup>
claw <b>n</b> fūkkā íkīmā	corpse <b>n</b> àtʃtʃà
clay <b>n</b> bādūmmā	corrupt <b>adj</b> ámáŋgādā, kābājā
clean <b>adj</b> kēkēmā	cotton <b>n</b> tù:tà
clear (land for planting) <b>v</b> lōbājá	cough <b>v</b> kōsādā
cliff <b>n</b> tōlā	count <b>v</b> kēlā
clitoris <b>n</b> dēndērā	country, ethnic area <b>n</b> sù:kā/sùgā
close, shut (tr) <b>v</b> sá <sup>ˉ</sup>	courageous, (be) brave <b>adj</b> ìddīrā
cloth <b>n</b> fògā	courtyard <b>n</b> dārībā ìtá <sup>ˉ</sup>
cloth worn by a woman <b>n</b> kā-fògà	cousin <b>n</b> āwwā māsāmā kījā
cloud <b>n</b> dāmānā	cover <b>v</b> kābūdā
coagulate, clot <b>v</b> kòkòbā ùtʃùkè	cow (female) <b>n</b> āilā ʃinnā
coffee <b>n</b> bùnà	coward <b>adj</b> ākālā
coil (rope) <b>v</b> gúnǵúlá	create, make <b>v</b> sānā
cold (objects) <b>adj</b> ʃiʃimā	crevice <b>n</b> ánbāká
cold weather <b>np</b> ʃiʃimā	cripple <b>n</b> mājá
colour <b>n</b> kālāmā	crocodile <b>n</b> fù:nà
colt <b>n</b> bārásá kījā	crooked <b>adj</b> mōŋgólá
comb <b>n</b> sāsā	cross (river) <b>v</b> kādā
come (or go) out, exit <b>v</b> sā	crossroads, intersection <b>np</b> tàbilà fètègànà
come <b>v</b> wā	crow (as a rooster) <b>v</b> bù:dà
compound, house <b>n</b> dārībā ìtá	crow <b>n</b> kākūkā
condole, comfort <b>v</b> ámādōdā	crowd <b>n</b> kā būtʃā
congratulate <b>v</b> mādā gógónūkē	crunch <b>v</b> fúlā
conquer, defeat <b>v</b> tàdà	crush (tr) <b>v</b> sūdūbā
contradict <b>v</b> bāgānā gādā	cry, weep <b>v</b> ìnbá
cook <b>v</b> álilá	cultivate, farm <b>v</b> biʃābā

cup *n* kūbbājā  
 curdled milk *np* àùsà tʃā  
 curse *n* bá:dākōsá  
 curse *v* bádākōsá tára  
 cut (hair) *v* ànà kōjā  
 cut (tr) *v* mìntʃā  
 cut down (tree) *vp* mīntʃā  
 cut open (fruit) *v* ñàṅàrà jā

**d**

dance *n* bā  
 dance *v* bā  
 danger *n* mēngōlá  
 darkness *n* kūllūdā  
 daughter *n* ākkā kíʃā  
 dawn (before sunrise) *adv* làgā lēlìdà  
 day after tomorrow *adv* sēllāsī ùtùdà  
 day before yesterday *adv* āsāndí ùtūdā  
 day *n* òddōmā  
 daytime *n* órōbā-sī  
 dead *adj* ātʃtʃā  
 deaf (mute) person *np* ùkùnā tēmà  
 death *n* tʃā  
 debt *n* kófúlā  
 deceive *v* sàlàngòdā  
 decide *v* mìntʃá  
 decorate *v* fāʃòdā  
 decrease (intr) *v* nī:dā, òlāfādā

deep *adj* tókú:rá<sup>ˉ</sup>  
 deepen *v* túṅgúrá<sup>ˉ</sup>ídā  
 defeated *v* kójá kīʃākè  
 defecate *v* kāfá ífá, kàfàffā  
 demon, evil spirit *n* sādāllā, àʃimmà  
 den, lair, hole *n* bí:lā  
 deny *v* kómmá  
 descend, go down *v* ídā  
 destroy, spoil *v* fādā  
 diarrhea *n* kàfà fùdā  
 die *v* tʃā  
 different *adj* àṅgàdà  
 dig *v* āsā  
 diminish *v* kójʃíʃbá  
 dirt, soil *n* làgā  
 dirty *adj* ʃí:nā  
 disappear *v* bálásá  
 ditch *n* bà  
 divide, separate (tr) *v* gédá  
 divorce *v* sākādā  
 dog *n* tājá  
 domesticate, tame *v* sùgùnnèdā  
 donkey *n* sàndà  
 door, doorway cover *n* ùdā  
 doorway *n* kòsèdà, dàgāsā  
 dove *n* ābūrūkā  
 down *adv* fùttà

drag <i>v</i> góbódá	east <i>n</i> wākūrā ɪ̀ttòrìmā
draw (picture) <i>v</i> sáūrōdā	eat <i>v</i> ñādā
draw water <i>vp</i> bíā gōdá	edge <i>n</i> ùdā
dream <i>n</i> ājā	egg <i>n</i> kòkòṅà
dress <i>v</i> kòtā	eggshell <i>np</i> kòkòṅà āṅgāfètà
drink <i>v</i> nā	eight (8) <i>cn</i> kōnsāttè
drive away <i>v</i> òlá fādā	eighteen (18) <i>cn</i> jèbnálà kōnsāttè
drop (tr) <i>v</i> bíkídá <sup>-</sup>	eighty (80) <i>cn</i> jèbkōnsāttè
drought, famine <i>n</i> lí:lā	elbow <i>n</i> ukuna kuṅa
drum <i>n</i> kùbūlā	elder <i>adj</i> àndā
drunk <i>v</i> àìfā būrā	elephant <i>n</i> àbinà
dry <i>adj</i> álābā	elephant's tusk <i>np</i> àbinā mā
dry out (clothes) <i>v</i> lābā	eleven (11) <i>cn</i> jèbnálà éllá <sup>-</sup>
dry season <i>np</i> lílā fānākā	eloquent <i>adj</i> lilidīnā
dry up, evaporate <i>v</i> ālābākā	empty <i>adj</i> àùbiā
duck <i>n</i> tà:kàfā	end <i>n</i> kōmaldà
dusk, twilight (after sunset) <i>n</i> dārmā	enemy <i>n</i> ābājā
dust <i>n</i> búṅgá	engaged, (be) betrothed <i>v</i> sàsàlā kòbinā
duty, obligation <i>n</i> kīsībā	enlarge <i>v</i> tāùdā
dwarf <i>adj</i> ɪ̀tētā	enough <i>dt</i> kóddímà
dwell, inhabit <i>v</i> òīnā	enter, go in <i>v</i> wá <sup>-</sup>
<b>e</b>	entrance hut <i>n</i> dāgāsā
eagle <i>n</i> ñā étā	equal <i>adj</i> kōllè
ear <i>n</i> ùkùnā	evening meal <i>np</i> sūdā kāwā
early <i>adv</i> ānā-lā	everybody <i>pr</i> kā búbījá <sup>-</sup>
earring <i>np</i> ùkùnā kūtītjā	everything <i>pr</i> dātā búbījá <sup>-</sup>
earwax <i>n</i> ùkùnā kāfā	everywhere <i>adv</i> làgā búbījá <sup>-</sup>

ewe **n** gàmmà ʃinnā  
 excision (female) **n** dēndērā tā  
 excrement, faeces **n** kāfá  
 expensive **adj** tàgìdà  
 explain **v** sàdà àurà  
 extinguish **v** tʃájá  
 eye **n** wā  
 eyebrow **n** wātʃōnà  
 eyelid **n** wāʃāmānà  
**f**  
 face **n** gādʒībā  
 fade **v** kùlùdà  
 fail **v** kōjā  
 faint **vp** ùffā mánà  
 fall (intr) **v** kōjā  
 family **n** ítā dīnè  
 far **adv** gē'rá<sup>ˉ</sup>  
 farmer **n** bīʃibàbà  
 fast **adj** lilidà  
 fasten, bind (load) **v** tāffā  
 fat **n** dānā  
 fat, thick **adj** āʃādā  
 father **n** ēwwā, āwwā, īwwā  
 father-in-law **n** ēnēngā ábǐjā  
 father's brother (uncle) **n** āwwā áddā  
 father's sister (aunt) **n** āwwā māsāmà  
 fear **n** kàilà

feather **n** túkūbā  
 feed (animals) **v** àilè ñādādā  
 feel (passive) **v** kōtíká (k)ājákè  
 fellow-wife, co-wife **n** süssā  
 fence in **v** ʃōkkā já  
 fence **n** ʃōkkā  
 ferment (alcohol) **v** àifā ōīdā  
 fertile soil **np** làgà tòtòmà  
 fetch (firewood) **v** ú:dāfá  
 fetus **n** kātā  
 fever (not malaria) **n** tōkōmāttá  
 few **dt** dāmādā  
 fiancé (betrothed boyfriend) **n** sàsālā  
 fiancée (betrothed girlfriend) **n** sàsālā  
 field **n** bīʃā  
 fierce **adj** ádámá  
 fifteen (15) **cn** ʃēbnálà küssümè  
 fifty (50) **cn** ʃēbküssümè  
 fight **v** jā  
 fill **v** wà:dā  
 fin **n** ì:sà fēfènà  
 find **v** ʃó:dà  
 finger **n** kona kǐʃe, kònà ànʃùllà  
 fingernail **n** ɪkīmā  
 finish, complete **v** málá, tílládā  
 fire **n** tōmá  
 fireplace **n** ētēngēnà

firewood *n* tōmâ ùdà  
 first *on* ékkéná<sup>ˉ</sup>  
 firstborn *n* ādīgìlà  
 fish *n* ī:sá  
 fish *v* ī:sè bīnā  
 five (5) *cn* kússúmè  
 five hundred (500) *cn* múdzê kússúmè  
 flame *n* bībbīdá  
 flap the wings *vp* fèfènàjā  
 flea *n* tēnkā  
 flee, run away from *v* àkàilā dzādzā  
 float *v* ássádá  
 flock (of birds) *n* jūkkè  
 flood *n* gādā bīā  
 floor *n* ítā ūffā  
 flour *n* kāwā  
 flow *v* ùtjūrā  
 flower *n* bú:bá  
 flute *n* fònfōrā  
 fly *n* āntānā  
 fly *v* fitìtidà  
 fold *v* tá<sup>ˉ</sup>, músā  
 follow *v* òlliā  
 food *n* ñādā  
 foot *n* mīndā  
 footprint (human) *n* āsērā  
 forbid *v* ká<sup>ˉ</sup>

forehead *n* kúndá  
 forest *n* bílá  
 forget *v* là:dà  
 fork (in path) *n* kúddādā  
 fortune-teller, diviner *n* jù:lùfādā  
 forty (40) *cn* jēbsállè  
 forward (direction) *adv* ānà-tā  
 four (4) *cn* sállè  
 fourteen (14) *cn* jēbnálà sállè  
 friend *n* kòllā  
 frighten *v* āddā dōdā  
 frog *n* ñòṅà  
 front (of something) *n* ānā  
 fruit *n* èlāmàgà  
 fry *v* tʃótʃā, ʃɪʃɪdā  
 full *adj* wādā  
 funeral (at occasion of death) *n* tʃā ùsùlā  
 fur *n* kì:mā  
**g**  
 gall bladder *n* mā:rā<sup>ˉ</sup>ítá<sup>ˉ</sup>, ùkā ágālā  
 game *n* dzírā  
 garden *n* ālābīfā  
 garlic *n* ʃɪŋgúrítā ārà  
 gather *v* búbūrā  
 generous *adj* kōnālè òdā  
 get well, recover *v* lùfòdā  
 get, obtain *v* ʃó:dā

giant *adj* gē:rá<sup>ˉ</sup>  
 gift *n* sà  
 gill *n* ī:sā sákaddādā  
 giraffe *n* dāràsà  
 girl *n* kī:fā  
 give pain, hurt *v* kòṅgàdā  
 give *v* sà  
 go round, detour *v* īgīdā  
 go *v* gàdà  
 goat *n* làjǰā  
 God (Supreme Being) *n* ānnā  
 goiter *n* mēnā túkkā  
 gold *n* dāhàbā  
 good *adj* fafā  
 gossip *n* kālā  
 grandchild *n* ākkā kíjā  
 grandparent *n* óbíā  
 grass *n* sēnà  
 grasshopper *n* gālāwá  
 grassland *n* làgà sēnà  
 grave *n* nàbùlà  
 gravel *n* ūgā ṅāṅgārā  
 green *adj* dzíggá  
 greet *v* sùllùmā-sā  
 grind *v* jāwā  
 grinding stone *n* ījjá  
 groan (with pain) *v* kòṅgàdā

groom *n* sòlòbā  
 ground, land *n* làgā  
 groundnut, peanut *n* fūlā  
 grow (of plants) *n* tāūdā  
 grow up *v* tāūdā  
 growl *v* ṅùrùdā  
 guest, visitor *n* kè:là  
 guide *n* mārā  
 guilty *adj* ā-fōgādā  
 gun *n* tūkkā  
**h**  
 haggle, negotiate a price *v* dàbòdiā  
 hair (of body) *n* kì:mā  
 hair (of head) *n* ànā  
 half *dt* sārā  
 hammer *n* bìdà tēddādā  
 hand *n* kōnā  
 handle *n* binà dādà  
 hang up *v* wàlādā  
 happy, (be) joyful *adj* gògòdà, jù:dā  
 hard *adj* gáṅgāmā  
 hardship, distress *n* bājā(n) kíjā sūmā  
 hare *n* tàmàggà  
 harp *n* àbàṅgàlā  
 harvest (maize) *v* làfā òikèdà  
 harvest season *np* àdàbà  
 harvest honey *v* gòlà gòlà

hasten, hurry <b>v</b> lilidà	high <b>adj</b> gē:rá̄
hat <b>n</b> kābbēllā	hippopotamus <b>n</b> āinōmā
hatch <b>v</b> sākōdā	hit, strike <b>v</b> jā
hate <b>v</b> ká̄	hoe <b>n</b> jènkòllā
have, possess <b>v</b> āṅgā	hoe <b>v</b> básādādā
hawk <b>n</b> étā	hold <b>v</b> bīnā
he (human) <b>pr</b> únū	hole <b>n</b> bá tītīmā
He himself/she herself/itself <b>pr</b> ūnū āin-ī-ā	honest <b>adj</b> kā lū:ǰá
head <b>n</b> āsāṅgā	honey <b>n</b> gòlà
headache <b>np</b> āsāṅgā ṅādā	honour <b>v</b> ānkātā sá
heal (tr), cure <b>v</b> lùǰòdā	hoof <b>n</b> ǰòkíná
healthy, (be) well <b>v</b> lūǰòdā	hope <b>n</b> kōbíná bínā
hear <b>v</b> tíkā	horn (musical instrument) <b>n</b> būrdzá
heart <b>n</b> ùffā, ùrfā	horn <b>n</b> gì:rà
heavy <b>adj</b> tággīmā	horse <b>n</b> bārásá
heel <b>n</b> òtōgōnā	host <b>n</b> kèlà bínáná
he-goat, billy goat <b>n</b> sà:rà	hot (objects) <b>adj</b> tōkōmā
heifer <b>n</b> lì:sà	hot (of person) <b>v</b> mūdā
help <b>v</b> dādā	hot weather <b>np</b> tókōmā
hen <b>n</b> dōrā ǰīnnā	how many? <b>Pr</b> íkállèno
herd (cattle, sheep) <b>n</b> kòbùbùrā	how? <b>Pr</b> íkídāmū
here <b>adv</b> állê	human being, person <b>n</b> kā kǰǰá, kā
heron <b>n</b> tūkāǰā	hump (of cow) <b>n</b> ǰòfā
hesitate <b>v</b> āgāsā-sī	hump (of hunchback) <b>n</b> bōdzōlá
hiccough <b>n</b> īggīgā	hunchback <b>n</b> bōdzōlá
hide (of animal) <b>n</b> ágālā	hundred (100) <b>cn</b> múdzá̄
hide (tr) <b>v</b> púmá	hungry, hunger <b>v</b> lílkè

