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1. Orthography

Data in this work are presented in a compromise between IPA phonemic transcriptions and ordinary spelling. An explanation of the need for special symbols such as ɪ, ʊ, ɲ along with tone marks, and with accompanying sound files, especially intended for speakers of the language without training in linguistics, is available online at <https://Languagedescriptions.github.io/Logoori/WritingtheLogoorilanguage>.

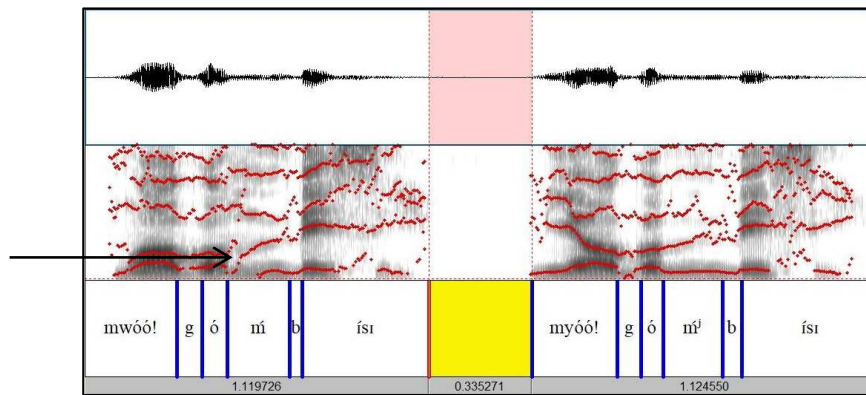
In terms of segment values, the following translations between the present work and IPA can be applied.

<i>This work</i>	<i>IPA</i>
ch	tʃ
j	dʒ
sh	ʃ
y	j
ny	nj, ɲ
ɲ	variable nj, ɲ, ɲj

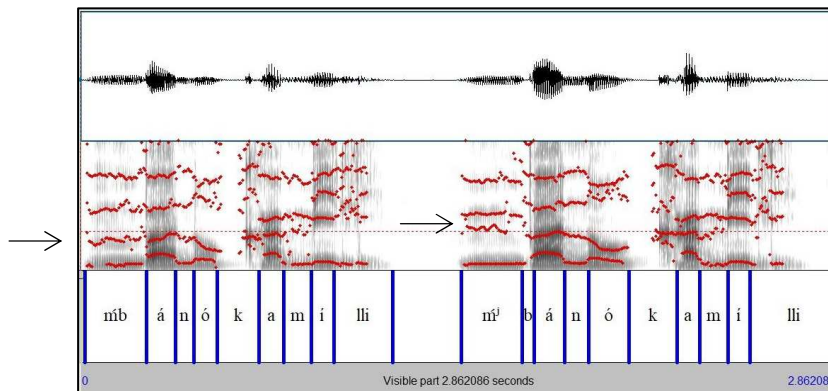
Long vowels are notated by doubling the vowel letter (*koroota* ‘to dream’), likewise geminate consonants double the first letter (*iddíji* ‘window’). There are no underlying geminates in the language, but many speakers have derived geminates arising from reduction of ri+C, ru+C, for example [iddíku] ‘day’ (EM,RK,BK), alternating with (ɪ)ridíku with these speakers; *ɪnneke* ~ *rineke* ‘Syzygium cordatum’ (BK); *ittíginyo* ~ (ɪ)ritíginyo ‘heel’ (EM,BK). All speakers appears to have geminate *l* from /rVr/, e.g. *lláánde* ‘Stephania abyssinica’ (/ri-ráánde/, cf *maráánde* ‘S.A. plants’), *lílimi* ‘tongue’ (/ru-rími/). Geminate [vv] also arises (again for at least some speakers) by reduction of /vi+v/ (vvírí ‘2 (cl. 8)’ /vi-vírí/) and /vo+v/, vvírí ‘2 (cl. 14)’ /vo-vírí/).

