

# Lugungu Phonology Statement



SIL International  
Uganda-Tanzania Branch



## Table of Contents

Table of Contents .....	1
1 Distribution List .....	3
2 Document Storage.....	4
3 Document History Log .....	5
4 History and Acknowledgment .....	6
5 Background .....	7
6 Consonants.....	8
6.1 Consonant inventory overview .....	8
6.2 Phonetic realisation.....	9
6.3 Positional restrictions on consonant distribution.....	10
6.4 Labialised consonants.....	11
6.5 Palatalised consonants .....	13
7 Vowel phoneme inventory .....	17
7.1 Inventory overview .....	17
7.2 Frequency of occurrence .....	18
7.3 Phonetic realisation.....	19
7.4 Vowel length .....	23
7.5 The phonemic status of [e] and [o] .....	28
8 Syllable structure .....	33
8.1 Word-initial V syllables .....	33
8.2 Vowel sequences .....	33
8.3 Phonotactic restrictions.....	37
9 Root and word structure.....	38
9.1 Nouns .....	38
9.1.1 Basic structure .....	38
9.1.2 Phonotactic restrictions involving consonants .....	43
9.1.3 Phonotactic restrictions involving vowels.....	43
9.2 Verbs.....	44
9.2.1 Basic structure .....	44
9.2.2 Phonotactic restrictions .....	48
10 Morphophonemic processes.....	49
10.1 Vocalic processes.....	49
10.1.1 Vowel height harmony .....	49
10.1.2 ATR harmony.....	50
10.2 Vowel hiatus resolution.....	54
10.2.1 Vowel elision .....	54
10.2.2 Glide formation.....	55
10.2.3 Vowel coalescence .....	56
10.2.4 Epenthesis .....	56
10.3 Consonantal processes.....	56
10.3.1 Hardening/consonant mutation .....	56
10.3.2 Fricative epenthesis .....	56
11 Tone .....	58
11.1 Lexical Tone .....	58
11.2 Morphological Tone. ....	58

11.3	Syntactic Tone.....	59
11.4	Phonologically Conditioned Tone.....	60
11.5	Contrastive tonal melodies of simple nouns.....	60
11.5.1	One mora.....	60
11.5.2	Two mora.....	60
11.6	Contrastive tonal melodies of simple verb roots.....	61
11.6.1	Consonant initial roots.....	62
11.6.2	Vowel initial roots.....	62
11.7	Tone in Phrases.....	62
11.8	Tone Rules.....	62
11.8.1	High Spreading.....	62
11.8.2	Noun Phrase-Final High Boundary Tone.....	62
11.8.3	Topic High Deletion.....	63
11.8.4	Final Floating Low.....	63
	Appendix A - Consonant examples.....	64
	Appendix B - Vowel examples.....	95
	References.....	107

---

Document Title:  
Lugungu Phonology Statement

Date: June 28, 2007  
Issue: B  
Status: Approved

---

## **1 Distribution List**

Chairperson, Buliisa District Language Board

Chairperson, Masindi District Language Board

Chairperson, Hoima District Language Board

District Education Officer, Buliisa District

District Education Officer, Masindi District

District Education Officer, Hoima District

Language Programs Manager, SIL Uganda

Literacy Coordinator, SIL Uganda

Chairperson, Lugungu Bible Translation & Literacy Association

Director, Institute of Languages, Makerere University Kampala

---

Document Title:  
Lugungu Phonology Statement

Date: June 28, 2007  
Issue: B  
Status: Approved

---

## 2 Document Storage

Stored on the SIL Uganda Entebbe File Server: 'Ebb-Server'.

Path: O:\Language Programs\All Uganda Projects\Gungu\Linguistics\Phonology\

Fonts: Charis SIL; Doulos SIL

---

Document Title:  
Lugungu Phonology Statement

Date: June 28, 2007  
Issue: B  
Status: Approved

---

### 3 Document History Log

Issue A	March 29, 2004	Originally a product of the SIL Bantu Phonology Project Lugungu Phonology Analysis Worksheet (PAW) as produced by Rod Casali with assistance from Martin Diprose.
Issue B	June 28, 2007	Updated and corrected by Martin Diprose.

---

Document Title:  
Lugungu Phonology Statement

Date: June 28, 2007  
Issue: B  
Status: Approved

---

## 4 History and Acknowledgment

This phonology statement is the result of the work of a number of different people.

Analysis of the Lugungu language began when SIL International became involved in the development of the language through a Sociolinguistic Survey in 1992. In 1994 Lugungu words were first collected and computerised by SIL linguist, Ron Moe. Ron, with the assistance of various Lugungu speakers, particularly James Mbabazi, undertook the initial analysis of Lugungu phonology. This resulted in the publication in 1999 of the *Lugungu Orthography Guide - Preliminary Version*. In 1999, SIL assigned Martin Diprose as Technical Advisor to the Lugungu Project. The Diprose family lived among the Bagungu in Northwest Uganda from 1999 – 2004. During this time Martin continued analysis of the language. Relevant publications by the end of this time included the *Lugungu Orthography Guide (First Edition)* and *A Brief Lugungu Spelling Guide (Trial Edition)*, both published in 2004.

During 2003-2004 Lugungu became one of three trial languages to use an early version of SIL's *Bantu Phonology Tool*. The tool enabled SIL linguist, Rod Casali with assistance from Martin Diprose to produce a Phonetic Analysis Worksheet which formed the basis for this Phonology Statement.

Thanks must therefore go to various people who have worked on the phonology of Lugungu over the years. These include linguists Ron Moe, Rod Casali, Connie Kutsch Lojenga, and Martin Diprose and a variety of Lugungu speakers including, Sam Jalango, James Mbabazi, Moses Babyenda, Simon Baraza, Fred Kasangaki, and Robert Businge.

Thanks are also due to various members of the Lugungu Bible Translation and Literacy Association (LUBITLA) who interacted with and approved each development of the Lugungu orthography.



## 5 Background

Lugungu is spoken in the Buliisa, Hoima and Masindi districts of Uganda, primarily along the northeast shore of Lake Albert in the Rift Valley. It is also spoken in the hills above the valley. 41% of speakers are located in Buliisa sub-county of Buliisa District. 23% are in Biiso sub-county of Buliisa District. 28% are in Kigorobya sub-county of Hoima District, and 8% in Masindi District and scattered elsewhere in Uganda.

Lugungu is a Narrow Bantu language of zone J. It is classified by the Ethnologue as belonging to the Nyoro-Ganda group (J.10).

Most speakers are bilingual in at least one other language. Most have a minimal spoken proficiency in Runyoro. Many have a minimal spoken proficiency in Alur and some have a minimal spoken proficiency in English. Language use is vigorous in all domains. The language has official status with the government and a working orthography is in place. A Bible translation project is in progress with an active literacy program. There is a Language Association.

The data on which this sketch of Lugungu phonology is primarily based consists of a set of phonetic transcriptions and sound recordings of about 2000 words, mainly nouns and verbs in citation forms. The examples were originally collected by Ron Moe, James Mbabazi and Martin Diprose during the period 1996 – 2003 and were transcribed by Martin Diprose and Rod Casali. The sound recordings were spoken by Fred Kasangaki, an adult male speaker of the dialect of Lugungu spoken in Buliisa sub-county, Buliisa District, Uganda. The recordings were made in Nyapeya village, Buliisa sub-county in February 2003.

Previous work on Lugungu phonology that was consulted in preparation for this statement includes Moe & Mbabazi (1996, 1999) and Kutsch Lojenga (1999).

## 6 Consonants

### 6.1 Consonant inventory overview

Lugungu has a total of 33 consonants at the labial, alveolar, (pre-)palatal, velar, and laryngeal places of articulation. The consonant inventory is shown in (1). Sounds in parentheses are rare in the data.

(1) **Chart of Lugungu plain (non-labialised and non-palatalised) consonant phonemes**

	Bilabial	Labiodental	Alveolar	Postalveolar/ Palatal	Velar	Laryngeal
Voiceless plosives	p		t	tʃ	k	
Voiced plosives <sup>1</sup>	b		d	dʒ	g	
Pre-asalised voiceless plosives	mp		-t	(-tʃ)	ŋk	
Pre-asalised voiced plosives	mb		-d	(-dʒ)	ŋg	
Voiceless fricatives		f	s			h
Voiced fricatives	β	(v)	z			
Pre-asalised voiceless fricatives		(ɱf)	-s			
Pre-asalised voiced fricatives			-z			
Nasals <sup>2</sup>	m		-	ɲ	(ŋ)	
Liquids			l			
Rhotics			r			
Approximants	w			j		

In addition to prenasalised voiced obstruents, which are quite common in Bantu languages, Lugungu also has cross-linguistically less common prenasalised voiceless stops and fricatives. A slightly unexpected gap in the consonant phoneme inventory concerns the absence (at least in our data) of a voiced counterpart /ɱv/ to the prenasalised voiceless fricative /ɱf/.<sup>3</sup>

Also worth noting is a phonemic opposition between an alveolar lateral /l/ and an alveolar flap /r/. In a number of neighbouring Bantu languages, [r] is analysable as an allophone of /l/, but in Lugungu the two segments clearly contrast.

Our analysis of Lugungu consonants recognises, as a marginal member of the consonant inventory, a phonemic voiced labiodental fricative /v/ that is not listed in the consonant

<sup>1</sup> It should be noted that some implosive stops (/ɓ/, /ɗ/) were present phonetically in the recordings, for example [ɗ] occurs in *kí-dê* 'bell (474)', *kí-kédê* 'mat (737)', and *dí-ì* 'religio- (1295)'. In agreement with the previous work of Kutsch Lojenga and Moe who never described implosives as being in contrast with plain stops, it is assumed that the presence of these implosives in some places in the data is simply a matter of free variation. Note however, that Casali (2004) stated that further investigation of this possible contrast should ideally be made.

<sup>2</sup> Moe, Mbabazi (1996 & 1999) list prenasalised (presumably geminate) nasals in the phoneme inventory. See the discussion at 9.1.1.

<sup>3</sup> Note however, that LUBITLA (2006) lists *mu:-<sup>h</sup>vu:li* 'umbrella' which fills in this gap in our data.

inventory presented in the *Lugungu Orthography Guide* (Moe & Mbabazi 2001).<sup>4</sup> This sound exists phonetically in the dialect of Lugungu on which this study is based, though it is apparently found only in loanwords. It is in surface contrast with both /β/ and /f/, as is evident from the following examples:

**(2) Examples of /v/**

kà-vè:rà	‘bag (865)’
kù-vúg-á	‘ride (292)’
kù-kévér-â	‘check (542)’

**(3) Examples of /β/**

kí-βérû	‘thigh (666)’
ì-βérê	‘breast (1968)’
kù-βú:ᵑg-á	‘visit (1405)’
má-βúgû	‘gifts (674)’
kù-kéβér-â	‘mark (541)’

**(4) Examples of /f/**

mù-fè:rùà	‘widow (1270)’
mù-fùrâ	‘dig- itary (690)’
mù-fú:zî	‘orpha- (1299)’
kà-fî:fi	‘poor (1298)’
ì-tâfâ:lî	‘brick (1930)’

Labialised and palatalised consonants occurring phonetically in Lugungu may be analysable as arising from prevocalic C + high vowel sequences underlyingly. (See Sections 6.4 and 6.5 below.)

## 6.2 Phonetic realisation

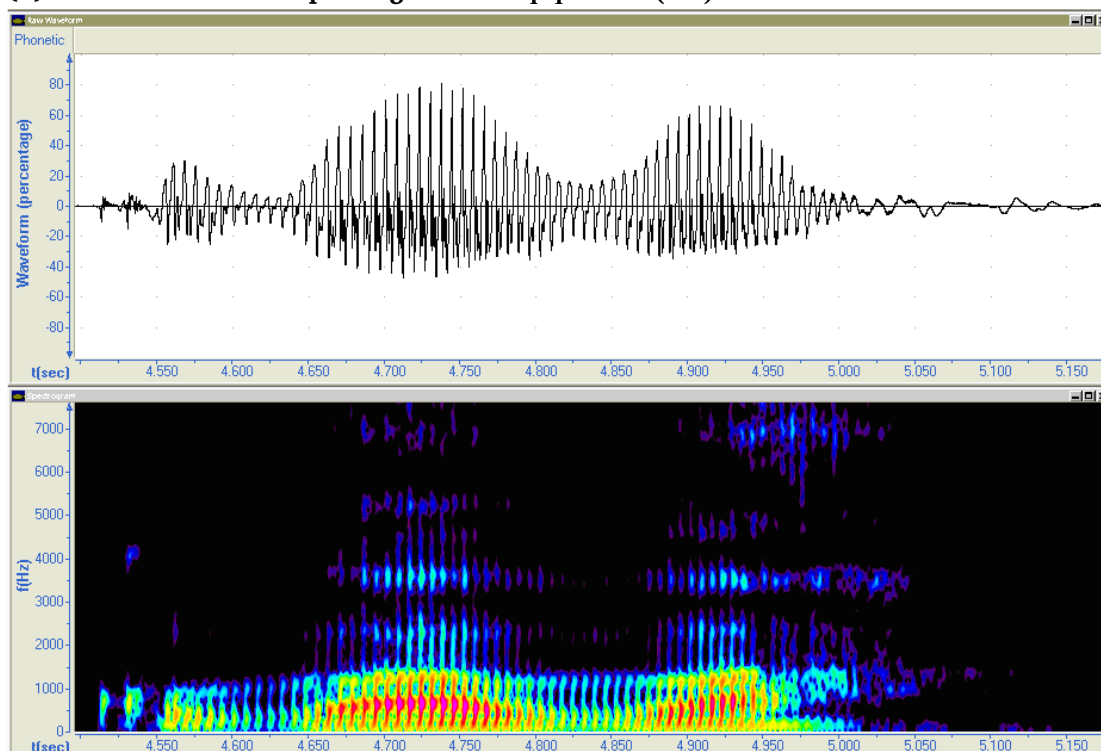
The sound /β/ is typically realised as an approximant, with no high frequency frication noise, and not as a fricative. (Thus, the symbol [v] would actually be more appropriate.)<sup>5</sup> This is clearly evident in the waveform and spectrogram below for the word kù-βáβ-á ‘itch (192)’.

---

<sup>4</sup> It is however, mentioned in LUBITLA (2006) which is the updated version of the *Lugungu Orthography Guide*.

<sup>5</sup> Because the sound /β/ in Lugungu is actually an approximate, rather than a lowered bilabial fricative [β] we should have represented it as [v] everywhere in this document. However, since this same sound occurs in many other Bantu languages and is consistently represented in publication by [β] we have retained that representation for Lugungu as well.

(5) Waveform and spectrogram of kù-βáβ-á ‘itch (192)’



On the other hand /v/, which is in contrast with /β/, is clearly a fricative. If anything, it seems more similar phonetically to [f], as it has clear frication but is not always fully voiced throughout its duration.

The Lugungu speaker who produced the sound recordings on which this analysis is based sometimes realised /β/ as a voiced stop [b] word-initially. In some cases, his productions show variation between word-initial [β] and [b] in consecutive repetitions of the same word.<sup>6</sup> Some limited instrumental measurements we have carried out suggest that these [b] realisations derived from word-initial /β/ may be somewhat shorter in duration on average than voiced stops reflecting underlying /b/, but this has not been systematically investigated using a sufficiently large number of examples to be sure.

Voiceless stops often show moderate to heavy aspiration. VOT's in the range of 35-60 milliseconds (or longer) are common.

### 6.3 Positional restrictions on consonant distribution

There is a tendency for palatal sounds to be avoided word-initially. /d̥ʝ/, /-t̥ʃ/, /-d̥ʒ/, /ɲ/, and /j/ do not occur at all in this environment in the data, while /t̥ʃ/ is rare word-initially.

/v/ does not occur word-initially in the data, while /mf/ does not occur word-medially. As both sounds are rare to begin with, these gaps may well be accidental.

In word- or stem-initial position, whether in nouns or verbs, /r/ normally occurs only before back round vowels or the low central vowel /a/. In non-initial position, /r/ is robustly attested before all vowels.

<sup>6</sup> E.g., examples βí-sá:βù ‘mud (1353)’, βíá"démâ ‘politics (178)’, and βùhió ‘heat (326)’

## 6.4 Labialised consonants

While phonetic labialised consonants (or, alternatively, consonant + [w] sequences) exist and indeed are quite common in Lugungu, it is far from clear that labialised consonants must be recognised as underlying segments. A number of considerations support an alternative analysis which takes all phonetic labialised consonants to be the surface realisation of underlying /C<sub>u</sub>/ or /Cu/ sequences.

To begin with, a large proportion of the phonetic labialised consonants in our data occur in word-initial position and are transparently derived by a process of glide formation that converts the underlying high round vowel of a CV noun class prefix (including the class 15 prefix /k<sub>u</sub>/~/ku/ that occurs with verb infinitives) to [C<sup>w</sup>] before a vowel-initial root. Some examples are given below.

### (6) Examples of word-initial labialised consonants

mù-ì:rá	→	m <sup>w</sup> ì:rá	‘compa- io- (102)’
mù-ì:rú	→	m <sup>w</sup> ì:rú	‘serva- t (104)’
mù-à:ká	→	m <sup>w</sup> à:ká	‘year (74)’
mù-à:- á	→	m <sup>w</sup> à:- á	‘child (75)’
lù-èzô	→	l <sup>w</sup> é zô	‘broom (91)’
βù-ð:ló	→	β <sup>w</sup> ù:ló	‘lazi- ess (107)’
βù-ð:mí	→	β <sup>w</sup> ù:mí	‘life (109)’
kú-á:g-â	→	k <sup>w</sup> á:g-â	‘melt (1764)’
kù-è:g-á	→	k <sup>w</sup> è:g-á	‘k- ow/teach (1769)’
kù-è:r-á	→	k <sup>w</sup> è:r-á	‘grow (1770)’
kù-è:t-á	→	k <sup>w</sup> è:t-á	‘call (1771)’
kù-ì:β-á	→	k <sup>w</sup> ì:β-á	‘steal (1773)’
kù-à:gúl-â	→	k <sup>w</sup> à:gúl-â	‘crawl (1817)’
kù-à:lók-â	→	k <sup>w</sup> à:lók-â	‘shout (1818)’
kù-ì:βál-â	→	k <sup>w</sup> ì:βál-â	‘carry (1837)’

Second, labialised consonants in this environment (as well as in other contexts) fluctuate somewhat in their phonetic realisation, sometimes manifesting a more quasi-vocalic pronunciation that might appropriately be transcribed as a consonant followed by a high round vocalic segment of identifiable [ATR] quality, viz. [C<sub>u</sub>] or [C<sub>u</sub>].

Third, and perhaps even more interestingly, labialised consonants are almost entirely absent in word-final syllables, the only exceptions being a few disyllabic nouns such as ì-g<sup>w</sup>ĩ ‘wasp (1791)’ and lù-k<sup>w</sup>í ‘firewood (328)’ in which the labialised consonant occurs in a word-final syllable that is also the initial (and only) syllable of the root. (This fact may be relevant in view of the well known cross-linguistic tendency for root-initial syllables to license a greater range of contrasts than non-initial syllables.) On the other hand, word-final sequences of the form [C<sub>u</sub>V] or [CuV], as in the examples shown below, are quite common in Lugungu.

### (7) Word-final examples of [C<sub>u</sub>V] or [CuV]

mú-kúà	‘salt (327)’
kà-lihúà	‘da- ce (609)’
kù-kú-á	‘die (12)’

kú-lú-à	‘ooze (14)’
kú-mú-à	‘shave (15)’
kú-gú-à	‘fall (1718)’
ŋ-gólùà	‘- orthwest wi- d (319)’
m-bàlúá	‘fish species (321)’
mú-- úà	‘mouth (331)’
kì-ṅúá	‘vei- (332)’
lù-súá	‘termite (333)’
mù-k <sup>w</sup> á:kúá	‘pla- t species (339)’
Ø-s <sup>w</sup> á:súà	‘mo- itor lizard (340)’
kí-gúò	‘fall (325)’
kí-túò	‘gift (337)’

The prevocalic high round vowels in these examples have a duration, at least at the rate of speech employed in our recordings, that gives them impressionistically a timing that approaches that of a full syllable nucleus. Moreover, as is evident from the tone in these examples, they are capable of bearing either high tone (as in *kì-ṅúá* ‘vei- (332)’), or low tone (as in *m-bàlúá* ‘fish species (321)’).

These phonetic [uV] and [ʊV] sequences do not freely occur word-initially or word-medially however, except in words where they fluctuate somewhat with more fully consonantal realisations, i.e. in which there is variation between [C<sup>w</sup>] and [C<sub>u</sub>] / [C<sub>ʊ</sub>]. In other words, while both [C<sup>w</sup>V] and [C<sub>u</sub>V] / [C<sub>ʊ</sub>V] occur phonetically in Lugungu, there is no clear contrast between them; their distributions are largely complementary, and where they overlap, there is some fluctuation between the two pronunciations. This strongly suggests that all labialised consonants in Lugungu are derived from underlying /Cu/ or /Cʊ/ sequences by a process of glide formation. This process fails (for reasons that must ideally be elucidated) to apply to underlying /CuV/ & /CʊV/ sequences that are word-final. In other contexts, the process is rather gradient and variable in its application, producing outputs that fluctuate somewhat along a continuum from sequences in which the prevocalic high round vowel is simply shortened in duration but retains its inherent quality to outputs in which the surface round vocalic element has a less specific quality that is impressionistically more similar to a generic round semivowel readily transcribable as [w] (or [ʷ]).

The chart below summarises the surface occurrences of the attested labialised consonants in our data before different vowel qualities. Note that labialised C’s occur contrastively before both non-round and non-high round vowels, but not before high round vowels. This pattern is not unexpected, as languages in which a surface labialisation contrast occurs before high round vowels are rare.

**(8) Distribution of labialised consonants before vowels**

C↓ V →	i	ɪ	e	ɛ	a	ɔ	o	u	u	Total # of Examples
mbw	1			1						2
βw	1					3				4
mw	2	5	5	7	7	3				29
tw					2					2
sw	2				1					3
lw					2					2
rw					1					1
ɲw				1	1					2
kw	4	6	5	28	14	13	1			71
gw	1		1		1					3
ŋgw			1	1						2
C↑ V →	i	ɪ	e	ɛ	a	ɔ	o	u	u	
Total # of Examples	11	11	12	38	29	19	1			

Except in word-final position, where long vowels do not occur in general in Lugungu, vowels following labialised consonants are consistently somewhat long phonetically, with durations that in at least some cases approximate those of underlying long vowels in comparable positions. However, more study is needed to determine whether there is a significant difference in the average durations of underlying long vowels and vowels that are predictably lengthened following Cw's. There does not, in any case, appear to be any contrast in vowel length following labialised consonants.

**6.5 Palatalised consonants**

As in the case of labialised consonants, there is no strong evidence that palatalised consonants exist underlyingly in Lugungu, as it is likely that all surface instances of palatalised consonants derive from underlying /CV/ sequences in which V is a high front vowel, /i/ or /ɪ/. In contrast to labialised consonants, however, which at the phonetic level at least are quite frequently encountered, palatalised consonants are rare in our data even at the phonetic level.

What do occur quite commonly in Lugungu are high front vocalic segments in the context [CiV] or [CɪV], as in the examples are shown below:

**(9) Examples of high front vocalic segments**

- kà-sòlíá 'roof (617)'
- mù-gòβíá 'liar (605)'
- kù-té:rí-à 'add/repeat/co- ti- ue (1650)'
- kú-díkí-à 'drop/immerse (1263)'
- kì-òsí 'a- klet (111)'
- Ø-ìsfòkò 'sti- gy perso- (1796)'

mù-sá: <sup>m</sup> bíà	‘tree species (1067)’
kí-ámú: <sup>n</sup> dâ	‘i- testi- e (153)’
kù-dí-á	‘eat (8)’
kì-àrù	‘village (78)’
mù-βíálá	‘mother-i- -law (344)’
kì-èmérézi	‘p- eumo- ia (143)’
kì-èhóhúlǔ	‘lu- g (141)’
mì-èhé: <sup>m</sup> bú	‘pride (154)’
ká-βá <sup>+</sup> díé	‘southeast wi- d (604)’

In all such cases, the second vowel in the sequence is non-high.

The duration and timing of these prevocalic high vocoids varies somewhat. In extreme cases (which we take to be more likely at faster speech rates), they may be shortened to the point where they are impressionistically non-syllabic and cannot easily be identified with a particular front vowel, so that transcribing the high vocoid as a semivowel [j] (or, more or less equivalently, as palatalisation on the preceding consonant) would seem justifiable. Clearly consonantal realisations of this type are uncommon, however, at least at the rate of speech employed in the recordings in our data. Much more commonly, the prevocalic high vocoid has a timing that is at least approximately that of a full syllable nucleus, and can be uniquely identified with a particular high vowel, [i] or [ɪ]. To be sure, it is not always easy to hear the difference (which is often relatively slight even in other environments) between the two high front vowels in this context. It needs to be emphasised however that the [ATR] distinction between these vowels is not neutralised phonetically in this context. Thus, the final vocalic sequence [ia] in a word like kì-hòhò:liá ‘butterfly (1033)’ is distinct from the sequence [ia] that occurs in a word like Ø-sèfǔlǎ ‘pot (602)’, with the prevocalic high front vowel sounding both slightly higher and with a more [+ATR]-like voice quality (see below) in the former than the latter utterance.<sup>7</sup>

As would be expected of nuclear segments, these prevocalic high front vowels are also tone bearing. This is evident in contrastive pairs like the following:

**(10) Examples of tone bearing prevocalic high front vowels**

má-βià	‘swolle- testicles (322)’
mù-gòβiá	‘liar (605)’

In some, possibly many, of these C<sub>i</sub>V and C<sub>i</sub>V sequences found in our data, the vowel sequence arises across a morpheme boundary. Cases of this type include at least the following:

1. Instances in which a /Ci/ or /Ci/ noun class prefix precedes a vowel-initial noun root, as in the following examples:

**(11) Examples of prevocalic high front vowels preceding a vowel-initial root**

kí-ámú: <sup>n</sup> dâ	‘i- testi- e (153)’
kì-à <sup>n</sup> dá	‘dry seaso- (167)’
βí-á <sup>n</sup> démâ	‘politics (178)’

---

<sup>7</sup> Waveform analysis shows a F1 formant for [i] in ‘butterfly’ as an average of 313 Hz, whereas the F1 formant of [ɪ] in ‘pot’ is 336 Hz.



kì-àrù	‘village (78)’
kì-àtâ	‘sweet potato (79)’
kì-èhóhólǔ	‘lu- g (141)’
kì-èsé	‘pot (89)’
kí-ézô	‘broom (92)’
kì-èmérézĩ	‘p- eumo- ia (143)’
kì-èrérézĩ	‘light ray(144)’
kí-éjâ	‘desert (90)’
lì-òβá	‘su- (105)’
kì-òsí	‘a- klet (111)’

2. Cases where a verbal causative suffix /i/ comes between the final C of a verb root (or preceding verbal suffix) and the final vowel /a/.

**(12) Examples of the verbal causative suffix before the final vowel**

kú-tátí:r-í-à	‘tighte- (883)’
kú-zík-í-à	‘cause to destroy (315)’
kú-léh-í-à	‘cause to le- gthe- (1647)’
kù-ráβ-ì-à	‘cause to pass through (312)’
kú-zík-í-à	‘cause to destroy (315)’
kù-lúm-í-á	‘die out (of a fire) (310)’
kù-ké:h-í-à	‘cause to shri- k’ <sup>8</sup>
kù-- à:β-í-à	‘wash’
kù-l <sup>w</sup> á:l-í-à	‘dress’
kù-tí:- ís-í-à	‘threate- ’

3. Instances where a /Ci/ or /Ci/ verb root precedes the final vowel /a/.

**(13) Examples of the verb roots ending in /i/ or /ɪ/ before the final vowel**

kù-dí-á	‘eat (8)’
k <sup>w</sup> -è: <sup>n</sup> dí-à <sup>9</sup>	‘love (1975)’
kù-hí-á	‘bur- ’ (11)’
kù-lè:hí-à	‘trip (1646)’
kù-kí-á	‘daw- (13)’
kù-- í-à	‘defecate (16)’

We conclude, provisionally, that palatalised consonants do not exist underlyingly in Lugungu. Surface sequences that approximate palatalised consonants or [Cj] sequences are judged to be simply the extreme endpoint of a gradient tendency to shorten underlying high vowels in duration somewhat where they directly precede a non-high vowel. Though the matter has not been investigated systematically, we assume that this shortening tends to apply to a greater degree in casual speech, while in more careful speech prevocalic high

---

<sup>8</sup> Examples in this statement with no reference number were supplied by Martin Diprose (personal communication) and do not appear in the original list of recorded words.

<sup>9</sup> Note: labialisation of consonants that arises across a morpheme boundary will be written with the morpheme break after the labialisation. I.e., in the above example the prefix, [k<sup>w</sup>-] is underlyingly /kò-/. Other examples were given in (6).

Document Title:	Date:	June 28, 2007
Lugungu Phonology Statement	Issue:	B
	Status:	Approved

vowels either remain fully syllabic or else are reduced in prominence (and hence are impressionistically not clearly and fully syllabic) relative to the immediately following vowel while nevertheless retaining their distinctive [ATR] quality (so that a transcription as [C̄iV] / [C̄iV] might be appropriate).

In our current data, palatalised consonants occur only before non-front vowels. However, vocoid sequences [iɛ] and [ie] do occur in the data, and since palatalised consonants in general are assumed to be essentially variant realisations of vowel sequences in which the first V is a high front vowel, it is assumed that these sequences are realisable in extreme cases as [īɛ], [īe]. If this is correct, then the expectation is that palatalised consonants should in fact occur, if a larger sample of data were available, in surface contrast with plain consonants before mid front vowels.

To the extent that palatalised consonants (as opposed to [Ci] / [C̄i] sequences) exist phonetically in the data, their behaviour with respect to compensatory lengthening of a following vowel is presumably analogous to that of labialised consonants. However, the number of clear examples of palatalised consonants in the data is too small to permit this to be adequately tested.

Although prenasalised palatalised consonants do not occur in our current data, this might largely be attributed to the fact that clear instances of palatalised consonants (as opposed to [Ci] / [C̄i] sequences) are rare in the data in general. Since [NCiV] and [NC̄iV] sequences do occur, and since palatalised consonants in general are assumed to be essentially variant realisations of vowel sequences in which the first V is a high front vowel, it is assumed that surface [NC̄V] and [NC̄V] sequences should be possible, at least in casual speech as variant pronunciations of [NCiV] and [NC̄iV]. This prediction remains to be directly verified however.