hunt **v** kō:fá  
 hunter **n** ākōfā  
 hunting net **n** fìgìdātá  
 hurt oneself **vp** āīnē-dāmmō-kō-bādā  
 husband **n** ábíā-āṅgā  
 hut **n** sēnā ítā  
 hyena **n** āūṅgá  
**i**  
 I **pr** àbā  
 I myself **pr** àbā āīnā āṅā  
 I only **pr** ábóká  
 illness, disease **n** bá:dā  
 imitate **v** sásá ídā  
 impatient **adj** ālilì fādà  
 important **adj** nāfōsùnà  
 impotent **np** ēbā átǎ́  
 in front of, before **adv** ānā  
 incision(s), tattoo(s) **n** āgàbàjā  
 increase (intr) **v** táfá́  
 incubate, set (on eggs) **v** ākāmā  
 indicate, point (as with the finger) **v** òinē  
 inexpensive **adj** kōjākè  
 inhabitant, resident **n** òīnā òdí-ā  
 inherit **v** ágítáká  
 inheritance **n** ágítá  
 in-law, relative by marriage **n** ētā  
 innocent **adj** fōgādā kī-mīnī-ttá

inside **adv** kākā-lā  
 insult **n** tà:rà  
 insult **v** tà:rà  
 intercede, mediate **v** nè:nà  
 intestinal worm **np** bíjjā  
 intestines **n** ārdḗ  
 invite **v** kòwwā bīnā  
 iron **n** bídá  
 island **n** biā ūffā làgā  
**j**  
 jackal **n** sālāṅgā  
 jaw **n**  
 jealous **adj** àtāròdā  
 join, put together **v** tōllà  
 journey, trip **n** kòsòdā  
 judge **v** fōgādā-sá  
 juice **n** fábá  
 jump **v** ābēdā  
 justice **n** ālālòdā  
**k**  
 keep, save **v** dōròdā  
 kernel (of corn, maize) **n** fòfòṅgòlà  
 kick **v** jā  
 kid **n** làfǎ́ kǐfá  
 kidney **n** ùnù kǐfá  
 kill, murder **v** jāfādā  
 kind **adj** ùffā íná, ākkōrūgá

kiss *v* fɛ̀ŋgòdà  
kitchen *n* dūmā itá  
kitten *n* àùggā kīfā  
knead *v* làkùdà  
knee *n* tógā  
kneel *v* túdā  
knife *n* àndzèrā  
knot *n* lílā  
know (something or someone) *v* tākā  
knowledge *n* tākā

## I

labour (n), birth pains *n* kòdògòsā  
lack *v* dāùdā  
ladder *n* āgūddādā  
lake *n* dābà  
lamb *n* gāmmà kīfā  
lamp, torch *n* fānūsā  
lance (spear) *n* māsā  
language *n* jèlā  
last *adj* kōmāldā  
late *adj* dábēdā  
lately *adv* kūrā-lā  
latrine, toilet *n* kāfá itá  
laugh *v* āmmā  
law *n* ùsùlā  
lay (eggs) *v* kòkòpā fādā  
lazy *adj* làṅgàlàngà mà

lead, guide *v* átá  
leaf *n* dùffā  
lean against (intr) *v* kòitā  
learn *v* sā:sā  
leave (place) *v* gādā  
leave (something somewhere) *v* wà  
leech *n* ālākā  
left (direction) *adv* sèggā  
leftovers *n* gānbēdā  
leg *n* mīndā  
lemon *n* lèminā  
lend *v* kófúlāsá  
lengthen *v* gē:rá idā  
leopard *n* kōitá  
leprosy *n* túttúná, mālā  
lick *v* kālā  
lie (n) (falsehood) *n* jè:rà  
lie down *v* sùdùbā  
life *n* jù:kā  
light (fire) *v* lè:dà  
light (not heavy) *adj* ājōkōmā  
light *n* lēlidā  
lightning *n* bāddā jindā  
lime, whitewash *n* làgā ārà  
limp *v* líkódá  
lion *n* 'mōkkā  
lip *n* ùdā

listen <b>v</b> tíká	many <b>dt</b> fàùdê, mōsè
liver <b>n</b> dēsā	market <b>n</b> sù:kā/sùgā
lizard <b>n</b> ālā ñòṅòtò	marry <b>v</b> dúmā mīnā
load <b>v</b> éggádā	marsh <b>n</b> nókótá
load, burden <b>n</b> éggádā	master <b>adj</b> āīnīā
locust <b>n</b> ū:lá <sup>-</sup>	mat <b>n</b> fāīdā, fīnnā
log <b>n</b> ēlā mīntfā	mead, honey beer <b>n</b> mēsā, gòlā
long <b>adj</b> gē:rā <sup>-</sup>	meaning <b>n</b> ābārā
look after <b>v</b> ānādā	meat <b>n</b> jā
look for <b>v</b> sēdā	medicine man, traditional healer <b>n</b> ànkòràdinā
loosen <b>v</b> tállādā	medicine <b>n</b> ànkòràdā
lose (tr) <b>v</b> dāūdā	meet, encounter <b>v</b> jó dā
lost <b>adj</b> bālā	mend, repair <b>v</b> tóllā
louse <b>n</b> tī:lā	menstrual period <b>np</b> mārā <sup>-</sup>
love <b>v</b> kómá <sup>-</sup>	messenger <b>n</b> sāmèdā
low <b>adj</b> fūttā	metal pot <b>np</b> āllā-tā
lower (tr) <b>v</b> ànkátásá	middle <b>n</b> āgāsā
lump (clay, mud) <b>n</b> kàffā	midwife <b>n</b> dēdā bīninè
lung <b>n</b> fù:tā	milk (cows, goats) <b>v</b> fúdá <sup>-</sup>
lying down <b>v</b> sūdā	milk <b>n</b> àùsà
<b>m</b>	millet (rainy season) <b>n</b> dāgūfā
mad person <b>np</b> āfjā mīnā	million (1000000) <b>cn</b> āsúmá <sup>-</sup>
maize, corn <b>n</b> làfā <sup>`</sup>	miscarriage <b>n</b> ālā fādā
make smooth <b>v</b> básā	molar tooth <b>n</b> ákkāmmā
malaria (fever) <b>n</b> dzirgā bā:dā	money <b>n</b> fōddā
man (male) <b>n</b> ábífā	monkey <b>n</b> gábàlā
mane <b>n</b> mófjá	month <b>n</b> tèrà



nurse, suckle (baby) (tr) **v** dèdā wālā

## **o**

oath **n** mǎhālā

obey **v** àndā āūrā kibbimmā

ocean, sea **n** bāhārā

odour, smell **n** àllàdā

offer **v** sà

often **adv** dīmàdimà

oil **n** lì:là

old (not new) **adj** áfá

old (not young) **adj** āfā

old person **np** àdigìfā

olden times **np** áfǎí

once **adv** tábbá éllá

one (1) **cn** éllá

onion **n** fìngúrítā

only **adv** āīnā

open (tr) **v** òikèdā

open **adj** ātá

open place, clearing **n** ēlā kìnā-tā lāgā

orange **n** ārānfā

order (someone to do something) **v**  
kīmīnītā

orphan **n** āmmō kìfā

ostrich **n** sègènā

other (men) **adj** fākēllē

outside **adv** ífātā-mmū

over, above **adv** bāddā-lā

overtake, pass (tr) **v** bātā

owner **n** ítā āīnā

ox (general term), bovine **n** bù:tā

## **p**

pain **n** kòngàdā

palate **n** nèlà dèndèrā

palm (of hand) **n** kōnā tākāsā

palpitate (of heart) **v** ùffā ādzá

pant **v** kòfòlà sākādā

parrot **n** káílá

partridge **n** tíríngā

path, road **n** tàbilā

patient **adj** kībīrā

pawpaw, papaya **n** bábàjā

pay (for goods, services, etc.) **v** fī:dá

payment **n** fī:dá

peace **n** sùllūmā

penalty, punishment **n** àkùrā

penis **n** ēbā

pepper (green) **n** gómá

perspire, sweat **v** āūkádā

persuade **v** ìfìfā nìfōnā

pestle, pounding stick **n** tùngùddādā-kìfā

pick up **v** nāùdā

pick, pluck (fruit) **v** bā, ēlāmā gāfā

picture **n** sáūrā

piece <i>n</i> mīntfāmìntfā	pregnant <i>adj</i> kōkātá
pierce (ears) <i>v</i> búrá	prepare (food to cook) <i>v</i> ñādā súśá
pierce <i>v</i> búrá	pretend <i>v</i> sāsā ìdā, kòmìnkè
pig <i>n</i> āsāmā	prevent <i>v</i> kòlà
pit <i>n</i> bà	price <i>n</i> àlèbiā
place <i>n</i> wàgà	prisoner, captive <i>n</i> àkùbinà
plan <i>n</i> gó:dá	problem, trouble <i>n</i> tàgàmà
plank <i>n</i> kùlētā	promise <i>n</i> ānā ēllá <sup>ˉ</sup>
plate <i>n</i> fáná	prophet <i>n</i> dīngūl
play (child) (intr) <i>v</i> dédā dzírá	prostitute <i>n</i> ēbā ánúñā
plead, implore <i>v</i> dàgàdà	protect, defend <i>v</i> kòlà
please, satisfy <i>v</i> gōgōdā	proud <i>adj</i> kòtátà
pluck (feathers) <i>v</i> múlá	proverb <i>n</i> fā:lā <sup>`</sup>
plunder (a town) <i>v</i> fúrá	pull <i>v</i> òidā
pocket <i>n</i> dzēbā	punish <i>v</i> àkùri-ā
poison <i>n</i> sādā	pup <i>n</i> tājá kifā
poison (a person) <i>v</i> sādā	pus <i>n</i> kōfā
polish <i>v</i> fódā	push <i>v</i> dōrōdā
polygamy <i>n</i> ūsūná	put, place, set <i>v</i> dōrá
poor <i>adj</i> bà:rà	python <i>n</i> tīrā
poor man <i>np</i> ābārā	<b>q</b>
pot (for water) <i>n</i> òtārā	quarrel <i>v</i> mō:dá
potato <i>n</i> dìniḡ	<b>r</b>
potter <i>n</i> kàffālālā, dzágābālālā	rag <i>n</i> kájúkâ
pound <i>v</i> tūngùdà	rain <i>n</i> àmàlà
praise <i>n</i> ànkàtā	rainbow <i>n</i> mánḡállá
pray <i>v</i> gādzōdā	rainy season <i>np</i> biā fānākā

raise, lift <i>v</i> nā̀ùdā	right, correct <i>adj</i> mā̀lìdì-ā
ram <i>n</i> gā̀mmà bùtā	ring (bell) <i>v</i> tilindàdà jā
rape <i>v</i> tī̀ngīrā-mū mīnā	ring (finger) <i>n</i> ā̀nnā ēllā
rat <i>n</i> fī:lā̀	ripe <i>adj</i> ílíké
razor <i>n</i> lāmā	ripen, become ripe <i>v</i> ílíké
really, truly <i>adv</i> kēkāmmù	rise up (intr) <i>v</i> fè:dà
red <i>adj</i> bī:bā	river bank <i>np</i> bāhārā ūdā
red pepper, hot pepper <i>n</i> āfrīngā	river <i>n</i> sūbā
refuse <i>v</i> ká̀	riverbed (dry) <i>np</i> sūbā dōgōnā
rejoice <i>v</i> fu:dā	roast <i>v</i> fī:dā
relative (by blood) <i>n</i> kēbēsā	robe (man's gown) <i>n</i> sānā fōgā
remain, stay <i>v</i> lākādā	rock (large) <i>n</i> tállā
remember <i>v</i> tābbā	roll <i>v</i> kōfūnfúrá
request <i>n</i> kōkēlá	rooster (cock) <i>n</i> àdù bùtā
resemble <i>v</i> kōmīnā	root <i>n</i> bóbā
resolve, settle (dispute) <i>v</i> tàgāmā t̄bīfā	rope <i>n</i> kī:rā
respect <i>v</i> ānkātōdā	rotten <i>adj</i> ā̀jkōsùmā
rest <i>v</i> sākēdā	rough <i>adj</i> góggótā
restless, (be) unsettled <i>adj</i> lilidā	round <i>adj</i> órá̀
return (tr), give back <i>v</i> káfā	rub <i>v</i> gífīdā
return, go back <i>v</i> dā	rubber <i>n</i> ēmālā
revive from danger <i>vp</i> bājā (n) kīfāssē	rubbish <i>adj</i> ā̀jkàwā
rib <i>n</i> làbātā	ruined, spoiled <i>adj</i> á̀jkósūmā
rice <i>n</i> rúzā	rule over, dominate <i>v</i> sākāmā
rich <i>adj</i> fānnádā	ruminant, chew cud <i>v</i> ādā wājā
rich man <i>np</i> ābūrā	run <i>v</i> ādzā
right (direction) <i>adv</i> tòkònā	rust <i>n</i> bīsā bīssē