Certain non-contrastive phonetic details may be included, which provide information about the pronunciation of particular tokens. For example, a superscripted pre-consonantal glide e.g. [ʸmbí] ‘bad (cl. 4)’, [ʷmbí] ‘bad (cl. 3)’, is encountered in some examples from speaker BK. This indicates a palatal offglide versus labial offglide (or possibly no offglide) from the preceding vowel. This feature was noticed and

recorded before an analysis of the phenomenon was available.¹ The same phenomenon has been observed with a few other ('remote interaction') speakers. The effect can be seen in the following spectrograms. The first example contrasts *mwóó¹gó mbísi* 'raw cassava' versus *myóó¹gó m^ybísi* 'raw cassavas' from speaker FA. In the former utterance (non-palatalized *m*), the second formant during *m* is initially quite low and rises significantly within the nasal, whereas in the second utterance *F*₂ starts higher and rises less.



In the following example of *mbánó kamilli* 'proper knife' versus *m^ybánó kamilli* 'proper knives' (or, *^ymbánó kamilli*), in the utterance-initial difference [m] versus [m^y] we again see that palatalized [m^y] has a higher *F*₂, averaging 1590 Hz versus 1418 Hz in the case of [m].



This effect has not been observed with EM or ML. In the case of ML, this probably reflects a difference in the underlying distribution of the augment. In the case of EM, augment deletion is dispreferred, and his strategy for phrasal hiatus reduction favors retention of the second vowel (the augment). For EM, we have *omwóó¹g-ómbísi* 'raw

¹ This phenomenon is probably the trace of the augment vowels /ɪ, ʊ/. That analysis was not initially considered, since it seemed that BK lacked the augment, but subsequent analysis revealed that the augment is underlyingly present, and is deleted (almost everywhere, for this speaker).

cassava’ versus *imyóó¹g-ímbísi* ‘raw cassavas’ where there is a very obvious difference in vowels on the adjective.

In a related vein, non-identical vowel sequences poses a minor transcriptional problem. Such sequences only arise in three contexts. One is as the realization of /Vyi/, where *y* may be elided before [i], giving rise to forms like [adui] ‘he hit’ from /aduyi/. The second is (rare) stem-internal sequences in some pronunciations of *nasááye*, *nasááe* ‘God’, *ring’ó¹ááni* ‘crested crane’ (sometimes attested as *ring’ó¹wááni*) and *íkíbí¹ráhóóni*, *íkíbí¹ráóóni* ‘small plate’. The third, which is very common, arises at the phrasal level with a word-final vowel before a word-initial vowel. Some speakers (in the available data) simply maintain vowels in hiatus; others (especially EM) seem to at least phonetically merge such vowel sequences into a single syllable, often deleting the first vowel. In the transcriptions, a breve mark may be used to notate this property.

[bk]maháraambá ísiríini	‘20 wasps’
[rl]Iróómö indara	‘1 room’
[em]mká ¹ ráji öm ¹ táambi	‘tall judge’
[em]vör-iing’inga	‘every moment’
[ml]mboozó ¹ ávó	‘their sister’
[ro]Ikáá ¹ yóóng-öinguzúúzu	‘young weed’

The breve mark is one way of notating the impression that the two vowel are “run together” into one syllable. The mark might appear on the first vowel or the second, with no implication that there is a systematic difference between first-V reduction and second-V reduction. Similarly, such vowels in sequence might be run together with no space, or there could be a separating space (as observed in the preceding examples); or, there could be a hyphen separating the words (see also *goméé¹r-íógónéne* ‘big ship’ with no breve). It was eventually decided that spellings like *goméé¹r-íógónéne* would be conventionally used to notate apparent syllabic merger, but examples elicited prior to that decision have not been re-transcribed. Location or presence of a breve, or a hyphen, in a vowel cluster simply indicates that the vowels in sequence phonetically merge into one syllable. The evidence that there is an actual phonological merger process pertains to the tone system.

Other variable phonetic details are retained in the transcriptions, for example there is velarization in some tokens, thus phonemic *mbwá* may be attested as [imbyuá] ‘dog’, *mwaakweeya* as [myaakweeya] ‘2p swept’. Again, the transcriptions have not been filtered to eliminate such variations. The forms [mwaakweeya] and [myaakweeya] are phonologically identical; the transcription [myaakweeya] indicates that velarization in that token was noticeable, and the transcription [mwaakweeya] either means that there was no noticeable velarization, or that it wasn’t considered important enough at the time to write. Typically, such allophonic details (which are commented on in appropriate parts of this chapter) were not systematically noted in transcriptions, except when they are initially observed.