## 7 Vowel phoneme inventory

### 7.1 Inventory overview

The Lugungu vowel system has been the subject of some uncertainty. In an unpublished paper that is to our knowledge the only previous in-depth treatment of the language's vowel inventory, Kutsch Lojenga (1999) presents evidence that is largely consistent with the assumption that Lugungu has an underlying seven-vowel /iiaɔuu/ system, with two additional vowels [e] and [o] occurring phonetically as conditioned variants of /ɛ/ and /ɔ/. However, after careful and detailed consideration of a considerable amount of data, she is not able to conclusively reject either of two alternative hypotheses: i.e., the possibility of an underlying nine-vowel inventory or of an underlying five-vowel system. The former possibility arises because while most instances of [e] and [o] occur in contexts where they can be regarded as predictable allophonic variants of /ɛ/ and /ɔ/, she also finds a number of surface instances of [e] and [o] that are not readily explained in these terms but appear to contrast with their [-ATR] counterparts [ɛ], [ɔ]. The latter possibility is raised by a certain amount of difficulty on the part of at least some native speakers in categorising high vowels in some words as [+ATR] [i], [u] or [-ATR] [ɪ], [ʊ], a fact which potentially raises some doubt about the reality (which in her initial research appeared quite clear) of the [ATR] contrast in high vowels.<sup>10</sup>

Several factors potentially contribute to uncertainty in the phonetic [ATR] values of high vowels in at least some words. First, the high [-ATR] vowels [ɪ], [ʊ] are auditorily quite close to their [+ATR] counterparts [i], [u]. Kutsch Lojenga (1999:4), who has had extensive experience working with languages with [ATR] harmony, describes the two [ATR] sets of high vowels as “much closer together auditorily than I had ever perceived them to be in any other language with [ATR] Vowel Harmony.” Our own experience in listening to Lugungu vowels leads us to agree that the auditory contrast is a subtle one.

Second, Kutsch Lojenga notes that many Lugungu speakers (in particular, those with some education) are bilingual in Runyoro. She suggests that the fact that Runyoro has a five-vowel system may exert some pressure leading some speakers to neutralise [ATR] contrasts so as to operate with, in effect, a five-vowel system in Lugungu as well. In fact, there does seem to be a significant amount of inter-speaker variation in the pronunciation of the vowels in some words, suggesting perhaps the possibility of historical changes in progress.

Finally, Kutsch Lojenga has recently suggested (personal communication) that at least some of the uncertainty she observed on the part of native speakers in categorising words as having [+ATR] or [-ATR] high vowels likely involved lexical items that combined [-ATR] roots with dominant [+ATR] suffixes (of which Lugungu possesses several). If, as is often the case in languages which have them, these dominant [+ATR] suffixes trigger gradient [+ATR] assimilation in preceding [-ATR] morphemes, such gradient and variable assimilation might frequently give rise to partially assimilated vowels of intermediate [ATR] quality.<sup>11</sup> It would not be at all surprising if underlying [-ATR] roots affected in this fashion gave rise to inconsistent categorisations on the part of native speakers (or linguists!) as to their vowel quality.

Our own investigation of the Lugungu vowel system has led us to conclusions that, like Kutsch Lojenga's, are clearer on some points than others. Our conclusions may be summed up as follows:

---

<sup>10</sup> If the questions concerning the existence of an [ATR] contrast in mid vowels are independent of those related to the existence of such a contrast in high vowels, then there is yet an additional possibility that might presumably be entertained: that of a seven-vowel system /iieaɔuu/ with an [ATR] contrast only among mid vowels. Kutsch Lojenga does not explicitly discuss such a possibility, probably because the existence of an [ATR] contrast among high vowels appears less doubtful than the existence of an [ATR] contrast for the mid vowels. /iieaɔuu/ systems also appear to be less common than /iieaɔuu/ systems in East African Bantu languages (Stewart 2000/2001).

<sup>11</sup> Such gradient [+ATR] spreading occurs for example in the Eastern Bantu zone J language Lubwisi (Tabb 2001) and zone F Rangi (Stegen 2000).

1. At the phonetic level, it is quite clear that Lugungu has the nine phonetic vowel qualities noted by Kutsch Lojenga, i.e. [iɛɛaɔuu]. (As will be discussed elsewhere, we also believe there is some evidence of a tenth vowel phonetically, a [+ATR] variant of /a/ that is restricted to [+ATR] contexts.) All nine vowels are reasonably well attested in the data.
2. We are convinced that there is a clear and robust [ATR] contrast in the high vowels, at least in the dialect spoken in Buliisa sub-county investigated in this study. Although there are few minimal pairs, there are many words that consistently have [-ATR] high [ɪ] and/or [ʊ] and many other words that are regularly pronounced with high [+ATR] vowels [i] and/or [u]. Nor is there any possibility that the [ATR] quality of high vowels might be predictable from context (as is the case for example in several Yoruba dialects; cf. George 1973, Yearn 1973, Przedziecki 2000). All four high vowels can occur in very similar contexts and can co-occur with all of the non-high vowels. Thus there are numerous examples of near-minimal contrast, cf. k̄i-k̄a:lí ‘palace (1326)’, ŋ-k̄àlì ‘uri-e (415)’ for /ɪ/ and /i/, or tá:gù ‘pa-creas (1366)’, -ḍ̄ʒâ:ḡù ‘cat (1475)’ for /ʊ/ and /u/.
3. [ATR] contrast in the mid vowels is marginal at best. Most instances of [e] or [o] occur in contexts in which their [+ATR] quality is not contrastive but could be attributed to a conditioning factor in the environment. Most notably, these vowels commonly occur in syllables immediately preceded or followed by a high [+ATR] vowel /i/ or /u/; since mid [-ATR] vowels [ɛ] and [ɔ] are generally excluded from this context, these instances of [e] and [o] are readily analysable as allophonic realisations of /ɛ/ and /ɔ/. Other conditioning factors that can give rise to mid [+ATR] vowels are discussed in Section 7.5.
4. It does not appear however that all surface instances of [e], [o] can be readily attributed to environmental conditioning that assigns a [+ATR] phonetic quality to /ɛ/, /ɔ/. Our data contains a small residue of examples in which mid [+ATR] vowels occur in contexts where no plausible conditioning factor is obvious. If, moreover, some of these words happen to be borrowings or potentially aberrant on other grounds, we are not aware of this. Unless some explanation can be found for these forms, it may ultimately be necessary to regard Lugungu as having a phonemic nine-vowel /iɛɛaɔuu/ system with /e/ and /o/ as marginal members of the inventory. For the present, however, we provisionally analyse Lugungu as having a seven-vowel /iɛaɔuu/ system in which [e], [o] are allophones of /ɛ/ and /ɔ/ respectively, while recognising the existence of some instances of [e] and [o] (symbolised as (e\*) and (o\*) in the chart below) which currently stand as unexplained exceptions to this analysis.

(14) **Lugungu vowel phonemes**

		fro- t	back
high	+ ATR	i	u
	-ATR	ɪ	ʊ
mid	+ ATR	(e*)	(o*)
mid	-ATR	ɛ ([e])	ɔ ([o])
low	-ATR		a

## 7.2 Frequency of occurrence

In overall terms, [-ATR] vowels occur with much greater frequency in Lugungu than [+ATR] vowels, a state of affairs that is quite common (though not universal) in languages with [ATR] harmony. A computer search of the words in our data revealed 785 words with only [-ATR] vowels, 140 words with only [+ATR] vowels, and 251 words with both [+ATR] and

Document Title: Lugungu Phonology Statement	Date: Issue: Status:	June 28, 2007 B Approved
--	----------------------------	--------------------------------

[-ATR] vowels.<sup>12</sup> In part this is no doubt due to the fact that underlying non-high [+ATR] vowels are at best quite rare in the language, so that any word which lacks high vowels will, except under special circumstances (e.g. the presence of a palatal consonant that could cause mid [-ATR] vowels /ɛ/, /ɔ/ to be realised as their [+ATR] allophones), be guaranteed to surface with only [-ATR] vowels phonetically. However, it is also true that high [-ATR] vowels outnumber high [+ATR] vowels in the data. The total numbers of each of the high vowels found in a computer search of the phonetic forms in our data are as follows.<sup>13</sup>

#### (15) Occurrence frequencies for high vowels

[i]: 392      [ɪ]: 335      [u]: 336      [ʊ]: 817

What is most striking about these figures is the much higher frequency of occurrence of [ʊ] (which is the second most frequent vowel in the language, after [a]) than any of the other high vowels, a fact attributable in part to the occurrence of /ʊ/ in several common class prefixes. This is clearly not the whole story however, for if the prefixes in question occurred as frequently with [+ATR] roots as [-ATR] roots, then these prefixes would give rise (through [ATR] harmony of prefix vowels with root vowels) to roughly as many instances of [u] as [ʊ].

It must also be recognised that the phonetic totals for the high [+ATR] vowels are made higher (and the totals for the high [-ATR] vowels correspondingly lower) than they would otherwise be by the fact that a number of the surface instances of [i] and [u] in the data undoubtedly arise from underlying /ɪ/ and /ʊ/ respectively through a process (discussed in more detail in Section 10.1.2) that spreads [+ATR] leftward from certain dominant [+ATR] suffixes onto [-ATR] root vowels.

The total numbers of occurrence of each of the non-high vowels in the phonetic data are given below:

#### (16) Occurrence frequencies for non-high high vowels

[e]: 149      [ɛ]: 364      [a]: 1336      [o]: 146      [ɔ]: 312

The frequencies of occurrence for [ɛ] and [ɔ] are very similar to those of the high vowels other than [u]. The mid [+ATR] vowels occur much less frequently, a fact that is not surprising in view of their non-phonemic (or at best marginally phonemic) status. The fact that the low vowel [a] occurs with such high frequency and is by far the most common vowel is of course not particularly surprising. It is perhaps worth noting however that the occurrence of /a/ as the final vowel in the many verb infinitives in the data is clearly a contributing factor to this very elevated count.

### 7.3 Phonetic realisation

Phonemically, we have analysed Lugungu as a seven-vowel system with two high [+ATR] vowels /i/, /u/, and five [-ATR] vowels /ɪ/, /ɛ/, /a/, /ɔ/, /ʊ/. At the phonetic level, additional phonetic segments arise through the operation of a number of allophonic processes. Perhaps most striking of these is the allophonic realisation of /ɛ/, /ɔ/ as [e], [o] in the vicinity of

<sup>12</sup> Generally these words with both [+ATR] and [-ATR] vowels are words in which a high [+ATR] vowel(s) co-occurs with the low vowel /a/. In reality, instances of the vowel /a/ that occur in such contexts may manifest an allophonic [+ATR] quality (see Section 7.3). This has not however been indicated in our phonetic transcriptions.

<sup>13</sup> Apart from being based on an imperfect (though reasonably large) sample of data, the computer-implemented frequency counts given in this section are in all likelihood slightly skewed by a number of other factors, which may include duplicates of some words in the data or occasional mistakes in phonetic transcription. Nevertheless, we believe that the size of the data sample is sufficiently large and the influence of such skewing factors sufficiently minor to permit a reasonably accurate picture of the overall relative frequency of vowel segments at the phonetic level to emerge.

[+ATR] vowels as well as adjacent to palatal consonants. This is discussed in more detail in Section 7.5.

Though not as obvious impressionistically, we believe that there is at least a strong tendency for the low vowel /a/ to also take on a more [+ATR]-like quality when it precedes a syllable with underlying [+ATR] vowels, as in words like those shown below.

**(17) Examples where /a/ shows [+ATR]-like quality**

m-páí	‘pa- ts (1684)’
ŋ-gází	‘palm (403)’
ŋ-kálí	‘uri- e (415)’
gà-βí	‘faeces (470)’
mù-kálí	‘woma- (735)’
mù-làβí	‘stick (763)’
Ø-ɲàké:tú	‘my/our sister (1048)’
βí-sá:βù	‘mud (1353)’

This change in quality, which has not been indicated in our transcriptions, is not primarily a matter of auditory raising.<sup>14</sup> Rather, the vowel [a] in this context tends to take on a voice quality (see below) that is more typical of [+ATR] vowels.

The high [+ATR] vowels /i/ and /u/ often undergo significant reduction in certain contexts, particularly in casual speech. This reduction involves shortening in duration and amplitude and complete or partial devoicing. The process is most prone to occur word-finally after a voiced consonant and medially between voiceless consonants. A few examples are given below. Devoicing is indicated in these examples (though not in phonetic transcriptions elsewhere in this description) using the IPA diacritic for voicelessness.

**(18) Examples of devoicing of high [+ATR] vowels**

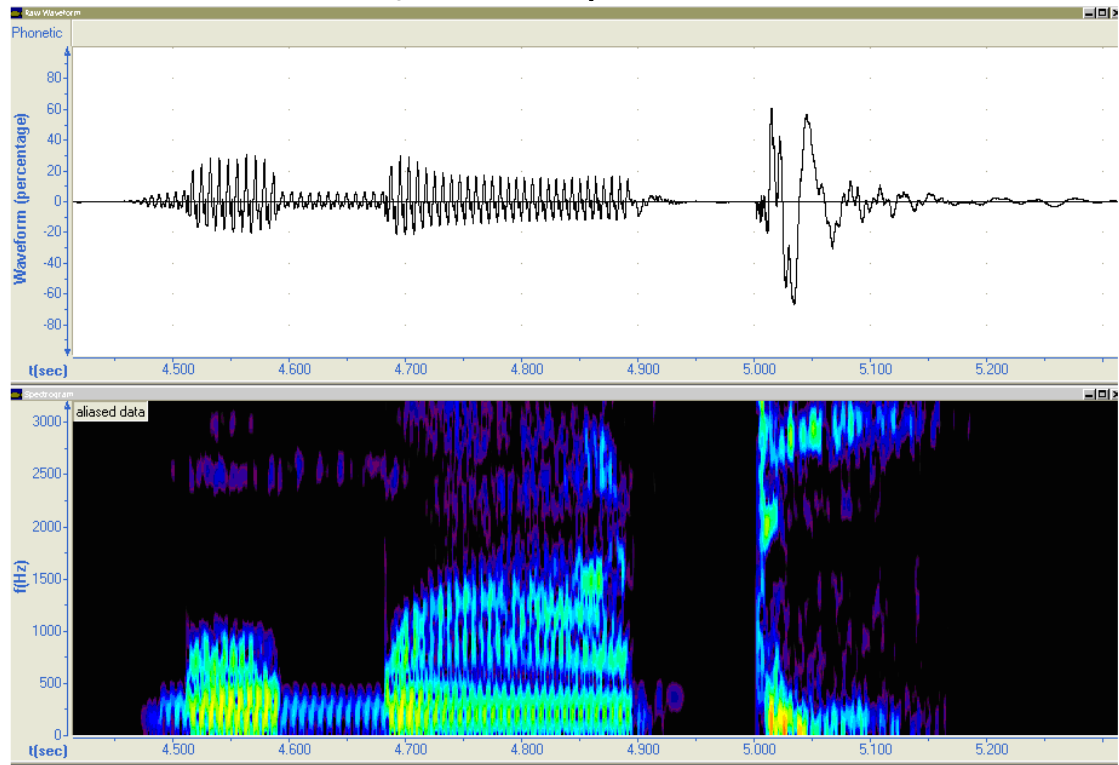
kì-bìrì:t̚	‘matchbox (1036)’
mù-má:t̚	‘potter (1342)’
í-t̚jót̚	‘- eck (1864)’
--t̚ít̚	‘dark- ess (457)’
kù-sú:ᵑg-á	‘sew (1446)’
mù:-ᵑgès̚	‘arrow (1541)’
w-è:t̚	‘my/our brother (1700)’
kí-f̚í	‘cooked meat (475)’

The reduction of the word-final [i] of mù-má:t̚ ‘potter (1342)’ and of the [u] that occurs in the word-initial syllable of kù-sú:ᵑg-á ‘sew (1446)’ is evident in the waveforms and spectrograms in (19) and (20) respectively.

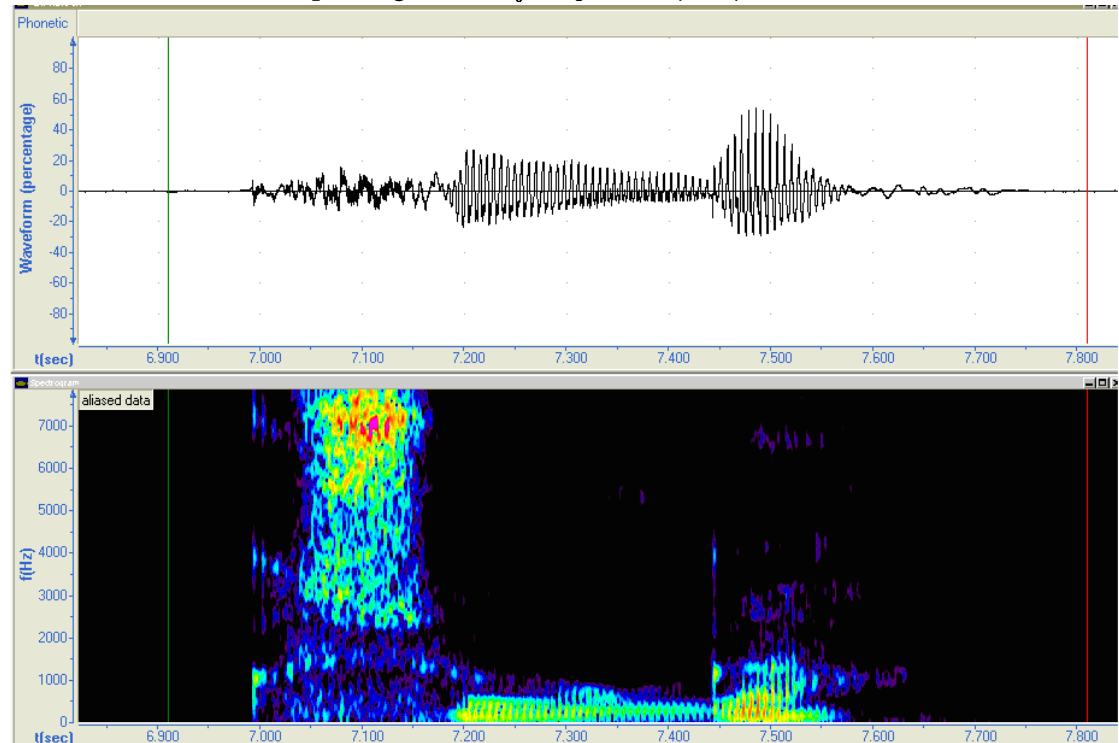
---

<sup>14</sup> Nor does some very preliminary investigation we’ve done reveal clear and consistent differences in first formant frequency between instances of [a] in this and other contexts. (The question has not however been looked at systematically, and we cannot at this point rule out the possibility that examination of an adequate sample of words would reveal a statistically significant difference.)

(19) Waveform and spectrogram of mù-má:tî ‘potter (1342)’



(20) Waveform and spectrogram of kù-sú:<sup>h</sup>g-á ‘sew (1446)’

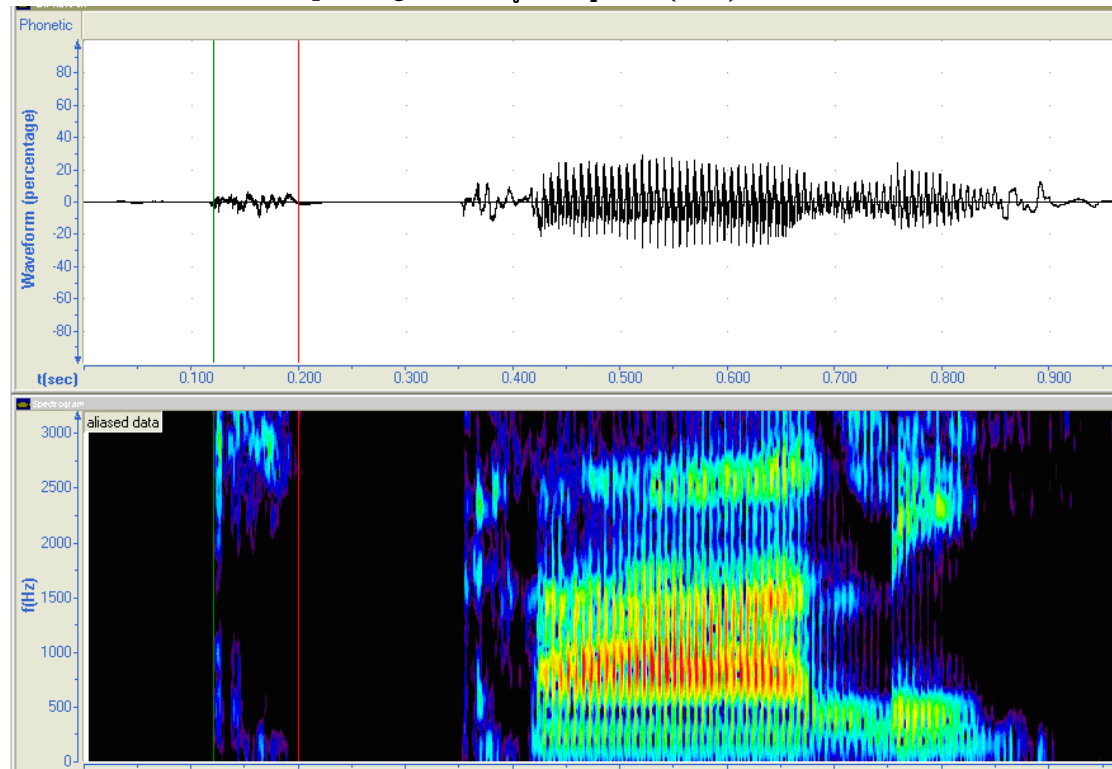


Where reduction of a high [+ATR] vowel takes place next to a voiceless fricative, as in (20), this fricative may itself be lengthened, presumably as a compensatory mechanism for the reduction of the vowel.



Devoicing of high [-ATR] vowels /ɪ/ and /ʊ/ has not been observed word-finally. However, these vowels do sometimes undergo devoicing, along with drastic reduction in duration and amplitude, in at least one context: in CV noun class prefixes that have a voiceless consonant, when the initial C of the following noun root is also voiceless. This can be clearly seen for example in the spectrogram and waveform for the word *kì-ká:lí* ‘palace (1326)’ below. The prefix vowel (between the cursors) fails to manifest regular glottal pulses and is in effect little more than an aspirated release of the word-initial [k].

**(21) Waveform and spectrogram of *kì-ká:lí* ‘palace (1326)’**



In many African languages with ATR harmony, the two [ATR] harmony sets have been described as manifesting a difference in overall ‘voice quality’. Different labels have been used to characterise the qualities of the two sets; generally however the [+ATR] vowels have been described as having a deeper or hollower sound that is sometimes accompanied by slight breathiness, while the [-ATR] vowels have been described as “bright,” “tight” or even slightly creaky.

Languages in the Nilo-Saharan family, especially Nilotic, are the most notorious for displaying such voice quality differences. Though descriptions of voice quality in Niger-Congo languages are less common, a number of Niger-Congo languages with ATR harmony have been described as showing voice quality distinctions, including Dogma (Flop et. al. 1998), Zima and Ashanti (Berry 1955), Akan (Berry 1952, as cited in Stewart 1967), Abia (Ward 1937, as cited in Stewart 1967), Zande (Boyd 1997), Nawuri (Casali 2002) and Yoruba (Armstrong 1985).

Impressionistic descriptions of voice quality in Bantu languages are almost absent in the literature, a fact that might tend to support several recent proposals (Clements 1991, Parkinson 1996) to the effect that Bantu vowel systems are not based on a phonological feature [ATR] but that a different feature underlies perceptual height distinctions in languages of this family. In light of this, we feel it is important to note that the ‘[ATR]’ distinction in Lugungu appears to be correlated with impressionistic differences in voice quality that (to our ears) are not dissimilar to the kinds of distinctions found in West African languages like Nawuri and Akan. The [-ATR] vowels tend to have a somewhat brighter



quality, while the [+ATR] vowels sound deeper, more muffled, and sometimes slightly breathy. There are of course inherent difficulties in trying to describe such differences using subjective labels such as these. The main points however are simply that 1) there does seem to be a noticeable difference in the overall quality of the voice associated with the two sets of vowels, and 2) the nature of the difference is at least roughly comparable to the impressionistic difference in [ATR] voice quality found in the West African languages cited above. One the other hand, since this observation has been made on the basis of recordings from just a single speaker of the language (and is moreover based on purely subjective impressions that have not been investigated instrumentally), it would clearly be premature to draw very strong conclusions at this point.

## 7.4 Vowel length

All seven of the phonemic vowel qualities in Lugungu can occur with contrastive vowel length. Phonemic /u:/ is relatively uncommon; all of the remaining six phonemic long vowels are well attested in the data. Examples illustrating contrast in length for each of the Lugungu vowel qualities are given below.

### (22) Examples of short /i/

ì-lígá	‘tear (eye) (1879)’
m-pítâ	‘ri- g (439)’
--títî	‘dark- ess (457)’
m-bíβô	‘stock (388)’
kù-líg-á	‘decorate (250)’
kú-lîh-â	‘pay fi- e (251)’
kú-pím-â	‘measure (269)’
kú-síd-â	‘bur- (276)’
kù-tíg-á	‘leave (288)’
mú-límî	‘farmer (773)’
ŋ-gírî	‘warthog (408)’
ŋ-gírô	‘refusal (409)’
--zíqô	‘e- mity (464)’
--dáβísò	‘mirror (628)’
kí-dîhî	‘meat (683)’
mù-tímá	‘heart (856)’
mù-tíró	‘pestle (857)’

### (23) Examples of long /i:/

--tírâ	‘electric fish (456)’
kú-hí:g-â	‘hu- t (1596)’
kù-hí:m-â	‘si- g (1597)’
kú-sí:g-â	‘pai- t (1621)’
kù-tí:- â	‘fear/threate- (1631)’
kò-fí:râ	‘hat (937)’

**(24) Examples of short /ɪ/**

kù-kír-á	‘do most (236)’
kú-lím-â	‘dig (252)’
kù-síg-á	‘pla- t (277)’
ɲ-gámírâ	‘camel (633)’
mà-gírâ	‘sauce (701)’
kí-gírâ	‘valley (702)’
mù-títí	‘pla- t species (858)’

**(25) Examples of long /ɪ:/**

kù-βí:h-â	‘be bad/i- sult (1585)’
kù-βí:k-â	‘store (1586)’
m-bálí:râ	‘budget (1274)’
mù-pî:râ	‘ball (1349)’
kì-pî:tè	‘beloved perso- (1350)’

**(26) Examples of short /ɛ/**

kù-- é- -á	‘bite/quarrel (264)’
kù-tém-á	‘cut (287)’
kú-lém-â	‘rule/lead (248)’
kú-sék-â	‘laugh (275)’
kú-kés-â	‘harvest (235)’
kù-tég-á	‘set (286)’
kú-hés-â	‘gossip (219)’
kú-mér-â	‘swallow (262)’
í-gégû	‘molar (1867)’
ì-tèhé	‘grou- d (1894)’
lù-ɲégé	‘da- ce (803)’
kí-gézû	‘test (700)’
kì-kédê	‘mat (737)’

**(27) Examples of long /ɛ:/**

kú-hé:k-â	‘carry (1594)’
kù-hé:s-â	‘carve/forge (1595)’
kù-lét-â	‘bri- g (1609)’
kú-sé:g-â	‘be poor (1620)’
kù-té:r-â	‘argue (1630)’
kù-kéh-â	‘shri- k (1644)’
ì-βé:rê	‘breast (1968)’
ì-pé:sâ	‘butto- (1969)’
ì-té:kâ	‘law (1971)’

mù-bè:ré	‘club (1284)’
kì-sê:gè	‘grief (1360)’
kí-dé:rû	‘gra-ary (1294)’

**(28) Examples of short /a/**

kú-gáβ-â	‘give/divide (519)’
kù-βág-á	‘tie (193)’
kú-mál-â	‘fi-ish (551)’
kù-mág-á	‘gla-ce (259)’
kù-kám-á	‘milk (231)’
kù-βáβ-á	‘itch (192)’
kù-βáz-á	‘speak (196)’
kù-bák-á	‘mix beer (203)’
βù-gàlí	‘width (692)’
mù-hárâ	‘daughter (720)’
mú-gáβî	‘giver (691)’
m-pàsá	‘axe (433)’
ŋ-kátá	‘ri-g (416)’

**(29) Examples of long /a: /**

kù-gá:- â	‘forbid (1592)’
kù-lá:l-â	‘lie (1606)’
kù-lá:m-â	‘cha-t (1607)’
kù-má:t-â	‘mould (1612)’
kú-- á:β-â	‘bathe/wash (1613)’
kù-ŋá:l-â	‘uri-ate (1615)’
kú-pá:l-â	‘slap (1617)’
kù-tá:g-â	‘groa- (1628)’
kú-- á:β-â	‘bathe/wash (1649)’
lù-bà:lí	‘rock (1288)’
kí-há:râ	‘locust (1308)’
βí-sá:βû	‘mud (1353)’
m-bà:tà	‘duck (1657)’
--dá:wé	‘-orth wi-d (1664)’

**(30) Examples of short /ə/**

kú-ból-â	‘rot (204)’
kù-hór-á	‘le-d (224)’
kú-kóβ-â	‘say (237)’
kú-lóg-â	‘bewitch (255)’

kú-sók-â	‘pack (279)’
kù-bóh-á	‘tie (201)’
mù-sòlò	‘tax (842)’
kì-hóté	‘wou- d (724)’
mó-tókà	‘vehicle (945)’
- -zógóró	‘tilapia (661)’
ŋ-kókó	‘chicke- (421)’
ŋ-kòmà	‘electio- (422)’

**(31) Examples of long /ɔ:/**

kú-ṱṱók-â	‘gather (1587)’
kú-hó:r-â	‘reve- ge (1599)’
kù-lót-â	‘dream (1611)’
kù-só:β-â	‘walk quietly (1623)’
kù-tól-â	‘remove/search/subtract (1633)’
mù-lól:lô	‘pla- t species (1338)’
kì-lótó	‘dream (1339)’
kí-tókí	‘ba- a- a (1374)’
mù-hò:zá	‘market master (1315)’
kì-kò:rá	‘leaf (1334)’
kà-hò:kí	‘bee (1314)’
ŋ-fóká	‘cha- geli- g (1668)’
kò:zá (from kà-ò:zá) <sup>15</sup>	‘fur (1717)’

**(32) Examples of short /u/**

kù-húh-á	‘become lighter (225)’
kù-fú- -á	‘receive (208)’
kú-gúl-â	‘buy (215)’
kú-ḍḍú- -â	‘help/rescue (229)’
kù-sú- -á	‘pi- ch (283)’
kù-lúm-á	‘bite/abuse/feel pai- (309)’
kú-ḍḍú- -â	‘help/rescue (539)’
kì-hùrú	‘hole (726)’
mù-gúgû	‘load (710)’
mù-dùlú	‘ma- (493)’
mù-kúsâ	‘sorghum (760)’
Ø-rùfú	‘death/fu- eral (476)’

---

<sup>15</sup> This example shows vowel lengthening arising from elision of the prefix vowel across the morpheme boundary.

**(33) Examples of long /u:/**

kù-tʃú:n-â	‘almost ready (1588)’
kú-hú:h-â	‘blow (1600)’
kù-dʒú:r-â	‘u- dress (1601)’
kù-kú:t-â	‘hit/draw (1605)’
kù-sú:l-â	‘refuse (1625)’
kú-sú:r-â	‘check (1626)’
kì-hú:rô	‘weak perso- (1318)’
lù-kô:kú	‘cowpea (1335)’
kà-lú:lú	‘cry (1340)’
kà-sò:kà	‘cloth (1692)’
Ø-rú:sî	‘kid (1352)’

**(34) Examples of short /u/**

kú-gúm-â	‘throw (216)’
kú-lúk-â	‘weave/twist (257)’
kù-lúm-â	‘bite/abuse/feel pai- (258)’
kú-zúβ-â	‘weed (294)’

**(35) Examples of long /u:/**

kú-sút-â	‘rub (1627)’
kù-tút-â	‘pierce (1634)’

Vowel length is not contrastive in absolute word-initial position in Lugungu. Word-initial vowels (which are generally prefixes) are phonologically short. Similarly, there is no vowel length contrast in word-final position in Lugungu; vowels in this position are phonologically short. In the relatively few cases in which vowels in this position do manifest significantly longer duration, as in the examples shown below, this can be regarded as conditioned lengthening due to the fact that they bear a tone contour. (Vowels which bear a falling or rising tone in Lugungu are always somewhat lengthened phonetically.)