**S**sacrifice **n** lágájá, fōrōdāsad **adj** àmàdā òdàsaliva **n** dzū:lásalt **n** kùndásame **adj** éllásīsāsand **n** jǐfáwāsated **v** būrāsaw **n** mágāzāsay goodbye, take leave of **v** kōfōdásay **v** sàdà àùràscabies (the itch) **n** kàìlìdāscar **n** tálàscarce **adj** dàùdāscatter (tr) **v** sālādāscorpion **n** kèràscratch **v** kórīdāseason **n** fānākāseated **v** kōttāsecond **on** ābārmāsee **v** ìntā, tításeed **n** ēlāgāself **n** āīnāselfish **adj** àtāròdāsell **v** àlèbàsemen **n** mārā ārā tâsend (someone to do something) **v** sámāsend (something to someone) **v** sámēdāsenile person **np** àkkā kàìlāservant(domestic) **n** ítā tātāserve **v** ìsēnākēsesame seed **n** ākòtāset (trap) **v** jìgidátáseven (7) **cn** kòntàbā:rèseventeen (17) **cn** jēbnálà kòntàbā:rèseventy (70) **cn** jēbkòntàbā:rèsew **v** tírāshadow **n** sēllāshake (tr) **v** úgúdáshame **n** gāsūdásharp **adj** ádamá<sup>-</sup>shave **v** ànà kōjā-lásheep **n** gāmmāshe-goat, nanny goat **n** làjǐā jīnnāshelter **n** sākēdāshield **n** ārmāshin **n** āndīrā/ āndzīlāshine **v** tǐtǐtǐrāshirt **n** bāddā fōgāshiver, tremble **v** kâtòdāshoe, sandal **n** āsūgāshoot **v** tūgùdāshort **adj** itētāshoulder **n** sègètā / sèkètā

shout (v), cry out <b>v</b> gòmàtā	slow <b>adj</b> fò:dà
shy <b>adj</b> sèràsērā mā	small <b>adj</b> dāmādā
sick, (be) ill <b>v</b> kō-bàdà	smear (tr) <b>v</b> kòfūlā
sickle <b>n</b> màfiddā	smell <b>v</b> āmā, āllādā
side (of body) <b>n</b>	smile <b>v</b> fòngòdā
side (of something) <b>n</b> dāggā	smoke <b>n</b> dúdá <sup>ˉ</sup>
silent <b>adj</b> wìdà	smoke <b>n</b> lū:dā
silk, hair (of maize) <b>n</b> gò:mà	smooth <b>adj</b> fùlùfùlùmā
sing <b>v</b> ānāná	snail <b>n</b> āffánání
sink <b>v</b> ní:dá	snake <b>n</b> dāmmā
sister (elder/younger) <b>n</b> āīnā kīfā	snatch, seize <b>v</b> fūrā
sit <b>v</b> kòttābā	sneeze <b>v</b> āttīfādā
six (6) <b>cn</b> kōntàllè	snore <b>v</b> ñàrtādā
sixteen (16) <b>cn</b> fēbnálà kòntàllè	soak <b>v</b> nāidā
sixty (60) <b>cn</b> fēbkōntàllè	soft <b>adj</b> nòngōnòngōmā
skin (animal) <b>v</b> fūtjā	soften <b>v</b> básā
skin (of fruit) <b>n</b> fòfòngòlà	soldier <b>n</b> bàjkùllā
skin (of man) <b>n</b> ágālā	sole <b>n</b> mīndā tākāsā
skull <b>n</b> āsāngā sángā	some (men) <b>dt</b> āngūdē
sky <b>n</b> kūjjā	sometimes <b>adv</b> fādāfādāmmū
slap <b>v</b> fāfālājá	son <b>n</b> ākkā áddā
slaughter (animal for butchering) <b>v</b> tá <sup>ˉ</sup>	song <b>n</b> ānā
slave <b>n</b> tiròtā	sorghum (dry season) <b>n</b> kì:nā
sleep <b>v</b> àttòdà, sùdùbā	sorrow <b>n</b> āmādā òdā tǎggímā
sleepy <b>v</b> àtòdā kábàbà	soul, spirit (of living person) <b>n</b> fūkā
slice <b>adj</b> tâ	soup, broth <b>n</b> là:fā
slide <b>v</b> fèkādā	sour <b>adj</b> mīmīntfā, mímímímímā

south <b>n</b> tīkā gātā	stand <b>v</b> sū:sā
sow, plant <b>v</b> lélátā	star <b>n</b> fūndā
spark <b>n</b> tākídā	startle, surprise <b>v</b> fākkārā
speak, talk <b>v</b> sàdā àùrà	steal <b>v</b> núnā
speech, discourse <b>n</b> àùrà	steer <b>n</b> dzābùrà
speed <b>n</b> lilidā	step <b>v</b> ānā idā
spend time, pass time <b>vp</b> fānākā ífádāssè	sting (bee) <b>v</b> sēmmājā
spider <b>n</b> kākūnā tǣrārā	stink, smell (bad) <b>n</b> āllālāmā, fèbèrā
spider's web <b>np</b> kākūnātǣrārā itā <sup>-</sup>	stir <b>v</b> fābā
spine, backbone <b>n</b> bādā gī:rā	stomach (internal)
spirit (of dead person) <b>n</b> tǣ fūkà	stomachache <b>np</b> kāsā bibilā
spit <b>v</b> fīngādā	stone (small) <b>n</b> ūgā
splendour, glory <b>n</b> ānkātā sùmā	stool <b>n</b> kóttābā ārāntā
splinter, sliver <b>n</b> tètērā	story (tale) <b>n</b> āǣfī āndā
spoiled (food) <b>adj</b> gùnbēdā	straight <b>adj</b> áfúrá <sup>-</sup> , tǣbbībā
spoon (traditional) <b>n</b> mánkā	straighten <b>v</b> áfúrá <sup>-</sup> idā
spread (disease, fire) <b>v</b> sáládā	stranger <b>n</b> kātākētā kèlā
spread out (maize) (tr) <b>v</b> ìfidā	strength <b>n</b> kámmā, kálmā
spring <b>n</b> bīā íráwá	stretch <b>v</b> òidā mājñā
sprinkle <b>v</b> tókkódā	string <b>n</b> sártā
spy (v), spy on <b>v</b> āngērā	strip off (bark) <b>v</b> fōkkādā
spy <b>n</b> āngērā	strong (physically) <b>adj</b> kámmā <sup>-</sup> inā
squat <b>v</b> túdā	stumble <b>v</b> kōjā
squeeze <b>v</b> fābā	stupid <b>adj</b> kōbājā
squirrel <b>n</b> fòrà	stupid person <b>np</b> kā bājā
stab <b>v</b> āndzērā-mù lèlā	subtract, take away <b>v</b> nī:dā, òlāfādā
stamp (with foot) <b>v</b> kōmā	succeed <b>v</b> fīlībónākē

suck **v** kō:rá  
sugar cane **n** āṅgillā  
summit, highest point **n** àjà tùnkùfà  
sun **n** wiā, wiākūrā  
sunrise **np** wīā kūrātōrā  
sunset **n** wīākūrā  
sunshine **np** wiā lēlidā  
surround **v** kōlā  
swallow **v** mé:dā  
swarm **n** ágūlá  
swear **v** māhālā-já  
sweep **v** sālēdā  
sweet **adj** ámā  
swell (intr) **v** filá<sup>-</sup>  
swim **vp** bīā dūdā  
swing (v), go back and forth **v** īfā īgīdā  
sword **n** gēgādzā

## t

tail **n** fīmā  
take (away), carry away **v** kā  
take out (from container) **v** gōdā  
take revenge **v** mábbátátá  
take **v** kā  
taste **n** ámā  
taste **v** āmímá  
teach **v** kōsāsā  
tear (tr) **v** dērā

tears **n** ìnbā bīá  
tell, recount (story) **v** ótǎwā  
ten (10) **cn** fē:bè  
tendon **n** sārtā  
termite hill **n** fúfá<sup>-</sup>  
termite **n** kúpǎ  
testicle **n** kākúpǎ  
thank **v** ānnā ēsò  
that (man) **pr** wāmā  
thatch **n** sēnā fāīdā  
there **adv** wāmátā  
they (human) **pr** imè  
they themselves **pr** imè āīn-í- ê  
thief **n** āpúpǎ  
thigh **n** bádá<sup>-</sup>, gābā  
thin **adj** ālābā, fīǎ  
thin **adj** fīǎ  
thing **n** dātā  
think **v** lāwētā  
third **on** āsāttā  
thirteen (13) **cn** fēbnálā sāttè  
thirty (30) **cn** fēbsāttè<sup>`</sup>  
this (man) **pr** àmā  
thorn **n** òtā  
thousand (1000) **cn** ālfā  
thread **n** tù:tà  
threaten **v** ādādōdā

three (3) <i>cn</i> sāttè	track (animal) <i>n</i> āsērā
thresh, beat (grain) <i>v</i> dzīŋgá	trader <i>n</i> àtèrèbà
threshing-floor <i>np</i> tǎgā	tradition, custom <i>n</i> kòsòsònā
throat <i>n</i> mēnā	traitor <i>n</i> bāndè
throw away, get rid of <i>v</i> fādā	transplant <i>v</i> là
throw <i>v</i> fādā	trap (animal) <i>v</i> ʃigìdátá
thumb <i>n</i> ùkùnā bùtá	trap <i>n</i> ʃigìdā
thunder <i>n</i> táŋgādā	travel, go on a trip <i>v</i> gādā
tie (knot) <i>v</i> lílā	traveler <i>n</i> gássā
tighten (tr) <i>v</i> kákkádá	tree <i>n</i> ēlā
time <i>n</i> fānākā	tribe, ethnic group <i>n</i> kòʃèrā
tired <i>v</i> kòfòlā	tribute <i>n</i> sādā ítā
tobacco <i>n</i> tǔnbàkā	trousers <i>n</i> gùgārā
today <i>adv</i> áttāmmā	trunk (of tree) <i>n</i> mùtùngùlā
toe <i>n</i> mīndā kíʃā	truth <i>n</i> kékā
together <i>adv</i> sàmàràmmù	turn over (tr) <i>v</i> tórá
tomato <i>n</i> kómīdārā	turn round (intr) <i>vp</i> kúrātā ígīdā
tomorrow <i>adv</i> sēllāsì	turtle (water) <i>n</i> bōbā
tongue <i>n</i> nè:là	twelve (12) <i>cn</i> ʃēbnálà bā:rè
tooth <i>n</i> mā	twenty (20) <i>cn</i> ʃēbbā:rè
tooth stick <i>n</i> òrmōʃā	twenty-one (21) <i>cn</i> ʃēbbá:rè éllá
top <i>n</i> túnkúʃá, ānākíʃā	twenty-two (22) <i>cn</i> ʃēbbā:rè bā:rè
torn <i>adj</i> sèsā bērīdā	twin <i>n</i> í:bā
tortoise (land) <i>n</i> dòlòkà	twist <i>v</i> ʃímtódā
touch, feel (active) <i>v</i> kōtíká	two (2) <i>cn</i> bā:rè
towards <i>adv</i> wāmà-tà	two hundred (200) <i>cn</i> múdzé bā:rè
town, city <i>n</i> sù:kā/sùgā	

**u**udder *n* ánāugly *adj* bājāuncover *v* òikèdāunder, below *adv* ókkómā-lāundress *v* fògà kòlàunload *v* íbífāunripe *adj* sām̄mādāuntie *v* ìbífāunwrap *v* ìbífāup *adv* bāddāupper arm *n* bēnāurinate *v* dzūrāurine *n* ùkāused up *v* nāfōdākāusually *adv* dīm̄àdimà**v**vagina *n* fināvalley *n* būllūkāvein *n* kōkōbā sārtāvillage *n* sù:kā/sùgā, dì:bāvirgin *n* sò:làvoice *n* gùnùdāvomit *v* ūtā**w**waist *n* ōrāwait *v* fā:ràwake up (intr) *v* tāggādāwalk *v* gādāwall *n* ēlā itāwander *v* ílódāwant, desire *v* sēdāwar *n* māsā bātjāwarthog *n* makàbàwash (clothes, utensils) *v* ífāwater *n* biāwave (hand as a greeting) *v* sūllūmāsáwe (incl.) *pr* kímēweak *adj* lāṅgālāṅgāmāwear clothes *vp* fōgā kòtāweave *v* kī:rāwedding (ceremony) *n* dīgīnāweed *v* sēnāmāweeds *n* sēnāweight *n* tāgīdāwell *adv* mādōkāwell *n* bàwest *n* wākūrā īsùmāwet *adj* tófīmāwhat? *pr* àinòwhen? *Pr* íkídí̄where? *pr* íkítá̄which (one)? *Pr* íkánōwhip *n* bòlā

whisper **v** fóidá  
 whistle **n** fóidá  
 white **adj** àrà  
 white man **np** ká àrà  
 who? **Pr** nánô  
 whole **dt** búbījê (táffīāmmū)  
 why? **Pr** áǰǰíní<sup>ˀ</sup>  
 wicked **adj** mōŋgōlá  
 wide **adj** sá:sá<sup>ˀ</sup>  
 widen **v** sá:sá<sup>ˀ</sup>ídā  
 wife **n** dàkkā-āŋgā  
 wild area **n** áddá  
 wind **n** sāwītā  
 window **n** māskōtá  
 wing **n** fēfēnà  
 wink (eye) **v** kámīdā  
 winnow **n** fādā  
 winnow, throw in air (grain) **v** fādā  
 wipe off (excreta) **v** lābá  
 wise **adj** fādābā  
 with **cj** -tè  
 wither (plant) **v** ǰūdā  
 woman **n** dàkkā  
 womb **n** dēdā ítā  
 wood **n** ú:dā  
 word **n** àrà

work **n** sānā, ǰēkōlā  
 world **n** làgātǰūlā  
 wound, sore **n** ǰāǰā  
 wrap up **v** ùmmādā  
 wrong **adj** fógādā  
**y**  
 yawn **v** àtòdà kàbàbà  
 year **n** gállà  
 yellow **adj** fākālā  
 yes **dt** é<sup>ˀ</sup>  
 yesterday **adv** āsāndí  
 yolk (of egg) **n** kòkòpà bī:bá  
 you (masc., sing.) **pr** ènā  
 you (pl.) **pr** émè  
 young **adj** ānfūrā  
 young man **np** ānfūrā  
**z**  
 zebra **n** áddá<sup>ˀ</sup> sāndā

## Appendix-II Context, Raw Formant and Duration Values of vowels

Speaker-1Token-1(Bahre)

/i/	Duration in ms.	Av. VD	F <sub>1</sub>	Av. F <sub>1</sub>	F <sub>2</sub>	Av.F <sub>2</sub>
tírā 'louse'	199	/i/=96	280	/i/=343	2429	/i/=2116
tīrā 'sew'	49		341		2201	
fīlā 'swell'	80		324		2014	
līlā 'tie'	138		360		2110	
tíkā 'hear'	74		330		2134	
kírā 'rope'	139		363		2122	
li:sā 'heifer'	194		342		2249	
tī:lā 'python'	174	/i:/=189	403	/i:/=341	2530	/i:/=2402
/e/						
sèrā 'neck'	89	/e/=114	533	/e/=458	1682	/e/=1818
kēlā 'count'	128		401		1858	
tèrā 'moon'	127		397		1714	
ké:lā 'kohl'	223		503		2020	
kè:lā 'guest'	192		556		2196	
sé:dā 'track(n) (Animal)'	225	/e:/=220	499	/e:/=527	1908	/e:/=2052
/o/						
kòrā 'suck'	135	/o/=114	483	/o/=568	1108	/o/=1101
tōfā 'anus'	179		514		960	
kòfā 'pus'	77		569		1018	
kòtā 'dress(v)'	152	/o:/=157	565	/o:/=498	1184	/o:/=1034
/a/						
tākā 'know'	118	/a/=79	934	/a/=875	1472	/a/=1392
sá:sá 'wide'	124		820		1413	
sàsā 'tell'	60		788		1628	
kā:sā 'belly'	131		705		1235	
kāfā 'faeces'	59	/a:/=127	903	/a:/=762	1077	/a:/=1324
/u/						
kūtā 'breast'	53	/u/=55	367	/u/=360	993	/u/=1102
súsá 'prepare'	58		354		1211	
sū:sā 'stand'	111		413		1228	
sū:sā 'type of tree'	104	/u:/=107	352	/u:/=382	902	/u:/=1065

Speaker-1Token-2(Bahre)