2. Segmental inventory

2.1. Consonants

The clearly-contrastive consonants of Logoori are as follows.²

	t	[tʃ] ch	k
b	d	[dʒ] j	g
f	s	[ʃ] sh	
v	z		
m	n	[ɲ, ɲʲ] ɲ	[ŋ] ng'
w	r, l	[j] y	h

The consonant [f] is infrequent, and generally only appears in loan words or before *u*, *w* – however [fwV] is widely replaced with [fV].³

The consonant *b* is somewhat infrequent when not preceded by a nasal (but [mb] is common, being the surface result of combining a nasal plus *v*). Words with [b] not preceded by a nasal are often loans.

ebééi	‘price’
ibáága	‘bag’
ibáákuuri	‘bowl’
itáábu	‘trouble’
kebóóko	‘hippo’
kítábu	‘book’
rijííbu	‘answer’

Few words universally have [p]. Candidates would be loanwords with [p] in the source language. The most common but not universal strategy for source-language [p] is to voice [p] to [b] when using such a word in Logoori. Some speakers use [p] in these words, some of the time.

ibíícha (ipíícha)	‘picture’
ibirabiri (ipiripiri)	‘pepper’
ebóósta (epóósta)	‘post office’
ibúúnda (ipúúnda)	‘donkey’

² The orthographic conventions used here are given in this table, along with the corresponding IPA symbol in square brackets, when they differ.

³ Some speakers maintain [fw] in *ifwééza* ‘silver’ vs. [f] in *mféneesi* ‘jackfruit’, but others employ *f* in both words – *ifééza* ‘silver’, *mfenesi*. Both words derive from Swahili *f* (*fedha*, *mfenesi*), and the contrast in Logoori is quite marginal, originating from the fact that *f* originally comes from a voiceless consonant before degree-1 round vocoids, i.e. *u*, *w*. *rifwá* ~ *irifá* ‘thorn’ ← Proto-Bantu **pua*, *rofóro* ‘foam’ ← **pudo*. Transformation of loanword *f* to *fw* as in *ifwééza* is uncommon and probably indicates that the word is an older loan. I have not observed inserted *w* for any speaker with recent words like *ofisá* ‘officer’, never **ofwisá*.

There are a few words with [p] which have not been observed to undergo voicing with any speaker, so far.⁴

rí'péera	'guava'
mpáángo	'plan'
mpííra	'ball'

There are also words with [b] which do not appear to vary with [p].⁵

kíkábo (Sw. <i>kikapu</i>)	'basket'
msííbi (Sw. <i>mshipi</i>)	'belt'
abáchi (Luo <i>abaki</i>)	'abachi '
kibáanji	'water pot'
kiburuburu	'butterfly '
rí'bwóoni (Luo <i>rabuon</i>)	'potato'

The phonetic consonants *l* and *r* are highly variable. As noted in chapter 1, orthographic practice is not uniform, in that both *r* and *l* may be used, with *r* being less-frequent. The orthographic rule promulgated in Godia (use <r> after front vowels) does not correspond to a phonetic pattern of Logoori⁶ that I have observed, but I have frequently encountered both a lateral approximant [l] and a flap that can be written as [r]. The distinction is largely rule-governed ([i,y] tend to condition immediately preceding [l]), but varies between speakers. Both *r* and *l* are employed in transcriptions, and are based on my judgment of whether the token was more *r*-like or more *l*-like. Such judgments largely fell out of the transcriptional record over time, since it became clear that more sophisticated methods are necessary to capture the range of pronunciations. All instances of <r> could be spelled with <l>, or vice versa, without losing general contrasts of the language.