**(36) Examples of conditioned lengthening of tone-contour bearing vowels**

Ø-mpǎ:	‘au- t (1762)’
Ø-mâ:	‘mother (1242)’
Ø-ità:	‘elder sibli- g (1958)’
mù-zê:	‘older ma- (1249)’
kì-kǔ:	‘dead (1239)’

As far as we have been able to tell, phonemically long vowels in Lugungu are restricted to roots. There are no contrastive long vowels in prefixes or suffixes.

Conditioned lengthening of vowels in Lugungu occurs following surface labialised consonants (and, presumably, following palatalised consonants also, though the number of clear instances of phonetic palatalised C’s in our data is too small to permit very firm conclusions) and before prenasalised consonants. There is also, as in many languages, lengthening of vowels that bear tonal contours. There is also compensatory lengthening with vowel elision.

## 7.5 The phonemic status of [e] and [o]

At the phonetic level, mid [+ATR] vowels [e] and [o] occur with reasonable frequency. For the most part, these vowels have a distribution which makes it possible to treat them as allophones of /ɛ/ and /ɔ/. Specifically, the mid [+ATR] vowels are largely restricted to the following environments:

1. Most instances of [e] or [o] in the data occur in a syllable immediately preceding or following a syllable containing one or more underlying high [+ATR] vowels /i/, /u/. These instances of mid [+ATR] vowels are readily analysable as derived from underlying /ɛ/, /ɔ/ via [+ATR] spreading from the neighbouring underlying [+ATR] vowel(s). There is no contrast between [e], [o] and [ɛ], [ɔ] in this context, in which only the former generally occur. Some examples are given below.

### (37) Examples of [e] following high [+ATR] vowels

kà-kúmí:rɛ	‘fame (1044)’
kì: <sup>n</sup> tìgè (from kì-ì <sup>n</sup> tìgè)	‘eyebrow (1543)’
mù-líé	‘bad habit (329)’
mù-túé	‘head (336)’
∅-gúlúhé	‘turtle (636)’
lú-íḍḗ	‘door (99)’

### (38) Examples of [e] preceding high [+ATR] vowels

w-è:tú	‘my/our brother (1700)’
∅-kèrúfí	‘behi- d (639)’
lú-mêi	‘dew (1243)’
mù-kéisò	‘wit- ess (1330)’
mú-lé:ǵí	‘beggar (1337)’
ŋ-kèi- à	‘do- key (1674)’
- zégú	‘elepha- t (463)’
ŋ-g <sup>w</sup> é:rí	‘hawk (68)’
mù-ké:hú	‘bamboo (738)’
mú-sérí	‘- ight da- cer (828)’
mù-kómésíá	‘official (906)’
kú-ségúlí:rí-à	‘move (1032)’
k <sup>w</sup> -è:gúà	‘hear/agree/be cold (1805)’

### (39) Examples of [o] following high [+ATR] vowels

kú-síóm-â	‘collect (123)’
kú-tíóm-â	‘gore (53)’
lù-tì: <sup>n</sup> dò	‘bridge (1178)’
kì-βú:lió	‘questio- (1269)’
kì-ḍḗ:kò	‘spoo- (1322)’
mù-kéisò	‘wit- ess (1330)’

mù-li:ᵐgò	‘look (1481)’
ŋ-kèítò	‘shoe (1675)’
lì:só (from lì-ìsó)	‘eye (1714)’
kí-gúò	‘fall (325)’
ŋ-gírô	‘refusal (409)’
ŋ-gúhò	‘cloth (412)’
--zígò	‘e- mity (464)’
kì-kùlò	‘tortoise (757)’

**(40) Examples of [o] preceding high [+ATR] vowels**

lú-wó:ᵐgî	‘cowpea (1187)’
mù-póí	‘tree species (1244)’
kì-t̪ò:lì	‘maize (1293)’
í-t̪ótfí	‘-eck (1864)’
ŋ-góβî	‘bag (410)’
ŋ-kòmì	‘click sou- d (423)’
--só- í	‘shame (450)’
mù-gòβíá	‘liar (605)’
kà-sòlíá	‘roof (617)’
lù-dódí	‘reed (684)’
kì-kósí	‘fu- eral clothes (753)’
mù-lóβí	‘fisherma- (779)’
kì-tó:gí	‘collar (860)’
kʷ-ó:kí-à	‘bur- (1790)’

2. In some cases [e], [o] occur immediately preceding a palatal consonant [t̪], [d̪], [ɲ] or [j]. The following examples illustrate this:

**(41) Examples of [o] preceding a palatal consonant**

mú-zígéíᵐd̪ó	‘firstbor- (1059)’
kì-kéíᵐd̪ó	‘sugarca- e (1329)’
kí-áᵐd̪ó:d̪óólò	‘supper (163)’
Ø-sóᵐd̪ó	‘sword grass (448)’
lù-gójé	‘cloth (708)’
kì-βògòjà	‘ba- a- a (918)’
Ø-gìèᵐná	‘hye- a (349)’
kí-éjâ	‘desert (90)’
ŋ-géjê	‘colobus (407)’
m-bé:ᵐd̪à	‘syphilis (1465)’
kù-té:ᵐn-â	‘gather wood (1629)’
kú-zé:ᵐn-â	‘play (1654)’
kù-ségéᵐn-â	‘da- ce (570)’

Mid [-ATR] vowels [ɛ] and [ɔ] generally do not occur in this context, as one would expect if [ɛ] and [ɔ] are allophonic realisations of /ɛ/, /ɔ/ before palatal consonants. Nevertheless, there are a few words in our data in which [ɛ] or [ɔ] does occur before a palatal consonant. Upon careful listening to the recordings of these words, it appears that some of the mid vowels in question are not clearly and invariably [ɛ], [ɔ] but either fluctuate from one repetition to the next with vowels that are arguably more [+ATR]-like or else sound rather close to the impressionistic borderline between [-ATR] and [+ATR] mid vowels, i.e. they are not easy to categorise and hence might be supposed to be of intermediate quality. Nevertheless, three words in the data, listed below, seem to have clear [-ATR] mid vowels (at least in the recordings) before palatal consonants.

**(42) Examples of [-ATR] mid vowels preceding palatal consonants**

kù-tʃékéʃ-â	‘da- ce (513)’
kú-m <sup>w</sup> é:ŋ-â	‘smile (41)’
kì-hðhópólǒ	‘bark (981)’

These words are potentially problematic for an allophonic rule that realises /ɛ/, /ɔ/ as [ɛ], [ɔ] preceding palatal consonants. Whether the mid vowel in a word like kù-m<sup>w</sup>é:ŋ-â ‘smile (41)’ is invariably pronounced [ɛ] (in which case the vowel in this example potentially contrasts with the [e] in a word like kù-zé:ŋ-â ‘play (1654)’ or fluctuates in its realisation so that a pronunciation kù-m<sup>w</sup>é:ŋ-â is also possible is a question that we must leave open at present. However, it seems fair to say that an analysis that treats [ɛ], [ɔ] as optional (though statistically preferred) variants of /ɛ/, /ɔ/ before palatals is consistent with the data available to us at least to a reasonably good first approximation.

3. There are other instances of [e], [o] which, though they do not themselves occur in one of the two conditioning contexts described above, occur in a syllable that immediately precedes or follows another instance of a [+ATR] vowel that does occur in such a context. Some examples illustrating this have already appeared in the data already presented above. In the word kí-ádǔó:dǔólô ‘supper (163)’ (given previously in (41)), for example, the leftmost [o] can be attributed, under the analysis proposed here, to the influence of the palatal consonant [dǔ] that it immediately precedes. The two rightmost instances of [o] on the other hand do not precede a palatal consonant (though the [o] in the penultimate syllable follows [dǔ]), nor do they occur adjacent to a syllable with a high [+ATR] vowel. These instances of [o] can be accounted for under the assumption that a [+ATR] value acquired contextually by any occurrence of /ɛ/ or /ɔ/ (whether due to a neighbouring high [+ATR] vowel or a palatal consonant) will further propagate itself to other mid vowels in the same phonological word. Further examples illustrating this are shown below.

**(43) Examples of [+ATR] propagation in mid vowels**

ki-èmérézǐ	‘p- eumo- ia (143)’
ki-èrérézǐ	‘light ray (144)’
--túlégé	‘zebra (657)’
lù-gèré	‘track (698)’
‘mù-légézǐ	‘priest (942)’
‘mù-tébézǐ	‘preacher (972)’
Ø-pèrèkúʃê	‘blu- t k- ife (989)’



kì-kuélé	‘da- ce (355)’
ŋ-géjê	‘colobus (407)’
lù-gójé	‘cloth (708)’
kù-ségép-â	‘da- ce (570)’
Ø-sóḍḍô	‘sword grass (448)’
mù-kòdòí	‘pla- t species (1024)’
mù-zòlòí	‘pla- t species (1026)’
kì-hòhò:liá	‘butterfly (1033)’
Ø-kòkòlò:kí	‘cock (1034)’

Note that in a number of these cases a mid vowel in a root-initial syllable not only has become [+ATR] before [+ATR] mid vowel in the following syllable, but further transmits this [+ATR] vowel to the prefix vowel to its left, resulting in a high [+ATR] vowel in the word-initial syllable.

While the vast majority of the instances of mid [+ATR] vowels in our data fall into the three categories described above, a small number of examples remain in which there is no apparent conditioning factor to which one or more instances of mid [+ATR] vowels in a word can plausibly be attributed, and in which the [+ATR] quality of these mid vowels therefore appears to be contrastive. This includes the following words:

**(44) Examples of [+ATR] mid vowels with no apparent conditioning factor**

a	kí-dê	‘bell (474)’
b	lù-gèré	‘track (698)’
c	--dè:rè	‘flute (1665)’
d	kú-ńé:g-â	‘wrestle (1262)’
e	lù-ńégé	‘da- ce (802)’
f	kù-wé:k-â	‘cover (1636)’
g	mù-sòmésâ	‘reader (968)’
h	Ø-dó:dô	‘spi- ach (1666)’
i	kì-rókóró	‘oesophagus (958)’
j	--dóβô	‘bucket (394)’
k	βù-dô: <sup>o</sup> go	‘wall (1083)’
l	kì-dò: <sup>o</sup> gò	‘thumb pia- o’ (1084)
m	Ø-só: <sup>n</sup> sò: <sup>n</sup> sà	‘locust (1557)’
-	kì-sò: <sup>n</sup> sò	‘- ick- ame (1758)’
o	kì: <sup>o</sup> gó:ró	‘leavi- gs (1577)’
p	βí-ó <sup>m</sup> bô	‘lu- gs (172)’
q	lì-òβá	‘su- (105)’
r	kì-kópô	‘cup (750)’
s	kí-zóβô	‘problem (468)’
t	Ø-kùló	‘tortoise (758)’
u	ì-zo	‘yesterday’
v	mù-- ó: <sup>n</sup> dê	‘tree species’

Example (44)r is presumably a borrowing from English. Though a number of these examples, e.g. (44)k,l,n,o,s, may superficially appear to be cases of contextual conditioning in that the [+ATR] mid vowels in these examples occur to the right of a high [+ATR] vowel, it needs to be noted that these high [+ATR] vowels all occur in noun class prefixes that regularly harmonise for [ATR]. Thus, the [+ATR] value of these prefix high vowels cannot be underlyingly [+ATR] and hence cannot be responsible for the [+ATR] surface quality of the following mid vowels. Rather, it seems necessary to assume that it is the [+ATR] quality of the mid vowels that triggers assimilation of the high vowels in the prefixes. Hence, these words, like the other words in (44), currently stand as unexplained exceptions to the proposed analysis of [e], [o] as conditioned variants of /ɛ/, /ɔ/.

## 8 Syllable structure

As is typically the case in Narrow Bantu languages, canonical syllable structure in Lugungu is CV (with V potentially bearing phonemic length in Lugungu, though in many Bantu languages this is not the case). There are however instances of V syllables as well. These exist at least word-initially and may, depending on the assumptions one makes about the syllabification of vowel sequences, arise word-internally as well.

There also appear to be at least some instances of word-initial syllabic nasals arising from prefixation of the class 9/10 nasal prefix before consonant-initial noun roots. The extent to which such prefixation yields a syllabic nasal rather than prenasalisation of the root-initial consonant is however a matter that warrants further investigation. (See Section 9.1.1 for brief discussion.)

### 8.1 Word-initial V syllables

The clearest cases of V syllables in Lugungu occur in word-initial position. All such examples in our data involve a word-initial high front vowel which harmonises for [ATR] with a following vowel(s), as in the examples below.

#### (45) Examples of word-initial V syllables

í-t̪íótí	‘- eck (1864)’
ì-g <sup>w</sup> ĩ	‘wasp (1791)’
ì-kò: <sup>n</sup> gí	‘sisal (1946)’
ì-lú	‘k- ee (1813)’
í-róhò	‘thirst (1884)’
í-bá: <sup>n</sup> gâ	‘blood (1943)’
í-gégò	‘molar (1867)’
í-gúrò	‘sky (1871)’
í-- íhî	‘liver (1881)’
í-tákâ	‘lake (1890)’
ì-βé:rê	‘breast (1968)’
ì-βú: <sup>m</sup> bà	‘clay (1942)’
ì-βàrá	‘- ame (1860)’
ì-ràrú	‘mad- ess (1883)’
ì-hé	‘army (1811)’
ì-kóló	‘root (1877)’
ì-súβí	‘grass/gree- (498)’
Ø-ìsíðkò	‘sti- gy perso- (1796)’
Ø-ìsíálá	‘brother-i- -law (1795)’

In most cases, the initial high front vowel is a noun class prefix, however, in the last two cases in (45)(45)(45) it is simply part of the root.

### 8.2 Vowel sequences

At the phonetic level, sequences of two adjacent, non-identical vowels are reasonably common in Lugungu. Such sequences do not occur in word-initial position, but are well attested word-medially and word-finally. The chart below shows the attested vowel sequences in our data with the number of examples of each type.

(46) Summary of occurrences of vowel sequences

V1↓ V2 →	i	ɪ	e	ɛ	a	ɔ	o	ʊ	u
i			8		36	1	19		
ɪ				7	19	1			
e	8								1
ɛ		3							
a	1							2	
ɔ									
o	4				1				
ʊ				6	31				
u	1		4		16		2		

Note that with the exception of a single instance of [ui] (which occurs in the word *lú-íd̪z̪ê* ‘door (99)’, all the attested sequences consist of a high and a non-high vowel (with the high vowel preceding in some sequences and the non-high in others). Note also that when a pair of vowels is attested in one order, the reverse sequence is in many cases attested as well.

Sequences in which [a] occurs as V<sub>2</sub> are particularly common, accounting for about 60% of the total. In a considerable number of the [Va] sequences in the data [a] is the verbal final vowel and the preceding V is the last segment of the verb root. Some examples are shown below.

(47) Examples of [Va] vowel sequences where [a] is word-final

kù-kí-á	‘daw- (13)’
kú-- í-à	‘defecate (16)’
kù-hí-á	‘bur- /be cooked (11)’
kù-dí-á	‘eat (8)’
kù-kú-á	‘die (12)’
kú-lú-à	‘ooze (14)’
kú-mú-à	‘shave (15)’
kú-gú-à	‘fall (1718)’
kú-sú-à	‘gri- d (18)’
kù-tú-á	‘spit (19)’
kú-gú-à	‘fall (9)’
kù-ɲú-á	‘dri- k (17)’
kù-dú-á	‘reach/arrive/satisfy (7)’
kù-t̪ú-á	‘judge/decide (5)’
kù-t̪ú-á	‘escape (6)’

In some of the other word-final [ia] sequences, [i] is a causative suffix that precedes the final vowel. Examples falling into this category are shown below.<sup>16</sup>

<sup>16</sup> Kutsch Lojenga (1999) notes seemingly similar causative + final vowel sequences but considers the causative suffix to be non-syllabic [j] (As in (83) below). While we cannot rule out the possibility that such [ja] pronunciations of these sequences are possible or even normative for some speakers, the high front vocoid typically has sufficient duration to be identified with a particular vowel quality ([i] and not [ɪ]) in the examples in our recordings.

**(48) Examples of [ia] vowel sequences where [i] is the causative suffix**

kú-lé:h-í-à	‘cause to le- gthe- (1647)’
kù-ráβ-ì-à	‘cause to pass through (312)’
kú-zík-í-à	‘cause to destroy (315)’
kù-lúm-í-á	‘die out (of a fire) (310)’
kù-ké:h-í-à	‘cause to shri- k’
kù-- à:β-í-à	‘wash’

In view of the low frequency of occurrence for some of the attested VV sequences in the data (e.g. [ɪɔ], [ai]) it is entirely possible that many of the unattested sequences are simply accidental gaps. However, there is at least one tendency that seems potentially noteworthy, which is that vowel /u/ is common as V<sub>1</sub> but almost unattested (one example only) in V<sub>2</sub> position. It is also worth noting that sequences in which the first vowel is high are much more common overall than those in which the second vowel is high.

As discussed elsewhere, there appears to be a tendency for non-final [CuV] and [CuV] sequences to fluctuate with more consonantal pronunciations that in some cases approach [CwV]. We assume that /CV<sub>1</sub>V<sub>2</sub>/ representations (in which V<sub>1</sub> is a high round vowel) underlie all such cases, and that [CwV] realisations are simply the extreme endpoint of a glide formation process that tends to shorten prevocalic high vowels in non-word-final syllables.

In the case of those vowel sequences in which both vowels are impressionistically fully syllabic (even in casual speech), a possible analysis that arises within at least some theoretical models (cf. Pike 1947) is to posit an intervening semivowel that is homorganic to one of the vowels in the sequence, so that for example what is impressionistically [ia] would be interpreted as [ija], the assumption being that there is not necessarily an invariant cross-linguistic auditory difference between the two sequence types so that in the absence of contrast between the two types in a language the issue cannot be decided on auditory grounds alone. Similarly, [ai] could be assumed under such an analysis to be a tri-segmental sequence [aji], [ua] would be interpreted as [uwa], etc.

We have not found any clear morphological or other evidence to support the general assumption of an intervocalic glide in the Lugungu high + non-high (or non-high + high) vowel sequences, and in the absence of such evidence we will continue to assume that we are dealing simply with [VV] and not [VGV] sequences. From the perspective of this assumption the observed fluctuation in non-final syllables between [uV] or [ɔV] and [wV] can be understood as a natural tendency for prevocalic high vowels to shorten and reduce, an effect which would be less expected perhaps if the high round vowel were immediately followed not by [V] but by [wV]. Moreover, some of the verb forms in (49) seem to clearly require the assumption that two underlying vowels are simply adjacent, at least if we assume that the roots in question have the /CV/ shape (e.g. /ku/ ‘die (12)’, /di/ ‘eat (8)’) that they commonly have elsewhere in Bantu. Similarly, if we take the causative suffix in (48) above, as would be natural on comparative grounds, to be /-i/ and not /-ij/, then these examples transparently involve /ia/ sequences. While it is more difficult perhaps to absolutely rule out a VGV analysis for some of the morpheme internal sequences in which the first vowel is non-high and the second high, e.g. [ei] (which might under such an analysis be interpreted as [eji]), we see no strong reason to adopt such an analysis and will not do so here.

Depending on how they are syllabified, VV sequences potentially give rise to instances of word-medial and word-final V syllables. This is illustrated below, where periods are inserted in the examples to indicate the syllable breaks that might be assumed under one possible analysis.

**(49) Examples of medial and word-final single V syllables**

a	kù.kí.á	‘daw- (13)’
b	kò.hí.á	‘bur- /be cooked (11)’
c	kù.dí.á	‘eat (8)’
d	kù.kú.á	‘die (12)’
e	kù.dú.á	‘reach/arrive/satisfy (7)’
f	kú.dí.kí.à	‘drop/immerse (1263)’
g	kú.sá.gá.lí.à	‘make - oise (1265)’
h	kì.ò.sí	‘a- klet (111)’
i	ì.sí.ò.kò	‘sti- gy perso- (1796)’
j	pí.ó.kò	‘rhi- oceros (363)’
k	mù.ké.ì.sò	‘wit- ess (1330)’
l	lú.mé.ì	‘dew (1243)’
m	sè.pé.ù	‘hat (1025)’
-	kú.lé.í.hâ	‘le- gthe- (1610)’

There is however an alternative analysis that treats the adjacent vowels as belonging to the same syllable:

**(50) Examples of medial and word-final VV syllables**

a	kù.kíá	‘daw- (13)’
b	kò.híá	‘bur- /be cooked (11)’
c	kù.díá	‘eat (8)’
d	kù.kúá	‘die (12)’
e	kù.dúá	‘reach/arrive/satisfy (7)’
f	kú.dí.kíâ	‘drop/immerse (1263)’
g	kú.sá.gá.líâ	‘make - oise (1265)’
h	kì.ò.sí	‘a- klet (111)’
i	ì.sí.ò.kò	‘sti- gy perso- (1796)’
j	pí.ó.kò	‘rhi- oceros (363)’
k	mù.ké.ì.sò	‘wit- ess (1330)’
l	lú.méì	‘dew (1243)’
m	sè.péù	‘hat (1025)’
-	kú.lé.í.hâ	‘le- gthe- (1610)’

We will not attempt to decide definitively between these two analyses here, but will simply note the following considerations that may be relevant to the choice:

1. Especially in word-final position, sequences in which the first vowel is high, as in (49)a-j, are pronounced (at least in our sound recordings) with both vowels having impressionistically the timing of a full syllable nucleus. Moreover, the two vowels may bear different tones. This would tend to favour the analysis in (49) in which the two vowels belong to different syllables. (The extent to which the prevocalic high vowels are reduced in duration and lose their syllabic prominence at more casual speech rates is a matter that may require further investigation.)
2. A number of the sequences in which  $V_1$  is non-high, especially [ei] and [ɛi], are not particularly long in overall duration (as compared for example with long vowels),

which perhaps favours the analysis in (50), i.e., a tautosyllabic (.CVV.) analysis of these sequences.

3. Some support for a .CVV. analysis comes from a type of language game in which native speakers were taught (using relatively unambiguous words) to clap their hands once per syllable while pronouncing a word. It was observed that a VV sequence in words of the type in (49) typically receives only one clap.
4. Conceivably, evidence from tonal behaviour might also be relevant to this syllabification issue. Since the tone system has not yet been analysed in detail, however, use of any arguments of this type seems premature.

### 8.3 Phonotactic restrictions

Consistent with its pervasive (C)V syllable structure, Lugungu possesses neither onset consonant clusters nor coda consonants.<sup>17</sup> The only potential locus of syllable-internal co-occurrence restrictions, therefore, involves restrictions between onset consonants and following vowels. We have seen no evidence of significant restrictions of this type.

---

<sup>17</sup> Of course, analysing labialised and palatalised consonants as Cw and Cj clusters respectively would entail that consonant clusters of these types do in fact exist. We certainly do not have any strong evidence that would rule out such an analysis, but have provisionally chosen to treat these entities as single segments on the phonetic level (while assuming that they arise phonologically from /CV/ sequences).

## 9 Root and word structure

### 9.1 Nouns

#### 9.1.1 Basic structure

As is common in Bantu languages nouns in Lugungu are canonically trisyllabic and of the form prefix-CVCV (where the vowel in the initial syllable of the root may be short or long). Some examples of nouns having this common structure are shown below.

#### (51) Examples of nouns with CVCV structure

ì-kò: <sup>n</sup> gí	‘sisal (1946)’
í-gégû	‘molar (1867)’
í-gúrû	‘sky (1871)’
βì-hágá	‘leprosy (714)’
βì-sógá	‘pla- t species (840)’
βù-sê:gì	‘poverty (824)’
βú-lógô	‘witchcraft (780)’
βù-βú: <sup>n</sup> gí	‘promiscuity (1080)’
kí-díhî	‘meat (683)’
kì-bó: <sup>n</sup> dí	‘a- thill (1079)’
kí-βérû	‘thigh (666)’
kí-tókí	‘ba- a- a (1374)’
kà-hé: <sup>n</sup> dú	‘problem (1110)’
kà-súmí	‘seaso- (845)’
lù-bà:lí	‘rock (1288)’
lù-límí	‘to- gue/la- guage (774)’
lù-zóká	‘worm (469)’
lù-gójé	‘cloth (708)’
lù-tì: <sup>n</sup> dò	‘bridge (1178)’
mù-βágá	‘bou- dary (662)’
mù-rùká	‘parish (813)’
mù-rà: <sup>m</sup> bù	‘corpse (1150)’
mù-títí	‘pla- t species (858)’
mù-kálí	‘woma- (495)’
mù-lí: <sup>m</sup> bà	‘fisherma- (1135)’
mù-làβí	‘stick (763)’
mù-lóβí	‘fisherma- (779)’
mù-sè:rí	‘sick perso- (1361)’
mà-gírâ	‘sauce (701)’
mà-gèzí	‘wisdom (699)’
mà-hàsá	‘twi- (721)’
mà-sírâ	‘pus (837)’



Two syllable nouns are also not uncommon. These fall into several types:

1. Nouns with a two-syllable root and no prefix<sup>18</sup>:

**(52) Examples of nouns with CVCV roots and no prefix<sup>18</sup>**

a	Ø-fú: <sup>n</sup> dî	‘tradesma- (1087)’
b	Ø-rá: <sup>n</sup> gî	‘colour (1153)’
c	Ø-dî: <sup>n</sup> î	‘religio- (1295)’
d	Ø-rú: <sup>n</sup> sî	‘kid (1352)’
e	Ø-sâ: <sup>n</sup> hà	‘watch (1355)’
f	Ø-tá: <sup>n</sup> gû	‘pa-creas (1366)’
g	Ø-zî: <sup>n</sup> zá	‘gra-dmother (1382)’
h	Ø-gâ: <sup>n</sup> lî	‘bicycle (1672)’
i	Ø-hé: <sup>n</sup> mà	‘te-t (1673)’
j	Ø-pù: <sup>n</sup> jó	‘black soil (441)’

Many words of this type, including those in (52)a,b,c,d,e,h,i, are borrowed.

2. Nouns with an underlying /Cu/ or /Cv/ prefix preceding a VCV root, realised as CwV:CV, as in the examples shown below.

**(53) Examples of nouns with VCV roots and a prefix**

m <sup>w</sup> -à:ká	‘year (74)’
m <sup>w</sup> -è:rí	‘moo- (87)’
m <sup>w</sup> -é: <sup>n</sup> gê	‘alcohol (170)’
β <sup>w</sup> -ð:ló	‘lazi-ess (107)’
β <sup>w</sup> -ð:mí	‘life (109)’
β <sup>w</sup> -ð:zó	‘weight (115)’

3. There are at least a couple nouns in the data in which a VCV noun root is preceded by a CV noun class prefix whose vowel is identical to the initial vowel of the noun root, resulting phonetically in a long vowel:

**(54) Examples of nouns with VCV roots and a prefix which results in a long vowel**

lî:só (from lî-îsó)	‘eye (1714)’
lî:-ó (from lî-î-ó)	‘tooth (1711)’

Both examples involve the class 5 prefix /li-/ ~ /lî-/.

4. Nouns with a monosyllabic CV root and V or CV prefix, as in the following examples:

**(55) Examples of nouns with CV roots and a V or CV prefix**

mó: <sup>n</sup> tô	‘perso- (1502)’
lù-k <sup>w</sup> í	‘firewood (328)’
ì-g <sup>w</sup> ĩ	‘wasp (1791)’

---

<sup>18</sup> At least no prefix in the singular. If the plural exists it may have a prefix e.g., bà-fú:<sup>n</sup>dî ‘tradesmen’ or ma-sâ:hà ‘watches’.

ì-dá	‘louse (1810)’
ì-hé	‘army (1811)’
má-lâ	‘small i- testi- es (1812)’
kì-βí	‘si- (472)’
kí-dê	‘bell (474)’
kí-fí	‘cooked meat (475)’
mú-gî	‘family (477)’
lù-gó	‘corral (478)’
mú-tô	‘soup (487)’

5. Nouns with disyllabic CVCV root and class 9/10 nasal prefix, realised as prenasalisation.

**(56) Examples of nouns with a CVCV root showing word-initial prenasalisation**

m-bé: <sup>n</sup> d̥zà	‘syphilis (1465)’
m-bò: <sup>n</sup> dù	‘gu- (1466)’
ŋ-fú: <sup>n</sup> dú	‘wart (1470)’
ŋ-ké: <sup>n</sup> dê	‘mo- key (1476)’
ŋ-kì: <sup>n</sup> zò	‘- eedle (1477)’
ŋ-kò: <sup>n</sup> dò	‘pole (1479)’
m-pà: <sup>n</sup> gà	‘cock (1487)’
--sì: <sup>m</sup> bù	‘epilepsy (1494)’
--sò: <sup>n</sup> gà	‘reaso- (1496)’
ŋ-gáβû	‘shield (397)’
ŋ-góβî	‘bag (410)’
ŋ-gúrâ	‘cassava (414)’
ŋ-kàlí	‘uri- e (415)’
--táβí	‘pla- t species (451)’
--téβê	‘chair (455)’
--tí:râ	‘electric fish (456)’
--títî	‘dark- ess (457)’
--zéǵû	‘elepha- t (463)’
--zígô	‘e- mity (464)’

The disyllabic status of these words hinges on the assumption that the initial nasal element, though morphologically a prefix, is incorporated phonologically into the following segment as prenasalisation. If instead the nasal were treated as syllabic, then these words would consist of three syllables. Some evidence in favour of this latter analysis comes from the observation that in an exercise that involves clapping the number of syllables in a word, native speakers will assign a separate clap to the initial nasal of these words (which hence have three claps in all). Although this evidence is suggestive, however, it seems necessary to interpret these results cautiously, as it is not easy to be certain that speakers’ performance of this task is based purely on awareness of syllable structure and not other factors such as the independent morphological status of the initial nasal.

Potential support for treating the initial N as prenasalisation in the surface form comes from the fact that the initial nasal elements in these words are not exceedingly long in duration and do not appear to bear contrastive tone, being uniformly relatively low in pitch. In this case too, however, it is not clear that the arguments are all that conclusive. It is not clear that duration is a very reliable cross-linguistic indicator of syllabic or non-syllabic status of initial preconsonantal N's, and arguments from tone are somewhat premature inasmuch as a thorough analysis of the tone system has yet to be carried out. (Among other things, it is not yet clear to what extent noun class prefixes bear contrastive tone in general.)