/i/	Duration in ms.	Av.VD	F1	Av. F1	F2	Av. F2
fì:là 'rat'	129	/i/=91	301	/i/=373	2661	/i/=2561
fìlā 'swell'	48		378		2585	
tíkā 'hear'	74		376		2515	
tì:kā 'place name'	196		297		2093	
kīrā 'rope'	152		367		2585	
tírā 'louse'	152	/i:/=159	452	/i:/=350	2550	/i:/=2434
/e/						
kè:lā 'guest'	243	/e/=140	534	/e/=505	2030	/e/=2112
tèrà 'moon'	106		539		2250	
ké:kā 'truth'	210		508		2339	
sé:dā 'track(n) (Animal)'	267		492		1897	
sēdā 'desire, want(n)'	160		448		1944	
kēlā 'count'	155	/e:/=240	529	/e:/=511	2142	/e:/=2088
/o/						
tōfā 'anus'	118	/o/=107	514	/o/=520	943	/o/=1092
kōfā 'pus'	67		552		1029	
kōtā 'dress(v)'	148		489		1156	
kō:rā 'suck'	190	/o:/=154	551	/o:/=532	1018	/o:/=980
/a/						
sā:sā 'wide'	176	/a/=54	803	/a/=722	1503	/a/=1544
sāsā 'tell'	51		788		1632	
kāfā 'faeces'	54		746		1468	
tāfā 'add, increase'	59		633		1534	
kā:sā 'abdomen'	121	/a:/=148	769	/a:/=786	1536	/a:/=1519
/u/						
sū:sā 'stand'	101	/u/=79	415	/u/=394	1254	/u/=1085
súsā 'prepare'	59		366		1224	
fù:tā 'lung'	172		417		967	
kùtā 'breast'	61		400		1113	
fúfā 'termite hill'	117	/u:/=136	417	/u:/=416	918	/u:/=1110

Speaker-1 Token-3 (Bahre)

/i/	Duration in ms.	Av.VD	F1	Av. F1	F2	Av. F2
lílā 'tie'	74	/i/=83	362	/i/=380	2534	/i/=2321
lí:lā 'hunger'	131		314		2703	
fí:lā 'rat'	172		421		2512	
fílā 'swell'	58		375		2493	
kírā 'string'	134		368		2178	
tíkā 'hear'	67	/i:/=151	417	/i:/=367	2082	/i:/=2607
/e/						
tèrà 'moon'	199	/e/=202	540	/e/=543	2210	/e/=2073
kēlā 'count(v)'	188		531		2070	
ké:lā 'kohl'	303		497		2130	
kēlā 'count'	221		560		1941	
kè:lā 'guest'	200	/e:/=251	530	/e:/=513	2327	/e:/=2228
/o/						
tórá 'turn over'	104	/o/=88	611	/o/=624	1236	/o/=1317
kòlā 'prevent'	73		638		1398	
tō:fā 'anus'	199		524		983	
kō:rā 'suck'	137	/o:/=168	479	/o:/=501	1111	/o:/=1047
/a/						
sá:sá 'wide'	149	/a/=64	707	/a/=717	1642	/a/=1576
sàsá 'tell(v)'	60		788		1628	
tāfā 'add, increase'	51		632		1452	
kā:sá 'abdomen'	121		708		1448	
kāfā 'faeces'	81	/a:/=135	731	/a:/=707	1649	/a:/=1545
/u/						
fúrá 'plunder(a town)'	62	/u/=103	463	/u/=423	1047	/u/=1238
sū:sā 'stand'	169		416		1235	
sū:sā 'soup(of meat)'	236		375		989	
kùtā 'breast'	145	/u:/=202	384	/u:/=395	1429	/u:/=1112

Speaker-1 Token-4(Bahre)

/i/	Duration in ms.	Av.VD	F1	Av. F1	F2	Av. F2
fīlā 'swell'	60	/i/=75	367	/i/=371	2585	/i/=2540
fī:lā 'rat'	232		404		2603	
līlā 'tie'	90		376		2496	
līlā 'oil'	231	/i:/=231	303	/i:/=353	2473	/i:/=2538
/e/						
tērā 'month'	173	/e/=150	514	/e/=524	1909	/e/=2000
kēlā 'count'	127		534		2092	
ké:lā 'antimony dust'	286		532		2052	
ké:kā 'truth'	172	/e:/=229	503	/e:/=517	2293	/e:/=2172
/o/						
kōlā 'crow'	71	/o/=76	605	/o/=590	1152	/o/=1160
kōsā 'cough(n)'	58		526		1122	
tōrā 'turn over'	106		617		1244	
kòlā 'prevent'	70		615		1123	
/a/						
fālā 'cheek'	172	/a/=137	862	/a/=810	1544	/a/=1584
sàsā 'tell'	177		777		1547	
sā:sā 'wide'	146		732		1634	
lā:fā 'soup'	283		802		1574	
kādā 'cross river'	62	/a:/=214	793	/a:/=767	1663	/a:/=1604
/u/						
sū:sā 'stand'	196		304		1159	
fù:tā 'lung'	174	/u:/=185	366	/u:/=335	1186	/u:/=1172

Speaker-2(token-1) Abboy Fantay G/egzher

/i/	Duration in ms.	Av.VD	F1	Av. F1	F2	Av. F2
tíkā 'hear'	92	/i/=96	422	/i/=400	2170	/i/=2076
títá 'see'	101		379		1983	
li:lā 'oil'	208		301		2522	
fī:lā 'rat'	134	/i:/=171	298	/i:/=299	2521	/i:/=2521
/e/						
sērā 'neck'	107	/e/=139	623	/e/=536	1864	/e/=2065
kēlā 'count'	154		528		2140	
sé:dā 'track(animal)(n)'	251		552		2019	
sēdā 'desire, want (n)'	158		458		2192	
kè:lā 'guest'	194	/e:/=222	560	/e:/=556	2183	/e:/=2101
/o/						
kōsā 'cough(n)'	59	/o/=68	544	/o/=554	1199	/o/=1107
kōfā 'pus'	77		565		1015	
tō:fā 'anus'	134		558		1028	
kō:rā 'suck'	152	/o:/=143	485	/o:/=521	1068	/o:/=1048
/a/						
kā:sā 'abdomen'	139	/a/=74	616	/a/=784	1531	/a/=1555
kāfā 'faeces'	65		685		1566	
kālā 'lick'	54		902		1551	
sà:sā 'learn'	172		779		1549	
sàsā 'tell(v)'	104	/a:/=155	766	/a:/=697	1550	/a:/=1540
/u/						
sū:sā 'stand'	100	/u/=73	372	/u/=439	1277	/u/=1106
fù:tā 'lung'	139		479		852	
fūlā 'crunch'	77		444		1037	
kùtā 'breast'	69		434		1176	
sū:sā 'type of tree'	216	/u:/=151	337	/u:/=396	1091	/u:/=1073

Speaker-2(token-2) Abboy Fantay G/ezgher

/i/	Duration in ms.	Av.VD	F1	Av. F1	F2	Av. F2
kírâ 'rope'	152	/i/=103	420	/i/=376	2352	/i/=2210
tíkâ 'hear'	48		338		2188	
tí:râ 'louse'	157		380		2288	
tī:râ 'python'	146		362		2118	
lílâ 'tie'	68		384		2184	
lí:lâ 'oil'	215	/i/=186	377	/i/=378	2376	/i/=2332
/e/						
kēlā 'count'	190	/e/=161	556	/e/=508	2192	/e/=2109
sé:dā 'track(animal)(n)'	249		549		1964	
sēdā 'desire, want (n)'	176		457		2193	
ké:kā 'truth'	172		516		2273	
tērā 'month'	173	/e/=210	511	/e/=532	1942	/e/=2118
/o/						
kōsā 'cough(n)'	69	/o/=63	534	/o/=568	1184	/o/=1118
kōkâ 'hate'	50		523		863	
tō:fâ 'anus'	154		556		1020	
kōfâ 'pus'	63		568		1032	
kòlâ 'prevent'	72	/o/=154	648	/o/=556	1394	/o/=1020
/a/						
tāfâ 'add, increase'	59	/a/=65	764	/a/=752	1557	/a/=1571
sārâ 'half'	72		741		1585	
kā:sâ 'abdomen'	139		665		1598	
sā:sâ 'wide'	211	/a/=175	796	/a/=730	1500	/a/=1549
/u/						
sù:kâ 'village, camp'	99		410		1440	
sū:râ 'brown'	193		403		1015	
sū:sâ 'stand'	94	/u/=128	367	/u/=393	1229	/u/=1228

Speaker-2 (Token-3) Abboy Fantay G/ezgher

/i/	Duration in ms.	Av. VD	F1	Av. F1	F2	Av. F2
kī:rā 'rope(v)'	344	/i/=97	326	/i/=346	2105	/i/=2450
kírā 'rope(n)'	137		277		2582	
li:lā 'oil'	223		321		2361	
lílā 'tie'	82		392		2339	
fī:lā 'rat'	255		308		2591	
filā 'swell'	74	/i:/=274	370	/i:/=318	2431	/i:/=2352
/e/						
sé:dā 'track(animal)(n)'	256	/e/=174	547	/e/=519	2009	/e/=2150
sēdā 'desire, want (n)'	195		456		2193	
kè:lā 'guest'	292		509		2160	
kēlā 'count (v)'	154		583		2108	
ké:kā 'truth'	220	/e:/=256	521	/e:/=525	1991	/e:/=2053
/o/						
kōsá 'cough(n)'	51	/o/=69	533	/o/=551	1230	/o/=1078
tō:fā 'anus'	144		557		1028	
kōfā 'pus'	67		552		1029	
kōká 'hate'	71		520		849	
kòlà 'surround'	90	/o:/=144	601	/o:/=557	1207	/o:/=1028
/a/						
tá:dá 'carve'	281	/a/=194	811	/a/=769	1597	/a/=1483
tàdā 'defeat, erase'	175		865		1510	
sā:sā 'learn'	282		783		1479	
sàsā 'tell'	196		775		1550	
là:fā 'soup'	231		856		1590	
lā:fā 'catch object in air'	212	/a:/=264	669	/a:/=816	1390	/a:/=1555
/u/						
bū:rā 'spotty(color of an ox)'	363	/u/=78	417	/u/=418	919	/u/=1050
būrā 'pierce(v)'	102		468		860	
sū:sā 'stand'	202		304		1160	
súsá 'prepare'	55	/u:/=282	368	/u:/=360	1241	/u:/=1039

Speaker-2 (Token-4) Abboy Fantay G/ezgher

/i/	Duration in ms.	Av. VD	F1	Av. F1	F2	Av. F2
kī:rā 'weave(v)'	325	/i/=94	334	/i/=336	1957	/i/=2560
kírā 'rope'	106		279		2582	
fī:lā 'rat'	254		308		2586	
fīlā 'swell'	83		370		2429	
tī:kā 'place name'	232		341		2761	
tíkā 'hear'	94	/i/=270	359	/i/=327	2669	/i/=2434
/e/						
sé:dā 'track(animal) (n)'	188	/e/=167	546	/e/=536	2005	/e/=2129
sēdā 'desire, want (n)'	162		521		2023	
kè:lā 'guest'	232		511		2163	
kēlā 'count(v)'	174		549		2156	
tērā 'moon'	167	/e/=210	539	/e/=528	2209	/e/=2084
/o/						
tō:fā 'anus'	137	/o/=73	587	/o/=595	930	/o/=1171
kōfā 'pus'	43		577		1023	
kōsā 'cough(n)'	59		544		1200	
kòlā 'prevent'	72		649		1230	
tórá 'turn over'	121	/o/=137	611	/o/=587	1232	/o/=930
/a/						
sā:sā 'wide'	176	/a/=94	732	/a/=768	1634	/a/=1551
sāsā 'tell(v)'	94	/a/=176	768	/a/=732	1551	/a/=1634
/u/						
sū:sā 'stand'	202	/u/=52	304	/u/=368	1158	/u/=1246
súsā 'prepare'	52	/u/=202	368	/u/=304	1246	/u/=1158

Speaker-3(token-1) Berhane Kegnu

/i/	Duration in ms.	Av.VD	F1	Av. F1	F2	Av. F2
tíkā 'hear'	71	/i/=75	369	/i/=379	2494	/i/=2415
ti:kā 'place name'	219		296		2660	
fīlā 'swell'	79		389		2336	
fī:lā 'rat'	176	/i:/=197	332	/i:/=314	2554	/i:/=2607
/e/						
ké:lā 'antimony dust'	315	/e/=175	459	/e/=509	2095	/e/=2243
sé:dā 'track(animal) (n)'	256		492		1897	
sēdā 'desire, want (n)'	193		458		2192	
kè:lā 'guest'	302		510		2170	
kēlā 'count(v)'	189		530		2329	
tērā 'moon'	143	/e:/=291	539	/e:/=487	2209	/e:/=2054
/o/						
tō:fā 'anus'	180	/o/=77	519	/o/=566	932	/o/=1033
kōfā 'pus'	65		566		1064	
kōkā 'hate'	83		532		882	
kòlā 'prevent'	83		601		1154	
kō:rā 'suck'	196	/o:/=188	550	/o:/=534	1017	/o:/=974
/a/						
kā:sā 'abdomen'	185	/a/=83	789	/a/=797	1515	/a/=1574
kāfā 'faeces'	81		745		1474	
sà:sā 'learn'	192		811		1549	
tākā 'know'	85		786		1634	
tá:lā 'scar'	152		869		1567	
kālā 'lick'	105		817		1522	
kàlā 'deny'	84	/a:/=158	860	/a:/=821	1614	/a:/=1538
/u/						
fù:tā 'lung'	177	/u/=70	424	/u/=401	976	/u/=1109
kùtā 'breast'	75		396		1101	
sú:sā 'soup (of meat)'	241		392		1011	
súsā 'prepare'	62		399		1330	
fúlā 'crunch'	75	/u:/=209	408	/u:/=408	896	/u:/=993

Speaker-3(token-2) Berhane Kegnu

/i/	Duration in ms.	Av.VD	F1	Av. F1	F2	Av. F2
kī:rā 'weave'	224	/i/=114	305	/i/=395	2618	/i/=2253
līlā 'tie'	73		377		2345	
li:lā 'oil'	146		332		2654	
kírā 'string(for clothing)'	155	/i:/=185	413	/i:/=318	2162	/i:/=2636
/e/						
kè:lā 'guest'	205	/e/=105	555	/e/=583	2151	/e/=2077
tèrà 'moon'	106		546		2289	
ké:lā 'antimony dust'	289		532		2052	
sērā 'neck'	105	/e:/=247	620	/e:/=543	1865	/e:/=2101
/o/						
kòtā 'dress(v)'	67	/o/=70	572	/o/=599	1131	/o/=1185
sò:lā 'virgin'	208		597		1391	
kòlā 'prevent'	74		627		1240	
kòlā 'crow'	103	/o:/=155	538	/o:/=567	1021	/o:/=1206
/a/						
kātā 'fetus'	173	/a/=86	790	/a/=759	1498	/a/=1583
kālā 'deny'	78		799		1591	
tà:rā 'insult'	222		775		1599	
fālā 'saying'	134		756		1515	
là:fā 'soup (of meat)'	146		801		1528	
làfā 'maize'	94	/a:/=168	719	/a:/=780	1575	/a:/=1535
/u/						
sù:kā 'country'	150	/u/=91	381	/u/=372	996	/u/=1113
súsá 'prepare'	81		379		1343	
sú:sá 'type of tree'	182		316		1041	
kūrā 'back(of something)'	102	/u:/=166	365	/u:/=348	884	/u:/=1018