For most speakers, /rVr/ reduces to [ll] (hence *llógoori* 'Logoori language' ← /rV-rogoori/, vs. *mrógoori* 'Logoori person' ← /mVrógoori/). The qualitative difference between [ll] and [r] is significant, and I always write [ll] although "rr" could, by rule, be interpreted as being pronounced [ll]. The duration of derived [ll] is, at least in certain contexts, typical of that found in various languages which have phonemic geminate *l*⁷ and for all speakers, it is quite evident when *ll* is word-initial (it can bear contrastive tone: [l'léési] 'cloud'). For some speakers, the duration of intervocalic *ll* is not consistently different from that of singleton *l* (as observed in their productions of Swahili words). In

⁴ I have not pursued investigation of adoption of Swahili words into Logoori, so these examples arose in the course of ordinary elicitation.

⁵ On occasion, the word [íbárási] 'horse' has been gathered in the form [ífárási] which is essentially the Swahili word and the immediate source of [íbárási], but since this is corrected to [íbárási], I conclude that [ífárási] is not actually part of Logoori. However, it is plausible that such a replacement has or will take place for some speakers.

⁶ This rule is probably inspired by the valid rule for distributing *l* and *r* in Luganda.

⁷ E.g. Saami, Norwegian, Italian, Arabic, Somali.

some instances, such as the verb *kohólla* ‘to hear’ from /kʊ-hór-ir-a/, *ll* tends to sound somewhat long, but sometimes does not appear to be very long.

Especially among younger speakers, /l/ may be emerging as a phoneme which is distinct from, though phonologically related to, /r/. There are some lexical items, all adaptations of Swahili *l*, which for some speakers have non-geminate [l]. For example the adjective *kamili* ‘proper’ always has a short consonant (though it may also be pronounced with *r*), and the word ‘bell’ from Swahili *kengele* may be pronounced *ekéengele*.⁸ The most wide-spread strategy for loanword adaptation and the strategy exemplified in long-established loans is to change Swahili *l* into *r*: the innovative strategy exemplified by words like *kamili* is to adopt *l* as [l]. As far as we can determine, there is no strategy to adopt foreign-word *l* as [ll], that is, delateralization (not gemination) is the only alternative to direct incorporation of [l] from another language.

The short version of *r* is a lingual flap (written here as *r*) and varies between [ɾ] and the lateral flap [ɺ], with both contextual and individual factors being relevant. Instances of [ɺ] in the speech of EM are relatively infrequent compared to BK and RL. Word-initial position and following *i*, *y* especially favor the lateral flap.

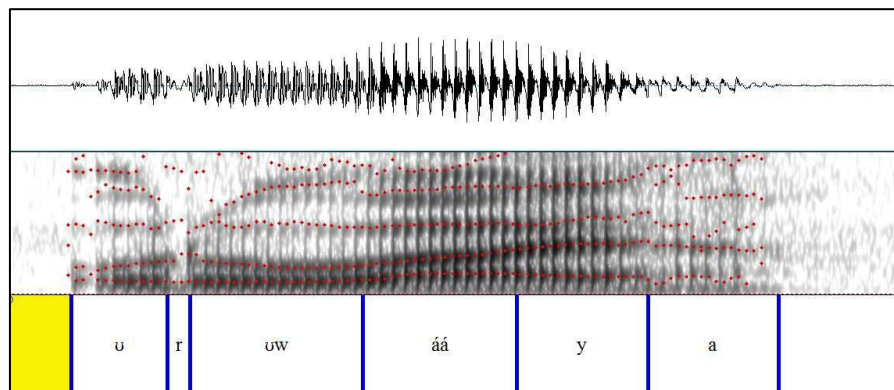
The voiced labial fricative, written as *v* (consistent with standard spelling practice), most closely resembles the IPA approximant [ʋ].