Further evidence that might be brought in eventually comes from the important observation that the class 9 – 10 prefix clearly gives rise to a syllabic nasal when the initial root consonant is itself a nasal, as in the following examples:

**(57) Examples of nouns with CVCV roots showing syllabic nasal prefixation**

ṁ-mésé	‘rat (426)’
ʔ--í:ⁿdó	‘-ose (1484)’
ʔ--ó-î	‘chalk (427)’
ṁ-ṁámâ	‘meat (428)’
ṁ-ṁí- áβǔ	‘uterus (644)’
ṁ-ṁè- í	‘sauce (429)’
ṁ-ṁá:ⁿgâ	‘grave (1485)’
ṁ-ṁó:ⁿdô	‘hammer (1486)’
ṁ-ṁó:βô	‘sauce (1680)’
ṁ-ṁó:tâ	‘thirst (1681)’
ṁ-ṁúmâ	‘back (430)’

Examples of this type are clearly relevant, and suffice to demonstrate that the N class prefix is realised syllabically in some cases, but do not necessarily prove that it is also syllabic in the examples in (56).<sup>19</sup> In view of the lack of clearly conclusive evidence, we leave this issue unresolved.

6. Monosyllabic nouns are rare. The following is an exhaustive list of those found in our recorded data:

**(58) Examples of nouns with a CV root and a nasal prefix**

a	Ø- <sup>m</sup> pă:	‘au- t (1762)’
b	--dâ	‘stomach (183)’
c	--sí	‘grou- d (186)’
d	--sú	‘fish (187)’
e	--tê	‘cow (189)’
f	m-b <sup>w</sup> ĩ	‘grey hair (20)’

Note that all of these nouns begin with prenasalised consonants. In the case of (58)a, this initial prenasalised consonant is simply part of the root (cf. the plural form

---

<sup>19</sup> One might think that a possible analysis (for which there is precedent in the behaviour of other Bantu languages) is that N is realised as prenasalisation where this results in a prenasalised C that is part of the underlying inventory, but as a syllabic nasal where it occurs before a segment (a nasal) that cannot host prenasalisation. However there are many examples of CVCV nouns that begin with a nasal where prefixation does not result in a syllabic nasal. E.g., Ø-mà-à ‘vagi- a (425)'; Ø-mézâ ‘table (1678)'; Ø--à:<sup>m</sup>bâ ‘-umber (1482)'; Ø--à-ár:sí ‘pi- eapple (1276)’. In these cases, we have indicated the class 9/10 prefix as a null.

bà-<sup>m</sup>pá: ‘au- ts’). In all the remaining cases, the initial nasal element comes from the class 9/10 noun prefix.<sup>20</sup>

7. Four- and five-syllable nouns are also amply attested. Many of these are probably morphologically complex. Some show complete or partial reduplication of a root. Some examples of four- and five-syllable nouns are given below.

**(59) Examples of four-syllable nouns**

kì-gò: <sup>o</sup> gòlò	‘millipede (1201)’
mù-hò: <sup>n</sup> dè:rà	‘deputy (1202)’
mù-kù: <sup>o</sup> kùlò	‘tree species (1206)’
kì-lò: <sup>o</sup> gìrò	‘valley (1207)’
kà-pù: <sup>m</sup> púlí	‘plague (1212)’
kà-tú: <sup>o</sup> gúlí	‘dizzi- ess (1218)’
lú-bú: <sup>m</sup> búlá	‘pla- t species (1230)’
kà-tà: <sup>n</sup> dà:rù	‘sta- d (1233)’
mù-zì: <sup>o</sup> gàlu	‘a- gry perso- (1537)’
ì-pókópó	‘ear (1914)’
mù-k <sup>w</sup> á:kúá	‘pla- t species (339)’
lù-βèβérà	‘pla- t species (915)’
kì-fóβírǎ	‘pu- ishme- t (927)’
lù-kàkàβí	‘termite (934)’
lù-kòmérà	‘fe- ce (939)’
mù-kúráší	‘represe- tative (940)’
lù-kúrátó	‘meeti- g (941)’
mú-légézi	‘priest (942)’
mù-ràmùzì	‘judge (956)’

**(60) Examples of five-syllable nouns**

mù-dè: <sup>n</sup> dèmólé	‘pla- t species (1221)’
kì-kò: <sup>o</sup> kòlókò	‘cor- cob (1224)’
kà-híríhí <sup>4</sup> rí	‘tuberculosis (980)’
kì-hòhòpóló	‘bark (981)’
kì-lìβàtìró	‘foot (985)’
kí-rúq-ír-í-mǔ	‘result (991)’
kà-sùlùsùlù	‘path (993)’
lù-tóbótóbó	‘pla- t species (996)’

Nouns of more than five syllables are not found in our data.<sup>21</sup>

---

<sup>20</sup> These words are only monosyllabic however under the assumption that the initial nasal constitutes prenasalisation. If these nasals are syllabic, then the words have two syllables.

<sup>21</sup> However, Martin Diprose (personal communication) reports that six- and seven-syllable nouns do occur. E.g., k<sup>l</sup>-á:kú-wó-ér-á-hò ‘example’ and βù-té-étégérez-á:ḡá-á ‘misunderstanding’.

### 9.1.2 Phonotactic restrictions involving consonants

Most Lugungu consonants can occur either as the initial consonant ( $C_1$ ) in CVCV noun roots or in the position of the second consonant ( $C_2$ ). The following restrictive tendencies have however been noted:

1. Labialised and palatalised consonants (which, in our current analysis, are not present underlyingly but derived through glide formation) do not occur in  $C_2$  position in our data.
2. Setting aside class 9/10 nouns, in which word-initial prenasalised consonants commonly arise through combination of the N prefix with a root-initial obstruent, prenasalised C's in Lugungu nouns occur relatively rarely in  $C_1$  position, but are quite common in  $C_2$  position.

As will be seen in Section 9.2.2 below, these generalisations have parallels in CVC verb roots.

### 9.1.3 Phonotactic restrictions involving vowels

The table below summarises the attested co-occurrence possibilities for vowels in  $V_1$  and  $V_2$  position in CVCV nouns in our data. The number in each cell represents the number of cases found in a computer search of our data in which the vowel in the cell's row heading occurred in  $V_1$  position in combination with the vowel in the cell's column heading in  $V_2$  position (i.e., the second syllable of the root).

#### (61) Vowel co-occurrence restrictions (CVCV nouns)

$V_1 \downarrow$ $V_2 \rightarrow$	i	ɪ	ɛ	a	ɔ	ʊ	u
i	10		2	10	8		
ɪ		4	1	11	2	3	
ɛ	3	1	13	6	1	7	2
a	12	10		52	1	21	6
ɔ	12	4	2	14	23	1	
ʊ		10	3	11		27	
u	4			2	1		1

The figures in these tables should be taken as approximate. Words with unconditioned (hence potentially phonemic) instances of [e] and [o] have been excluded from the data on which this table is based.

The following observations on V...V co-occurrence possibilities in CVCV nouns are based on this chart of CVCV vowel co-occurrence:

- There are no violations of ATR harmony among high vowels.
- The non-high vowels /ɛ/, /ɔ/, /a/, which lack phonemic [+ATR] counterparts, are “neutral” and can co-occur with both [-ATR] and [+ATR] high vowels, though in the latter case they typically surface in their [+ATR] allophonic realisations.
- All vowels can occur as either  $V_1$  or  $V_2$ .
- /a/ does not generally precede mid vowels in roots. There is a single exception in the data, m̀-tʷá:r̀ô ‘bu-dle (367)’ (probably underlyingly /m̀-túár̀ô/).
- The mid vowels /ɛ/ and /ɔ/ rarely co-occur. (Only one example was found of /ɛ...ɔ/ and two of /ɔ...ɛ/.)
- There are no examples of /i/ as  $V_1$  and /u/ as  $V_2$ .
- While there may be some tendency toward vowel height harmony (Hyman 1999), exceptions to vowel height harmony occur in the form of the following attested sequences: /ɛ...ɪ/ (1 instance), /ɛ...ʊ/ (7), /ɔ...ɪ/ (4), /ɔ...ʊ/ (1). (The /ɛ...ʊ/ cases would

be expected however if Lugungu has asymmetric vowel height harmony, as described in Hyman (1999). See Section 10.1 for more discussion).

- Although the effect of vowel height harmony in seven-vowel Bantu languages is to disfavour height 2 vowels (in this case /i/, /u/) in syllables following height 3 vowels, the reverse sequences /i...ε/ (1), /i...ɔ/ (2), /u...ε/ (3), /u...ɔ/ (0) are actually slightly rarer in the data.
- Roots in which V<sub>1</sub> and V<sub>2</sub> are identical are especially common, accounting for about 40% of the total.

## 9.2 Verbs

### 9.2.1 Basic structure

In their citation forms, verbs normally consist minimally of an infinitival (class 15) prefix [kʊ]~[ku], a root (which is most typically CVC, though shorter and longer roots are attested) and a final vowel /a/.

Verbs that are disyllabic in their citation forms are of two types. The first type, of which only a few examples exist, consists of the infinitival [kʊ] prefix followed by a [Ca] syllable which is perhaps best analysed as consisting of a monosegmental C root followed by the final vowel [a] that regularly appears with verbs in their citation forms:

#### (62) Examples of verbs with a C root

kù-b-á	‘be (3) <sup>22</sup> ’
kù-h-á	‘give (4)’
kù-ɲ-á	‘wri-g’
kù-t-á	‘put’

In the second type of disyllabic verb, the vowel of the infinitival prefix undergoes glide formation (see below) before a VC root, yielding a surface structure of the form C<sup>w</sup>:VCa. The examples in the data of this type are listed below.

---

<sup>22</sup> Martin Diprose (personal communication) notes that the verb kù-b-á is used in an auxiliary function, and is not a full lexical verb.

**(63) Examples of verbs with a VC root**

k <sup>w</sup> -á:g-â	‘melt (1764)’
k <sup>w</sup> -è:g-á	‘k- ow/teach (1769)’
k <sup>w</sup> -è:r-á	‘grow (1770)’
k <sup>w</sup> -è:t-á	‘call (1771)’
k <sup>w</sup> -é:z-â	‘sweep (1772)’
k <sup>w</sup> -ì:β-á	‘steal (1773)’
k <sup>w</sup> -ì:m-á	‘be mea- (1774)’
k <sup>w</sup> -ì:r-á	‘retur- /a- swer (1775)’
k <sup>w</sup> -ì:t-á	‘kill (1776)’
k <sup>w</sup> -ð:β-â	‘be sharp (1778)’
k <sup>w</sup> -ð:h-â	‘remove fibres (1779)’
k <sup>w</sup> -ð:h-á	‘bewitch (1780)’
k <sup>w</sup> -ð:h-á	‘bail (1781)’
k <sup>w</sup> -ð:m-á	‘be dry (1782)’
k <sup>w</sup> -ð:s-á	‘be abse- t (1783)’
k <sup>w</sup> -ð:t-á	‘warm (1784)’
k <sup>w</sup> -ð:β-á	‘be sharp (1814)’
k <sup>w</sup> -è:g-á	‘k- ow/teach (1827)’

k <sup>w</sup> -é: <sup>m</sup> b-â	‘dig (1972)’
k <sup>w</sup> -é: <sup>n</sup> g-â	‘ripe- (1973)’
k <sup>w</sup> -ð: <sup>n</sup> k-â	‘suckle (1974)’

Here again, the final [a] in these examples is the same final vowel that occurs with verbs quite generally in the language, so that the root in all such cases has the underlying form VC. Some examples of tri-syllabic verbs having the very common structure kV-CVC-a are shown below:

**(64) Examples of verbs with a CVC root**

kù-- úg-á	‘ig- ore (268)’
kú-pím-â	‘measure (269)’
kú-βá: <sup>n</sup> d-â	‘be possessed (1398)’
kú-há: <sup>n</sup> d-â	‘grow up (1103)’
kú-βú: <sup>m</sup> b-â	‘mould (1404)’
kù-hí <sup>m</sup> b-á	‘fall ill (1414)’
kù-zì: <sup>n</sup> g-à	‘twist (1500)’
kù-tʃú: <sup>n</sup> -â	‘almost ready (1588)’
kù-gá:- -â	‘forbid (1592)’
kù-hé:s-â	‘carve/forge (1595)’
kù-ḍú:r-â	‘u- dress (1601)’
kù-kú:t-â	‘hit/draw (1605)’
kù-lá:l-â	‘lie (1606)’
kú-- á:β-â	‘bathe/wash (1613)’
kú-sí:g-â	‘pai- t (1621)’
kù-só:β-â	‘walk quietly (1623)’
kù-té:r-â	‘argue (1630)’
kú-zé: <sup>n</sup> -â	‘play (1654)’
kù-ɲè:t-à	‘be fat (1722)’
kù-tó:l-â	‘remove/search/subtract (1732)’

Other potentially trisyllabic verbs have CV roots.<sup>23</sup>

**(65) Examples of verbs with a CV root**

kù-kú-á	‘die (12) ‘
kù-kí-á	‘daw- (13) ‘
kù-hí-á	‘bur- /be cooked (11) ‘
kú-mú-à	‘shave (15) ‘
kú-- í-à	‘defecate (16) ‘
kú-lú-à	‘ooze (14) ‘
kù-ɲú-á	‘dri- k (17) ‘
kú-gú-à	‘fall (1718) ‘

---

<sup>23</sup> Whether or not the words in (65) are in fact trisyllabic depends on what one assumes about the syllabification of VV sequences. (See section 8.1 for discussion).



Note that the root vowel in all such cases carries a high tone. Note also that at least in reasonably careful speech the hiatus resulting from contact of the root vowel with the final vowel [a] is maintained; there is no gliding or desyllabification of the prevocalic high vowel, as occurs in some other contexts.

Still other trisyllabic verbs have VCVC roots before which the vowel of the infinitival prefix undergoes glide formation, resulting in a verb with the phonetic structure k<sup>w</sup>-V: CVC-a, as in the examples shown below.

**(66) Examples of verbs with a VCVC root**

k <sup>w</sup> -à:tík-â	‘be broke- (1821)’
k <sup>w</sup> -ì:zúl-â	‘be full (1851)’
k <sup>w</sup> -ð:zóh-â	‘be heavy (1815)’
k <sup>w</sup> -è:tág-â	‘be rude (1835)’
k <sup>w</sup> -è:t̃júm-â	‘be smart (1826)’
k <sup>w</sup> -è:mét-â	‘become preg- a- t (1831)’
k <sup>w</sup> -è:gód-â	‘be- d over (1829)’
k <sup>w</sup> -ì:βál-â	‘carry (1837)’
k <sup>w</sup> -à:túl-â	‘co- fess (1822)’
k <sup>w</sup> -à:gúl-â	‘crawl (1817)’
k <sup>w</sup> -ð:kól-â	‘extract (1852)’
k <sup>w</sup> -ε:βér-â	‘forget (1823)’
k <sup>w</sup> -è:hór-â	‘get o- credit (1830)’
k <sup>w</sup> -è:mók-â	‘go back (1832)’
k <sup>w</sup> -è:- íg-â	‘ha- g (1833)’
k <sup>w</sup> -à:- úl-â	‘remove (1820)’
k <sup>w</sup> -á:gúd-â	‘scratch (1816)’
k <sup>w</sup> -à:lúk-â	‘shout (1818)’
k <sup>w</sup> -à:mír-â	‘shout (1819)’
k <sup>w</sup> -è:bák-â	‘sleep (1824)’
k <sup>w</sup> -è:gám-â	‘starve (1828)’

Verbs consisting of four or more syllables in their infinitival forms are also not uncommon. Many such verbs have morphologically complex stems consisting of a root plus one or more derivational suffixes. Some examples are given below.

**(67) Examples of verbs with long roots showing stem morphology**

With reversive -ul ~ -úl	kù-kí: <sup>n</sup> g-úl-â	‘to ope-’
With causative -i	kù-ké:h-í-à	‘to cause to shri- k’
	kú-lé:h-í-à	‘to cause to become lo- g’
With causative -isi	kù-tí:- ísí-à	‘to cause to fear (threaten-);
With applicative -ír ~ -ér	kú-ḍǔ- -ír-â	‘to help’
	kú-lí: <sup>n</sup> d-ír-â	‘to wait (for someo- e)’
With passive u ~ u	kù-βíál-ú-à	‘to be bor-’
	kú-súé:r-ú-à	‘to be married’

With stative -ik ~ -ik	kú-mál-ík-à	‘to get fi-ished’
With reciprocal -a <sup>0</sup> ga-	kù-tómér-á <sup>0</sup> gá- -â	‘to collide with each other’
	kù-kút-á <sup>0</sup> gá- -â	‘to hit each other’
With i- te- sive -iriir ~ -iriir	kù-tí:- ís-írír:-í-à	‘to threate- repeatedly’

There are many other verbs of four or more syllables whose stems cannot be readily analysed as consisting of an independently attested CVC root plus one or more derivational extensions. Even though the roots in these longer verbs do not occur independently, however it is nevertheless striking that the segmental VC sequences which occur following the first CVC sequence of the stem and preceding the final vowel are commonly drawn from a very restricted set of VC sequences, which includes [ɪr]~[ɛr], [ʊr]~[ɔr], [ʊl]~[ɔl], [ʊk]~[ɔk], [ɪk]~[ɛk] (the choice being determined by vowel height harmony), along with [al], and [a- ], that in many cases look very similar to verbal extensions found elsewhere in Bantu. This suggests that these VC's were suffixes at least historically and it might not be out of place in some cases to view them as “frozen” suffixes synchronically. Some examples are shown below.

#### (68) Examples of verbs with long roots exhibiting frozen derivational morphology

kù-kéβér-â	‘check (542)’
kú-rágír-â	‘comma- d (559)’
kú-rágúr-â	‘foretell (560)’
kú-sóβór-â	‘ca- (579)’
kú-rámúr-â	‘bargai- (564)’
kú-sáhúl-â	‘s- atch (568)’
kú-- ókól-â	‘harvest (554)’
kù-túlúk-â	‘be- d (591)’
kú-sómók-â	‘come out (581)’
kù-tálík-â	‘smoke (584)’
kú-gérék-â	‘tax (524)’
kù-sígál-â	‘remai- (575)’
kú-βágá- -â	‘divide (500)’

### 9.2.2 Phonotactic restrictions

The following restrictions/tendencies appear to be true for consonant occurrence in CVC verb roots:

1. Palatal affricates are rare in C<sub>2</sub> position (1 example only, in kù-kétʃ-á ‘bite (233)’).
2. Prenasalised C's occur only as C<sub>2</sub> in the data.
3. Labialised C's occur only as C<sub>1</sub> in the data.

The second and third generalisations have parallels in CVCV noun roots. (See section 9.1.2.)

## 10 Morphophonemic processes

### 10.1 Vocalic processes

#### 10.1.1 Vowel height harmony

Lugungu displays very clear evidence of vowel height harmony (VHH) in verb stems. In particular, the following generalisations hold true for verb stems in our data almost without exception:

1. The high front [-ATR] vowel [i] does not occur in a syllable following a mid vowel [ɛ] or [ɔ], but only follows high or low vowels. (The only exceptions occur in the words k<sup>w</sup>-è:- íg-â ‘ha-g (1833)’ and k<sup>w</sup>-è:rî:d-â ‘protect (1938)’.)
2. The high back [-ATR] vowel [u] does not follow the mid back [-ATR] vowel [ɔ] in verbs (no exceptions in our data). [u] does sometimes follow the front mid vowel [ɛ] (though such examples are not particularly common), indicating that VHH is of the asymmetric type (Hyman 1999).
3. Mid front vowels do not occur in verb stems except as the initial (or only) root vowel or in a syllable immediately following another mid vowel. Back round mid vowels do not occur following mid front vowels either; [ɔ] (and its [+ATR] allophone [o]) in non-initial stem syllables occurs only where preceded by a syllable containing another instance of [ɔ] (or [o]). (The only exception we have found to these statements involves several verbs, e.g. kú-síóm-â ‘collect (49)’, kú-tíóm-â ‘gore (53)’, in which [o] immediately follows [i] as part of a vowel sequence.)

Several cases have been identified of verbal suffixes that actively undergo height harmony alternations. One of these is an applicative suffix (described also in Kutsch Lojenga (1999)) that alternates between [-ɪr] and [-ɛr] following [-ATR] verb roots and between [-ɪr] and [-ɛr] in [+ATR] contexts (following [+ATR] verb roots as well as when it is followed by the [+ATR] causative suffix). The high vowel allomorphs follow syllables with non-mid vowels, while the mid vowel allomorphs occur only following syllables with mid vowels. Some examples are shown below:

#### (69) Examples of applicative suffix realised as [-ɪr] following non-mid [-ATR] vowels

kú-hú- -ír-â	→	kúhú- írâ	‘be asto- ished for somebody’	c.f. kúhú- â ‘be asto- ished’
kù-fú- -ír-â	→	kùfú- írâ	‘receive for somebody’	c.f. kùfú- á ‘receive (208)’
kú-gáβ-ír-â	→	kúgáβírâ	‘sacrifice’	c.f. kúgáβâ ‘give/divide (519)’
kú-mál-ír-â	→	kúmálírâ	‘fi- ish up for somebody’	c.f. kúmálâ ‘fi- ish (551)’
kú-lím-ír-â	→	kúlímírâ	‘dig for somebody’	c.f. kúlímâ ‘dig (252)’

#### (70) Examples of applicative suffix realised as [-ɛr] following mid [-ATR] vowels

kù-lég-îr-â	→	kùɲégê:râ	‘accuse formally’	c.f. kùlégá ‘accuse (243)’
kù-è:t-ír-â	→	k <sup>w</sup> è:térâ	‘call for somebody’	c.f. k <sup>w</sup> è:tá ‘call (1771)’
kù-kól-ír-â	→	kùkólérâ	‘do for somebody’	c.f. kùkólâ ‘do (238)’
k <sup>w</sup> -è- dí-ír-â	→	k <sup>w</sup> è- dérîfâ	‘love for somebody’	c.f. k <sup>w</sup> è- dîâ ‘love (1975)’

#### (71) Examples of applicative suffix realised as [-ɪr] following high [+ATR] vowels

kú-dík-ír-â	→	kúdíkírâ	‘si- k’	c.f. kúdíkîâ ‘drop/immerse (302)’
kú-gúm-ír-â	→	kúgúmírâ	‘throw to somebody’	c.f. kúgúmâ ‘throw (216)’

**(72) Examples of applicative suffix realised as [-er] following mid [+ATR] vowels**

kú-góβí-ír-â → kúgóbérîâ ‘lie for somebody’ c.f. kúgóbîâ ‘lie (304)’

Other verbal suffixes subject to height (and ATR) harmony are the reversion/separative suffixes /-ul/ (transitive) and /-uk/ (intransitive), and the stative suffix /-ik/. Some examples illustrating the harmonic behaviour of these morphemes are shown below:

**(73) Examples of reversion/separative (transitive) suffix /-ul/**

kù-è:túk-úl-â → k<sup>w</sup>è:túkúlâ ‘remove s.t. from head’ c.f. k<sup>w</sup>è:túkâ ‘lift s.t. o- to head’  
kù-kí:ᵑg-úl-â → kùkí:ᵑgúlâ ‘ope-’ c.f. kùkí:ᵑgâ ‘shut (1424)’  
kù-hák-úl-â → kùhákúlâ ‘harvest ho-ey (531)’ c.f. kùhákâ ‘put i-’

**(74) Examples of reversion/separative (intransitive) suffix /-uk/**

kú-b<sup>w</sup>óm-úk-â → kúb<sup>w</sup>ómókâ ‘be poured’ c.f. kúb<sup>w</sup>ómâ ‘pour (24)’  
kù-- í:- -úk-â → kù- í:- úkâ ‘climb dow-’ c.f. kù- í:- â ‘climb (1614)’

**(75) Examples of stative suffix /-ik/**

kú-mál-ík-à → kúmálíkà ‘be fi- ished’ c.f. kúmálâ ‘fi- ish (551)’  
kù-wó- -ík-á → kùwó- ékâ ‘be visible’ c.f. kùwó- á ‘see (293)’

Finally, there is a causative suffix /-isi/ that is also subject to height harmony. Unlike the four suffixes considered above, however, which all have underlyingly [-ATR] vowels, this causative suffix, which is underlyingly [+ATR], does not alternate in its [ATR] value in agreement with a preceding root vowel. Rather, its [+ATR] value is dominant and causes preceding root vowels to become [+ATR]. Some examples illustrating the behaviour of this suffix are shown below.

**(76) Examples of causative suffix /-isi/**

kù-sú:l-ísí-à → kùsú:lísîâ ‘cause to refuse’ c.f. kùsú:lâ ‘refuse (1625)’  
kù-sál-ísí-à → kùsálísîâ ‘cause to cut’ c.f. kùsálâ ‘cut (274)’  
kú-mál-ísí-à → kúmálísîâ ‘cause to fi- ish’ c.f. kúmálâ ‘fi- ish (881)’  
kù-lót:t-ísí-à → kùlót:tésîâ ‘cause to dream’ c.f. kùlót:tâ ‘dream (1339)’  
kù-- é- -ísí-à → kù- é- ésîâ ‘cause to bite’ c.f. kù- é- á ‘bite (264)’  
kú-sóm-ísí-à → kúsómésîâ ‘cause to read’ c.f. kúsómâ ‘read (280)’

All of the roots of these causative verbs in (76) are underlyingly [-ATR], as is evident from the non-causative forms in the last column.

The behaviour of this causative suffix is unusual in that height 1 vowels do not usually undergo the effects of height harmony in Bantu languages.

There is also at least a tendency toward vowel height harmony as a static distributional pattern in nouns. (See Section 9.1.3.)

### 10.1.2 ATR harmony

Lugungu has an ATR harmony system that for the most part is very typical of /iieaouu/ seven-vowel systems (setting aside the possibility that /e/ and /o/ may be marginally contrastive). The Lugungu harmony system manifests the following features:

1. Harmony involving high vowels is obligatory root-internally. [+ATR] /i/, /u/ do not co-occur root-internally with [-ATR] /ɪ/, /ʊ/.
2. Underlying mid [-ATR] vowels can occur in roots containing high [+ATR] vowels, but are generally realised phonetically as their [+ATR] allophones [e], [o]. (See Section 7.5.)
3. There appears to be a difference in voice quality between the [+ATR] and [-ATR] vowels, similar to the difference described in a large number of non-Bantu languages with [ATR] harmony. (See Section 7.3.)
4. The low [-ATR] vowel /a/ is neutral and can co-occur with [+ATR] vowels (though, interestingly, not normally with mid [+ATR] vowels—see the discussion of vowel co-occurrence restrictions in Section 9.1.3).
5. As discussed in Section 7.3, the low vowel /a/ appears to have a more [+ATR]-like realisation when it occurs in words with [+ATR] vowels.
6. There are many examples in which /a/ superficially appears to be transparent to [+ATR] spreading. Some examples:

**(77) Examples of /a/ transparent to [+ATR] spreading**

ì-sátú	‘three (1886)’
kì-d̄zà: <sup>n</sup> gí	‘bra- ch (1119)’
mù-tá: <sup>m</sup> bí	‘doctor (1170)’
mú-já: <sup>m</sup> bî	‘helper (1189)’
mù-zà:- ù	‘match (1379)’
βí-sá:βù	‘mud (1353)’
m <sup>w</sup> -è:ká: <sup>m</sup> bí	‘hardworki- g (156)’
m <sup>w</sup> -è:já: <sup>n</sup> dú	‘height (157)’
kì-ád̄zò:d̄zólò	‘supper (163)’
mù-ɲ <sup>w</sup> á:- î	‘frie- d (361)’
mù-t <sup>w</sup> á:rô	‘bu- dle (367)’
mù-kálí	‘woma- (495)’
mù-βází	‘medici- e (664)’
mù-kálí	‘woma- (735)’
mù-làβí	‘stick (763)’
kí-- ázî	‘date tree (794)’
kì-sísá- ï	‘picture (966)’
mù-sítálí	‘li- e (967)’
mù-táβá <sup>t</sup> - í	‘so- (969)’
mù-támí:rú	‘dru- kard (971)’
kù-bálí-à	‘bli- k (296)’
kù-ráβ-ì-à	‘cause to pass through (312)’
kù-bálúk-â	‘burst (501)’
kù-hárúk-â	‘have diarrhoea’
kú-máɲís <sup>j</sup> -â:	‘i- form (599)’
kú-tátí:rí-à	‘tighte- (883)’
mù-kàtúlíkì	‘Catholic (984)’
lù-gà- ìkíó	‘tale (905)’

There are other examples, less numerous, where /a/ appears to be opaque to [ATR] harmony. An exhaustive (or nearly so) list of such examples in our data are given below:

**(78) Examples where /a/ is opaque to [+ATR] spreading**

kì-ràmùkíó	‘greeti- g (909)’
mù-má:tí	‘potter (1342)’
mó-tá:hî	‘- neighbour (1367)’
mù-hà: <sup>n</sup> dú	‘adult (1504)’
mù-ràmùzì	‘judge (956)’
kù-tá: <sup>n</sup> dík-â	‘begi- (1527)’
kú-rámí-à	‘worship (313)’
kú-rámúkí-à	‘greet (600)’

In view of what is said above about /a/ possibly having a [+ATR] allophone to the left of [+ATR] vowels, it may be that the apparent cases of transparency are really pseudo-transparency, i.e. /a/ actually assimilates the [+ATR] quality of a vowel to its right and transmits this [+ATR] vowel to a vowel further to the left. Cases of opacity like those in (78) might then be due to the gradient and variable nature of allophonic [+ATR] spreading in its application to low vowels, i.e. these would simply be cases in which variable [+ATR] spreading has applied less completely. Further investigation is ideally needed here however.

7. Noun class prefixes (including the class 15 prefix in its occurrence with verb infinitives) harmonise for [ATR] with root vowels. This harmonisation is assumed to be categorical, with prefixes fully harmonising even in careful speech, though further investigation is really required to establish whether this is so.

**(79) Examples of prefix harmonisation with [+ATR] roots**

í-t̥jótí	‘- eck (1864)’
ì-lígá	‘tear (eye) (1879)’
ì-g <sup>w</sup> ĩ	‘wasp (1791)’
kí-díhî	‘meat (683)’
kì-bó: <sup>n</sup> dí	‘a- thill (1079)’
kì-kùló	‘tortoise (757)’
kí-dê	‘bell (474)’
kí-fî	‘cooked meat (475)’
βù-βú: <sup>n</sup> gí	‘promiscuity (1080)’
lù-gójé	‘cloth (708)’
lù-tì: <sup>n</sup> dò	‘bridge (1178)’
lù-k <sup>w</sup> í	‘firewood (328)’
mù-lì: <sup>n</sup> gò	‘look (1481)’
mù-lóβí	‘fisherma- (779)’
mù-sè:rí	‘sick perso- (1361)’

**(80) Examples of prefix harmonisation with [-ATR] roots**

í-gégò	‘molar (1867)’
ì-hé	‘army (1811)’
βì-hágá	‘leprosy (714)’
βì-sógá	‘pla- t species (840)’

βù-dùlú	‘male-ess (688)’
βù-sê:gì	‘poverty (824)’
kí-βérù	‘thigh (666)’
kí-tó:kí	‘ba-a-a (1374)’
kì-bàgá	‘rai-y seaso- (675)’
kì-βí	‘si- (472)’
kì-hú:rù	‘weak perso- (1318)’
lù-kúbá	‘thu-der (754)’
lù-límí	‘to-gue/la-guage (774)’
lù-zálá	‘fi-ger/toe (868)’
lù-gó	‘corral (478)’
mù-βágâ	‘bou-dary (662)’
mù-bè:ré	‘club (1284)’
mù-dùlú	‘ma- (493)’
mù-títí	‘pla-t species (858)’
mù-tô	‘soup (487)’

In verbs, Kutsch Lojenga notes (1999) notes that pronominal prefixes with non-low vowels harmonise for [ATR]. As illustrated in Section 10.1, several verbal extensions with underlying high [-ATR] vowels also undergo [ATR] harmony with verb roots.