Speaker-3(token-3) Berhane Kegnu

/i/	Duration in ms.	Av.VD	F1	Av. F1	F2	Av. F2
kī:rā 'weave'	287	/i/=108	386	/i/=362	2180	/i/=2482
kírā 'rope'	172		333		2613	
lílā 'tie'	94		387		2422	
lí:lā 'hunger'	287		346		2619	
fi:dā 'pay(payment)'	183		325		2583	
fi:lā 'rat'	213		349		2435	
filā 'swell'	60	/i/=242	367	/i/=351	2412	/i/=2454
/e/						
tèrà 'moon'	172	/e/=180	567	/e/=550	2095	/e/=2092
ké:kā 'truth'	201		502		2301	
kè:lā 'guest'	251		530		2330	
kēlā 'count'	188	/e/=226	534	/e/=516	2090	/e/=2315
/o/						
fòrà 'squirrel'	198	/o/=88	589	/o/=618	1205	/o/=1209
tōlā 'cliff'	185		567		1110	
tórá 'turn over'	106		621		1251	
kōlā 'surround'	70	/o/=191	615	/o/=578	1167	/o/=1157
/a/						
sā:sā 'learn'	179	/a/=95	773	/a/=803	1642	/a/=1573
táfā 'add, increase'	60		814		1721	
sārā 'half'	98		800		1561	
sà:rā 'billy-goat'	226		756		1538	
kāfā 'faeces'	64		824		1542	
fādā 'get rid of'	114		800		1491	
tādā 'carve'	140		781		1553	
tá:dā 'erase'	252		844		1551	
fà:rā 'wait'	183	/a/=210	735	/a/=777	1447	/a/=1544
/u/						
fúrá 'plunder(a town)'	78	/u/=81	488	/u/=451	924	/u/=969
fúfā 'termite hill'	123		417		909	
fūlā 'pea nut'	44		448		1075	
sū:sā 'stand'	145		392		1282	
sū:lā 'brown'	144	/u/=144	365	/u/=378	1286	/u/=1284

Speaker-3(token-4) Berhane Kegnu

/i/	Duration in ms.	Av.VD	F1	Av. F1	F2	Av. F2
fīlā ‘swell’	65	/i/=81	372	/i/=347	2444	/i/=2509
fī:lā ‘rat’	256		310		2566	
tíkā ‘hear’	62		353		2670	
tì:kā ‘place name’	201		334		2770	
līlā ‘tie’	57		392		2339	
lí:lā ‘hunger’	198		380		2568	
kírā ‘rope(n)’	140		273		2584	
kī:rā ‘weave’	341	/i:/=249	336	/i:/=340	1918	/i:/=2455
/e/						
sé:dā ‘track (animal)’(n)	296	/e/=163	547	/e/=494	2009	/e/=2131
sēdā ‘desire, want (n)’	154		510		2192	
kè:lā ‘guest’	174		523		2157	
ké:kā ‘truth’	193		531		2253	
kēlā ‘count’	172	/e:/=221	458	/e:/=526	2071	/e:/=2139
/o/						
Kōlā ‘crow’	83	/o/=74	605	/o/=597	1151	/o/=1184
kòtā ‘dress(v)’	65		592		1226	
kòlā ‘prevent’	74		594		1175	
/a/						
tā:lā ‘scar’	226	/a/=93	869	/a/=786	1546	/a/=1331
fā:lā ‘saying’	180		789		1326	
kāfā ‘faeces’	74		793		1152	
sā:sā ‘learn’	270		789		1482	
lāfā ‘catch (object in air)’	112		780		1511 1590	
là:fā ‘soup (of meat)’	214	/a:/=222	856	/a:/=825		/a:/=1486
/u/						
sú:sá ‘type of tree’	167	/u/=52	377	/u/=368	924	/u/=1238
súsá ‘prepare’	52		368		1238	
sū:sā ‘stand’	174	/u:/=170	305	/u:/=341	1141	/u:/=1032

## Appendix-III Contexts and Raw F0 Values

### F<sub>0</sub> Values in Monosyllabic words

Words	S:T	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	SD	VD
wā 'eye'	1:1	117.7	100.1	113	4.3	162
	1:2	117.8	102.8	112.5	3.6	133
	2:1	155.5	138.4	149	4.9	125
	3:1	124.9	113.5	121.4	3.1	295
	3:2	135.3	130.3	133.1	1.1	359
	3:3	135.2	123.6	131.2	3.3	295
	3:4	135.9	109.3	131.1	3.9	306
	3:5	144.9	140.8	143.8	1.1	186
	3:6	144.9	141.5	143.9	1	160
wā 'coming'	3:1	124.2	119.5	121.9	1.4	326
	3:2	124.8	119.2	122	1.4	327
	3:3	120	115.4	118.3	1.3	380
wā 'entering'	3:1	172.8	134.8	152.1	11.3	109
	3:2	197.3	132.1	161	19.8	168
	3:3	193.1	132.2	158.9	18.3	159
	3:4	166.1	134.8	149.8	10.1	99
wā 'leaving off'	3:1	121.7	115.4	117.9	1.2	240
	3:2	122.7	110.9	119.9	2.9	282
	3:3	118.2	114.5	116.2	0.8	234
	3:4	121.6	114.2	116.4	1.7	293
	3:5	120.7	114.2	116.2	1.4	279
	3:6	121.2	117.7	120.1	0.9	314

Words	S:T	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	SD	VD
bá <sup>-</sup> ‘sexual intercourse, ploughing’	3:1	194.7	128.6	158.7	21.7	253
	3:2	193.3	141.1	171.2	15.7	197
	3:3	259.9	184.9	217.9	28.6	200
	3:4	259.9	185	218.2	28.9	208
bā ‘dance (traditional)’	3:1	150.1	135.1	140.3	3.9	274
	3:2	122.9	116.8	120.3	1.2	318
	3:3	122.8	113.8	120.2	1.8	353
	3:4	157.7	151.8	154.6	1.1	374
	3:5	157.7	151.9	154.6	1.2	346
	3:6	144.6	126.6	135.4	4.5	202
	3:7	122.8	113.8	120.1	1.9	319
	3:8	157.4	152.3	154.8	1.3	231
bā ‘collecting coffee beans from the tree’	3:1	146.2	137.3	141.9	2.7	350
	3:2	146.2	137.2	141.8	2.6	396
bā ‘pit’	3:1	129.9	106.6	120.9	4.9	300
	3:2	120.6	116.9	119.3	0.9	316
	3:3	126.4	118.6	122.9	2.9	194
	3:4	135.3	129.2	133.3	1.6	184
	3:5	135.3	123.7	131.8	3.1	244
	3:6	120.6	117.9	119.5	0.7	210

Words	S:T	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	SD	VD
tá <sup>-</sup> ‘breaking’	3:1	177.2	127	153.8	15.4	142
	3:2	240.1	157.7	204.9	25.9	202
	3:3	239.2	162.8	205.6	24.3	187
	3:4	213.9	160.8	192.3	18.5	167
tá <sup>-</sup> ‘folding’	3:1	178.9	141.7	162.3	11.9	138
	3:2	190.7	135.5	157.7	17.4	202
	3:3	188.9	135.9	156.8	16.8	199
	3:4	178.9	141.8	162	11.6	133
tá <sup>-</sup> ‘slaughter, killing animals for food’	3:1	174.1	139.9	155.3	9.8	104
	3:2	143.3	122.5	130.9	6.2	61
	3:3	182	126.9	152.1	17.3	157
	3:4	182.8	126.9	152.5	13.7	157
	3:5	205.3	173.8	192.5	9.6	101

Words	S:T	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	SD	VD
ká̄ ‘hate’	3:1	224.3	162.3	195	21.7	155
	3:2	231.5	166.3	198.5	17.7	165
	3:3	224.6	162.1	195.2	21.6	157
	3:4	232.4	163.2	198.1	17.9	167
kā ‘taking’	3:1	145	123.5	132.6	6.6	149
	3:2	172.2	164.7	168.3	2.1	345
	3:3	151.7	142.1	144.7	1.6	300
	3:4	152.1	136.9	142.1	3.6	147
	3:5	172.3	165.1	168.3	1.9	438
	3:6	147.4	137.9	141.3	2.3	128

Words	S:T	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	SD	VD
sâ ‘closing’	3:1	173	131.2	151.4	12.6	155
	3:2	181.2	122.5	147.4	17.3	223
	3:3	179.1	135.4	156.9	10.9	138
sā ‘exiting (from a house)’	3:1	172.2	156.6	160.8	2.8	369
	3:2	136.9	121.1	126.3	4.3	186
	3:3	172.2	156.8	160.9	3.1	369
sà ‘giving’	3:1	130.1	115.6	120.5	3.8	207
	3:2	140.3	121.6	128.2	5.3	159
	3:3	136.4	123.6	128.7	2.8	253

Words	S:T	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	SD	VD
fā ‘cabbage’	3:1	161.5	155.3	157.7	1.4	261
	3:2	160.7	155.3	157.4	1.2	235
	3:3	161.6	155.4	157.7	1.5	276
fā ‘burying’	3:1	129.1	116.9	125.3	2.9	208
	3:2	138.7	116.8	126.4	5.4	180
	3:3	126.2	116.4	121.9	2.6	176
	3:4	140.7	116.4	121.9	2.6	197

### F<sub>0</sub> Values in Disyllabic Words

Words	S:T	L		R		L	R	L	R	L	R
		MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	SD	SD
àná 'hair'	1:1	127.4	118.9	122.5	117.8	122.2	119.7	78	99	3.7	1.6
	1:2	129.5	112.1	122	111.9	120.7	114.9	119	89	6.4	4.1
	3:1	127.3	121.8	129.8	122.7	125.3	126.9	153	173	1.9	2.5
	3:2	134.1	130	151.7	140.7	131.9	148.3	122	261	1.5	3.0
	3:3	116.2	114.3	130.8	123.4	114.9	127.7	159	253	0.6	2.2
	2:1	147.8	137.4	154.9	140.3	142.3	150.8	104	131	4.2	4.9
	2:2	147.9	137.3	154.9	144.9	142.2	152.1	99	118	4.2	3.6
ānā 'song'	3:1	148.5	140	149.4	143.3	142.9	146.8	146	200	6.9	1.7
	3:2	169.5	165.1	172.7	165.2	167.2	167.4	97	403	1.4	1.5
	3:3	169.5	165.1	170.7	165	167.2	167.4	93	379	1.3	1.4
	3:4	148.5	141.1	148.2	145.1	145.8	147.3	83	149	2.5	0.9
ánā 'udder'	3:1	212.1	198.5	140.9	137.9	207.4	139.5	300	208	3.8	0.9
	3:2	212.3	198.9	160.4	137.9	207.0	141.2	307	252	4.0	4.9
ānā 'front'	3:1	129.7	111.1	139.5	128.5	124.6	135.6	167	274	5.0	3.6
ānnā 'God'	3:1	138.2	135.7	134.6	129.9	136.9	131.9	148	277	0.9	1.2
	3:2	150.7	148.1	150.5	144.8	149.5	147.9	136	197	0.9	2.0

Words	S:T	L		R		L	R	L	R	L	R
		MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	SD	SD
bádá~'thigh'	3:1	194.3	190.3	178.9	137.5	192.6	157.7	91	168	1.1	13.1
	3:2	174.6	169.7	153.2	140.4	172.9	144.9	93	120	1.7	4.1
	3:3	194.2	191.4	179.9	142.7	192.8	160.3	91	159	0.96	12.6
	2:1	188.8	180.6	165.6	139.9	186.6	151.7	75	56	2.3	10.3
	2:2	188.0	177.5	167.9	140.7	185.9	154.2	78	57	3.4	10.4
bá:dá~'raid'	3:1	172.9	161.4	182.1	131.9	169.1	155.2	232	194	3.2	15.1
	3:2	173	161.7	182.8	137.5	169.1	158.1	239	175	3.0	13.9
	3:3	173	168.1	184.2	138.3	170.6	159.6	168	179	1.7	14.5
	3:4	172.9	164.1	184.1	132.5	169.8	156.9	204	197	2.4	15.6
bàdā 'back'	3:1	122.3	120.8	131.0	126.5	121.8	129.4	85	114	0.5	1.5
	3:2	122.1	120.7	130.9	127.6	121.7	129.5	73	125	0.5	1.1
bá:ḏā 'illness'	3:1	179.8	158.5	141.8	132.8	170.3	136.5	165	126	6.6	2.8
	3:2	179.8	158.9	147.5	133.5	170.6	138.9	162	170	6.4	4.6
bāddā 'above'	3:1	134.1	129.2	147.5	142.9	131.0	145.9	83	107	1.5	1.5
	3:2	142.8	139.4	161.9	149.5	140.9	154.8	106	208	1.2	2.9
	3:3	136.7	129.1	147.4	141.4	131.4	145.5	93	142	2.1	1.9

Words	S:T	L		R		L	R	L	R	L	R
		MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	SD	SD
mā:rá <sup>-</sup> ‘bile’	3:1	163.4	136.2	160.7	122.8	151.7	142.3	176	150	9.6	11.7
	3:2	163.3	136.2	159.4	123.7	152.2	142.0	194	149	9.5	11.6
	3:3	204.5	144.1	199.9	148.2	184.1	175.3	250	101	21.6	16.5
	3:4	204.5	144.6	198.1	149.2	181.9	174.1	215	96	21.7	15.9
	3:5	192.0	141.9	182.1	134.6	176.2	158.7	176	114	17.0	15.4
	2:1	189.9	169.1	185.2	159.5	184.3	173.3	168	78	6.3	8.5
mārá <sup>-</sup> ‘guide (n)’	3:1	131.9	120.8	141.4	108.8	125.9	122.2	102	205	3.9	11.4
	3:2	148.6	137.9	161.9	131.3	144.4	148.0	91	181	3.6	11.1
	3:3	148.5	137.8	162.4	131.6	144.3	148.5	94	178	3.7	11.0
	3:4	148.7	140.2	160.1	131.6	145.4	147.9	72	160	2.6	10.6
	3:5	131.1	121.6	140.5	110.7	121.6	124.8	73	154	3	10.6
mára <sup>-</sup> ‘menstruation’	3:1	167.3	154.3	178.4	151.9	159.5	168.8	97	107	5.0	8.4
	3:2	167.4	154.3	178.4	152.4	159.2	169.0	104	109	5.0	8.4
	3:3	166.4	154.6	178.4	152.4	160.5	169.3	67	102	4.5	7.9
dá:dá <sup>-</sup> ‘separating’	3:1	165.5	158.3	130.9	121.5	162.9	124.3	194	131	2.1	2.6
	3:2	219.9	200.7	183.1	142.8	213.2	158.7	240	216	6.1	11.7
	3:3	219.9	201.1	168.7	142.1	213.2	154.9	239	102	6.1	7.8
dāda ‘helping’	3:1	154.5	126.5	113.9	105.9	142.5	108.9	163	120	9.8	2.2
	3:2	171.7	140.3	126.9	117.2	155	120.1	184	154	10.3	2.9
	3:3	166.2	126.2	124.7	102.9	145.3	114.9	171	237	11.5	5.2
	3:4	166.8	126.3	124.7	102.9	145.6	114.7	173	245	11.6	5.5
	3:5	156.6	126.8	121.7	112.7	143.7	117.2	143	85	9.9	3.2
dāda ‘bead’	3:1	125.8	121.1	123.7	121.1	123.6	122.1	184	197	1.4	0.6
	3:2	136.9	131.9	133.8	126.7	135	130.7	154	160	1.6	1.6
	3:3	134.5	130.5	139.1	132.5	133.3	136.2	194	114	1.2	1.5
	3:4	134.5	130.4	139.3	127.7	133.4	135.3	191	131	1.2	2.8