The glide *y* in Logoori, in most idiolects, is phonetically unusual, compared to the segment transcribed [j] in IPA which found in many other languages (such as English, German, Swahili), indeed we know of a parallel only in the Central Kenyan Bantu language Kamba. The front glide need not have a raised tongue position, that is, it is not always a palatal, it may be a dental approximant. Leung also notes this feature and transcribes *y* as <*y*>, referring to it as a ‘dental glide’.⁹ The glide is palatal (which for clarity we indicate in this section as [y^j]) when it stands before the vowel [i], also when preceded by a consonant, but is realized as a dental glide when syllable-initial before [ɪ e a o u].¹⁰ For some speakers, the glide is palatal on some (most) tokens of the word *rowááya* ‘wire’ – [rowááy^ja] – a loanword, which allows a comparison of the palatal vs. dental versions of *y* in reasonably comparable contexts. As can be seen in [ɔrowááy^ja], we find the expected shift in formants for [y^j], but no appreciable change in waveform amplitude at that point.

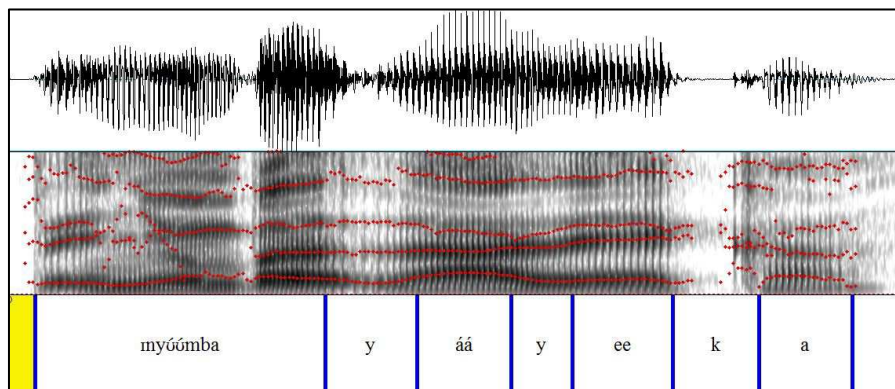
⁸ The most-nativized form is *egéengere*, which can also be pronounced *ekéengere*. We have so far not encountered **egéengele* with nativization of just the initial consonant.

⁹ Mould 1976 likewise marks *y* with the dental diacritic, but does not comment on that property.

¹⁰ Surface [yu] does not appear to exist in the language.



In [nyóómba yááyeeeká], dental *y* has a significant decrease in waveform amplitude during its articulation, reflecting the effect of the narrower dental approximation.¹¹



For those speakers with the dental allophone, alternations within a morpheme can be observed depending on phonetic context, for example *kováaya* ‘to visit’, *avááyí* ‘he visited’. Since this feature is entirely transparent, we do not otherwise note it in transcriptions. It should also be noted that *y* is often not very distinct before [i].

A related phenomenon is the pronunciation of *ɲ*. Especially among speakers with the dental glide pronunciation of *y*, the palatal nasal is phonetically dental [ɲ̪]. There is a surface contrast between *ny* and *ɲ*, for example *kɔɲára* ‘to be able’, *konyáara* ‘to be thin’; *konyiira* ‘to stretch’, *kɔɲiimbira* ‘to sing for me’; *ɲombákáa* ‘I am building’, *inyóómba* ‘house’. There is an alternations where /ɲ/ becomes [ny] before *i*, for example *kokóoɲa* ‘to help’, *vaakóonyi* ‘they have helped’. The relationship of *ny* and *ɲ* will be dealt in in more detail in X.

The fricative *sh* ([ʃ]) is highly variable across speakers. The original situation appears to be that there was no [ʃ], but there was a contrast between [hy] and [sy]. Palatalization of *hy* to *sh* is quite widespread, compared to palatalization of *sy* to *sh*. Some speakers synchronically maintain a three-way distinction between *sh*, *hy* and *sy*, though for those speakers, robust [ʃ] is only found in loan words such as *imísheni* ‘mission’, *rísháhidi* ‘witness’ (from Swahili). Other speakers neutralize *sh* and *hy* to *sh*,

¹¹ In this token, the second *y* has some but not as much constriction.

thus *kohyóoha* ~ *koshóoha* ‘to be warm’). Finally, some speakers have *sy* where other speakers use *sh*, e.g. *kosyeena* ~ *kosheena* ‘to step’. EM, for example, uses *sh* in these words, whereas BK uses *sh* in the former example and *sy* in the latter, and PM uses *hy* and *sy* as well as *sh*. An additional context for deriving *sh* is that /h/ becomes [sh] optionally or obligatorily (depending on speaker) before suffixal *i*, for example *kwááha* ‘to pluck’, *nzahi* ~ *nzashi* (EM) ‘I plucked’. Data in this work records whatever pronunciation a speaker uses in a token – there seems to be some variation especially in the case of *hi* which may appear as *hi* or *shi* in the speech of an individual.