8. As in other languages with seven-vowel /iɛaou/ systems, [+ATR] is the dominant value (Casali 2003). Kutsch Lojenga (1999) describes several dominant [+ATR] suffixes; these include an agentive suffix [-i], an adjective forming suffix [-u], and two causatives suffix [-j] and [-isj]. Examples are shown below.

**(81) Examples of agentive suffix [-i]<sup>24</sup>**

a	mù-lím-î	→	múlímí	‘farmer’	cf. kúlímâ ‘to dig (252)’
b	mù-lé:g-î	→	múlé:gí	‘beggar’	cf. kúlé:gâ ‘to beg (1608)’
c	mù-ló:t-î	→	mùló:tí	‘dreamer’	cf. kùló:tâ ‘to dream (1339)’
d	mù-vúg-í	→	mùvúgí	‘driver’	cf. kùvúgâ ‘to drive (886)’
e	mù-lóβ-í	→	mùlóβí	‘fisherman’	cf. kùlóβâ ‘to fish (779)’

**(82) Examples of adjective forming suffix [-u] (from Kutsch Lojenga 1999)**

a	tàmí:r-ú	→	tàmírú	‘dru-k’	cf. kótàmírâ ‘to be dru-k (1259)’
b	tèrér-ú	→	tèrérú	‘slippery’	cf. kùtèrérâ ‘to slip (884)’
c	ìzúl-ú	→	ìzúlú	‘full’	cf. k <sup>w</sup> ìzúlâ ‘to be full (1851)’
d	òrób-ú	→	òróbú	‘soft’	cf. k <sup>w</sup> òróbâ ‘to become soft (1853)’
e	sìd-ú	→	sìdú	‘bur-t’	cf. kúsídâ ‘to bur- (276)’

<sup>24</sup> Examples (81)a-d are adapted from (Kutsch Lojenga 1999); (81)a, b, e are also found in our own data as well.

**(83) Examples of causative suffix [-j] (from Kutsch Lojenga 1999)**

a	kú-lír-j-â	→	kúlírjâ	‘cause to cry’	cf. kúlírâ ‘to cry (253)’
b	kú-gúl-j-â	→	kúgúljâ	‘cause to buy’	cf. kúgúlâ ‘to buy (215)’
c	kú-té: <sup>m</sup> b-j-â	→	kuté: <sup>m</sup> bjâ	‘cause to climb’	cf. kuté: <sup>m</sup> bâ ‘to climb (1448)’
d	kù-hó- j-â	→	kùhó- jâ	‘cause to get well’	cf. kùhó- á ‘to get well (306)’

**(84) Examples of causative suffix [-isj] (from Kutsch Lojenga 1999)**

a	kú-lí: <sup>n</sup> d-ísj-â	→	kúlí: <sup>n</sup> dísjâ	‘cause to wait’	cf. kúlí: <sup>n</sup> dâ ‘to wait (1433)’
b	kù-sú:l-ísj-â	→	kùsú:lísjâ	‘cause to refuse’	cf. kùsú:lâ ‘to refuse (1625)’

We assume that the underlying forms of these causative suffixes are probably /-i/ and /-isi/ and that where these show up phonetically with semi vocalic realisations [-j], [-isj], as in the examples above, this will be due to glide formation. However we also note that in our own data verbs that appear to have the /-i/ causative suffix show up phonetically with a final [ja] sequence in which the causative suffix preceding the final vowel [a] is realised as a syllabic high front [+ATR] vocoid and not as [j]. That is, the speaker we investigated does not appear to apply glide formation to these sequences.

Kutsch Lojenga also cites a couple of forms which are interesting in that they show the simultaneous application of [+ATR] spreading from the /-isi/ causative suffix and vowel height harmony:

**(85) Examples of simultaneous [+ATR] spreading and vowel height harmony**

kù-- é- -ísj-â	→	kù- é- ésjâ	‘cause to bite’	cf. kù- é- á ‘to bite (264)’
kù-lót-ísj-â	→	kùlót:ésjâ	‘cause to dream’	cf. kùlót:tâ ‘to dream (1611)’

While the [+ATR] value of the causative suffix spreads leftward onto the root, the underlying initial high vowel of the suffix itself undergoes lowering following the mid root vowel. This is somewhat unusual in that height 1 vowels do not usually undergo the effects of height harmony in Bantu languages.

## 10.2 Vowel hiatus resolution

Though it permits vowel sequences in some contexts, there are other contexts in which such sequences are not permitted in Lugungu. In these contexts, the language displays a number of common strategies (Rosenthal 1994, Casali 1996) for resolving hiatus, including elision of the first vowel (V<sub>1</sub>), glide formation, and vowel coalescence (merger). In addition to these processes there is also some limited instances of a hiatus resolution strategy that is found less commonly in Bantu, epenthesis of a consonant between the vowels.

### 10.2.1 Vowel elision

Sequences in which a low V<sub>1</sub> precedes a mid V<sub>2</sub> are sometimes resolved in Lugungu by eliding the first vowel, with compensatory lengthening of V<sub>2</sub>. This occurs for example with /Ca/ noun class prefixes before roots with a mid vowel, as illustrated below:

**(86) Examples of vowel elision in nouns with compensatory lengthening**

ká-érâ	→	ké:râ	‘-oise (1706)’
kà-èsé	→	kè:sé	‘pot (1707)’
kà-òzá	→	kò:zá	‘fur (1717)’

Elision of V<sub>1</sub> also occurs with pronominal prefixes before the initial vowel of a verb stem, as in the following examples:



**(87) Examples of vowel elision in verbs**

bà-ègírí	→	bè:gírí	‘they k-ew’
bà-òhírí	→	bò:hírí	‘they bailed’

**10.2.2 Glide formation**

As discussed in connection with labialised consonants, glide formation in Lugungu commonly applies to noun class prefixes of the form /Cu~/Cu/, yielding [Cw]. In many Bantu languages (e.g. Luganda) that show this pattern, glide formation applies in parallel fashion to prefixes of the form /Ci~/Ci/ to yield [Cj]. The extent to which this happens in Lugungu may need further investigation, as we have fewer examples of noun class prefixes of the form /Ci~/Ci/ in our data. However, the examples we do have, such as those shown below, suggest that prefixes with front vowels may be more resistant to glide formation than those with round vowels.

**(88) Examples where glide formation does not occur from noun prefixation**

kì-àrù	‘village (78)’
kì-ò má	‘metal (108)’
kì-ò sí	‘a-klet (111)’
kì-ò tó	‘fireplace (112)’
kì-è m é r é z í	‘p-eumo-ia (143)’
kì-è <sup>m</sup> bú	‘so-g (168)’
kì-è g <sup>w</sup> é: t̪ í	‘stick (63)’
kí-á d̪ ɔ́ ó: d̪ ɔ́ ló	‘supper (163)’
kì-à tá	‘sweet potato (79)’
kì-è h ó h ú l ǔ	‘lu-g (141)’
kí-á m ú: n d̪ á	‘i-testi-e (153)’
kì-à <sup>n</sup> dá	‘dry seaso- (167)’

We leave this matter for further study.

Glide formation of high round vowels also applies to CV pronominal prefixes in some cases, as in the examples below:

**(89) Examples of high round glide formation from noun prefixation**

tù-àl-ír-í	→	t <sup>w</sup> à:lírí	‘we swam’
tù-èg-ír-í	→	t <sup>w</sup> è:gírí	‘we k-ew’
tù-ìz-ír-í	→	t <sup>w</sup> è:zírí	‘we came’
tù-òh-ír-í	→	t <sup>w</sup> ò:hírí	‘we bailed’

As discussed elsewhere, vowels following labialised (and presumably palatalised, though relevant examples are somewhat sparse in our data) consonants, including those derived via glide formation, undergo compensatory lengthening.

Though glide formation normally affects high vowels in Lugungu, there is at least one context in which mid round vowels also glide. This occurs where the second person singular pronominal prefix /ɔ-/ occurs before a vowel-initial verb root, as in the examples below:

**(90) Examples of mid round vowel glide formation from noun prefixation**

ò-àl-â	→	wà:lâ	‘you swim!’
ò-ègú-à	→	wègúà	‘you hear!’
ò-ò:"gér-â	→	wò:"gérâ	‘you add!’

**10.2.3 Vowel coalescence**

Vowel coalescence applies in some cases to sequences of a non-high vowel followed by a high vowel arising at the boundary between a prefix and a root, as in the following example:

**(91) Examples of vowel coalescence**

mà-ìzì	→	mè:zì	‘water (1715)’
bà-ìz-ír-í	→	bèìzírí	‘they came’
ɲ-à-è-ìzúk-ír-í	→	ɲèìzúkírí	‘I remembered myself’

**10.2.4 Epenthesis**

In at least some cases of hiatus involving a mid front vowel as V<sub>1</sub>, a consonant [z] is epenthesised between the two vowels, as in the examples below:

**(92) Examples of vowel epenthesis**

ɲ-à-è-ágúd-ír-í	→	ɲè:zágúdírí	‘I scratched myself’
ɲ-à-è-égw-ír-í	→	ɲè:zégwírí	‘I heard myself’
ɲ-à-è-ìhúl-ír-í	→	ɲè:zìhúlírí	‘I served myself’
ɲ-à-è-òkí-ír-í	→	ɲè:zòké:rié	‘I bur-t myself’

**10.3 Consonantal processes**

**10.3.1 Hardening/consonant mutation**

Certain consonants undergo a morphophonemic “hardening” process when they are preceded by a nasal prefix in root-initial position. The specific changes attested are as follows: /l/ and /r/ are realised as [d], /h/ is realised as [p], /β/ and /w/ are realised as [b]. Examples illustrating this process are shown below:

**(93) Examples of consonant hardening**

a	kù-rúg-á	‘to come from’	- dúgâ	‘I come from’
b	kú-rá:"g-â	‘to a- - ou- ce	- dà:"gâ	‘I a- - ou- ce’
c	kù-lég-á	‘to accuse’	- dégâ	‘I accuse’
d	kú-lú:"g-â	‘to add a- i- gredie- t’	- dú:"gô	‘i- gredie- t’
e	kù-h-á	‘to give’	mpâ	‘I give/give me’
f	kú-hú:h-â	‘to blow’	mpù:hà:"bé	‘I blow’
g	kú-βál-â	‘to cou- t’	mbálâ	‘I cou- t’
h	kù-βú:lí-à	‘to ask’	mbú:líà	‘ask me’
i	kù-wó- -á	‘to see’	mbó- â:"bé	‘I see’

**10.3.2 Fricative epenthesis**

A process of epenthesis causes a consonant [z] to be inserted between a nasal and a vowel across morpheme boundaries.

**(94) Examples of fricative epenthesis**

--íjê	→	ʒíɖʒê	‘doors’
--óhô	→	ʒóhô	‘bailer’
à-- -ég-ír-í	→	à- zégírí	‘he k- ew me’
à-- -ágí-á: <sup>m</sup> b-é	→	à- zágíá: <sup>m</sup> bé	‘he fi- ds me’
à-- -òkì-à: <sup>m</sup> b-é	→	à- zòkìà: <sup>m</sup> bé	‘he bur- s me’

## 11 Tone

Lugungu is typical of many Bantu languages in that it exhibits a rich tonal system. Unfortunately the Phonetic Analysis Worksheet upon which this Statement is based did not examine the tonal system. However, some analysis has been done and it has been summarised and added to this Phonology Statement in this section.

Lugungu is analysed as having an underlying two tone distinction, although tonal processes result in a surface distinction between high, low, rising, and falling. In addition there is unconditioned downstep resulting from floating low tones.

Tone is utilised to distinguish words, indicate grammatical categories, and indicate grammatical relationships

### 11.1 Lexical Tone

A number of words are identical except for tone.

#### (95) Examples of lexical tone contrast

βì-βí	‘si- s (472)’	βì-βí	‘these’
β <sup>w</sup> -émí	‘width (84)’	β <sup>w</sup> -émí	‘rebellio- (85)’
mù-t̄	‘soup (488)’	mù-t̄	‘youth (487)’
kú-ál-â	‘make a bed (1767)’	kú-ál-á	‘swim (1766)’
βé:tú (from βá-étú)	‘our brothers’	βê:tú	‘but’
mù-límá	‘cripple (771)’	mù-límá	‘perso- of Lima cla- (772)’
hâ:-hà	‘here’	hâ:-há	‘gra- dfather (1307)’

While lexical tone is clearly present, the number of contrasts where lexical tone alone is the distinguishing factor are relatively few in Lugungu.

### 11.2 Morphological Tone.

Tone also distinguishes verb tenses and other morphological categories.

1. Tone distinguishes the narrative past tense from the near future tense.

#### (96) Examples of verbal tonal contrast for tense

βá-à-dí-à	‘they ate’	βá-à-dí-á	‘they will eat’
yá-á-lùk-à	‘he faste- ed’	yá-à-lùk-à	‘he will faste- ’
βá-á-gùm-à	‘they threw’	βá-á-gùm-á	‘they will throw’

2. Tone distinguishes remote past tense from recent past tense.

#### (97) Examples of verbal tonal contrast for past tenses

kì-pókó kî-à-hùè- -í kî-èsé	‘the gourd resembled a pot (REC)’
kì-pókó kî-á-húè- -ì kî-èsé	‘the gourd resembled a pot (DISTANT)’

3. Tone distinguishes a relative verb from an indicative verb, and distinguishes imperfective aspect from present tense.

**(98) Examples of other verbal tonal contrasts**

kìpókó 'kí-kú-'húá- -á kî-èsé	'the gourd that resembles a pot (REL)'
kìpókò kî-kú-'húá- -á kî-èsé	'the gourd is resemblin- g a pot (IMPFV)'
kìpókò kî-kú-'húá- -á kî-èsé	'the gourd resembles a pot (PRS)'

4. Tone distinguishes statements from questions.

**(99) Examples of tonal contrast for questions**

kìpókó kî-à-hùà- -é- g-í kî-èsé	'the gourd was resemblin- g a pot'
kìpókò kî-à-hùà- -é- g-í kî-èsè?	'was the gourd resemblin- g a pot?'
kìpókò kî-á-hùà- -à kî-èsé	'the gourd resembled a pot'
kìpókò kî-á-hùà- -á kî-èsé	'the gourd will resemble a pot'
kìpókò kî-á-hùà- -á kî-èsè?	'will the gourd resemble a pot?'

5. Tone indicates the speaker's attitude.

**(100) Examples of tonal contrast implying speaker attitude**

kìpókó kî-á-hùà- -á kî-èsé?	'will the gourd resemble a pot?' <sup>25</sup>
kìpókò kî-á-hùà- -á kî-èsè?	'will the gourd resemble a pot?' <sup>26</sup>

6. Tone distinguishes the imperative with an object and the subjunctive

**(101) Examples of tonal contrast in the imperative and subjunctive**

a	βà-lè:t-è	'you(sg) bri- g them (IMP)'
b	βà-lè:t-è	'let them bri- g (SUBJ)'
c	βà-lè:t-é	'brought o- es'

The examples in (101) show that tone contrast alone can be the distinguishing factor between two different parts of speech. In the examples above; (101)a, b are verbs, while (101)c is a noun.

### 11.3 Syntactic Tone.

Tonal patterns also depend on syntactic relationships. Notice that the tone of kî-èzô 'broom (92)' and mú-lógô 'witch (781)' varies in the following sentences:

**(102) Examples of syntactic tone variation**

lé:'t-á 'kí-k'íó 'kí-ézô	'bri- g that broom'
kí-kí kî-èzò kî-á:'ngê	'this is my broom'
kí-ézú kî-à-hé- ék-ír-í	'(the) broom was rui- ed'

---

<sup>25</sup> This question intonation implies surprise, mockery, or annoyance.

<sup>26</sup> This question intonation implies you feel the idea is stupid.

mù-lògò mù-hà: <sup>n</sup> dú	‘a- old witch’
mú-lógó mù-hà: <sup>n</sup> dú	‘the witch is old’
mú-lógò mù-hà: <sup>n</sup> dú	‘the witch, is old’

## 11.4 Phonologically Conditioned Tone.

The tone of a word is often affected by the tone of the preceding word. In the following examples the tone of the second word is affected by the preceding word:

### (103) Examples of phonologically conditioned tone

mù-kálí mú-hà: <sup>n</sup> dú	‘a- old woma-’
mù-dùlú mú-hà: <sup>n</sup> dú	‘a- old ma-’
mù-gólê mù-hà: <sup>n</sup> dú	‘a- old bride’
mù-lògò mù-hà: <sup>n</sup> dú	‘a- old witch’
- ì-à-wé:- í mú- <sup>t</sup> gólê	‘I saw (REM) a bride’
- í-á-wê:- ì mù-gólê	‘I saw (REC) a bride’

## 11.5 Contrastive tonal melodies of simple nouns

### 11.5.1 One mora

Two contrastive tonal melodies have been found for -CV noun stems.

### (104) Examples of tones on single-mora noun stems

Class	H		L	
C1/2	mù-sí / βâ-sí	‘i- habita- t (1247)’		
C3/4	mù-tó / mì-tó	‘soup (488)’	mú-gî / mí-gî	‘family (477)’
C5/6	ì-hé / mà-hé	‘army (1811)’	í-lâ / má-lâ	‘i- testi- e (1812)’
C7/8	kì-ró / βî-ró	‘day (482)’	kí-fî / βí-fî	‘cooked meat (475)’
C9/10	--sú / --sú	‘fish (187)’	--tê / --tê	‘cow (189)’
C11/10	lù-gó / --gó	‘corral (478)’		
C14	βù-tá	‘bow (485)’		
C21/6	gà-βí / mà-βí	‘feces (470)’		

### 11.5.2 Two mora

Four contrastive tonal melodies have been found for -CVCV noun stems. The following nouns are all in Class 1, but are representative of all the noun classes.

**(105) Examples of tones on two-mora noun stems**

HH	LH	HL	LL
mù-kálí	mù-dùlú	mù-gólé	mù-lógò
‘woma- (495)’	‘ma- (493)’	‘bride (707)’	‘witch (781)’
mù-kálí wà: <sup>n</sup> gè	mù-dùlú wà: <sup>n</sup> gè	mù-gólé wà: <sup>n</sup> gè	mù-lógò wà: <sup>n</sup> gè
‘my woma-’	‘my ma-’	‘my bride’	‘my witch’
mù-kálí yógò	mù-dùlú yógò	mù-gólé ‘yógò	mù-lógó ‘yógò
‘this woma-’	‘this ma-’	‘this bride’	‘this witch’

All the noun classes appear to function the same tonally. All the prefixes (both noun and adjective) seem to be underlyingly low. Each of the following examples is a noun phrase composed of a noun and an adjective.

**(106) Examples of tones on all the classes of two-mora noun stems**

Class	HH	LH	HL	LL
C1	mù-kálí mù-hà: <sup>n</sup> dú ‘old woma-’	mù-dùlú mù-hà: <sup>n</sup> dú ‘old ma-’	mù-gólé mù-hà: <sup>n</sup> dú ‘old bride’	mù-lógò mù-hà: <sup>n</sup> dú ‘old witch’
C2	βà-kálí βà-hà: <sup>n</sup> dú ‘old wome-’	βà-dùlú βà-hà: <sup>n</sup> dú ‘old me-’	βà-gólé βà-hà: <sup>n</sup> dú ‘old brides’	βà-lógò βà-hà: <sup>n</sup> dú ‘old witches’
C3	mù-tégú gù-hà: <sup>n</sup> dú ‘old trap’	mù-sòlò gù-hà: <sup>n</sup> dú ‘old tax’	mù-sípí gù-hà: <sup>n</sup> dú ‘old belt’	mù-girà gù-hà: <sup>n</sup> dú ‘old river’
C4	mì-tégú mí-hà: <sup>n</sup> dú ‘old traps’	mì-sòlò mí-hà: <sup>n</sup> dú ‘old taxes’	mì-sípí mì-hà: <sup>n</sup> dú ‘old belts’	mì-girà mì-hà: <sup>n</sup> dú ‘old rivers’
C5	ì-súmú lí-hà: <sup>n</sup> dú ‘old spear’	ì-gì-á lí-hà: <sup>n</sup> dú ‘old egg’	ì-sásí lì-hà: <sup>n</sup> dú ‘old bullet’	ì-t̪òtì lì-hà: <sup>n</sup> dú ‘old -eck’
C6	mà-súmú gá-hà: <sup>n</sup> dú ‘old spears’	mà-gì-á gá-hà: <sup>n</sup> dú ‘old eggs’	mà-sásí gà-hà: <sup>n</sup> dú ‘old bullets’	mà-còtì gà-hà: <sup>n</sup> dú ‘old -ecks’
C7	kì-hóté kí-hà: <sup>n</sup> dú ‘old wou- d’	kì-síkí kí-hà: <sup>n</sup> dú ‘old fu- eral log’	kì-kédé kì-hà: <sup>n</sup> dú ‘old straw mat’	kì-ṅò-ì kì-hà: <sup>n</sup> dú ‘old bird’
C8	βì-hóté bí-hà: <sup>n</sup> dú ‘old wou- ds’	βì-síkí bí-hà: <sup>n</sup> dú ‘old fu- eral logs’	βì-kédé bì-hà: <sup>n</sup> dú ‘old straw mats’	bì-ṅò-ì bì-hà: <sup>n</sup> dú ‘old birds’
C9	ṅ-kókó gí-hà: <sup>n</sup> dú ‘old chicke-’	m-pàlú gí-hà: <sup>n</sup> dú ‘old weapo-’	-tébé gí-hà: <sup>n</sup> dú ‘old chair’	m-pètà gí-hà: <sup>n</sup> dú ‘old buffalo’
C10	ṅ-kókó zì-hà: <sup>n</sup> dú ‘old chicke- s’	m-pàlú zì-hà: <sup>n</sup> dú ‘old weapo- s’	-tébé zì-hà: <sup>n</sup> dú ‘old chairs’	m-pètà zì-hà: <sup>n</sup> dú ‘old buffalos’
C11	lù-dódí lù-hà: <sup>n</sup> dú ‘old reed’	lù-sùsù lù-hà: <sup>n</sup> dú ‘old ski-’	rù-píjá lù-hà: <sup>n</sup> dú ‘old mo- ey’	lù-kò-ì lù-hà: <sup>n</sup> dú ‘old -ape of -eck’
C12	kà-sígó ká-hà: <sup>n</sup> dú ‘old seed’	kà-tàlì ká-hà: <sup>n</sup> dú ‘old market’	kà-túkó lù-hà: <sup>n</sup> dú ‘old e- largeme- t’	kà-lèḍzù kà-hà: <sup>n</sup> dú ‘old chi-’
C14	βù-sígó bú-hà: <sup>n</sup> dú ‘old seeds’	βù-tàlì bú-hà: <sup>n</sup> dú ‘old markets’	βù-ké-é bù-hà: <sup>n</sup> dú ‘old i- ability’	βù-lèḍzù bù-hà: <sup>n</sup> dú ‘old chi- s’

**11.6 Contrastive tonal melodies of simple verb roots**

Although noun stems have multiple contrastive tonal melodies, verb stems never have more than two contrastive melodies for any given syllable pattern. In the infinitive form of the verb one of the surface patterns is the characteristic HHF of underlyingly L stems. The other pattern varies depending on the CV pattern, but can be analysed as having a single

underlying H which is associated to the first vowel of the stem, and then spread according to other rules of the language.

### 11.6.1 Consonant initial roots

#### (107) Examples of tones on consonant initial verb roots

CV patter-	H		L	
C	kù-h-á	‘give (4)’		
CV	kù-dí-á	‘eat (8)’	kú-gú-à	‘fall (9)’
CVC	kù-tém-á	‘cut (287)’	kú-pím-â	‘measure (269)’

### 11.6.2 Vowel initial roots.

#### (108) Examples of tones on vowel initial verb roots

CV patter-	H		L	
VC	k <sup>w</sup> -ì:β-á	‘steal (1773)’	k <sup>w</sup> -íz-â	‘come (1777)’
VCVC	k <sup>w</sup> -ì:βál-â	‘carry (1837)’	k <sup>w</sup> -í-ám-â	‘be-d (1845)’

## 11.7 Tone in Phrases

When words are used in phrases, tone changes occur. The following table illustrates this.

#### (109) Some examples of phrase level boundary tones

	H Class 3 ‘ash spice (490)’	L Class 3 ‘family (477)’
(isolatio-)	mùzú	múgì
my ___	mùzú gúá: <sup>n</sup> gê	mùgì gúá: <sup>n</sup> gê
this ___	mùzú gúgù	mùgì gúgù
this ___ is good (lit. this ___ (is) good)	gúgù mùzú gùrô: <sup>n</sup> gí	gúgù múgì gùrô: <sup>n</sup> gí
I saw (REM) ___	jàwé:- í mù <sup>+</sup> zú	jàwé:- í múgì

## 11.8 Tone Rules

This section presents some of the tone rules that have been found to operate in Lugungu.

### 11.8.1 High Spreading

When a high tone is followed by a low tone, the high spreads to the following tonal node and the low is detached, becoming a floating low. There must be no H’s before the end of the phonological word. The rule is iterative, applying to all L’s up to the end of the phonological word. When the following word begins with a high, the floating low is realised as a downstep.

#### (110) An example of high spreading tone rule

Ø-wákámè - á - -zègù → wákámé <sup>+</sup>- á - zégù ‘hare (658)’ a-d ‘elepha-t (463)’

### 11.8.2 Noun Phrase-Final High Boundary Tone

A H boundary tone occurs at the beginning of nouns when they are phrase-final. When a noun occurs phrase-final, a H boundary tone is inserted at the beginning of the noun. This H tone only surfaces when the noun is underlyingly low throughout.



**(111) Example of phrase-final insertion of H tone**

		L-HH ‘woman’	L-LH ‘man’	L-HL ‘bride’	L-LL ‘witch’
a	isolation	mù-kálí	mù-dòlù	mù-gólê	mù-lógô
b	my__	mù-kálí wâ: <sup>n</sup> gè	mù-dòlù wâ: <sup>n</sup> gè	mù-gólé wâ: <sup>n</sup> gè	mù-lógô wâ: <sup>n</sup> gè
c	the __ is mine	mù-kálí wâ: <sup>n</sup> gè	mù-dòlù wâ: <sup>n</sup> gè	mù-gólé wâ: <sup>n</sup> gè	mù-lógô wâ: <sup>n</sup> gè

Example (111)b shows that mù-lógô is underlyingly low. The underlying tone pattern is used when the noun is the head of a noun phrase and there is material following the noun in the noun phrase. In (111)c the noun is phrase-final hence the H insertion.

The High Spreading rule is ordered before the Phrase Final Insertion rule.

**11.8.3 Topic High Deletion**

There is a topic-comment syntactic pattern, in which a final H in the topic is deleted.

**(112) Example of topic high deletion**

		L-HH ‘woman’	L-LH ‘man’	L-HL ‘bride’	L-LL ‘witch’
a	a foolish __	mù-kálí mú- <sup>h</sup> dómâ	mù-dòlù mú- <sup>h</sup> dómâ	mù-gólé <sup>h</sup> mù-dómâ	mù-lógô mú-dómâ
b	__ (is) f.	mù-kálí mú-dómâ	mù-dòlù mú-dómâ	mù-gólé <sup>h</sup> mù-dómâ	mù-lógô <sup>h</sup> mù-dómâ
c	__, (is) f.	mù-kàlì, mú-dómâ	mù-dòlò, mú-dómâ	mù-gólê, mú-dómâ	mù-lógô, <sup>h</sup> mù-dómâ

In (112)a we have a noun adjective noun phrase. In (112)b we have a noun adjective clause and in (112)c we have the topic-comment construction.

Both mù-kálí ‘woman’ and mù-dòlù ‘man’ underlyingly end in H, but surface in the topic-comment construction as LLL. mù-gólé ‘bride’ and mù-lógô ‘witch’ both end in L, and the rule has no effect.

**11.8.4 Final Floating Low**

When a floating Low occurs utterance final or phrase final, it is associated to the final vowel of the word. Since floating Lows are always the result of High Spread, the final vowel is always High, and the result is a falling tone.