Words	S:T	L		R		L	R	L	R	L	R
		MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	SD	SD
f̄o:dà ‘blessing’	3:1	213.5	145.6	127.9	122.9	182.5	124.8	327	149	20.5	1.3
	3:2	213.5	145.6	128.7	122.9	182.6	124.9	321	142	20.1	1.4
	3:3	217.1	147.2	128.9	122.9	183.1	124.9	330	155	20.3	1.6
f̄o:dà ‘finding (someone)’	3:1	172.9	136.3	118.8	111.4	155.9	114.2	141	109	12.4	2
	3:2	180.3	152.7	128.8	115.8	165.8	120.4	73	101	9.8	3.6
	3:3	185.9	152.9	131.8	116	168.9	121.3	97	112	11.8	4.6
	3:4	171.2	136.3	116.9	111.8	154.5	113.9	130	97	11.9	1.5
	3:5	180.9	153.1	133.9	115.9	167	122.1	78	122	10.3	5.3
f̄o:dà ‘rubbing’	3:1	114.6	107.5	119.7	102.5	109.7	115.1	333	197	1.8	5.9
	3:2	102.9	96.8	117.7	114.6	100.9	116.5	293	69	1.7	1.2
	3:3	104.6	101.5	110.4	108.4	103.2	109.3	179	118	1.1	0.6
	3:4	104.6	101.5	110.5	108.4	103.1	109.3	202	125	1.1	0.6
	3:5	112.9	107.5	120.4	115.1	109.6	117.8	338	69	1.8	1.8
	3:6	102.9	96.8	117.7	114.5	100.6	116.5	310	73	1.9	1.2
	3:7	104.6	101.5	110.4	108.4	103.2	109.3	173	114	1.1	0.6
f̄oddā ‘money’	3:1	140.8	136.7	162.2	135.5	138	149.1	109	78	1.1	8.8
	3:2	138.4	136.8	169.1	135.7	137.7	153.2	97	92	0.6	10.7
	3:3	139.2	136.6	164.4	131.1	137.8	148.2	97	81	0.7	9.8

Words	S:T	L		R		L	R	L	R	L	R
		MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	SD	SD
í:fã ‘outside’	3:1	203.1	198.6	173.8	142.9	201.2	153.6	202	162	1.1	9.7
	3:2	209.2	193.4	166.6	141.9	204.9	145.6	234	184	5.2	6.5
ī:fã ‘let us go’	3:1	163.5	155.1	186.5	176	159.9	181.3	306	130	2.1	3.2
	3:2	179.2	168.1	197.4	192.3	175.4	193.9	318	165	3.3	1.6
	3:3	156.1	138.9	179.6	173.3	149.1	176.7	221	173	6.5	2
i:fã ‘brother/sister’	3:1	131.4	123.7	142	140.5	128.3	141.3	322	191	1.8	0.5
	3:2	131.3	124.9	142.4	140.5	128.3	141.4	316	234	1.7	0.5
	3:3	131.4	121.6	145.5	140.5	128.3	141.6	314	245	1.7	0.9
ifã ‘washing (clothes, utensils)’	3:1	138.2	136.2	127	122.9	137.3	124.3	75	167	0.6	1
	3:2	141.4	132.3	133.1	126.9	135.9	128.4	93	138	2.7	1.8
	3:3	182.4	164	165.8	157.9	170.9	160.1	73	181	6.3	1.6
	3:4	176.1	163.9	164.3	157.8	169	160	69	150	4.8	1.8
	3:5	177.4	160.7	164.8	157.8	167.6	160.1	96	150	5.3	1.4

Words	S:T	L		R		L	R	L	R	L	R
		MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	SD	SD
lí:lā 'hunger'	3:1	207.9	162.5	142.2	136.9	184.6	138.4	250	157	16.4	1.7
	3:2	203.5	158.9	140.9	136.9	178.2	138	171	147	15.2	1.1
lí:lā 'tying, a bundle'	1:1	160.7	157	131.1	111.9	159.4	120.2	56	67	1.4	6.8
	3:1	191.2	179.1	152.1	131.2	187.2	141.2	51	109	4.4	6.6
	3:2	161.6	156.8	135.9	123.9	160.3	127.5	75	30	1.5	5
	3:3	163.7	159.7	135.1	122.3	161.9	127.2	73	117	1.5	3.8
	3:4	190.9	186.8	139.9	127.3	189.2	132.2	36	175	1.8	3.5
	3:5	197.5	184.2	149	137.2	192.9	140.9	56	112	5	3.3
	3:6	197.4	181	145.1	137.2	191.7	140.5	62	106	6	2.7
	3:7	197.5	180.7	145.6	137.3	191	140.9	65	120	6.4	2.9
lí:lā 'oil'	3:1	134.9	132.3	128.3	122.6	133.6	124.2	200	162	1	1.4
	3:2	143.1	140	137.7	131.5	141.9	134.2	181	125	0.9	2
	3:3	130.4	126.3	125.6	120.7	129.6	122	220	176	0.6	1.2
	3:4	134.3	128.2	132.3	126	130.8	129.1	208	142	1.9	2.2
	3:5	134.4	127.3	132.2	126.6	130.9	129.4	223	126	1.9	2.2
	3:6	134.3	128	132.2	121.6	130.6	128.1	195	213	1.9	2.9

Words	S:T	L		R		L	R	L	R	L	R
		MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	SD	SD
ké:lā 'kohl'	3:1	154.2	149.3	145.9	137.6	151.8	142.7	285	207	1.4	2.9
	3:2	183.7	179.9	174.8	170.1	181.7	171.7	236	150	1.2	1.3
	3:3	183.7	180	174.3	169.9	181.8	171.7	229	168	1.2	1.2
	3:4	183.7	179.9	174	170.1	181.7	171.6	236	155	1.2	1.2
kè:lā 'guest'	3:1	124.8	109.1	110.1	106.5	112.9	108.6	157	102	4.2	1.3
	3:2	131.3	126.3	141.2	136.7	127.5	139.5	152	126	1.2	1.2
	3:3	132.6	121.1	140.3	134.1	126.9	137.7	247	149	2.8	1.8
	3:4	132.5	124.1	140.3	134.1	126.9	137.8	250	141	2.7	1.7
	3:5	132.6	124.1	140.4	134.6	126.8	137.8	237	240	2.7	1.2
kē:lā 'counting'	1:1	130.1	121.5	120.6	116.9	124.9	118.7	97	48	2.9	1.4
	3:1	140.5	134.6	133.1	130.2	137.4	131.3	199	192	1.6	0.8
	3:2	137.3	130.5	126.2	124.6	132.4	125.5	139	152	2.1	0.5
	3:3	152.8	146.7	151.4	146.7	150.2	149.2	126	115	2.1	1.8
	3:4	152.7	146.3	151.5	146.6	150.4	149.4	106	122	2.1	1.7
3:5	152.7	146.3	151.4	146.7	150.2	149	118	170	2.2	1.6	

Words	S:T	L		R		L	R	L	R	L	R
		MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	SD	SD
ũ:lâ 'wild edible root'	3:1	178	133.4	169.3	132.2	153.8	143.6	173	144	16.2	12.6
	3:2	206.5	93.6	172.4	135.9	178.5	146	282	160	29.7	10.6
	3:3	206.5	137	170.8	135.9	180.7	146.3	279	152	26.9	10.7
	3:4	205.9	135.8	164	136	180.6	144.6	282	146	27	9
	3:5	206.3	136.2	178.1	136.2	183	146.2	326	279	25.9	11.8
	3:6	178.8	125.8	169.3	132.2	157.2	143.6	319	144	18.2	12.6
	3:7	205.9	135.9	168.5	136.1	182.5	145.4	313	163	26.3	10.1
ũ:lâ~ 'locust'	3:1	137.7	132.6	148.9	132.9	135.1	141.9	160	53	1.5	5.4
	3:2	167.6	159.3	193.8	140.7	164.1	162.2	276	141	2.9	18.8
	3:3	156.2	152.6	171.3	151.6	154.7	165.2	279	75	1	6.7
	3:4	156.2	150.9	170.1	154.4	154.5	165.9	290	67	1.4	5.7
	3:5	156.2	151.1	170.8	155.8	154.5	166.6	301	65	1.3	4.9
ũlâ 'body (human)'	3:1	159.5	151.9	151.2	147.5	154.6	148.9	99	170	2.6	1
	3:2	133.9	117.7	119.2	113.7	125.3	116.4	109	125	5.3	1.9
	3:3	133.7	117.3	119.8	113.7	124.2	116.6	96	126	4.6	1.9
	3:4	134.3	118.5	120.9	113.7	125.4	116.9	105	150	5.2	2.1
	3:5	138.5	131.1	124.7	115.1	133.3	119.3	72	178	2.4	3.1

Words	S:T	L		R		L	R	L	R	L	R
		MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	SD	SD
sā:sā~ 'wide'	3:1	181.2	143.4	165.7	143.7	164.7	154.6	146	46	13.9	8.3
	3:2	180.8	143.3	167.9	145.8	163.8	156.5	147	49	14.2	8.7
	3:3	184.3	143.7	171.3	132.3	167.3	149.8	170	110	13.9	12.3
	3:4	184.3	142.7	177.8	132.2	166.6	153.5	181	133	14.6	14.8
sà:sā 'learning'	3:1	126.8	118	138.2	131.4	123.3	134.7	178	194	2.1	1.9
	3:2	126.6	118.9	139.2	130.5	121.8	135	150	176	1.9	3.1
	3:3	131.7	124.5	137.8	134.8	128.8	135.9	229	229	1.6	0.8
	3:4	130.4	124.3	137.7	134.8	128.8	135.9	223	199	1.6	0.8
sà:sā 'telling'	3:1	123	116.8	138.3	131.7	119.9	133.7	189	101	1.3	2.1
	3:2	140.9	116.8	135.9	131.8	121.2	132.9	163	162	4.6	0.9
sāssā 'comb (n)'	3:1	135.8	123.8	144.1	141.9	129.2	143	69	173	4.8	0.7

Words	S:T	L		R		L	R	L	R	L	R
		MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	SD	SD
kò:jà ‘giving birth’	3:1	126.1	110.1	126.9	122.3	117.5	125.7	44	110	5.3	1.1
	3:2	117.6	108.6	126.9	122.3	113.9	125.6	44	115	4.3	1.2
kō:jà ‘hunting’	2:1	130.3	125.8	139.2	118.6	128.4	128.4	97	61	1.3	7.1
	3:1	151.8	143.3	168.3	157.8	147.9	162.2	120	57	3.5	3.6
	3:2	159.2	152.3	175.1	126.6	156.3	147.5	271	142	1.9	14.7
	3:3	159.1	152.1	178.5	126.5	156.3	148.5	266	150	1.9	15.7
kō:jà ‘washing one’s body/hand’	3:1	133.2	127.2	147.6	117.3	130.9	128.7	162	83	2.3	10.4
	3:2	152.8	143.3	168.3	157.8	147.9	162.4	120	57	3.5	3.6
	3:3	159.2	152.3	175.1	126.6	156.3	147.5	271	142	1.9	14.7
	1:1	130.3	125.8	139.2	118.6	128.4	128.4	97	61	1.3	7.1
‘kó:jà ‘healthy’	3:1	223.6	195.6	147.1	137.7	207.7	139.8	62	80	10.3	2.6
	3:2	196.6	171.7	∅	∅	183.7	∅	43	∅	9.8	∅

Words	S:T	L		R		L	R	L	R	L	R
		MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	SD	SD
búrá ‘pierce’	3:1	195.5	189.3	149.2	132.7	193.4	139.2	49	101	2.6	4.4
	3:2	195.5	188.9	150.1	133.1	193.3	139.7	62	109	2.4	5.1
	3:3	240.4	229.7	197.3	151.1	237.2	162.7	69	144	4.2	14.3
	3:4	240.5	226.4	184.3	151.2	236.2	159.4	77	133	5.2	10.6
	3:5	240.5	225.3	183.9	151.2	236.4	159.1	83	131	5.2	10.3
būrā ‘satiety’	3:1	153.8	139.1	172.5	132.8	146.3	154.7	56	136	5.5	14.8
	3:2	155.6	139.2	173	133	147.8	156.3	64	146	5.9	15
bū:rā ‘spotty (color of an ox)’	3:1	143.9	141.6	144.6	137.8	143	141.4	204	197	0.6	1.9
	3:2	158.4	123.9	152.3	147.5	148.3	149.9	361	187	7.1	1.5
	3:3	152.6	149.3	152.3	147.5	150.9	149.8	292	192	0.9	1.4
	3:4	152.5	149.3	152.2	147.6	150.9	149.8	329	138	0.9	1.6

Words	S:T	L		R		L	R	L	R	L	R
		MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	SD	SD
súsá 'preparing'	3:1	184	181.4	181.5	166.9	182.7	172.5	36	96	1.1	4.9
	3:2	191.7	167.6	167.4	165.4	179.5	166.4	57	128	7.9	0.8
	3:3	182.7	167.7	171.8	165.4	177.4	166.9	46	155	6	1.5
sú:sá~ 'soup (of meat)'	3:1	244.3	237.2	203.6	148.9	241.2	169.4	218	159	2	16.7
	3:2	244.4	235.5	207.2	149.3	241.1	171.2	216	157	2.2	17.5
sū:sā 'tree name'	3:1	174.3	167.7	169.3	156.5	172.5	161.6	181	83	1.4	4
	3:2	150.6	147.1	145.3	134.2	148.8	138.9	155	155	1.2	2.7
sū:sā 'standing up'	3:1	149.3	145.6	166.5	127.8	146.9	145.8	138	141	1.1	12.2
	3:2	149.6	141.4	169.2	126.8	146.3	146.6	150	154	1.7	13.3
	3:3	136.7	131.3	153.2	127.4	133.6	140.6	155	70	1.7	8.8
	3:4	143.2	139.7	171.3	129.2	140.9	149.7	200	77	0.8	15
	3:5	142.6	139.8	167.9	126.4	141	148.9	166	70	0.7	14
	2:1	164.7	161.6	177.8	128.4	162.5	148.3	130	73	1	15.7
sússà 'co-wife'	3:1	177.6	156.2	126.7	116.4	167.5	121.5	53	152	7.8	3.1
	3:2	177.8	156.9	126.6	116.3	168.1	121.1	57	122	8	3.2
	3:3	229.9	185.2	137.5	124.8	213.2	128.9	77	83	15.5	3.8

Words	S:T	L		R		L	R	L	R	L	R
		MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	SD	SD
kólá~ 'crow'	3:1	182.8	177.4	203.6	134.4	179.6	165.6	59	247	2.1	26.5
	3:2	182.9	176.9	203.8	134.8	179.6	166.1	64	240	2.2	26.4
	3:3	164.3	158.2	186.4	167.3	161.1	180.4	62	69	2.3	7.1
	3:4	163.8	159.6	186.8	164.9	161.8	180.4	36	73	1.8	7.5
	3:5	166.1	162.3	184.7	143.4	164.4	164.5	59	102	1.6	14.9
kòlà 'preventing, defending'	3:1	132.9	126.8	132.4	127.4	128.8	131.8	56	162	2.2	1.7
	3:2	124.5	121.5	125.8	122.4	123.2	124.3	53	75	1	1.2
	3:3	140.9	138.3	158.4	155	139.4	156.7	59	194	1.1	1
	3:4	124.6	120.9	125.8	121.3	123.1	124.1	64	97	1.2	1.5
	3:5	129.3	121.8	125.2	120.7	126.6	122.8	51	181	2.9	1.3
	3:6	123.6	117.1	128.5	126.9	121.5	127.7	61	128	2	0.4
	3:7	123.5	119.2	129.1	127.4	121.8	128	59	89	1.6	0.5
	3:8	134.7	133.9	144.3	139	134.3	141.6	59	70	0.3	1.9
'kòllá 'engulfing'	3:1	168.3	154.5	172.3	161.3	157.6	169.6	59	40	5.4	4
	3:2	165.1	155.5	178.9	168.4	157.6	176.4	125	62	2.2	3.8
kòllā 'friend'	3:1	133.6	124.2	131.2	128.9	128.4	130.2	76	114	3	0.8
	3:2	144.9	123.8	143.1	136.9	134.4	140.5	63	167	6.7	1.9
	3:3	135.1	123.7	143.1	136.9	127.8	140.5	86	146	3.3	2.1
	3:4	137.5	130.1	153.2	141.4	133.2	148.5	93	301	1.9	2.7