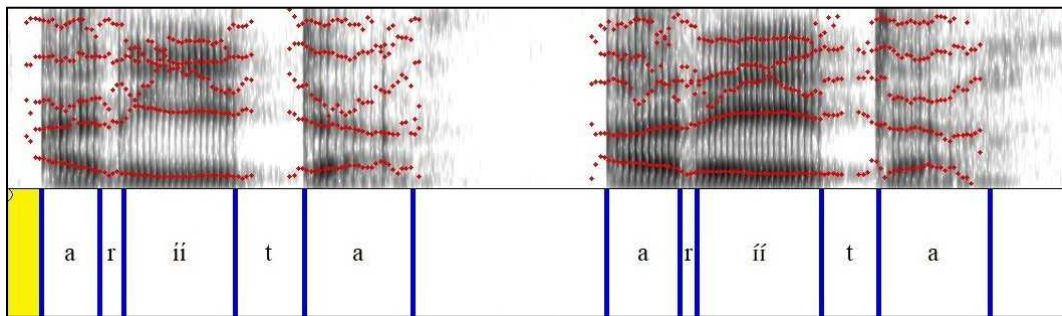
The fricative *z* is widely pronounced as [z], but some speakers optionally pronounce this as an affricate [dz], with a relatively short closure period.

The clusters *mw*, *bw*, *vw* may be pronounced with fricativization and unrounding of the glide, for example [bk] *mbwá* [mbɣuá] ‘dog’, [fa] *mwaakweeya* [mɣaakweeya] ‘2p have swept’, [rl] *mwaaráa* [mɣaaraa] ‘2p are spreading’, [em] *uvwóóngo* [uvɣuóóngo] ‘brain’.¹² This phonetic process is most noticeable in the case of /mw/, where /w/ may delete without a trace in some tokens, e.g. [rl] *umíívi umdáámaanó* ‘bad thief’ alongside [omwíívi umdáámaanó]; [em] *yaarí míígizi* ‘he was a teacher’.¹³

A similar process affects /kw, gw/ which are realized as [kp, kpf, gb, gbv, gv], for instance [rl] *umsáara gbaakpáádika* ‘a split tree’, [ompííra gbaakpáádika] ‘a burst ball’ (*gwáákwáádika*), [kpfaámkoba] ‘we beat him’ (*kwáámkoba*) [yáá ngvííra] ‘he fell on me’ (*yaangwííra*); [fa] *muryáángo gbííguchi* ‘open door’ (*gwííguchi*), [aangbííri] ‘he fell on me’ (*aangwííri*); [pm] *kpóómbaka* ‘to build’ (*kwóómbaka*), [kugba] ‘to fall’ (*kogwa*).

2.2. Vowels

There are 7 distinctive vowel qualities in Logoori: [a e o ɪ ʊ i u]. The vowels [e,o] are comparable to Swahili *e,o* and IPA [ɛ, ɔ]. The distinction between [i, ɪ] and [u, ʊ] is quite subtle; I have only found one minimal pair in word-medial position, [aríita] ‘he will kill’ and [aríita] ‘he will bury himself’.

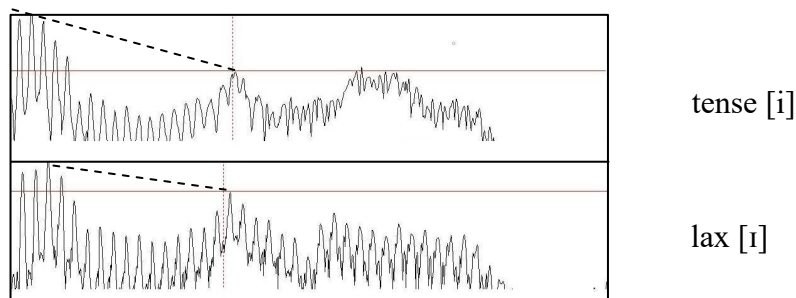


The following spectral slice in the range 0-5500 Hz compares the energy distribution of [ɪ] and [i], and we can see that the tense vowel on the top has a more pronounced downward spectral tilt compared to the lax vowel on the bottom. Compare the greater

¹² This feature is also noted in Mould’s transcriptions [mɳ] for *mw*.