**(113) Example of final floating low resulting in a fall**

Underlying	∅-wàkámè	‘hare (658)’
H Spread	∅-wàkámé(L)	
Final Floating L	∅-wàkámê	

## Appendix A - Consonant examples

### Examples of /p/

Word-initial	Ø-púkúpû	‘deaf (647)’
	Ø-píókô	‘rhinoceros (363)’
	Ø-pèrèkútŷê	‘blunt knife (989)’
Word-medial (root-initial)	kì-pâ: <sup>o</sup> gà	‘machete (1149)’
	kà-pù: <sup>m</sup> púfí	‘plague (1212)’
	mù-pî:rà	‘ball (1349)’
	kì-pî:tè	‘beloved person (1350)’
	ì-pé:sâ	‘button (1969)’
	kì-pókô	‘gourd (808)’
	kì-pìrìpíó	‘drill (908)’
	kù-pá: <sup>m</sup> p-á	‘clap (1437)’
	kú-pá:l-â	‘slap (1617)’
	mù-póí	‘tree species (1244)’
	kú-pím-â	‘measure (269)’
	kù-pákír-â	‘pack (555)’
	kù-pásúl-â	‘snatch (556)’
Word-medial (non-root-initial)	Ø-púkúpû	‘deaf (647)’
	kà-bé <sup>+</sup> púlé	‘small (917)’
	ì-pókópó	‘ear (1914)’
	Ø-tŷúpâ	‘bottle (681)’
	k <sup>w</sup> -è:pá: <sup>o</sup> k-á	‘be proud (1936)’

### Examples of /t/

Word-initial	Ø-tá:gû	‘pancreas (1366)’
	Ø-tà:rà	‘lamp (1696)’
	Ø-tábû	‘problem (452)’
Word-medial (root-initial)	ì-tá:mû	‘five (1723)’
	mù-tá: <sup>m</sup> bí	‘doctor (1170)’
	lù-tâ: <sup>m</sup> bú	‘pace (1171)’
	mù-tà: <sup>n</sup> dá	‘shore (1172)’
	lù-tì: <sup>n</sup> dò	‘bridge (1178)’
	mù-tì: <sup>n</sup> dò	‘standard (1180)’
mù-tô: <sup>m</sup> bà	‘plant species (1182)’	

	mù-tò: <sup>m</sup> bí	‘corpse (1183)’
	lù-tú: <sup>m</sup> bú	‘hair (1184)’
	kà-tú: <sup>g</sup> gú:lí	‘dizziness (1218)’
	kì-tá:tù	‘drying rack (1369)’
	kà-tê:rà	‘trunk (1370)’
	mù-té:tê	‘tree species (1372)’
	ì-té:kâ	‘law (1971)’
	kù-té:ŋ-â	‘gather wood (1629)’
	kí-tó:kî	‘banana (1374)’
	ì-tòkó	‘noise (1896)’
	kì-tó:gî	‘collar (860)’
Word-medial (non-root-initial)	w-è:tú	‘my our brother (1700)’
	kì-kô:tò	‘big (1720)’
	kì-lô:tó	‘dream (1339)’
	ì-sátú	‘three (497)’
	rú-átù	‘public (81)’
	kì-bì:rì:tì	‘matchbox (1036)’
	kì-pî:tè	‘beloved person (1350)’
	Ø-ŋg <sup>w</sup> é:té	‘uncle (1760)’
	mà:- <sup>g</sup> gò:tà	‘sleeping sickness (1578)’
	m-bà:tà	‘duck (1657)’
	ká-ŋó:tâ	‘spark (806)’
	ŋ-kè:ítò	‘shoe (1675)’
	mù-sítálí	‘line (967)’
	kù-hágátír-â	‘hold (888)’

### Examples of /tʃ/

Word-initial	Ø-tʃúá <sup>m</sup> bá	‘grass species (375)’
	Ø-tʃúpâ	‘bottle (681)’
Word-medial (root-initial)	kì-tʃò:lì	‘maize (1293)’
	í-tʃótí	‘neck (1864)’
	ì-tʃúhí	‘pea leaf (1865)’
	kú-tʃá: <sup>g</sup> g-â	‘dance/mix (1406)’
	kù-tʃú: <sup>n</sup> d-á	‘churn/strain (1407)’
	kú-tʃó:k-â	‘gather (1587)’
	kù-tʃú:ŋ-â	‘almost ready (1588)’
	kù-tʃék-á	‘be weak (206)’
	kùtʃúérâ	‘hunt (27)’
	kù-tʃú-á	‘judge/decide (5)’

	kù-tʃámúr-â	‘boil (512)’
	kù-tʃékétʃ-â	‘dance (513)’
Word-medial (non-root-initial)	kì-ĩtʃà:rú	‘dowry (1756)’
	m <sup>w</sup> -é:tʃú+mí	‘smart person (128)’
	kì-wà:tʃú	‘watermelon species (867)’
	Ø-pèrèkútʃê	‘blunt knife (989)’
	kù-kétʃ-á	‘bite (233)’
	kù-tʃú-á	‘escape (6)’

### Examples of /k/

Word-initial	kí-ɲónî	‘bird (805)’
	kí-fî	‘cooked meat (475)’
	kì-kúkí	‘snake species (756)’
	kà-ò:zá	‘fur (1717)’
	Ø-kó:ᵐdô	‘crown (1478)’
	Ø-kólómé	‘pigeon (938)’
	kà-èsé	‘pot (1707)’
	ká-é:râ	‘noise (1706)’
	kí-βérû	‘thigh (666)’
	kí-βírâ	‘forest (668)’
	kì-bàgá	‘rainy season (675)’
	kù-b-á	‘be (3)’
	kù-góz-á	‘paddle (214)’
	kù-hál-á	‘peel (218)’
	kà-hò:kí	‘bee (1314)’
	kà-hé:ᵐdú	‘problem (1110)’
	kà-hà:ᵑgá	‘skull (1108)’
	Ø-kèrúlî	‘behind (639)’
	kì-òsí	‘anklet (111)’
	Ø-kòkòlò:kí	‘cock (1034)’
	kú-líh-â	‘pay fine (251)’
	kù-lúm-á	‘bite/abuse/feel pain (258)’
	kú-dík-í-à	‘drop/immerse (1263)’
Word-medial (root-initial)	mú-kúà	‘salt (327)’
	mù-kúrásí	‘representative (940)’
	mò-kó:ᵐdó	‘navel/umbilical cord (1128)’
	mù-kónó	‘arm (749)’
	kù-kír-á	‘do most (236)’
	mò-kè:kà	‘grass mat (1328)’

	lù-ké: <sup>n</sup> kénúà	‘shard (1197)’
	mù-kúsâ	‘sorghum (760)’
	lù-kúβá	‘thunder (754)’
	lù-kô:kú	‘cowpea (1335)’
	mù-kô: <sup>n</sup> zí	‘girlfriend (1133)’
	mù-ká	‘wife (788)’
	mù-ká:gá	‘brideprice (1324)’
	mù-kálí	‘woman (495)’
	mù-kákú	‘plant species (734)’
	mù-ké:hú	‘bamboo (738)’
	mù-kórí	‘worker (751)’
Word-medial (non-root-initial)	kì-kúkí	‘snake species (756)’
	kì-síkí	‘funeral log (833)’
	kí-kákâ	‘cloud (732)’
	kí-tó:kî	‘banana (1374)’
	kì-ràmùkíó	‘greeting (909)’
	kì-ḍǎ:kâ	‘jackfruit (1320)’
	kì-pókô	‘gourd (808)’
	kì-sàkâ	‘bush (821)’
	kù-βí:k-á	‘keep (197)’
	kù-tʃék-á	‘be weak (206)’
	kù-pákír-â	‘pack (555)’
	kù-síkî: <sup>r</sup> -á	‘inherit (576)’
	kù-tʃékétʃ-â	‘dance (513)’
	kù-té:kér-â	‘sharpen (585)’
	kú-βókúl-â	‘uncover (505)’
	kú-rámúkí-à	‘greet (600)’
	kú-nókól-â	‘harvest (554)’
	k <sup>w</sup> -è:tókúl-â	‘remove (1907)’

#### Examples of /b/

Word-initial	Ø-bíníkâ	‘teapot (626)’
	Ø-bísâ	‘lungfish (676)’
	Ø-bòdì	‘dress (678)’
	Ø-bùbú	‘fish species (679)’
	Ø-bàrúhâ	‘letter (921)’
Word-medial (root-initial)	kà-bémúlè	‘big (916)’
	kà-bé <sup>t</sup> púlé	‘small (917)’
	mù-bè:rè	‘club (1284)’

	kì-bìrì:tì	‘matchbox (1036)’
	kì-bó: <sup>n</sup> dí	‘anthill (1079)’
	lú-bú: <sup>m</sup> bú:lâ	‘plant species (1230)’
	kù-bóh-á	‘tie (201)’
	kà-bà: <sup>m</sup> bà:sí	‘bare ground (1229)’
	lù-bà:lí	‘rock (1288)’
	í-bá: <sup>g</sup> gâ	‘blood (1943)’
	kì-bàgá	‘rainy season (675)’
	kù-bálí-à	‘blink (296)’
	kú-bágál-â	‘carry (507)’
Word-medial (non-root-initial)	Ø-bùbú	‘fish species (679)’
	Ø-rábâ	‘eraser (442)’
	Ø-tábû	‘problem (452)’
	n-tébê	‘chair (455)’
	kì-tàbú	‘bed/book (850)’
	Ø-kàsùròbânû	‘fish species (976)’
	k <sup>w</sup> -è:bák-â	‘sleep (1824)’

#### Examples of /d/

Word-initial	Ø-dàkìtâ:lì	‘doctor (1007)’
	Ø-dí:nì	‘religion (1295)’
	Ø-dú:kâ	‘shop (1296)’
	Ø-dó:dô	‘spinach (1666)’
	Ø-dírísâ	‘window (926)’
Word-medial (root-initial)	mù-dè: <sup>n</sup> dèmólê	‘plant species (1221)’
	kí-dé:rû	‘granary (1294)’
	kù-dé: <sup>m</sup> b-á	‘lick (1408)’
	kù-dé: <sup>g</sup> gê:t-â	‘float (1565)’
	kí-dê	‘bell (474)’
	kù-dí-á	‘eat (8)’
	kí-díhî	‘meat (683)’
	kú-díámúk-â	‘belch (119)’
	kú-dík-í-à	‘drop/immerse (302)’
	mù-dá: <sup>g</sup> gá	‘gap (1082)’
	kì-dâ:lì	‘hasp (1663)’
	ì-dá	‘louse (1810)’
	Ø-dó:dô	‘spinach (1666)’
	lù-dódí	‘reed (684)’
	βù-dòkâ	‘throat (685)’

	mù-dùlú	‘man (687)’
	kù-dóm-á	‘be stupid (492)’
	kù-dú-á	‘reach/arrive/satisfy (7)’
Word-medial (non-root-initial)	ká-βá <sup>h</sup> díé	‘southeast wind (604)’
	kì-kédê	‘mat (737)’
	∅-bòdì	‘dress (678)’
	∅-sádádá	‘grass species (649)’
	kì-sídá	‘scar (829)’
	mù-tidà	‘catapult (855)’
	k <sup>w</sup> -á:gúd-â	‘scratch (1816)’
	kú-ká: <sup>h</sup> kád-â	‘pour (1515)’
	kú-gód-â	‘dance (213)’
	mù-kòdòí	‘plant species (1024)’
	kà-tìdò:βà	‘candle (1057)’

#### Examples of /d̥z/

Word-medial (root-initial)	kì-d̥zà: <sup>h</sup> gí	‘branch (1119)’
	kí-d̥zà: <sup>h</sup> gâ	‘wave (1118)’
	lù-d̥zù: <sup>h</sup> gù	‘English (1121)’
	kì-d̥zà:kâ	‘jackfruit (1320)’
	βù-d̥zùnέ	‘sorrow (729)’
	ká-d̥zù:rù	‘lake fly (730)’
	kì-d̥zágúzǎ	‘celebration (929)’
	kù-d̥zù:r-â	‘undress (1601)’
	kù-d̥zóm-á	‘scare (228)’
	kú-d̥zón-â	‘help/rescue (229)’
	kù-d̥zúár-â	‘wear (33)’
	kú-d̥zón-â	‘help/rescue (539)’
Word-medial (non-root-initial)	lú-βád̥zù	‘rib (663)’
	kí-s <sup>w</sup> íd̥zâ	‘flu (365)’
	kí-ád̥zò:d̥zólô	‘supper (163)’
	η-kód̥zò	‘scar (420)’
	∅-sód̥zô	‘sword grass (448)’
	lú-íd̥zè	‘door (99)’

**Examples of /g/**

Word-initial	Ø-gâ:lì	‘bicycle (1672)’
	Ø-gièrâ	‘hyena (349)’
	gâ-βí	‘faeces (471)’
	Ø-gúlúhé	‘turtle (636)’
	Ø-gùlé	‘baboon (712)’
	Ø-gàràgárâ	‘lizard (979)’
Word-medial (root-initial)	kí-gá: <sup>m</sup> bû	‘word (1089)’
	lù-gà: <sup>n</sup> dá	‘clan (1090)’
	mú-gá: <sup>n</sup> dá	‘bundle (1091)’
	lú-gó: <sup>g</sup> ô	‘spine (1096)’
	kì-gò: <sup>g</sup> òlóló	‘millipede (1201)’
	í-gó:sí	‘testicle (1870)’
	mù-gòβíá	‘liar (605)’
	mù-gózí	‘rower (709)’
	kí-gùò	‘fall (325)’
	mú-gúhâ	‘rope (711)’
	mú-gú: <sup>m</sup> bâ	‘barren one (1099)’
	lú-gú: <sup>g</sup> ô	‘Gungu language (1101)’
	í-gúrô	‘sky (1871)’
	í-gégû	‘molar (1867)’
	kí-gézû	‘test (700)’
	mú-géñí	‘guest (697)’
	mà-gèzí	‘wisdom (699)’
	mú-gî	‘family (477)’
	mà-gírâ	‘sauce (701)’
	kí-gírâ	‘valley (702)’
mú-gírâ	‘river (703)’	
Word-medial (non-root-initial)	mù-ká:gá	‘six (1323)’
	mù-ká:gá	‘brideprice (1324)’
	mù-gùlú:sû	‘aged person (1037)’
	m <sup>w</sup> -é:gésâ	‘teacher (129)’
	mú-hí:gî	‘hunter (1310)’
	mú-lé:gî	‘beggar (1337)’
	kì-sê:gè	‘grief (1360)’
	n-dégê	‘airplane (393)’
	n-túlégé	‘zebra (657)’
	n-zógóró	‘tilapia (661)’
	w-ègò: <sup>m</sup> bò:râ	‘subcounty chief (1199)’
	Ø-tá:gû	‘pancreas (1366)’



má-βúgû	‘gifts (674)’
n-zégû	‘elephant (463)’
n-zígô	‘enmity (464)’
kì:- <sup>n</sup> tìgè	‘eyebrow (1543)’

#### Examples of /mp/

Word-initial	m-pà: <sup>0</sup> gà	‘cock (1487)’
	m-pá:kû	‘pet name (1683)’
	m-pálî	‘pants (1684)’
	∅-mpǎ:	‘aunt (1762)’
	m-píó	‘crocodile (22)’
	m-pàkà	‘argument (431)’
	m-pàlú	‘weapon (432)’
	m-pàsá	‘axe (433)’
	m-pérú	‘end (435)’
	m-pétâ	‘buffalo (436)’
	m-píhî	‘belch (437)’
	m-pítâ	‘ring (439)’
	m-púnû	‘pig (440)’
	m-párá:kî	‘cob (646)’
	Word-medial (root-initial)	kì:- <sup>m</sup> pálá: <sup>m</sup> pá
Word-medial (non-root-initial)	kà-pù: <sup>m</sup> púlî	‘plague (1212)’
	kù-pá: <sup>m</sup> p-á	‘clap (1437)’
	kà-wé: <sup>m</sup> pè	‘razorblade (1499)’
	kù- <sup>n</sup> á: <sup>m</sup> p-â	‘fart (1436)’

#### Examples of /nt/

Word-initial	n-tá:mâ	‘sheep (1695)’
	n-tê	‘cow (189)’
	n-tálî	‘lion (453)’
	n-tébê	‘chair (455)’
	n-tírâ	‘electric fish (456)’
	n-tífi	‘darkness (457)’
	n-túlégé	‘zebra (657)’
Word-medial (root-initial)	mú:- <sup>n</sup> tû	‘person (1502)’
	kì:- <sup>n</sup> tìgè	‘eyebrow (1543)’

**Examples of /nĩ/**

Word-initial                      n- $\overline{\text{tj}}$ úérâ                      ‘cobra (67)’

**Examples of /ŋk/**

Word-initial

ŋ-kérê:<sup>m</sup>bé                      ‘baby (1069)’  
ŋ-kì:<sup>n</sup>zò                      ‘needle (1477)’  
ŋ-kò:<sup>n</sup>dò                      ‘pole (1479)’  
ŋ-kù:<sup>n</sup>gàni                      ‘quarrel (1534)’  
ŋ-kèínà                      ‘donkey (1674)’  
ŋ-kèítò                      ‘shoe (1675)’  
ŋ-kòníó                      ‘pestle (320)’  
ŋ-kàlí                      ‘urine (415)’  
ŋ-kátá                      ‘ring (416)’  
ŋ-kénâ                      ‘horse (417)’  
ŋ-kímâ                      ‘monkey species (418)’  
ŋ-kírí                      ‘brain (419)’  
ŋ-kó $\overline{\text{d}}$ ó                      ‘scar (420)’  
ŋ-kókó                      ‘chicken (421)’  
ŋ-kòmà                      ‘election (422)’  
ŋ-kòmì                      ‘click sound (423)’  
ŋ-kómô                      ‘prison (424)’  
ŋ-kànàhú                      ‘sesame (638)’  
ŋ-kóhórò                      ‘cough (641)’  
ŋ-kókólâ                      ‘elbow (642)’

Word-medial (root-initial)

mù:-<sup>n</sup>kìrá                      ‘tail (1539)’  
m<sup>w</sup>i:-<sup>n</sup>kírá                      ‘tail (180)’  
lù:-<sup>n</sup>kè:<sup>n</sup>kè                      ‘handful (1558)’

Word-medial (non-root-initial)

mù- $\overline{\text{tj}}$ â:<sup>n</sup>kà                      ‘sand (1081)’  
kà-kò:<sup>n</sup>kó                      ‘tuberculosis (1131)’  
lú-sò:<sup>n</sup>kò                      ‘shell (1164)’  
lù-ké:<sup>n</sup>kénúà                      ‘shard (1197)’  
mù-jà:<sup>n</sup>kómô                      ‘prisoner (1211)’  
kì-kò:<sup>n</sup>kòlíkò                      ‘corn cob (1224)’  
lù:-<sup>n</sup>kè:<sup>n</sup>kè                      ‘handful (1558)’  
kù-ké:<sup>n</sup>k-á                      ‘go bad (1422)’  
kú-ká:<sup>n</sup>kád-â                      ‘pour (1515)’

kù-ká: <sup>h</sup> kán-â	‘shiver (1516)’
kù-kó: <sup>h</sup> kón-â	‘knock (1517)’
k <sup>w</sup> -è:pá: <sup>h</sup> k-á	‘be proud (1936)’
k <sup>w</sup> -ò: <sup>h</sup> k-á	‘suckle (1974)’

#### Examples of /mb/

Word-initial	m-bírô	‘athletics (390)’
	m-bé: <sup>h</sup> džà	‘syphilis (1465)’
	m-bálí:râ	‘budget (1274)’
	m-bà:tà	‘duck (1657)’
	m-bàlúá	‘fish species (321)’
	m-bóhéré	‘string (623)’
	m-bóníkò	‘new moon (624)’
	m-bóní	‘pupil (391)’
	m-bù: <sup>h</sup> dù	‘gun (1466)’
Word-medial (non-root-initial)	mù-tá: <sup>mb</sup> í	‘doctor (1170)’
	mú-já: <sup>mb</sup> í	‘helper (1189)’
	m <sup>w</sup> -è:ká: <sup>mb</sup> í	‘hardworking (156)’
	mù-sú: <sup>mb</sup> í	‘flesh (1166)’
	mù-tò: <sup>mb</sup> í	‘corpse (1183)’
	ì-tò: <sup>mb</sup> í	‘night (1949)’
	mù-jé: <sup>mb</sup> é	‘mango (1190)’
	ŋ-kérê: <sup>mb</sup> é	‘baby (1069)’
	Ø-βá: <sup>mb</sup> á	‘mudfish (1073)’
	mú-gú: <sup>mb</sup> á	‘barren one (1099)’
	mù-lí: <sup>mb</sup> à	‘fisherman (1135)’
	βi-ò <sup>mb</sup> ô	‘lungs (172)’
	kí-gá: <sup>mb</sup> ô	‘word (1089)’
	mù-rà: <sup>mb</sup> ò	‘corpse (1150)’
	lù-tâ: <sup>mb</sup> ú	‘pace (1171)’
	n-sì: <sup>mb</sup> ù	‘epilepsy (1494)’
	kì-è <sup>mb</sup> ú	‘song (168)’

#### Examples of /nd/

Word-initial	n-dégê	‘airplane (393)’
	n-démésà	‘plant species (630)’
	n-dá:wé	‘north wind (1664)’
	n-dáβísò	‘mirror (628)’

Word-medial (non-root-initial)	kì-bó: <sup>n</sup> dí	‘anthill (1079)’
	Ø-fú: <sup>n</sup> dí	‘tradesman (1087)’
	lù-gà: <sup>n</sup> dá	‘clan (1090)’
	mú-gá: <sup>n</sup> dâ	‘bundle (1091)’
	mù-há: <sup>n</sup> dá	‘path (1104)’
	mù-kó: <sup>n</sup> dó	‘navel/umbilical cord (1128)’
	ŋ-kò: <sup>n</sup> dò	‘pole (1479)’
	lù-tì: <sup>n</sup> dò	‘bridge (1178)’
	mù-tì: <sup>n</sup> dò	‘loud noise (1179)’
	kà-hé: <sup>n</sup> dú	‘problem (1110)’
	mù-hí: <sup>n</sup> dú	‘fish species (1114)’
	lù-hì: <sup>n</sup> dú	‘needle (1115)’
	βù-hà: <sup>n</sup> dú	‘age (1106)’
	mù-hà: <sup>n</sup> dú	‘adult (1107)’
	mù-hà: <sup>n</sup> dú	‘adult (1504)’

#### Examples of /nd͡ʒ/

Word-initial	n-d͡ʒá: <sup>n</sup> gù	‘cat (1068)’
	n-d͡ʒóárâ	‘dress (69)’
Word-medial (non-root-initial)	kí-gá: <sup>n</sup> d͡ʒâ	‘palm (1092)’
	m-bé: <sup>n</sup> d͡ʒâ	‘syphilis (1465)’
	kì-fú: <sup>n</sup> d͡ʒó	‘large intestine (1088)’
	‘kí-é <sup>n</sup> d͡ʒû	‘banana (171)’

#### Examples of /ŋg/

Word-initial	ŋ-gírî	‘warthog (408)’
	ŋ-gírô	‘refusal (409)’
	ŋ-géjê	‘colobus (407)’
	ŋ-gáβô	‘shield (397)’
	ŋ-gágâ	‘plant species (398)’
	ŋ-gálû	‘hand (401)’
	ŋ-gólùà	‘northwest wind (319)’
	ŋ-góβî	‘bag (410)’
	ŋ--gùnú	‘gum (413)’
	ŋ-gúrâ	‘cassava (414)’
	ŋ-gũhò	‘cloth (412)’

Word-medial (root-initial)	ká:- <sup>0</sup> gí	‘player (1123)’
	mù:- <sup>0</sup> gàlà	‘fish (1538)’
	mù:- <sup>0</sup> gèsú	‘arrow (1541)’
Word-medial (non-root-initial)	βù-βú: <sup>0</sup> gí	‘promiscuity (1080)’
	kì-ḍḗ: <sup>0</sup> gí	‘branch (1119)’
	mù-só: <sup>0</sup> gí	‘plant species (1163)’
	mù-gê: <sup>0</sup> gé	‘leper (1094)’
	kí-lé: <sup>0</sup> gê	‘hoof (1134)’
	∅-sè: <sup>0</sup> gê: <sup>0</sup> gè	‘barbed wire (1556)’
	rù-há: <sup>0</sup> gâ	‘god (1015)’
	mù-dá: <sup>0</sup> gá	‘gap (1082)’
	kà-hà: <sup>0</sup> gá	‘skull (1108)’
	lú-gó: <sup>0</sup> gô	‘spine (1096)’
	mú-gó: <sup>0</sup> gô	‘back (1098)’
	mù-ró: <sup>0</sup> gô	‘twin (1154)’
	mù-lì: <sup>0</sup> gò	‘look (1481)’
	lù-βá: <sup>0</sup> gú	‘shaft (1075)’
	lú-gú: <sup>0</sup> gô	‘Gungu language (1101)’
	mú-gú: <sup>0</sup> gô	‘Gungu person (1102)’
	n-ḍḗ: <sup>0</sup> gù	‘cat (1068)’

#### Examples of /mf/

Word-initial	ᵛ-fó:ká	‘changeling (1668)’
	ᵛ-fú: <sup>n</sup> dú	‘wart (1470)’
	ᵛ-fúmú	‘proverb (396)’

#### Examples of /ns/

Word-initial	n-sì: <sup>m</sup> bù	‘epilepsy (1494)’
	n-síjǎ	‘mosquito (445)’
	n-sítá	‘secret (446)’
	n-sékû	‘laughter (444)’
	n-sáhú	‘bag/sack (443)’
	n-sò: <sup>0</sup> gà	‘reason (1496)’
	n-sónê	‘knife (449)’
	n-sóhêrâ	‘housefly (651)’
	n-sóní	‘shame (450)’
Word-medial (root-initial)	kì:- <sup>n</sup> sò: <sup>n</sup> sì	‘cock’s comb (1559)’

Word-medial (non-root-initial)	kì:- <sup>n</sup> sò: <sup>n</sup> sì	‘cock’s comb (1559)’
	mù- <sup>n</sup> jà: <sup>n</sup> sí	‘citizen (1145)’
	Ø- <sup>n</sup> só: <sup>n</sup> sô: <sup>n</sup> sà	‘locust (1557)’

#### Examples of /nz/

Word-initial	n-zéné: <sup>0</sup> gúá	‘dancer (1063)’
	n-zálâ	‘hunger (462)’
	n-zégû	‘elephant (463)’
	n-zígô	‘enmity (464)’
	n-zíkû	‘gonorrhoea (465)’
	n-zírâ	‘path (466)’
	n-zíró	‘soot (467)’
	n-zógóró	‘tilapia (661)’
	n-zírámí‘ré	‘python (911)’
Word-medial (root-initial)	kì:- <sup>n</sup> zâ:li	‘curry/yellow (1763)’
Word-medial (non-root-initial)	mù-kû: <sup>n</sup> zí	‘girlfriend (1133)’
	kà-má: <sup>n</sup> zá	‘drying area (1137)’
	kì- <sup>n</sup> jé: <sup>n</sup> zé	‘cockroach (1146)’
	kì-zò: <sup>n</sup> zá	‘nest (1195)’
	ŋ-kì: <sup>n</sup> zò	‘needle (1477)’
	kú- <sup>n</sup> βá: <sup>n</sup> z-â	‘be first (1399)’
	kú-gó: <sup>n</sup> z-â	‘love/enjoy oneself (1410)’
	kú-ró: <sup>n</sup> z-â	‘track (1439)’
	kù-zé: <sup>n</sup> z-á	‘trot (1456)’
	kù-sá: <sup>n</sup> zír-â	‘chat (1523)’

#### Examples of /f/

Word-initial	Ø-fú: <sup>n</sup> dí	‘tradesman (1087)’
Word-medial (root-initial)	kà-fi:fi	‘poor (1298)’
	kì-fú: <sup>n</sup> d̥́ú	‘large intestine (1088)’
	mù-fùrá	‘dignitary (690)’
	mù-fú:zî	‘orphan (1299)’
	kì-fúβíră	‘punishment (927)’
	kù-fún-á	‘receive (208)’
	kù-fóβír-â	‘punish (517)’

	mù-fê:rùà	‘widow (1270)’
	kí-fi	‘cooked meat (475)’
Word-medial (non-root-initial)	Ø-rùfú	‘death/funeral (476)’
	ì-tàfâ:lì	‘brick (1930)’
	Ø-sèfùlîà	‘pot (602)’

### Examples of /s/

Word-initial	Ø-sèpéù	‘hat (1025)’
	Ø-sùrù:rù	‘pickaxe (1055)’
	Ø-sà: <sup>n</sup> dúkà	‘coffin (1214)’
	Ø-só: <sup>n</sup> sèí	‘pumpkin leaf (1228)’
	Ø-sâ:hà	‘watch (1355)’
	Ø-sè: <sup>n</sup> gê: <sup>n</sup> gè	‘barbed wire (1556)’
	Ø-só: <sup>n</sup> sô: <sup>n</sup> sà	‘locust (1557)’
	Ø-sô:rà	‘chapter (1693)’
	Ø-sù:tù	‘suit (1694)’
	Ø-sód̥ʒô	‘sword grass (448)’
	Ø-sèfùlîà	‘pot (602)’
	Ø-sádádá	‘grass species (649)’
	Ø-sâhâ:nì	‘plate (650)’
	Ø-sókísì	‘sock (652)’
	Ø-sùàsí	‘southwest wind (71)’
	Ø-ségâ	‘vulture (825)’
	Ø-sálákâ	‘chest (960)’
Word-medial (non-root-initial)	kú-gúlú:s-â	‘to be old (1383)’
	ì-pé:sâ	‘button (1969)’
	kù-hé:s-â	‘carve/forge (1595)’
	mú-gásô	‘valve (694)’
	kì-kósí	‘funeral clothes (753)’
	mù-kómésíá	‘official (906)’
	kì-òsí	‘anklet (111)’
	mù-kúrásí	‘representative (940)’
	kà-bà: <sup>m</sup> bà:sí	‘bare ground (1229)’
	m-básî	‘arrow (387)’
	Ø-sùàsí	‘southwest wind (71)’
	kì-èsé	‘pot (89)’
	mù-gúlú:sù	‘aged person (1037)’
	mù: <sup>n</sup> gèsú	‘arrow (1541)’
	kù-téísúk-â	‘lose support (1731)’

	k <sup>w</sup> -è:súkús-â	‘wash (516)’
	mù-nású	‘bailer (793)’
	∅-s <sup>w</sup> á:súà	‘monitor lizard (340)’
	kù-pásúl-â	‘snatch (556)’
	kú-kúsúmúl-â	‘pour (890)’
	mù-kéìsò	‘witness (1330)’
	n-dáβísò	‘mirror (628)’
Word-medial (root-initial)	kì-ságú	‘pillow (818)’
	mù-sâ:rà	‘wage (822)’
	lù-sàjá	‘jaw (823)’
	í-sázâ	‘county (1887)’
	kì-sídá	‘scar (829)’
	kú-sí:g-â	‘paint (1621)’
	mù-síjí	‘sand (835)’
	kù-sík-á	‘pull (278)’
	mà-sírâ	‘pus (837)’
	kù-síq-á	‘plant (277)’
	mú-sérí	‘night dancer (828)’
	kú-sé: <sup>m</sup> b-â	‘support (1442)’
	kú-sé: <sup>g</sup> -â	‘carry (1443)’
	kú-sék-â	‘laugh (275)’
	kà-súmí	‘season (845)’
	kù-sú: <sup>g</sup> -á	‘sew (1446)’
	kú-sú-à	‘grind (18)’
	ì-súβí	‘grass/green (1888)’
	kà-sómú	‘pen (848)’
	lù-sùsú	‘skin (849)’
	kù-sú:l-â	‘refuse (1625)’
	βì-sógá	‘plant species (840)’
	mú-sómô	‘subject (843)’
	kù-só:β-â	‘walk quietly (1623)’
	mù-sòlò	‘tax (842)’

#### Examples of /h/

Word-initial	∅-hà:há	‘grandfather (1307)’
	∅-hù:zì	‘thread (1319)’
	∅-hé:mà	‘tent (1673)’
Word-medial (root-initial)	mù-há: <sup>n</sup> dá	‘path (1104)’
	kà-hà: <sup>g</sup> gá	‘skull (1108)’



	βì-hágá	‘leprosy (714)’
	lù-hálá	‘bald head (717)’
	kù-hí: <sup>m</sup> b-á	‘fall ill (1414)’
	kà-híríhí‘rí	‘tuberculosis (980)’
	βù-híó	‘heat (326)’
	mú-hí:gí	‘hunter (1310)’
	mù-hí: <sup>n</sup> dú	‘fish species (1114)’
	lù-hì: <sup>n</sup> dú	‘needle (1115)’
	kù-hí-á	‘burn/be cooked (11)’
	mù-hé:sî	‘blacksmith (1309)’
	kà-hé: <sup>n</sup> dú	‘problem (1110)’
	kú-héhé:r-â	‘to be soft/easy (1384)’
	kú-hé: <sup>m</sup> b-â	‘light (1413)’
	ì-hé: <sup>m</sup> bé	‘horn (1945)’
	ì-hé	‘army (1811)’
	kú-hú: <sup>n</sup> d-â	‘be slightly rotten (1417)’
	kú-húní:r-â	‘be astonished (1252)’
	kì-hú:lù	‘mortar (1316)’
	mù-húlízi	‘obedient person (928)’
	kì-hòhò:liă	‘butterfly (1033)’
	kú-hóró: <sup>n</sup> g-â	‘wail (1061)’
	kú-hó: <sup>n</sup> g-â	‘sacrifice (1416)’
	kì-hóló	‘leftovers (723)’
	kì-hóté	‘wound (724)’
Word-medial (non-root-initial)	Ø-hà:há	‘grandfather (1307)’
	mù-sá:há	‘expert (1354)’
	Ø-sá:hà	‘watch (1355)’
	mú-tá:hí	‘neighbour (1367)’
	kí-díhî	‘meat (683)’
	kì-kâ:hì	‘leaf (1325)’
	ì-t̥jùhí	‘pea leaf (1865)’
	í-níhî	‘liver (1881)’
	m-píhî	‘belch (437)’
	Ø-gúlúhé	‘turtle (636)’
	ì-tèhé	‘ground (1894)’
	m <sup>w</sup> -ð:hé	‘cursed one (106)’
	mì-èhé: <sup>m</sup> bú	‘pride (154)’
	ŋ-kànàhú	‘sesame (638)’
	mù-ké:hú	‘bamboo (738)’
	kà-lìhúà	‘dance (609)’
	kì-èhùhólǔ	‘lung (141)’
	lú-sáhô	‘mountain/hill (819)’

n-sáhú	‘bag/sack (443)’
ŋ-gúhò	‘cloth (412)’
í-róhò	‘thirst (1884)’
ŋ-kóhórò	‘cough (641)’
k <sup>w</sup> -è:hór-á	‘get on credit (1830)’