Words	S:T	L		R		L	R	L	R	L	R
		MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	SD	SD
kàilā ‘fear (n)’	1:1	142.3	125.0	129.9	124.8	129.6	127.2	197	109	4.7	1.8
	1:2	128.2	117.7	133.7	123.4	119.8	126.3	128	67	2.9	4.7
	3:1	129.1	115.5	131.3	127.6	122.2	128.8	226	99	2.9	1.2
	3:2	113.9	99.2	116.4	109.3	103.3	114.3	226	114	4.1	2.2
	3:3	112.1	99.8	116.4	109.3	102.3	113.7	266	70	2.7	2.5
kāilā ‘parrot’	3:1	181.9	141.9	157.8	129.8	161.3	141.6	216	110	14.6	9.2
	3:2	161.6	142	-	-	153.4	-	179	-	6.5	-
	3:3	161.3	142.2	-	-	153.7	-	168	-	6.2	-
étā ‘hawk’	3:1	219.3	204.1	167.4	151.6	216.3	157.1	275	245	3.8	4.2
	3:2	219.3	204.2	167.7	151.5	216.4	157.1	294	281	3.9	4
ētā ‘relative (by marriage)’	3:1	145.9	121.9	126.3	110.8	135.3	114.9	229	160	7.8	4.6
	3:2	159.1	113.6	132.2	115.7	139.8	122.9	179	89	16.3	5.8
	3:3	159.6	113.8	151.7	114.7	145.7	127.7	304	120	15.7	10.8
	3:4	159	113.9	137.6	115.2	139.5	124.9	167	107	15.7	7.5
	3:5	145.9	122	131.4	110.9	135.2	115.9	162	175	8.2	5.9
áddā ‘son’	3:1	158	154	115	110.6	154	112.5	69	126	1.4	1.4
	3:2	183.1	175.2	133.1	124.7	180.7	127.7	202	152	2.5	2.4
áddā ‘wild area’	3:1	157.1	147.4	140.6	122.1	154.8	127.4	103	122	3.1	5.8
	3:2	195	186.3	170.8	134.8	191.9	151.4	150	140	2.2	10.7
	3:3	175.6	160.5	163.3	149.2	171.3	156.6	185	75	4.5	5.5
‘mökkā ‘lion’	3:1	155.4	149.4	160.5	153.8	152.6	155.7	371	331	1.4	1.5
	3:2	128.7	122.9	128.3	117.8	125.7	120.5	122	104	1.9	122
	3:3	129.7	123.3	127.3	123.2	126.9	123.9	104	171	2.4	0.8
	3:4	155.4	149.7	159.6	153.8	153.1	156	118	192	1.7	1.4
mökkā ‘mollusk’	3:1	121.6	115.9	130.2	123.1	120	124.4	220	189	1.6	1.7
	3:2	120.2	103.3	133.3	124.9	112.1	128	115	183	5	2.9
	3:3	121.4	116.1	127.3	123.2	120	123.9	64	171	1.8	0.8
ótā ‘uprooting’	3:1	214.9	201.8	168.4	146.7	210.4	150.6	139	212	4.1	5.6
	3:2	214.9	201.6	165.7	146.6	210.4	150.6	134	168	4.1	5.2
	3:3	221.3	209.3	153.1	143	217.4	145.6	165	205	3.4	2.7
òtā ‘thorn’	3:1	130.5	125.2	116.1	107.5	127.5	111.5	244	130	1.7	2.7
	3:2	129.9	122.9	132	119.6	127.2	121.7	279	220	2	3.1
	3:3	129.9	119.7	148.6	119.6	126.9	122.8	295	216	2.5	6.1
	3:4	150.4	138.6	154.3	143.3	145.9	148	208	109	4.2	3.8
kōitā ‘tiger’	3:1	188	160.1	190.5	185.1	171.6	188.8	374	175	5.6	1.4
	3:2	200.6	159.6	190.5	185.4	172.5	188.8	342	163	6.5	1.5
	3:3	142.3	130.3	156.4	146.8	135.9	150.8	314	245	2.5	1.9
	3:4	138.9	130.2	155.6	146.8	135.6	150.5	284	221	2.3	1.6
kòitā ‘lean against’	3:1	130.3	122.1	136.9	127.6	127.5	132.2	234	157	2.9	3.4
	3:2	130.3	122.2	136.5	127.6	127.4	131.3	239	130	2.7	3.1
	3:3	136.8	123.8	142.4	133.5	128	136.8	212	131	2.5	2.9
	3:4	121.2	106.6	126.5	116.9	111.4	119.9	232	192	3.8	2.9
	3:5	121	106.9	129.8	115.9	113.1	122.5	248	97	4.1	4.9
	3:6	120.9	103.2	124.4	116.9	110.8	119.1	244	134	3.9	2.1

Words	S:T	L		R		L	R	L	R	L	R
		MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	SD	SD
fūdā ‘milking’	3:1	230.7	197.3	184.7	162.3	210.3	173.9	171	59	7.1	8.4
	3:2	215.6	197.2	184.8	157.6	209.2	171.7	141	64	5.3	9.4
fūdā ‘withering’	3:1	167.5	155.6	157.2	152.6	159.9	154.6	200	305	2.2	1.2
	3:2	160.7	155.9	156.6	151.6	159.3	154.3	154	125	1.3	1.2
	3:3	160.7	157.4	156.8	152.8	159.6	154.3	88	126	1	1.3
fālā ‘cheek’	3:1	154.6	147.7	174.6	119.9	151.3	147.7	221	186	2.5	20.9
	3:2	147.6	140.1	155	143.2	144.6	150.9	199	59	2.7	4.3
	3:3	147.5	140.1	156.4	146.5	144.3	152.4	179	57	2.8	3.3
fālā ‘proverb’	3:1	136	125.5	119.4	105	130.9	109.4	149	160	4.1	3.6
	3:2	155.2	131.8	130.2	110.6	144.3	118.9	204	152	8.5	4.2
	3:3	157.5	138.7	134.2	109.1	149.9	119.2	178	94	7.2	8.6
	3:4	157.6	141.9	135.1	109.2	141.9	119.5	125	88	4.6	8.8
fādā ‘throwing’	3:1	157.8	152.5	130.8	110.3	154.6	120.9	181	109	1.5	6.4
fādā ‘winnowing’	3:1	166.2	157.9	129.4	117.1	160.9	123.6	178	64	2.2	4.2
	3:2	158.2	155.1	143.9	125.9	156.8	133.4	152	107	0.9	6.1

## F<sub>0</sub> Values in Trisyllabic Words

Words	S:T	L		M		R		L	M	R	L	M	R	L	M	R
		MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	Mx	Mn	AvF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	VD	SD	SD	SD
ʃɪgídā ‘animal’	1:1	151.2	115.9	127.7	116.4	113.7	105.5	128.3	123.2	108.8	65	56	48	11.5	4.3	3.2
	3:1	177.5	174	205.4	186.5	153.8	136.5	175.5	198.1	144	62	73	86	1.3	7.3	6.2
	3:2	138.7	133.9	148.5	139.5	125.2	109.7	136.6	144.5	115.9	75	91	126	1.7	3.4	5
	3:3	146.7	141.4	176.8	154.2	142.5	124.7	143.9	170.1	132.9	64	91	117	1.9	7.4	5.7
	3:4	196.1	176.9	224.1	206.1	163.2	143.8	185.4	214.4	148.9	85	93	115	6.6	8.5	6
	3:5	196.5	176.8	224	205.9	163.4	143.8	184.4	221.2	148.8	72	40	110	7.2	6.7	5.8
ʃɪgídā ‘trap(n)’	3:1	127.5	110	122.2	110.3	129.8	109.9	121.5	116.8	119.9	69	85	126	6.9	5.4	6
	3:2	134.1	114.1	123.4	113.2	137.1	128.9	125.3	120.7	130.7	75	80	316	7.2	3.5	1.4
	3:3	134.2	119.4	135.3	127.4	135.7	133.3	126.3	131.9	134.7	59	96	123	6.5	2.6	0.7
	3:4	138.5	132.6	130.1	120.4	142.2	138.4	135.6	127	140.3	38	61	116	2.5	3.2	1.2
	3:5	138.6	128.9	130.4	127.7	141.8	140.4	134.9	129	141	51	56	61	3.4	0.9	0.5
kébésâ ‘a baby ...’	3:1	201.9	194.5	198	190.3	184	128.5	198.8	194.1	144.9	67	99	231	2.6	2.7	14.8
	3:2	269.6	251.4	252.6	240.6	230.2	153.9	261.2	247.2	172.6	78	86	200	5.5	4.8	20.6
kē bēsā ‘relative(by blood)’	3:1	133.7	124.9	147.3	143.5	136.1	107.3	127.3	146.1	116.9	61	49	152	3.4	1.6	8.6
	3:2	153.1	142.6	169.7	167.8	156.6	130.2	148.7	168.8	140.9	57	49	146	3.6	0.8	7.3
	3:3	155.4	139.6	160.9	156.3	161.8	126.5	144.5	159	138.7	49	69	122	6.4	1.8	10.5
kófūlá ‘credit’	3:1	174.7	133.2	175.1	167.4	193.8	125.2	147.1	169.2	160.7	88	51	192	12.1	2.4	23.1
	3:2	155.8	128.9	145.2	141.5	132.9	120.8	135.8	142.9	126.5	48	85	38	10.9	1.4	5
	3:3	131	125.7	158.5	149.9	136.2	115.2	128.4	154.1	123.6	44	69	81	2.6	2.9	6.9
	3:4	198.6	194.5	257.4	234.2	197.6	152.2	196.3	247.2	165.4	54	102	170	1.5	8.1	12.8
	3:5	197.7	193.9	257.6	235.8	193	152.2	195.9	247.2	164.4	70	96	165	1.3	7.5	11.9
kòfūlá ‘smearing(tr)’	3:1	135.5	120.4	143.8	136.9	159.4	119.9	128.4	139.4	138.8	53	65	134	5.8	2.2	12.9
	3:2	126.9	119.7	164.6	148.4	173.1	128.9	124.1	156	158.3	89	71	118	2.4	5.1	15.2
	3:3	131.9	122.3	163.9	152.6	171.2	150.4	127.9	158.5	161.5	54	78	51	3.9	4.9	7.8
	3:4	135.6	132.2	178.5	163.6	187.9	166.9	133.4	167.3	177.9	57	90	144	1.5	5.5	7.9
	3:5	137.1	131.9	175.8	162.7	193.9	165.9	133.7	166.1	181.1	36	77	244	2.2	4.1	9.9

## F<sub>0</sub> Values in Trisyllabic Words

Words	S:T	L		M		R		L	M	R	L	M	R	L	M	R
		MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	Mx	Mn	AvF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	VD	SD	SD	SD
ʃɪgídā ‘animal’	1:1	151.2	115.9	127.7	116.4	113.7	105.5	128.3	123.2	108.8	65	56	48	11.5	4.3	3.2
	3:1	177.5	174	205.4	186.5	153.8	136.5	175.5	198.1	144	62	73	86	1.3	7.3	6.2
	3:2	138.7	133.9	148.5	139.5	125.2	109.7	136.6	144.5	115.9	75	91	126	1.7	3.4	5
	3:3	146.7	141.4	176.8	154.2	142.5	124.7	143.9	170.1	132.9	64	91	117	1.9	7.4	5.7
	3:4	196.1	176.9	224.1	206.1	163.2	143.8	185.4	214.4	148.9	85	93	115	6.6	8.5	6
	3:5	196.5	176.8	224	205.9	163.4	143.8	184.4	221.2	148.8	72	40	110	7.2	6.7	5.8
ʃɪgídā ‘trap(n)’	3:1	127.5	110	122.2	110.3	129.8	109.9	121.5	116.8	119.9	69	85	126	6.9	5.4	6
	3:2	134.1	114.1	123.4	113.2	137.1	128.9	125.3	120.7	130.7	75	80	316	7.2	3.5	1.4
	3:3	134.2	119.4	135.3	127.4	135.7	133.3	126.3	131.9	134.7	59	96	123	6.5	2.6	0.7
	3:4	138.5	132.6	130.1	120.4	142.2	138.4	135.6	127	140.3	38	61	116	2.5	3.2	1.2
	3:5	138.6	128.9	130.4	127.7	141.8	140.4	134.9	129	141	51	56	61	3.4	0.9	0.5
kébésâ ‘a baby ...’	3:1	201.9	194.5	198	190.3	184	128.5	198.8	194.1	144.9	67	99	231	2.6	2.7	14.8
	3:2	269.6	251.4	252.6	240.6	230.2	153.9	261.2	247.2	172.6	78	86	200	5.5	4.8	20.6
kē bēsā ‘relative(by blood)’	3:1	133.7	124.9	147.3	143.5	136.1	107.3	127.3	146.1	116.9	61	49	152	3.4	1.6	8.6
	3:2	153.1	142.6	169.7	167.8	156.6	130.2	148.7	168.8	140.9	57	49	146	3.6	0.8	7.3
	3:3	155.4	139.6	160.9	156.3	161.8	126.5	144.5	159	138.7	49	69	122	6.4	1.8	10.5
kófūlá ‘credit’	3:1	174.7	133.2	175.1	167.4	193.8	125.2	147.1	169.2	160.7	88	51	192	12.1	2.4	23.1
	3:2	155.8	128.9	145.2	141.5	132.9	120.8	135.8	142.9	126.5	48	85	38	10.9	1.4	5
	3:3	131	125.7	158.5	149.9	136.2	115.2	128.4	154.1	123.6	44	69	81	2.6	2.9	6.9
	3:4	198.6	194.5	257.4	234.2	197.6	152.2	196.3	247.2	165.4	54	102	170	1.5	8.1	12.8
	3:5	197.7	193.9	257.6	235.8	193	152.2	195.9	247.2	164.4	70	96	165	1.3	7.5	11.9
kòfūlá ‘smearing(tr)’	3:1	135.5	120.4	143.8	136.9	159.4	119.9	128.4	139.4	138.8	53	65	134	5.8	2.2	12.9
	3:2	126.9	119.7	164.6	148.4	173.1	128.9	124.1	156	158.3	89	71	118	2.4	5.1	15.2
	3:3	131.9	122.3	163.9	152.6	171.2	150.4	127.9	158.5	161.5	54	78	51	3.9	4.9	7.8
	3:4	135.6	132.2	178.5	163.6	187.9	166.9	133.4	167.3	177.9	57	90	144	1.5	5.5	7.9
	3:5	137.1	131.9	175.8	162.7	193.9	165.9	133.7	166.1	181.1	36	77	244	2.2	4.1	9.9