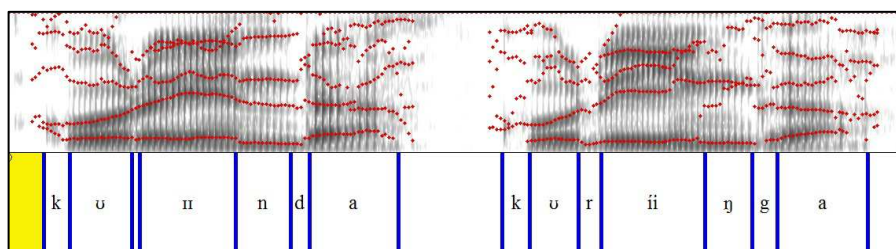
¹³ There is no practical way to determine if *w* is actually deleted as opposed to being rendered most difficult to detect: by comparison, some evident correspondent of *w* is audible in all tokens of *vw*, *bw*.

decrease in amplitude between F1 and F2 for [i], and the lesser decrease in amplitude between these formants for [ɪ]. This is consistent with the impression that the tense high vowels are breathy-voiced – the spectrum of breathy vowels has a larger negative slope compared to modal-voiced vowels.

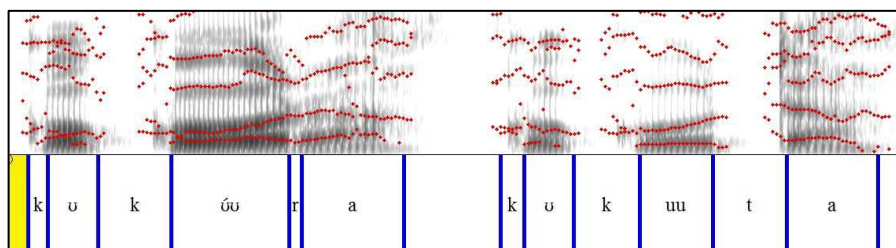


The spectra and spectrograms indicate that the first two formants of [i] are further apart than those of [ɪ], by about 200 Hz.

A general source of minimal pairs is the difference between singular imperative with object prefix (*korɪndi* ‘guard us!’, *gigori* ‘buy it!’) and plural imperative with object prefix (*korɪnda* ‘guard-pl. us!’, *gigori* buy-pl. it!’), with high root vowels. An example of a near-minimal pair *korɪnda* ‘to guard’ vs. *korɪnga* ‘to fold’ is seen below.

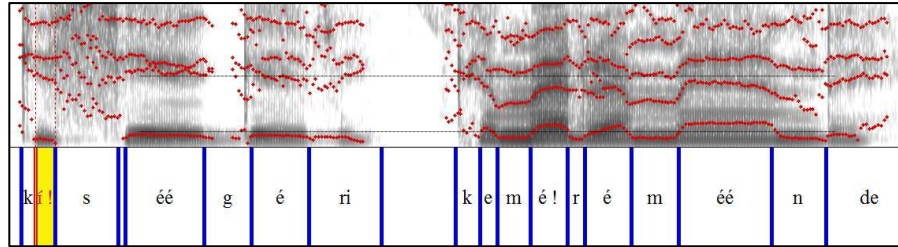


The near-minimal pair *kokóɔra* ‘to extract’ vs. *kokuuta* ‘to scrape’ is seen here.