### Examples of /β/

#### Word-initial

∅-βá: <sup>m</sup> bá	‘mudfish (1073)’
βí-sá:βû	‘mud (1353)’
βí-ó <sup>m</sup> bò	‘lungs (172)’
βí-á <sup>n</sup> démâ	‘politics (178)’
βì-hágá	‘leprosy (714)’
βì-sógá	‘plant species (840)’
βù-βú: <sup>n</sup> gí	‘promiscuity (1080)’
βù-hà: <sup>n</sup> dú	‘age (1106)’
βù-híó	‘heat (326)’
βù-dòká	‘throat (685)’
βù-dùlú	‘maleness (688)’
βù-gàlí	‘width (692)’
βó-lógò	‘witchcraft (780)’

#### Word-medial (root-initial)

kú-βál-â	‘count (194)’
kì-βá:râ	‘tsetse fly (1282)’
ì-βará	‘name (1860)’
lú-βád̄zò	‘rib (663)’
mà-βí	‘faeces (470)’
n-dáβísò	‘mirror (628)’
kì-βí	‘sin (472)’
kí-βírâ	‘forest (668)’
mú-βírî	‘body (671)’
kí-βérò	‘thigh (666)’
ì-βé:rê	‘breast (1968)’
βù-βú: <sup>n</sup> gí	‘promiscuity (1080)’
kì-βú:lìó	‘question (1269)’
kú-βú: <sup>m</sup> b-â	‘mould (1404)’
kù-βú: <sup>n</sup> g-á	‘visit (1405)’
má-βúgù	‘gifts (674)’
lú-βú:βî	‘cream (1287)’
ì-βó: <sup>m</sup> bà	‘clay (1942)’
kù-βój-á	‘smell (202)’

Word-medial (non-root-initial)	lì-òβá	‘sun (105)’
	kà-tìdò:βà	‘candle (1057)’
	lù-kúβá	‘thunder (754)’
	ŋ-góβí	‘bag (410)’
	mù-làβí	‘stick (763)’
	mú-gáβí	‘giver (691)’
	mù-lóβí	‘fisherman (779)’
	ì-súβí	‘grass/green (1888)’
	kì-fúβírǎ	‘punishment (927)’
	‘mù-téβézí	‘preacher (972)’
	kì-téβé	‘class (853)’
	kù-kéβér-â	‘mark (541)’
	lù-βèβérâ	‘plant species (915)’
	k <sup>w</sup> -e:βér-â	‘forget (1823)’
	βí-sá:βû	‘mud (1353)’
	lú-m <sup>w</sup> á:βû	‘blade (360)’
	Ø-nàká:βú	‘his their sister (125)’
	ŋ-gáβû	‘shield (397)’
	kì-βó	‘basket (1708)’
	m-bíβô	‘stock (388)’
n-dóβô	‘bucket (394)’	
ǰ-ǰó:βô	‘sauce (1680)’	
ì-lóβó	‘fishhook (1880)’	
kú-sóβó:r-â	‘explain (1257)’	

#### Examples of /v/

Word-medial	kà-vè:rà	‘bag (865)’
	kù-vúg-á	‘ride (292)’
	kù-kévér-â	‘check (542)’

#### Examples of /z/

Word-initial	Ø-zì:zá	‘grandmother (1382)’
	Ø-zí:pù	‘zipper (1703)’
Word-medial (root-initial)	mù-zà:ná	‘slave (1378)’
	lù-zálá	‘finger/toe (868)’
	‘kí-záβírô	‘mourning (974)’
	mù-zí <sup>9</sup> gâ	‘beehive (1193)’

	lú-zígê	‘locust (869)’
	má-zímâ	‘truth (871)’
	mú-zégéíḍṵô	‘firstborn (1059)’
	mù-zì: <sup>0</sup> gàlù	‘angry person (1537)’
	kú-zík-í-à	‘cause to destroy (315)’
	kù-zì: <sup>0</sup> g-à	‘twist (1500)’
	mù-zírâ	‘ululation (873)’
	mú-zírê	‘deceased (876)’
	mú-zé:nî	‘player (1381)’
	kú-zé:n-â	‘play (1654)’
	kù-zé: <sup>n</sup> z-á	‘trot (1456)’
	kú-zúβ-â	‘weed (294)’
	mù-zúmú	‘spirit (879)’
	kú-zúβ-úí-â	‘pluck (593)’
	kú-zúmúr-â	‘pay dowry (594)’
	kù-zúmú	‘underworld (878)’
	mù-zú	‘ash spice (490)’
	mù-zòlòí	‘plant species (1026)’
	lù-zóká	‘worm (469)’
	lù-zótá	‘star (877)’
	kì-zò: <sup>n</sup> zá	‘nest (1195)’
	kú-zó: <sup>0</sup> góβ-â	‘quarrel (1531)’
Word-medial (non-root-initial)	kì-òzá	‘feather (114)’
	mù-fú:zì	‘orphan (1299)’
	mù-hô:zà	‘market master (1315)’
	∅-hú:zì	‘thread (1319)’
	m <sup>w</sup> -ì:zúlù	‘flood (134)’
	mù: <sup>0</sup> gèrészâ	‘British (1550)’
	∅-zì:zá	‘grandmother (1382)’
	kì-èmérézì	‘pneumonia (143)’
	kì-èrérézì	‘light ray (144)’
	m <sup>w</sup> -ì:zúkólù	‘grandchild (148)’
	∅-mé:zâ	‘table (1678)’
	kà-ò:zá	‘fur (1717)’
	í-sázâ	‘county (1887)’
	mù-βázì	‘medicine (664)’
	mà-gèzì	‘wisdom (699)’
	kí-gézù	‘test (700)’
	mù-gózì	‘rower (709)’
	lù-kìzì	‘spinal cord (741)’
	kà-kìzì	‘greedy one (742)’
	lù-ézù	‘broom (91)’

kí-ézû	‘broom (92)’
mù-húlízi	‘obedient person (928)’
kì-ḍǎgúzǎ	‘celebration (929)’
‘mú-légézi	‘priest (942)’
mù-ràmùzi	‘judge (956)’
‘mù-tébézi	‘preacher (972)’
k <sup>w</sup> -é:z-â	‘sweep (1772)’
k <sup>w</sup> -ð:zǎh-â	‘be heavy (1815)’
kí-názi	‘date tree (794)’
k <sup>w</sup> -ì:zól-â	‘be full (1851)’
kù-háriz-â	‘flatter/boast (1908)’
kù-βáz-á	‘speak (196)’
kù-gǎz-á	‘paddle (214)’
kù-káz-á	‘tighten (232)’
kú-gúzúk-â	‘jump (529)’
kù-séméz-â	‘make better (572)’
kú-sápurúz-â	‘comb (895)’

#### Examples of /m/

##### Word-initial

Ø-mé:zâ	‘table (1678)’
mì-èhé: <sup>m</sup> bú	‘pride (154)’
mà: <sup>ɔ</sup> gè:tà	‘sleeping sickness (1578)’
má-lâ	‘small intestines (1812)’
má-βiâ	‘swollen testicles (322)’
mù-tǎ: <sup>ɔ</sup> kà	‘sand (1081)’
mù-dá: <sup>ɔ</sup> gá	‘gap (1082)’
mú-gá: <sup>n</sup> dâ	‘bundle (1091)’
mù-gê: <sup>ɔ</sup> gé	‘leper (1094)’
mù-lí: <sup>m</sup> bà	‘fisherman (1135)’
mù-sú: <sup>m</sup> bí	‘flesh (1166)’

##### Word-medial (root-initial)

mú-mírô	‘throat (785)’
kú-mér-â	‘sprout (261)’
kà-má: <sup>n</sup> zá	‘drying area (1137)’
mù-má:tí	‘potter (1342)’
kì-má:jâ	‘dance cloth (1343)’
kí-mólê	‘flower (789)’
lú-mólê	‘torch (790)’
kú-mú-à	‘shave (15)’

##### Word-medial (non-root-initial)

m <sup>w</sup> -é:tǎú <sup>+</sup> mí	‘smart person (128)’
---------------------------------------	----------------------

ŋ-kòmì	‘click sound (423)’
mú-límí	‘farmer (773)’
β <sup>w</sup> -ð:mí	‘life (109)’
lù-límí	‘tongue/language (774)’
Ø-númî	‘bull (798)’
Ø-wàkámê	‘hare (658)’
Ø-kólómé	‘pigeon (938)’
kì-òamá	‘metal (108)’
m <sup>w</sup> -ì:rímâ	‘darkness (132)’
Ø-hémà	‘tent (1673)’
ŋ-kómô	‘prison (424)’
kí-kómô	‘anklet (746)’
mú-sómô	‘subject (843)’
kí-kémû	‘pond (739)’
mù-rámú	‘sibling-in-law (809)’
lù-súmú	‘musumu fruit (846)’
β <sup>w</sup> -ì:námú	‘coldness (131)’
ŋ-fúmú	‘proverb (396)’
mì-èhé: <sup>m</sup> bú	‘pride (154)’

#### Examples of /n/

Word-initial	Ø-nâ:nì	‘who (1344)’
	Ø-nâ: <sup>m</sup> bà	‘number (1482)’
	Ø-nâ: <sup>g</sup> gà	‘piano (1483)’
	Ø-nónô	‘grudge (1679)’
	Ø-númî	‘bull (798)’
Word-medial (root-initial)	kì-nígâ	‘anger (795)’
	mú-nígô	‘necktie (796)’
	kú-ní-à	‘defecate (16)’
	í-níhî	‘liver (1881)’
	kù-nén-á	‘bite/quarrel (264)’
	mù-nákú	‘poor person (791)’
	mù-nású	‘bailer (793)’
	kí-názî	‘date tree (794)’
	lú-nónô	‘nail (797)’
	kú-nóβ-â	‘hate (266)’
	kú-nól-â	‘be sweet (267)’
	kù-núg-á	‘ignore (268)’
	Word-medial (non-root-initial)	ŋ-kù: <sup>g</sup> gàni

mù-ŋ <sup>w</sup> á:nî	‘friend (361)’
m-bóní	‘pupil (391)’
Ø-dí:nì	‘religion (1295)’
Ø-nâ:nì	‘who (1344)’
Ø-sàhâ:nì	‘plate (650)’
Ø-wèt̪jùnέ	‘fish species (973)’
n-sónê	‘knife (449)’
m-b <sup>w</sup> ê:nέ	‘dog (66)’
βù-d̪z̪ùnέ	‘sorrow (729)’
mù-zà:ná	‘slave (1378)’
ŋ-kèínà	‘donkey (1674)’
kì-íná	‘hole (1710)’
Ø-nó:nò	‘grudge (1679)’
Ø-wî:nò	‘ink (1701)’
lì-ínó	‘tooth (1711)’
ŋ-gùnó	‘gum (413)’
m-púnô	‘pig (440)’

#### Examples of /ŋ/

##### Word-initial

ŋ-ŋínáβǔ	‘uterus (644)’
Ø-ŋìné:kâ	‘husband (951)’
ŋ-ŋèní	‘sauce (429)’
ŋ-ŋá: <sup>n</sup> gâ	‘grave (1485)’
Ø-ŋà: <sup>n</sup> -gò: <sup>n</sup> gì	‘loved wife (1555)’
ŋ-ŋámâ	‘meat (428)’
ŋ-ŋó: <sup>n</sup> dò	‘hammer (1486)’
ŋ-ŋó:βò	‘sauce (1680)’
ŋ-ŋó:tâ	‘thirst (1681)’
Ø-ŋù: <sup>m</sup> bâ	‘house (1148)’
ŋ-ŋúmâ	‘back (430)’
Ø-ŋúgútà	‘number (645)’

##### Word-medial (root-initial)

kì-ŋé: <sup>n</sup> zé	‘cockroach (1146)’
mù-ŋè:rê	‘gecko (1346)’
kà-ŋà: <sup>n</sup> gù	‘sunrise (1144)’
mù-ŋà: <sup>n</sup> sí	‘citizen (1145)’
lù-ŋá:ŋâ	‘tomato (1345)’
ká-ŋó:tâ	‘spark (806)’
kì-ŋó:wâ	‘peanut (807)’
kí-ŋónî	‘bird (805)’
kù-ŋú-á	‘drink (17)’

Word-medial (non-root-initial)	mú-zé:ŋí	‘player (1381)’
	mú-géŋí	‘guest (697)’
	mù-síŋí	‘sand (835)’
	lù-ŋá:ŋá	‘tomato (1345)’
	Ø-gièŋá	‘hyena (349)’
	n-síŋá	‘mosquito (445)’
	mù-kúŋú	‘plant species (759)’

#### Examples of /ŋ/

Word-medial	k <sup>w</sup> -è:ŋúróŋú:tí-à	‘grumble (1924)’
	Ø-lè:ŋá	‘plant species’
	kù-níŋín-â	‘tie (553)’

#### Examples of /l/

Word-initial	lì-òβá	‘sun (105)’
	lì-ìsó	‘eye (1714)’
	lì-ìnó	‘tooth (1711)’
	Ø-lí	‘be (184)’
	lù-tìjó	‘sweat (859)’
	lú-zíqê	‘locust (869)’
	lù-gànikíó	‘tale (905)’
	lú-íd̥z̥ê	‘door (99)’
	lù-gèré	‘track (698)’
	lù-dódí	‘reed (684)’
	lù-βá: <sup>ŋ</sup> gú	‘shaft (1075)’
	lú-gó: <sup>ŋ</sup> gô	‘spine (1096)’
	lú-gú: <sup>ŋ</sup> gô	‘Gungu language (1101)’
	lù-hì: <sup>n</sup> dú	‘needle (1115)’
	lú-βád̥z̥ô	‘rib (663)’
	lú-só: <sup>ŋ</sup> kô	‘shell (1164)’
Word-medial (root-initial)	kú-lá: <sup>n</sup> d-â	‘crawl (1429)’
	kú-lá: <sup>ŋ</sup> g-â	‘plait (1430)’
	kà-làkà	‘grass species (764)’
	kà-lálá	‘bare ground (765)’
	mù-lí: <sup>m</sup> bà	‘fisherman (1135)’
	mù-lí: <sup>ŋ</sup> gò	‘look (1481)’
	ì-lígá	‘tear (eye) (1879)’



	mú-límî	‘farmer (773)’
	kú-líβát-â	‘walk (549)’
	lù-límí	‘tongue/language (774)’
	lú-lírâ	‘umbilical cord (777)’
	kú-lírálír-â	‘forestall (891)’
	mú-lé:gî	‘beggar (1337)’
	kí-lé: <sup>o</sup> gê	‘hoof (1134)’
	lù-lè: <sup>o</sup> gò	‘main point (1480)’
	kú-lé: <sup>o</sup> g-â	‘tempt/try (1431)’
	kù-lé:t-â	‘bring (1609)’
	ì-lú	‘knee (1813)’
	kú-lú-à	‘ooze (14)’
	kú-lúlúh-â	‘be bitter/sour (550)’
	kà-lú:lú	‘cry (1340)’
	kú-lú: <sup>o</sup> g-â	‘salt (1434)’
	mù-lóβí	‘fisherman (779)’
	mù-lólò	‘plant species (1338)’
	kì-lò:tó	‘dream (1339)’
	ì-lóβó	‘fishhook (1880)’
	βú-lóggò	‘witchcraft (780)’
	mú-lóggò	‘witch (781)’
Word-medial (non-root-initial)	kù-kól-á	‘do (598)’
	kú-mál-â	‘finish (881)’
	kú-sáhúl-â	‘snatch (568)’
	kú-sásúl-â	‘pay (569)’
	∅-kèrúlî	‘behind (639)’
	kì-hòhò:lì-á	‘butterfly (1033)’
	kà-pù: <sup>m</sup> púlî	‘plague (1212)’
	kà-tú: <sup>o</sup> gú:lí	‘dizziness (1218)’
	m-bálí:râ	‘budget (1274)’
	kì-ká:lí	‘palace (1326)’
	mù-sâ:lí	‘tree (1357)’
	lù-bà:lí	‘rock (1288)’
	kà-bémúlè	‘big (916)’
	n-túlégé	‘zebra (657)’
	kì-kúélé	‘dance (355)’
	kà-bé <sup>+</sup> pulé	‘small (917)’
	lú-mólê	‘torch (790)’
	∅-gùlé	‘baboon (712)’
	mù-dè: <sup>n</sup> démólê	‘plant species (1221)’
	mù-zì: <sup>o</sup> gàlù	‘angry person (1537)’
	mù-gùlú:sù	‘aged person (1037)’

kú-lúk-â	‘weave/twist (257)’
kà-sùlùsùlù	‘path (993)’
mù-kù: <sup>h</sup> kùlù	‘tree species (1206)’
kì-hù:lù	‘mortar (1316)’
m <sup>w</sup> -ì:zúkólù	‘grandchild (148)’
kì-èhùhùlù	‘lung (141)’
mù-zòlòí	‘plant species (1026)’
kí-ád̄zò:d̄zólò	‘supper (163)’
Ø-kùlò	‘tortoise (758)’
Ø-kòkòlò:kí	‘cock (1034)’
β <sup>w</sup> -à:ló	‘laziness (107)’
kì-gò: <sup>h</sup> gòlò	‘millipede (1201)’
m <sup>w</sup> -ì:zúlù	‘flood (134)’
ì-kólò	‘root (1877)’

**Examples of /r/**

Word-initial

rù-há: <sup>h</sup> gâ	‘god (1015)’
Ø-rá: <sup>h</sup> gî	‘colour (1153)’
Ø-rú:sî	‘kid (1352)’
Ø-rá: <sup>n</sup> dâ	‘wood plane (1489)’
Ø-rábâ	‘eraser (442)’
rù-fù	‘death/funeral (476)’
rù-βúgá	‘town (672)’
rú-átû	‘public (81)’
rù-kúrátû	‘council (959)’

Word-medial (root-initial)

kú-rágán-â	‘promise (558)’
kù-ráβ-ì-à	‘cause to pass through (312)’
ì-ràkâ	‘voice (1882)’
mù-rà: <sup>m</sup> bù	‘corpse (1150)’
βù-rúmí	‘pain (814)’
ká-rúrû	‘vote (816)’
kú-rú: <sup>m</sup> b-â	‘assault (1440)’
ì-rù: <sup>h</sup> gù	‘wilderness (1947)’
kì-rùgù	‘drink offering (812)’
mù-rùkâ	‘parish (813)’
kì-ró	‘day (482)’
mù-ró: <sup>h</sup> gô	‘twin (1154)’
ì-rò: <sup>h</sup> gù	‘grass species. (1490)’
í-róhò	‘thirst (1884)’
kú-ró: <sup>n</sup> z-â	‘track (1439)’

Word-medial (non-root-initial)	m <sup>w</sup> -ì:rá	‘companion (102)’
	mù-hò: <sup>n</sup> dè:rà	‘deputy (1202)’
	kì-hì: <sup>m</sup> bárâ	‘blind (1205)’
	mù-sè:rí	‘sick person (1361)’
	kì-bì:rì:tì	‘matchbox (1036)’
	ŋ-kìrì	‘brain (419)’
	m <sup>w</sup> -à:mí:ríá	‘soloist (160)’
	m <sup>w</sup> -ì:rímâ	‘darkness (132)’
	k <sup>w</sup> -á: <sup>m</sup> bírî	‘private parts (177)’
	m <sup>w</sup> -ì: <sup>n</sup> kírá	‘tail (180)’
	kà-kúmí:ré	‘fame (1044)’
	kì-èmérézì	‘pneumonia (143)’
	mù-ñúéré	‘hated wife (362)’
	kì-èrérézì	‘light ray (144)’
	mù:- <sup>n</sup> gèrészâ	‘British (1550)’
	ŋ-kérê: <sup>m</sup> bé	‘baby (1069)’
	mù-ñè:rê	‘gecko (1346)’
	mù-bè:ré	‘club (1284)’
	Ø-sùrû:rù	‘pickaxe (1055)’
	mù-tàmí:rú	‘drunkard (971)’
	k <sup>w</sup> -è:ñúrúñû:tí-á	‘grumble (1924)’
	Ø-kèrúílî	‘behind (639)’
	mà-gàrò	‘pliers (693)’
	ká-ḍ̣̣̣ú:rù	‘lake fly (730)’
	m-pérú	‘end (435)’
	kì-lò: <sup>n</sup> gìrò	‘valley (1207)’
	ŋ-gírô	‘refusal (409)’
	mù-tíró	‘pestle (857)’
	n-zíró	‘soot (467)’
	m <sup>w</sup> -s:rô	‘fire (110)’
	m-bóhérǒ	‘string (623)’
	ŋ-kóhórǒ	‘cough (641)’
	m-bírô	‘athletics (390)’

#### Examples of /w/

Word-initial	w-è:ñù	‘your brother (1498)’
	w-è:tú	‘my our brother (1700)’
	w-ègò: <sup>m</sup> bò:rá	‘subcounty chief (1199)’
	Ø-wà: <sup>n</sup> dálá	‘bird species (1220)’
	Ø-wî:nò	‘ink (1701)’

	Ø-wàkámê	‘hare (658)’
	wà-mà̀nènúà	‘in-law (904)’
	Ø-wèt̪f̪ùné	‘fish species (973)’
Word-medial (root-initial)	lú-wó: <sup>n</sup> gî	‘cowpea (1187)’
	kà-wé: <sup>m</sup> pè	‘razorblade (1499)’
	kì-wà: <sup>t̪</sup> f̪ú	‘watermelon species (867)’
	kù-wón-á	‘see (293)’
Word-medial (non-root-initial)	kì-ŋó:wâ	‘peanut (807)’
	n-dá:wé	‘north wind (1664)’

#### Examples of /j/

Word-medial (root-initial)	mú-já: <sup>m</sup> bî	‘helper (1189)’
	mù-jé: <sup>m</sup> bê	‘mango (1190)’
Word-medial (non-root-initial)	kì-má:jâ	‘dance cloth (1343)’
	m <sup>w</sup> -è:já: <sup>n</sup> dú	‘height (157)’
	ŋ-géjê	‘colobus (407)’
	lù-gójé	‘cloth (708)’
	lù-sàjâ	‘jaw (823)’
	lù-tìjò	‘sweat (859)’
	kí-éjâ	‘desert (90)’
	kà-lâ:jâ	‘basin (1336)’
	kù-βój-á	‘smell (202)’

#### Examples of labialised consonant /mbw/

Word-initial	m-b <sup>w</sup> ĩ	‘grey hair (20)’
	m-b <sup>w</sup> ê:né	‘dog (66)’

#### Examples of labialised consonant /βw/

Word-initial	β <sup>w</sup> -ð:ló	‘laziness (107)’
	β <sup>w</sup> -ð:mí	‘life (109)’
	β <sup>w</sup> -ð:zò	‘weight (115)’
	β <sup>w</sup> -ì:ɲámú	‘coldness (131)’

**Examples of labialised consonant /mw/**

Word-initial	m <sup>w</sup> -è: <sup>n</sup> dá	‘nine (169)’
	m <sup>w</sup> -è: <sup>n</sup> dá	‘nine (494)’
	m <sup>w</sup> -ì:rá	‘companion (102)’
	m <sup>w</sup> -ì:rú	‘servant (104)’
	m <sup>w</sup> -ð:hé	‘cursed one (106)’
	m <sup>w</sup> -ó:rô	‘fire (110)’
	m <sup>w</sup> -à:ná:lí	‘female child (126)’
	m <sup>w</sup> -é:ʃú <sup>+</sup> mí	‘smart person (128)’
	m <sup>w</sup> -é:gésâ	‘teacher (129)’
	m <sup>w</sup> -ì:rímâ	‘darkness (132)’
	m <sup>w</sup> -ì:zúlô	‘flood (134)’
	m <sup>w</sup> -ì:zókúlú	‘grandchild (148)’
	m <sup>w</sup> -è:ká: <sup>m</sup> bî	‘hardworking (156)’
	m <sup>w</sup> -è:já: <sup>n</sup> dú	‘height (157)’
	m <sup>w</sup> -à:mí:ríá	‘soloist (160)’
	‘m <sup>w</sup> -é: <sup>o</sup> gê	‘alcohol (170)’
	m <sup>w</sup> -ó: <sup>o</sup> gî	‘pea (173)’
	m <sup>w</sup> -ì: <sup>o</sup> kírâ	‘tail (180)’
	m <sup>w</sup> -à:ká	‘year (74)’
	m <sup>w</sup> -à:ná	‘child (75)’
	m <sup>w</sup> -á:nî	‘coffee (76)’
	m <sup>w</sup> -à:ɲá	‘sky (77)’
	m <sup>w</sup> -è:rò	‘disorientation (82)’
	m <sup>w</sup> -è:gí	‘student (83)’
	m <sup>w</sup> -è:rí	‘moon (87)’
	m <sup>w</sup> -è:rú	‘bumper crop (88)’
	m <sup>w</sup> -ì:há	‘cowife (96)’
Word-medial	lú-m <sup>w</sup> á:βô	‘blade (360)’
	kú-m <sup>w</sup> é:ɲ-â	‘smile (41)’

**Examples of labialised consonant /tw/**

Word-medial	mù-t <sup>w</sup> á:rô	‘bundle (367)’
	kù-t <sup>w</sup> á:l-â	‘take (51)’

**Examples of labialised consonant /sw/**

Word-initial	∅-s <sup>w</sup> á:súà	‘monitor lizard (340)’
--------------	------------------------	------------------------

Word-medial	kí-s <sup>w</sup> íd̥zâ	‘flu (365)’
	mú-s <sup>w</sup> íd̥zâ	‘fever (366)’

**Examples of labialised consonant /lw/**

Word-medial	kù-l <sup>w</sup> á:l-â	‘wear/dress (39)’
	kù-l <sup>w</sup> á:l-â	‘wear/dress (59)’

**Examples of labialised consonant /rw/**

Word-medial	ì-r <sup>w</sup> â:rú	‘hospital (1797)’
-------------	-----------------------	-------------------

**Examples of labialised consonant /ɲw/**

Word-medial	mù-ɲ <sup>w</sup> á:nî	‘friend (361)’
	mù-ɲ <sup>w</sup> é:rê:rú	‘AIDS (374)’

**Examples of labialised consonant /kw/**

Word-initial	k <sup>w</sup> -á: <sup>m</sup> bírî	‘private parts (177)’
	k <sup>w</sup> -á:g-â	‘melt (1764)’
	k <sup>w</sup> -è:g-á	‘know/teach (1769)’
	k <sup>w</sup> -è:r-á	‘grow (1770)’
	k <sup>w</sup> -è:t-á	‘call (1771)’
	k <sup>w</sup> -é:z-â	‘sweep (1772)’
	k <sup>w</sup> -ì:β-á	‘steal (1773)’
	k <sup>w</sup> -ì:m-á	‘be mean (1774)’
	k <sup>w</sup> -ì:r-á	‘return/answer (1775)’
	k <sup>w</sup> -ì:t-á	‘kill (1776)’
	k <sup>w</sup> -ð:β-à	‘be sharp (1778)’
	k <sup>w</sup> -ó:h-â	‘remove fibres (1779)’
	k <sup>w</sup> -ð:h-á	‘bewitch (1780)’
	k <sup>w</sup> -ð:h-á	‘bail (1781)’
	k <sup>w</sup> -ð:m-á	‘be dry (1782)’
	k <sup>w</sup> -ð:s-á	‘be absent (1783)’
	k <sup>w</sup> -ð:t-á	‘warm (1784)’
	k <sup>w</sup> -è:gú-à	‘hear/agree/be cold (1787)’
	k <sup>w</sup> -ó:kí-à	‘burn (1790)’

k <sup>w</sup> -è:kúá:t-â	‘appeal/excuse (1793)’
k <sup>w</sup> -è:gú-à	‘hear/agree/be cold (1805)’
k <sup>w</sup> -ð:β-á	‘be sharp (1814)’
k <sup>w</sup> -ð:zòh-â	‘be heavy (1815)’
k <sup>w</sup> -á:gúd-â	‘scratch (1816)’
k <sup>w</sup> -à:gúl-â	‘crawl (1817)’
k <sup>w</sup> -à:lúk-â	‘shout (1818)’
k <sup>w</sup> -à:mír-â	‘shout (1819)’
k <sup>w</sup> -à:nól-â	‘remove (1820)’
k <sup>w</sup> -à:tík-â	‘be broken (1821)’
k <sup>w</sup> -à:túl-â	‘confess (1822)’
k <sup>w</sup> -ε:βér-â	‘forget (1823)’
k <sup>w</sup> -è:bák-â	‘sleep (1824)’
k <sup>w</sup> -è:tʃúm-â	‘be smart (1826)’
k <sup>w</sup> -è:g-á	‘know/teach (1827)’
k <sup>w</sup> -è:gám-â	‘starve (1828)’
k <sup>w</sup> -è:gód-â	‘bend over (1829)’
k <sup>w</sup> -è:hór-á	‘get on credit (1830)’
k <sup>w</sup> -è:mét-â	‘become pregnant (1831)’
k <sup>w</sup> -è:mók-â	‘go back (1832)’
k <sup>w</sup> -è:níg-â	‘hang (1833)’
k <sup>w</sup> -è:tág-á	‘be rude (1835)’
k <sup>w</sup> -ì:βál-â	‘carry (1837)’
k <sup>w</sup> -ì:zúl-â	‘be full (1851)’
k <sup>w</sup> -ð:kól-â	‘extract (1852)’
k <sup>w</sup> -à:níkír-â	‘spread (1901)’
k <sup>w</sup> -è:túkúl-â	‘remove (1907)’
k <sup>w</sup> -ì:rágúr-â	‘to be black (1910)’
k <sup>w</sup> -è:gó: <sup>m</sup> b-â	‘admire (1932)’
k <sup>w</sup> -è:hé: <sup>m</sup> b-â	‘act proud (1933)’
k <sup>w</sup> -è:pá: <sup>0</sup> k-á	‘be proud (1936)’
k <sup>w</sup> -è:rá: <sup>0</sup> g-â	‘introduce (1937)’
k <sup>w</sup> -è:rî: <sup>n</sup> d-â	‘protect (1938)’
k <sup>w</sup> -ó: <sup>0</sup> gér-â	‘add/continue (1951)’
k <sup>w</sup> -è:gá:n-â	‘deny (1960)’
k <sup>w</sup> -é: <sup>m</sup> b-â	‘dig (1972)’
k <sup>w</sup> -é: <sup>0</sup> g-â	‘ripen (1973)’
k <sup>w</sup> -ð: <sup>0</sup> k-á	‘suckle (1974)’
k <sup>w</sup> -è: <sup>n</sup> dí-à	‘love/want (1975)’
k <sup>w</sup> -á: <sup>m</sup> búk-â	‘cross (1976)’
k <sup>w</sup> -á: <sup>0</sup> gán-â	‘separate (1977)’
k <sup>w</sup> -á: <sup>0</sup> gúh-â	‘be quick (1978)’
k <sup>w</sup> -ó: <sup>0</sup> gér-â	‘add/continue (1981)’

	k <sup>w</sup> -ì:ᵐgír-â	‘enter/bring inside (1983)’
	k <sup>w</sup> -è:súkús-â	‘wash (516)’
	k <sup>w</sup> -è:ᵐúrúᵐú:í-à	‘grumble (1924)’
Word-medial	kí-k <sup>w</sup> í+sán-â	‘same as (136)’
	lù-k <sup>w</sup> í	‘firewood (328)’
	mù-k <sup>w</sup> á:kúá	‘plant species (339)’
	kì-k <sup>w</sup> ê:rê	‘full moon (356)’
	mú-k <sup>w</sup> é:ᵐdâ	‘representative (378)’
	kú-k <sup>w</sup> é:ᵐ-â	‘have dry skin (37)’

**Examples of labialised consonant /gw/**

Word-medial	ì-g <sup>w</sup> ĩ	‘wasp (1791)’
	lù-g <sup>w</sup> á:râ	‘flute (347)’
	kì-èg <sup>w</sup> é:í	‘stick (63)’

**Examples of labialised consonant /ᵐgw/**

Word-initial	Ø-ᵐgwé:té	‘uncle (1760)’
	ᵐgwé:rî	‘hawk (68)’

**Examples of /sj/**

Word-medial	kú-máᵐs <sup>j</sup> -â:	‘inform (599)’
-------------	--------------------------	----------------

**Examples of /nj/**

Word-medial	mù-n <sup>j</sup> ᵐgó:rô	‘earthworm (384)’
-------------	--------------------------	-------------------

**Examples of /hj/**

Word-medial	kù-h <sup>j</sup> ó:lí-à	‘whistle (56)’
-------------	--------------------------	----------------

Palatalised consonants are not analysed as present underlyingly, but are derived from prevocalic Ci/Ci by means of glide formation. (See notes on the analysis of palatalised consonants.)