Words	S:T	L		M		R		L	M	R	L	M	R	L	M	R
		MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	MxF <sub>0</sub>	MnF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	AvF <sub>0</sub>	VD	VD	VD	SD	SD	SD
āmādā 'baboon'	3:1	127.5	125.5	132.9	128	145.7	137.2	126.8	130.2	141.9	112	141	117	0.8	1.8	3.7
	3:2	153.3	150.2	156.2	153.8	176	141.4	152.5	155.4	156.8	138	155	69	0.9	0.8	13.1
	3:3	153.3	149.7	156.2	153.7	108	103.6	152.4	155.1	105.7	115	192	56	1.2	0.9	1.8
	3:4	153.3	149.3	156.2	155.3	176.2	141.2	152.4	155.8	156.9	89	107	66	1.3	0.3	12.9
	3:5	153.3	150.5	156.1	153.8	177.6	142.9	152.7	155.5	158.9	75	136	60	0.9	0.7	12.6
āmā dā 'sadder'	3:1	127.2	125.3	170.7	148.6	135.3	131.7	126	163.7	133.3	122	160	168	0.8	7	1.3
	3:2	127.7	110.1	151.2	131.7	110.2	103.4	116.2	145.4	106.3	97	149	71	4.8	6.3	2.2
	3:3	117	84.9	151.2	129.9	108	103.6	111.3	144.9	105.7	146	154	56	9.7	6.9	1.8
	3:4	116.9	110.1	151.2	138.6	108	103.6	114.9	147.5	105.7	73	106	56	1.9	4.3	1.8
	3:5	117.1	113.6	151.3	139.7	108.5	103.5	115.4	148.1	106	70	101	60	1.1	3.6	1.9
kāfātā 'buttock'	3:1	156	137.5	144.9	137	152	134.7	149.2	141.8	138.7	83	97	160	5.2	2.6	5.1
	3:2	151.6	143.3	144.9	137.7	142.2	134.7	149.1	142.5	136.5	57	64	123	3.2	2.6	1.9
	3:3	140	134.8	145.8	135.5	147.5	131.9	136.6	138.3	134.3	91	93	226	1.7	3.4	3.7
	3:4	123.9	121.4	136.4	132.8	∅	∅	122.4	135.5	∅	77	73	∅	1.2	1.4	∅
	3:5	151.6	142.4	144.9	137.6	142.4	134.7	148.6	141.9	136.4	54	73	134	3.6	2.9	2
kāfā 'down'	3:1	133.9	124.4	126.7∅	124.8∅	141.2	114.5	127	126 ∅	125.6	130	∅	89	2.6	∅	9.9
	3:2	132.9	124.5	127∅	125∅	136.7	114.6	126.8	125.8∅	122.8	126	∅	73	2.3	∅	7.8
	3:3	133.2	124.7	127.2	125.5	137.9	114.5	127.5	126.3	124	77	133	76	3.1	0.5	8.6

**Appendix-IV Raw Duration Scores of /ŋ/, /g/ and [ŋg]**

Contexts	Duration in ms across Tokens								
	Initial			Medial					
	/ŋ/			/ŋ/			[ŋg]		
ŋādā ‘food’	109	134	106						
ŋàŋà ‘mosquito’	96			75	70				
ŋòŋà ‘frog’	85			77	76	87			
fīŋà ‘thin’				97	92	94			
ŋáŋgíjā ‘branch(tree)’	117						115	126	
sāŋgā ‘bone’							109	141	
āŋgillā ‘sugar cane’							220	186	
āsāŋgā ‘head’							114	120	
	Initial /g/			/g/					
gē:rā ‘long’	88	95	95	50	46				
gì:rā ‘horn’	85								
gò:mā ‘chin’	96								
gūdžā ‘stick’	95								
làqā ‘earth, land’							75	82	
āgā ‘navel’							64	60	
fōgā ‘cloth’							75		
sògā ‘chest’							73	49	48

## Appendix-V Sample Annotated Text

The annotated corpus documentation (.eaf) comprises of Kunama tangible cultural traits that were videotaped during a visit to the Kunama Cultural Museum in Shiraro town, three short tales, a proverb and an autobiography of an elderly Kunama. All texts are annotated in five tiers, namely, text (t), word (w), morpheme break (mb), gloss (gl) and free translation (ft), which are time aligned. The initial letters of the tier types and the consultant's name are used to create each tier. While the free translation is in English orthography, the remaining four tiers are IPA transcriptions. Among the annotated texts, the present study uses the annotation of Kunama cultural artifacts in the introductory chapter. Since the primary aim of this study is describing the phonology of Kunama, the annotation of longer texts is presented only for a digital archive. In the sample annotation given below, the free translation tier additionally contains detail description of the respective cultural item.

t@B àmā dōkā

w@B àmā dōkā

mb@B àmā dōkā

gl@B this (is) a cooler

ft@B This is Kunama's traditional device that is used to keep water and alcoholic drinks cold.

t@B àmā lākādžâ

w@B àmā lākādžâ

mb@B àmā lākādžâ

gl@B this filter

ft@B This is Kunama's traditional funnel like filter that is used to stir the fine alcohol (of their own) from the residue.

t@B àmā àndā jī:ná dádá/ sālānbómā  
w@B àmā àndā jī:ná dádá/ sālānbómā  
mb@B àmā àndā jī:ná dádá/ sālānbómā  
gl@B this big dirt separating winnower  
ft@B This is Kunama's big size winnower, alternatively called **sālānbómā**, is used to remove chaff from the fine grain.

t@B àmā kōntálà  
w@B àmā kōntálà  
mb@B àmā kōntálà  
gl@B this plate  
ft@B This is a plate used to take hold of Injera or pancake from the baking plate.

t@B àmā jǎlà  
w@B àmā jǎlà  
mb@B àmā jǎlà  
gl@B this winnower  
ft@B This is the small size winnower of Kunama used to remove chaff out of the fine grain.

t@B àmā kókk<sup>wā</sup>  
w@B àmā kókk<sup>wā</sup>  
mb@B àmā kókk<sup>wā</sup>  
gl@B this grain basket  
ft@B This is Kunama's grain basket that is used to store maize and sorghum. It can also be used to carry such grains to the farm during harvesting season.

t@B àmā sékènā

w@B àmā sékènā

mb@B àmā sékènā

gl@B this cup

ft@B This is a traditional cup used to drink water and often Kunama's local beer called  
**àifā**

t@B àmā àndzèrà

w@B àmā àndzèrà

mb@B àmā àndzèrà

gl@B this knife

ft@B This is Kunama's knife.

t@B àmā láūsā

w@B àmā láūsā

mb@B àmā láūsā

gl@B this axe

ft@B This is an axe of Kunama.

t@B àmā-n bólà

w@B àmā-n bólà

mb@B àmā n bólà

gl@B this INTR whip

ft@B This is Kunama's whip used to urge on oxen during ploughing.

t@B àmā másā

w@B àmā másā

mb@B àmā másā

gl@B this spear

ft@B This is Kunama's spear used for hunting wild animals, defending oneself from an  
enemy and digging land.

t@B àmā tágītā/ bārnátā/kábéllā

w@B àmā tágītā/ bārnátā/ kábéllā

mb@B àmā tágītā/ bārnátā/ kábéllā

gl@B this hat hat hat

ft@B This is uniquely of Kunama male hat with three alternative names. The latter two names are adapted forms of Tigrinya/Amharic origin terms.

t@B àmā jīnnā

w@B àmā jīnnā

mb@B àmā jīnnā

gl@B this mat

ft@B This is Kunama's traditional mat used for sleeping and decorating houses.

t@B àmā dādà nāṅārà

w@B àmā dādà nāṅārà

mb@B àmā dādà nāṅārà

gl@B this bead gravel

ft@B This is a gravel like bead, often worn by females and put on their necks. But, males can also wear this bead.

t@B àmā tājá nè:là dādà

w@B àmā tājá nè:là

mb@B àmā tājá nè:là

gl@B this dog tongue

ft@B This bead looks like dog's tongue and can be worn by both male and female.

t@B àmā mīnd-è dādà

w@B àmā mīnd-è dādà

mb@B àmā mīnd è dādà

gl@B this leg PL bead

ft@B This is a foot/leg bead used only by females, and they wear it on their ankle.

t@B àmā kənínā dādà  
w@B àmā kənínā dādà  
mb@B àmā kənínā dādà  
gl@B this pill bead  
ft@B This is a pill like bead that is put on the neck of females.

t@B àmā fōnfōrà  
w@B àmā fōnfōrà  
mb@B àmā fōnfōrà  
gl@B this flute  
ft@B This is Kunama's flute having five small holes like the ordinary flute used by other ethnic groups in Northern Ethiopia.

t@B àmā fīnńá āfàràdà  
w@B àmā fīnńá āfàràdà  
mb@B àmā fīnńá āfàràdà  
gl@B this female bangle  
ft@B This is commonly known to be female's bracelet worn by unmarried women, as put on the lower arms. However, the Kunama claim for indigenous origin to Aksum show that this bracelet can also be worn by men, as the imperial bodyguards of King Bazen of Aksum were used to wear it.

t@B àmā sàssā  
w@B àmā sàssā  
mb@B àmā sàssā  
gl@B this comb  
ft@B This is a comb used by males and made of wood.

t@B àmā ābāḥgālā/kānkálā

w@B àmā ābāḥgālā/ kānkálā

mb@B àmā ābāḥgālā/ kānkálā

gl@B this lyre lyre

ft@B This is Kunama's lyre and known by two alternative names. This traditional musical instrument has only two strings unlike the commonly known five strings lyre used in Ethiopia.

t@B másā mādā

w@B másā mādā

mb@B másā mādā

gl@B spear the other very sharp end of the Kunama spear

ft@B While másā is used as a generic name for the Kunama spear, the other sharp end of the spear is referred as mādā, which is designed for quick hunting of wild animals

t@B kōntálà

w@B kōntálà

mb@B kōntálà

gl@B Injera plate

t@B sákènā

w@B sákènā

mb@B sákènā

gl@B a traditional cup used to drink Kunama's **àifà** and water

ft@B Though the present study claims the term to be Tigrinya origin that is adapted to Kunama, this native Kunama man does not seem to confirm the claim. Instead, he was asking for the Tigrinya equivalent of the term, so this instance may tell us that the loanword adaptation process of Kunama completely nativize borrowed terms.

t@B fèfèrā

w@B fèfèrā

mb@B fèfèrā

gl@B a small size cup

ft@B This cup is smaller than the previous cup. Both of these are made of the hard skin of the gourd plant and serve for drinking Kunama's local beer as well as water. However, the smaller cup is often used for one person while the larger is often serves when they drink in a group. In addition, the smaller cup can also be used as means of serving each individual with beer from the cooler.

t@B dōkā

w@B dōkā

mb@B dōkā

gl@B traditional cooler

ft@B This helps to keep water and Kunama's traditional beer cold for a longer time. It is made of the raffia grass, and the Kunama believe that the **dōkā** better replaces the modern fridge and is commonly cited as a proof for the long lasting wisdom of Kunama's handcrafting.

t@B ǰǰà

w@B ǰǰà

mb@B ǰǰà

gl@B winnower

ft@B This is used to separate chaff from the fine grain, and it is designed so as to make it easier for males participate in winnowing.

t@B āndzèrā āndzèrā kókkā āndzèrā tíbbíbā

w@B āndzèrā āndzèrā kókkā āndzèrā tíbbíbā

mb@B āndzèrā āndzèrā kókkā āndzèrā tíbbíbā

gl@B knife knife curved or rounded knife straight

ft@B Kunama has different types of knives. Among those, the two notable knives are

the curved knife and the straight knife that are named after their shapes. The former is used for everyday purpose in the house while the latter is often worn by Kunama young males around the waist as a way of showing bravado as well as for self-defense.

t@B lākādzâ

w@B lākādzâ

mb@B lākādzâ

gl@B filter or funnel

ft@B The Kunama uses this funnel to filtrate their traditional beer, **àifà**.

t@B láūsā

w@B láūsā

mb@B láūsā

gl@B axe

ft@B The Kunama axe is similar to the ordinary axe used by other communities.

t@B ĵīnnā

w@B ĵīnnā

mb@B ĵīnnā

gl@B Kunama traditional mat

ft@B The Kunama traditional mat serves different purposes for the community as well as for the non-Kunama people around. The natives use mainly for sleeping, decorating houses and protecting the sun heat as a curtain; whereas, the non-natives use it for building coffee shops and restaurants, as this material helps to mediate the very hot temperature in Shiraro town. The Kunama mat is of different types, for example, **ĵōngō**, **bāddālā gālā** and **ābbùminā**. For house decoration purposes, the Kunama prefers a colorful mat so that they design it with mixed colors.

t@B dādà ṅāṅārà

w@B dādà ṅāṅārà

mb@B dādà ṅāṅārà

gl@B bead gravel, small stones

ft@B This bead type is named after the tiny texture of the bead balls that looks like a gravel or small stones. Although this type is commonly identified as female ornament, Kunama males can also wear it.

t@B mīnd-è dādà

w@B mīnd-è dādà

mb@B mīnd è dādà

gl@B leg, foot PL bead

ft@B This bead type takes its name as it is put on the leg/foot, particularly on the ankle. It often is red and yellow in color, and only females wear it.

t@B tājá ṅè:là

w@B tājá ṅè:là

mb@B tājá ṅè:là

gl@B dog tongue

ft@B This bead type is a necklace named after the shape of each bead that looks like a dog's tongue.

t@B kōnínā dādà

w@B kōnínā dādà

mb@B kōnínā dādà

gl@B pill bead

ft@B This type of bead is also a necklace named after the shape of each single bead that looks like a pill.

t@B kèlù-mā dādà

w@B kèlù-mā dādà

mb@B kèl mā dādà

gl@B guest affirmative bead

ft@B It is bead of a guest. This type of bead is used as a necklace for men, but only Kunama war heroes, brave hunters and honored guests, wear the red bead. It is a symbol of resistance and prestige if worn by male members of the community, whereas, it is used as a symbol of recognition for honored guests that do not belong to the Kunama community.

t@B āfārādà

w@B āfārādà

mb@B āfārādà

gl@B bangle

ft@B This is a bangle commonly worn by unmarried women, but it can also be worn by male members. It can be made from silver, bronze or gold. The Kunama believes that the imperial bodyguards of King Bazen of Aksum who is claimed to be Kunama native by the Kunama community, were used to wear this bangle. The museum guide told me that the trace of the bangle is found in the present day Aksum.

t@B fōnfōrā

w@B fōnfōrā

mb@B fōnfōrā

gl@B flute

t@B sàssā

w@B sàssā

mb@B sàssā

gl@B comb

ft@B Kunama males, in general, use this comb in styling their hair, whereas, young male members used to put a smaller comb on their hair during different occasions.

t@B kānkálā /ābāñgàlā

w@B kānkálā /ābāñgàlā

mb@B kānkálā /ābāñgàlā

gl@B lyre lyre

ft@B Among the traditional musical instruments of Kunama, they believe that the lyre is uniquely of their own and has only two strings. On the other hand, an elder consultant told me that the Kunama lyre is similar with the lyre of the Tukrir that are believed to be recent Muslim settlers, in Eritrea , from Nigeria.

t@B kábēllā/bārnātā/tágītā

w@B kábēllā/bārnātā/tágītā

mb@B kábēllā/bārnātā/tágītā

gl@B hat

ft@B This is Kunama male hat worn both as an ornament during festivals and as sun protection during farming activities. It is decorated around with thread bands of the Ethiopian flag colors, and at the center of the hat, they used to hang a small mirror. With regard to its name, the Kunamas that live in Addi Goshu area use the native term **tágītā**; whereas, those who live in Tahitay Addi Yabo and Shiraro town use two borrowed terms, **bārnātā** and **kábēllā**, from Tigrinya/Amharic, i.e. barnet'a and kep, which are adapted to Kunama.