## Appendix B - Vowel examples

### Examples of /i/

Word-initial	ì-g <sup>w</sup> ĩ	‘wasp (1791)’
	ì-lú	‘knee (1813)’
	í-t̪ó̄tí	‘neck (1864)’
	ì-lígá	‘tear (eye) (1879)’
	ì-kò: <sup>o</sup> gí	‘sisal (1946)’
Word-medial	mù-lí: <sup>m</sup> bà	‘fisherman (1135)’
	lù-tí: <sup>n</sup> dò	‘bridge (1178)’
	mù-zí: <sup>o</sup> gâ	‘beehive (1193)’
	kà-fí:fí	‘poor (1298)’
	mú-hí:gí	‘hunter (1310)’
	mù-lì: <sup>o</sup> gò	‘look (1481)’
	mù-zì: <sup>o</sup> gàlù	‘angry person (1537)’
	kì:- <sup>n</sup> tigè	‘eyebrow (1543)’
	m <sup>w</sup> -à:mí:ríá	‘soloist (160)’
	ì-lígá	‘tear (eye) (1879)’
	βù-híó	‘heat (326)’
	mù-líé	‘bad habit (329)’
	ŋ-gírí	‘warthog (408)’
	ŋ-gírò	‘refusal (409)’
	n-tí:râ	‘electric fish (456)’
	n-títí	‘darkness (457)’
	kà-líhúà	‘dance (609)’
	Ø-bísâ	‘lungfish (676)’
	kí-díhî	‘meat (683)’
	mú-nígô	‘necktie (796)’
	kì-sídá	‘scar (829)’
	kì-síkí	‘funeral log (833)’
	lú-zígê	‘locust (869)’
	Ø-kòfí:rà	‘hat (937)’
	kú-dík-í-à	‘drop/immerse (1263)’
	kù-hí: <sup>m</sup> b-á	‘fall ill (1414)’
	kú-sí:g-â	‘paint (1621)’
	kù-tím-â	‘fear/threaten (1631)’
	kù-líg-á	‘decorate (250)’
	kú-líh-â	‘pay fine (251)’
	kú-pím-â	‘measure (269)’
	kù-sík-á	‘pull (278)’

	kù-tíg-á	‘leave (288)’
	kù-tíríβ-â	‘smear (588)’
Word-final	∅-kèrúfí	‘behind (639)’
	∅-kàlitú: <sup>n</sup> sì	‘eucalyptus (1003)’
	mù-kòdòí	‘plant species (1024)’
	∅-kòkòlò:kí	‘cock (1034)’
	kì-bìrì:tì	‘matchbox (1036)’
	kì-bó: <sup>n</sup> dí	‘anthill (1079)’
	∅-fú: <sup>n</sup> dí	‘tradesman (1087)’
	kì-òsí	‘anklet (111)’
	mù-tá: <sup>m</sup> bí	‘doctor (1170)’
	kà-tú: <sup>n</sup> gú:lí	‘dizziness (1218)’
	kì-t̪ò:lì	‘maize (1293)’
	kà-fì:fì	‘poor (1298)’
	mú-hígî	‘hunter (1310)’
	∅-hú:zì	‘thread (1319)’
	mú-lé:gî	‘beggar (1337)’
	mù-má:tí	‘potter (1342)’
	mú-zé:jî	‘player (1381)’
	m-pálí	‘pants (1684)’
	í-t̪ó:tí	‘neck (1864)’
	ì-kò: <sup>n</sup> gí	‘sisal (1946)’
	ŋ-gírî	‘warthog (408)’
	ŋ-kàlí	‘urine (415)’
	n-títí	‘darkness (457)’
	mà-βí	‘faeces (470)’
	kí-fí	‘cooked meat (475)’
	mú-gî	‘family (477)’
	mù-kàlí	‘woman (495)’
	lù-dódí	‘reed (684)’
	mà-gèzí	‘wisdom (699)’
	mù-kórí	‘worker (751)’
	kì-kósí	‘funeral clothes (753)’
	mù-làβí	‘stick (763)’
	kà-súmí	‘season (845)’
	kì-tó:gî	‘collar (860)’
	‘mú-légézî	‘priest (942)’

#### Examples of /i/

Word-initial	ì-tá:nô	‘five (1723)’
--------------	---------	---------------

ì-hé: <sup>m</sup> bé	‘horn (1945)’
ì-sátú	‘three (497)’
ì-rð: <sup>n</sup> gù	‘grass species. (1490)’
ì-dá	‘louse (1810)’
ì-hé	‘army (1811)’
ì-βàrá	‘name (1860)’
ì-ṽúhí	‘pea leaf (1865)’
í-gégù	‘molar (1867)’
í-gúrô	‘sky (1871)’
ì-kálá	‘charcoal (1876)’
ì-kóló	‘root (1877)’
ì-lóβó	‘fishhook (1880)’
ì-ràkà	‘voice (1882)’
í-sázâ	‘county (1887)’
í-tákâ	‘lake (1890)’
ì-tèhé	‘ground (1894)’
ì-pókópó	‘ear (1914)’
ì-βú: <sup>m</sup> bà	‘clay (1942)’
ì-βé:rê	‘breast (1968)’
ì-pé:sâ	‘button (1969)’

Word-medial

mù-hí: <sup>n</sup> dú	‘fish species (1114)’
m-bálí:râ	‘budget (1274)’
m <sup>w</sup> -ì:zúlô	‘flood (134)’
mù-pî:râ	‘ball (1349)’
kì-pî:tè	‘beloved person (1350)’
mù-: <sup>n</sup> kirà	‘tail (1539)’
lì-ìnó	‘tooth (1711)’
í-níhî	‘liver (1881)’
m-bírô	‘athletics (390)’
m-píhî	‘belch (437)’
n-sítá	‘secret (446)’
m-bóníkò	‘new moon (624)’
bì-níkâ	‘teapot (626)’
kí-βírâ	‘forest (668)’
mú-βírî	‘body (671)’
mà-gírâ	‘sauce (701)’
lù-límí	‘tongue/language (774)’
lù-lírâ	‘umbilical cord (777)’
mú-mírô	‘throat (785)’
mù-títí	‘plant species (858)’
mú-zírô	‘deceased (876)’
mù-lírâ:múà	‘neighbour (907)’

	mù-lígí <sup>+</sup> ré	‘engaged person (943)’
	kì-rágírǒ	‘law (954)’
	kù-hí-á	‘burn/be cooked (11)’
	kú-húní:r-â	‘be astonished (1252)’
	kù-há: <sup>n</sup> dî:k-â	‘write (1567)’
	kù-βí:h-â	‘be bad/insult (1585)’
	kù-βí:k-â	‘store (1586)’
	k <sup>w</sup> -î: <sup>o</sup> gír-â	‘enter/bring inside (1983)’
	kú-lím-â	‘dig (252)’
	kù-síg-á	‘plant (277)’
	kú-gáβír-â	‘sacrifice (520)’
	kú-líβát-â	‘walk (549)’
	kù-dí-á	‘eat (8)’
Word-final	β <sup>w</sup> -ð:mí	‘life (109)’
	mù-só: <sup>o</sup> gí	‘plant species (1163)’
	mù-sú: <sup>m</sup> bí	‘flesh (1166)’
	mù-tô: <sup>m</sup> bí	‘corpse (1183)’
	lú-βú:βî	‘cream (1287)’
	lù-bà:lí	‘rock (1288)’
	mù-fú:zî	‘orphan (1299)’
	kà-hò:kí	‘bee (1314)’
	kì-kâ:hì	‘leaf (1325)’
	kì-ká:lí	‘palace (1326)’
	∅-rú:sî	‘kid (1352)’
	mù-sâ:lí	‘tree (1357)’
	kí-tó:kî	‘banana (1374)’
	n-sí	‘ground (186)’
	ì-ŋ <sup>h</sup> óhí	‘pea leaf (1865)’
	m-básí	‘arrow (387)’
	kì-βí	‘sin (472)’
	m-párá:kî	‘cob (646)’
	mú-βírî	‘body (671)’
	lù-límí	‘tongue/language (774)’
	∅-númî	‘bull (798)’
	mù-títí	‘plant species (858)’

#### Examples of /ɛ/

Word-medial	mù:- <sup>o</sup> gèrészâ	‘British (1550)’
	ì-hé: <sup>m</sup> bé	‘horn (1945)’

	m <sup>w</sup> -è: <sup>n</sup> dá	‘nine (494)’
	kà-bé <sup>+</sup> pólé	‘small (917)’
	ŋ-kérê: <sup>m</sup> bé	‘baby (1069)’
	kà-hé: <sup>n</sup> dú	‘problem (1110)’
	kí-lé: <sup>o</sup> gê	‘hoof (1134)’
	mù-hò: <sup>n</sup> dè:rà	‘deputy (1202)’
	mù-fê:rùà	‘widow (1270)’
	mù-bè:ré	‘club (1284)’
	kí-dé:rô	‘granary (1294)’
	mù-kè:kà	‘grass mat (1328)’
	mù-ŋè:rê	‘gecko (1346)’
	kì-sê:gè	‘grief (1360)’
	kà-tê:rà	‘trunk (1370)’
	ŋ-ké: <sup>n</sup> dê	‘monkey (1476)’
	lò-lê: <sup>o</sup> gò	‘main point (1480)’
	Ø-hé:mà	‘tent (1673)’
	kì-èsé	‘pot (1707)’
	ŋ-g <sup>w</sup> é:té	‘uncle (1760)’
	í-gégù	‘molar (1867)’
	ì-pé:sâ	‘button (1969)’
	ì-té:kâ	‘law (1971)’
	m-pérú	‘end (435)’
	n-sékù	‘laughter (444)’
	n-démésà	‘legume (631)’
	n-sóhérâ	‘housefly (651)’
	kí-gézù	‘test (700)’
	kì-kédê	‘mat (737)’
	Ø-ségâ	‘vulture (825)’
	kù-ŋégê:r-â	‘accuse (1255)’
	kú-hé: <sup>m</sup> b-â	‘light (1413)’
	kú-hé:k-â	‘carry (1594)’
	kù-hé:s-â	‘carve/forge (1595)’
	kù-lé:t-â	‘bring (1609)’
	kú-kés-â	‘harvest (235)’
	kú-lék-â	‘pull out (245)’
	kù-té:kér-â	‘sharpen (585)’
Word-final	ì-hé: <sup>m</sup> bé	‘horn (1945)’
	kà-bé <sup>+</sup> pólé	‘small (917)’
	m <sup>w</sup> -ò:hé	‘cursed one (106)’
	ŋ-kérê: <sup>m</sup> bé	‘baby (1069)’
	kí-lé: <sup>o</sup> gê	‘hoof (1134)’
	mù-ŋè:rê	‘gecko (1346)’

	kì-pî:tè	‘beloved person (1350)’
	ŋ-ké: <sup>n</sup> dê	‘monkey (1476)’
	n-dá:wé	‘north wind (1664)’
	kì-èsé	‘pot (1707)’
	∅-ŋg <sup>w</sup> é:té	‘uncle (1760)’
	ì-hé	‘army (1811)’
	n-tê	‘cow (189)’
	ká-βá <sup>+</sup> díé	‘southeast wind (604)’
	∅-wàkámê	‘hare (658)’
	∅-gùlé	‘baboon (712)’
	kì-hóté	‘wound (724)’
	βù-ḍ̣ẓùné	‘sorrow (729)’
	lú-múlê	‘torch (790)’
	kì-èsé	‘pot (89)’
	∅-kólómé	‘pigeon (938)’
	mù-líqí <sup>+</sup> ré	‘engaged person (943)’
Realised allophonically as [e] in [+ATR] / palatal C contexts	w-è:ɲù	‘your brother (1498)’
	w-è:tú	‘my our brother (1700)’
	∅-kèrúfî	‘behind (639)’
	kà-bémúlè	‘big (916)’
	mù-jé: <sup>m</sup> bê	‘mango (1190)’
	mú-lé:gî	‘beggar (1337)’
	mù-sè:rí	‘sick person (1361)’
	mú-zé:ɲî	‘player (1381)’
	mù:- <sup>ɲ</sup> gèsú	‘arrow (1541)’
	m <sup>w</sup> -è:ká: <sup>m</sup> bî	‘hardworking (156)’
	kì-kúélé	‘dance (355)’
	ŋ-géjê	‘colobus (407)’
	n-zégû	‘elephant (463)’
	n-túlégé	‘zebra (657)’
	ŋ-g <sup>w</sup> é:rî	‘hawk (68)’
	kú-ségí-à	‘bring (314)’
	kù-ségéɲ-â	‘dance (570)’
	kì:- <sup>n</sup> tigè	‘eyebrow (1543)’
	∅-gúlúhé	‘turtle (636)’
	lù-gójé	‘cloth (708)’
	lú-íḍ̣ẓê	‘door (99)’

#### Examples of /a/

Word-medial	mù-ká:gá	‘six (1323)’
-------------	----------	--------------

kú-βál-â	‘count (194)’	
ì-sátú	‘three (497)’	
lú-βád̥z̥ô	‘rib (663)’	
rù-há: <sup>o</sup> gâ	‘god (1015)’	
∅-βá: <sup>m</sup> bá	‘mudfish (1073)’	
lù-βá: <sup>o</sup> gú	‘shaft (1075)’	
kí-gá: <sup>m</sup> bû	‘word (1089)’	
βù-hà: <sup>n</sup> dú	‘age (1106)’	
mù-hà: <sup>n</sup> dú	‘adult (1107)’	
kí-ḍz̥á: <sup>o</sup> gâ	‘wave (1118)’	
kì-ḍz̥à: <sup>o</sup> gí	‘branch (1119)’	
kà-ṅà: <sup>o</sup> gù	‘sunrise (1144)’	
mù-ṅà: <sup>n</sup> sí	‘citizen (1145)’	
∅-rá: <sup>o</sup> gî	‘colour (1153)’	
mù-tá: <sup>m</sup> bí	‘doctor (1170)’	
mù-ṅà: <sup>o</sup> kómô	‘prisoner (1211)’	
kà-sà: <sup>m</sup> bùrà	‘dry season (1213)’	
∅-sà: <sup>n</sup> dúkà	‘coffin (1214)’	
∅-wà: <sup>n</sup> dàlá	‘bird species (1220)’	
lù-bà:lí	‘rock (1288)’	
β <sup>w</sup> -ì:ṅámú	‘coldness (131)’	
kì-ká:lí	‘palace (1326)’	
mù-má:tí	‘potter (1342)’	
βí-sá:βû	‘mud (1353)’	
ṅ-kù: <sup>o</sup> gànì	‘quarrel (1534)’	
m-bà:tà	‘duck (1657)’	
m-pálí	‘pants (1684)’	
ì-kálá	‘charcoal (1876)’	
ì-ràrú	‘madness (1883)’	
í-tákâ	‘lake (1890)’	
m-básî	‘arrow (387)’	
ṅ-gánô	‘wheat (402)’	
ṅ-kàlí	‘urine (415)’	
m-pàlú	‘weapon (432)’	
∅-tábô	‘problem (452)’	
βù-gàlí	‘width (692)’	
mù-kágú	‘friendship (731)’	
lù-zálá	‘finger/toe (868)’	
mù-sítálí	‘line (967)’	
kù-βáz-á	‘speak (196)’	
kú-líβát-â	‘walk (549)’	
Word-final	mù-há: <sup>n</sup> dá	‘path (1104)’

kà-hà: <sup>0</sup> gá	‘skull (1108)’
mù-hú: <sup>n</sup> dá	‘weapon (1116)’
lú-sú: <sup>m</sup> bâ	‘teat (1165)’
mù-zí: <sup>0</sup> gâ	‘beehive (1193)’
Ø-wà: <sup>n</sup> dàlá	‘bird species (1220)’
mù-fê:rùà	‘widow (1270)’
m-bálí:râ	‘budget (1274)’
mò-pî:râ	‘ball (1349)’
ŋ-kìàkîà	‘foot disease (166)’
ká-érâ	‘noise (1706)’
kà-ð:zá	‘fur (1717)’
Ø-mpá:	‘aunt (1762)’
ì-dá	‘louse (1810)’
ì-lígá	‘tear (eye) (1879)’
ì-té:kâ	‘law (1971)’
mù-k <sup>w</sup> á:kúá	‘plant species (339)’
mú-k <sup>w</sup> é: <sup>n</sup> dá	‘representative (378)’
ŋ-gúrâ	‘cassava (414)’
m-pítâ	‘ring (439)’
mù-gòβíá	‘liar (605)’
ŋ-kókólâ	‘elbow (642)’
rù-βúgá	‘town (672)’
mù-fürá	‘dignitary (690)’
lù-hálá	‘bald head (717)’
ká-ŋó:tâ	‘spark (806)’
kì-sàkâ	‘bush (821)’
mù-sâ:râ	‘wage (822)’
kù-hí-á	‘burn/be cooked (11)’
kù-tút-â	‘pierce (1634)’
kù-tú-á	‘spit (19)’
k <sup>w</sup> -à:níkír-â	‘spread (1901)’
kù-dóm-á	‘be stupid (207)’
kù-bálí-à	‘blink (296)’
kù-kùŋ-à	‘fold (308)’

#### Examples of /ɔ/

#### Word-medial

kì-kò:tò	‘big (1720)’
β <sup>w</sup> -ð:ló	‘laziness (107)’
lú-gó: <sup>0</sup> gô	‘spine (1096)’
kà-kò: <sup>n</sup> dà	‘machete (1127)’
mù-só: <sup>0</sup> gí	‘plant species (1163)’
kì-gò: <sup>0</sup> gòló	‘millipede (1201)’



	kà-hò:kí	‘bee (1314)’
	kì-kò:rà	‘leaf (1334)’
	mù-ló:lô	‘plant species (1338)’
	kí-tó:kí	‘banana (1374)’
	ì-rò: <sup>h</sup> gù	‘grass species. (1490)’
	í-gósfí	‘testicle (1870)’
	ì-kóló	‘root (1877)’
	ì-lóβó	‘fishhook (1880)’
	n-sónê	‘knife (449)’
	n-zógóró	‘tilapia (661)’
	kì-hóté	‘wound (724)’
	mù-sóló	‘tax (842)’
	Ø-kólómé	‘pigeon (938)’
	kù-ḥjók-â	‘gather (1587)’
	kù-lót-t-â	‘dream (1611)’
	kù-ból-â	‘rot (204)’
	kù-kól-á	‘do (238)’
	kù-sók-â	‘pack (279)’
	kù-tómér-â	‘bump/dance (590)’
Word-final	kà-kò: <sup>h</sup> kó	‘tuberculosis (1131)’
	mù-ró: <sup>h</sup> gô	‘twin (1154)’
	mù-nà: <sup>h</sup> kómô	‘prisoner (1211)’
	m <sup>w</sup> -ì:zólô	‘flood (134)’
	lù-lè: <sup>h</sup> gò	‘main point (1480)’
	lì-ínó	‘tooth (1711)’
	ì-kóló	‘root (1877)’
	í-róhò	‘thirst (1884)’
	mù-kíénô	‘curse (359)’
	ŋ-kókó	‘chicken (421)’
	lù-gó	‘corral (478)’
	kì-ró	‘day (482)’
	mù-tô	‘soup (487)’
	m-bóhéré	‘string (623)’
	m-bóníkò	‘new moon (624)’
	mù-mírô	‘throat (785)’
	kì-pókò	‘gourd (808)’
	mù-zírô	‘deceased (876)’
	kì-ḍzágúzǒ	‘celebration (929)’
	kì-rágírǒ	‘law (954)’
Realised allophonically as [o] in [+ATR] / palatal C contexts	lì-òβá	‘sun (105)’
	kì-bó: <sup>h</sup> dí	‘anthill (1079)’

kì-òsí	‘anklet (111)’
lú-wó: <sup>h</sup> gí	‘cowpea (1187)’
kì-ṭfò:lì	‘maise (1293)’
kà-sòlía	‘roof (617)’
lù-gójé	‘cloth (708)’
kì-βògòjà	‘banana (918)’
lù-tì: <sup>n</sup> dò	‘bridge (1178)’
lì-ìsó	‘eye (1714)’
ŋ-kòníó	‘pestle (320)’
kí-gúò	‘fall (325)’
ŋ-gúhò	‘cloth (412)’
Ø-sóḍḍô	‘sword grass (448)’
n-zígò	‘enmity (464)’
kì-kùlò	‘tortoise (757)’

#### Examples of /u/

##### Word-medial

kì-fú: <sup>n</sup> ḍḍú	‘large intestine (1088)’
lú-gú: <sup>h</sup> gò	‘Gungu language (1101)’
mù-hú: <sup>n</sup> dá	‘weapon (1116)’
mù-ḍḍú: <sup>h</sup> gò	‘whiteman (1122)’
mù-kò: <sup>n</sup> zì	‘girlfriend (1133)’
lú-βú:βî	‘cream (1287)’
mù-fú:zî	‘orphan (1299)’
kà-lò:lú	‘cry (1340)’
ì-ṭfúhí	‘pea leaf (1865)’
ŋ-gólùà	‘northwest wind (319)’
n-dólù	‘gallbladder/bile (395)’
mù-fùrá	‘dignitary (690)’
βù-ḍḍùné	‘sorrow (729)’
lú-mólê	‘torch (790)’
kù-ṭfú:ŋ-â	‘almost ready (1588)’
kù-ŋú-á	‘drink (17)’
kú-gúl-â	‘buy (215)’
kù-ṭfú-á	‘judge/decide (5)’
kú-βúkúl-â	‘uncover (505)’
kú-gémúl-â	‘visit (523)’

##### Word-final

ì-sátú	‘three (497)’
m <sup>w</sup> -ì:rú	‘servant (104)’
kì-fú: <sup>n</sup> ḍḍú	‘large intestine (1088)’
lò-hì: <sup>n</sup> dú	‘needle (1115)’

mú-sá: <sup>o</sup> gô	‘case (1157)’
kà-tà: <sup>n</sup> dà:rù	‘stand (1233)’
kí-dé:rô	‘granary (1294)’
kà-lô:lú	‘cry (1340)’
Ø-tá:gô	‘pancreas (1366)’
kì-tá:tù	‘drying rack (1369)’
m <sup>w</sup> -ì:zókúlú	‘grandchild (148)’
ì-rò: <sup>o</sup> gò	‘grass species. (1490)’
mú:- <sup>n</sup> tô	‘person (1502)’
í-gégô	‘molar (1867)’
í-gúrô	‘sky (1871)’
m-púnô	‘pig (440)’
n-sékô	‘laughter (444)’
n-zíkô	‘gonorrhoea (465)’
Ø-rùfú	‘death/funeral (476)’
mù-zú	‘ash species (490)’
kí-βérô	‘thigh (666)’
mù-dòlú	‘man (687)’
lú-sáhô	‘mountain/hill (819)’
lù-sùsú	‘skin (849)’
m <sup>w</sup> -è:rú	‘bumper crop (88)’

#### Examples of /u/

##### Word-medial

Ø-kèrúfí	‘behind (639)’
kà-bémúlè	‘big (916)’
mù-gùlú:sù	‘aged person (1037)’
Ø-sùrú:rù	‘pickaxe (1055)’
Ø-fú: <sup>n</sup> dí	‘tradesman (1087)’
kà-tú: <sup>o</sup> gú:lí	‘dizziness (1218)’
kì-βú:lió	‘question (1269)’
m <sup>w</sup> -é:ǰú <sup>+</sup> mí	‘smart person (128)’
mú-kúà	‘salt (327)’
ŋ-fúmú	‘proverb (396)’
ŋ-gǔhò	‘cloth (412)’
Ø-gúlúhé	‘turtle (636)’
n-túlégé	‘zebra (657)’
kì-kúkí	‘snake species (756)’
kì-kùló	‘tortoise (757)’
ká-rúrú	‘vote (816)’
kà-súmí	‘season (845)’
kà-sùlùsúlú	‘path (993)’

	mù-sùrùkálî	‘soldier (994)’
	kù-sù: <sup>9</sup> g-á	‘sew (1446)’
	kù-tú:t-â	‘pierce (1634)’
	kù-tú-á	‘spit (19)’
	kú-gúm-â	‘throw (216)’
	kú-zúβ-â	‘weed (294)’
	kú-t̃fúmí-â	‘dip (299)’
	kù-túlúk-â	‘bend (591)’
	kù-sájúk-â	‘be happy (595)’
	kú-gú-â	‘fall (9)’
Word-final	w-ètú	‘my our brother (1700)’
	mù-gùlú:sù	‘aged person (1037)’
	∅-sùrù:rù	‘pickaxe (1055)’
	βù-hà: <sup>n</sup> dú	‘age (1106)’
	β <sup>w</sup> -ì:námú	‘coldness (131)’
	mù-zà:nù	‘match (1379)’
	n-d̃zâ: <sup>9</sup> gù	‘cat (1475)’
	n-sì: <sup>m</sup> bù	‘epilepsy (1494)’
	mù-hà: <sup>n</sup> dú	‘adult (1504)’
	mù-zì: <sup>9</sup> gàlù	‘angry person (1537)’
	mù-: <sup>9</sup> gèsú	‘arrow (1541)’
	‘kí-é <sup>n</sup> d̃zû	‘banana (171)’
	ì-lú	‘knee (1813)’
	n-sú	‘fish (187)’
	ŋ-fúmú	‘proverb (396)’
	n-zégû	‘elephant (463)’
	∅-bùbù	‘fish species (679)’
	mù-kágú	‘friendship (731)’
	mù-ké:hû	‘bamboo (738)’
	ká-rúrû	‘vote (816)’
	mù-tàmí:rú	‘drunkard (971)’
	kí-rúgírímǔ	‘result (991)’
	kà-sùlùsúlú	‘path (993)’

## References

- Armstrong, Robert G. 1985. The tenth vowel in proto-Kwa. *Journal of West African Languages* 15, 1:104-110.
- Berry, J. 1955. Some notes on the phonology of the Nzema and Ahanta dialects. *Bulletin of the School of Oriental and African Studies*, 17:160-165.
- Boyd, Raymond. 1997. Les harmonies vocaliques du zande. *Lingua* 101:1-19.
- Casali, Roderic F. 1996. Resolving hiatus. UCLA dissertation. (Published by Garland Publishing, New York, 1998.)
- \_\_\_\_\_.2002. Nawuri ATR harmony in typological perspective. *Journal of West African Languages* XXIX, 1:3-43.
- \_\_\_\_\_. 2003. [ATR] value asymmetries and underlying vowel inventory structure in Niger-Congo and Nilo-Saharan. *Linguistic Typology* 7: 307-382.
- \_\_\_\_\_. 2004. Lugungu Orthography Suggestions. MS from Bantu Phonology Tool. Summer Institute of Linguistics.
- Clements, George N. 1991. Vowel height assimilation in Bantu languages. *Working Papers of the Cornell Phonetics Laboratory* 5:37-76.
- Fulop, Sean, Ethelbert Kari & Peter Ladefoged. 1998. An acoustic study of the tongue root contrast in Degema vowels. *Phonetica* 55:80-98.
- George, Isaac. 1973. Vowel harmony: Why so restricted in Yoruba?. *Notes from the Department of Linguistics and Nigerian Languages, University of Ibadan*, 6.172-188.
- Hyman, Larry. M. 1999. The historical interpretation of vowel harmony in Bantu. *Bantu Historical Linguistics: Theoretical and Empirical Perspectives*, ed. by Jean-Marie Hombert & Larry M. Hyman, 235-95. Stanford, CA: C.S.L.I.
- Kutsch Lojenga, Constance. 1999. In search of the vowel system of LuGungu (Bantu E): Contrast, conditioning, or both? MS, Leiden University and SIL.
- LUBITLA. 2006. Lugungu orthography guide – first edition revised. MS, Lugungu Bible Translation and Literacy Association in cooperation with SIL International.
- Moe, Ronald & James Mbabazi. 1996. Lugungu phonology notes. MS, Summer Institute of Linguistics.
- \_\_\_\_\_. 1999. Lugungu orthography guide – Preliminary Version. MS, Lugungu Language Committee.
- Oyelaran, Olasope O. 1973. Yoruba vowel co-occurrence restrictions. *Studies in African Linguistics* 4:155-182.
- Parkinson, Frederick. 1996. The representation of vowel height in phonology. Ohio State University dissertation.
- Pike, Kenneth L. 1947. *Phonemics: A technique for reducing languages to writing*. Ann Arbor: University of Michigan Press.
- Przedziecki, Marek. 2000. Vowel-to-vowel coarticulation in Yorùbá: The seeds of ATR vowel harmony. *WCCFL 19 Proceedings*, 385-398. Somerville: MA: Cascadilla Press.
- Rosenthal, Samuel. 1994. Vowel/glide alternation in a theory of constraint interaction. University of Massachusetts PhD dissertation.
- Stegen, Oliver. 2000. Rangi vowel system: Five or Seven? Paper presented at the 30th Colloquium on African Languages and Linguistics, University of Leiden, August 28-30, 2000.
- Stewart, John M. 1967. Tongue root position in Akan vowel harmony. *Phonetica* 16:185-204.

---

Document Title:  
Lugungu Phonology Statement

Date: June 28, 2007  
Issue: B  
Status: Approved

---

Tabb, Waller C. 2001. LuBwisi phonology survey. MS, SIL.

Ward, I.C. 1937. Phonetic phenomena in African languages. Archiv für die gesamte Phonetik 1.