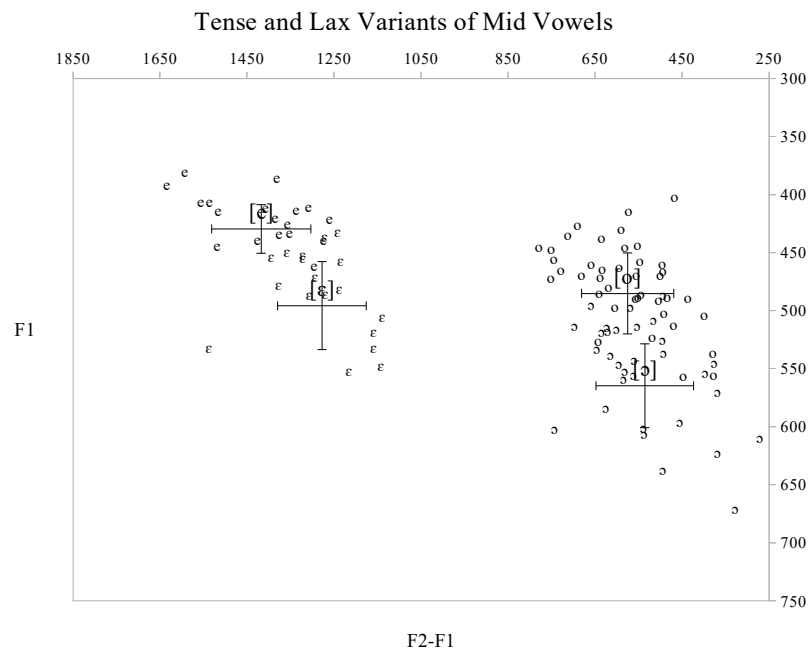


The vowels [i,u] tend to partially devoice in favorable environments, which can aid in identifying the vowel distinction.

There is also phonetic raising of the mid vowels *e, o* ([ɛ, ɔ]) which become tense [e, o] before *i, u*. For some speakers this process applies iteratively through a string of mid vowels. In the examples from SY *kí'syéégéri* ‘sty’ versus *kemé'rémeénde* ‘candy’, the lowest two formants are much closer together in the latter (more closely resemble *a*) compared to the former (more closely resembling *i*).



Older speakers tend to have a more “phonologized” version of raising and younger speakers tend to raise vowels only when right before the high trigger. There is also a tendency for some speakers to devoice prepausal *i*, *u* but not other vowels. A more detailed and controlled phonetic study is the realization of the *i*/*ɪ*, *u*/*ʊ* contrast is required. Nevertheless, data from speaker EM exemplifying /e,o/ before [a,e] versus [i] suggests iterative harmony. These data include sequences of multiple syllables with mid vowels before [i], and the goal was to determine (a) whether there is a measurable acoustic difference in [e,o] before [i] versus before [a,e] and (b) whether any raising effect is limited to the syllable immediately before [i]. Below is a plot of formant measurements.



The expectation, based on hearing many tokens, was that there would be raising throughout *koo₁tee₂vi* ‘we have asked’, *koo₁ché₂ere₃vi* ‘we were late’, *koo₁vee₂zege₃ri* ‘we have belched’, and there would be no raising in *óósoomeree* ‘you have read for me’, *kooroondani* ‘we have followed e.o’, *koo₁tee₂vani* ‘we have asked e.o’, *kovee₁zege₂ra* ‘to belch’. Accordingly, in the above plot, /e,o/ followed by [i] and not separated from [i] by [a] are marked as [e,o], and /e,o/ without following [i] or with [a] intervening between /e,o/ and [i] are marked as [ɛ,ɔ].

Over a corpus of 107 vowels, there was no significant difference in F_2 value associated with the following vowel context (i.e. /e/ before [i] versus /e/ before [a]), but there was a significant difference in F_1 value. Thus there is a raising harmony process in

the language affecting mid vowels. Moreover, there was no significant difference in F_1 depending on whether the mid vowel is immediately before [i] versus separated from [i] by one or more syllables with /e,o/ (which are assumed to harmonize and thus to be the immediate cause of vowel raising in e.g. [k_oo_ov_eē_ez_eg_er_i]). This latter fact suggests an iterative categorial rule. It is tentatively concluded that there is a low-level phonological rule tensing /e,o/ to [ē,ō] before [i] (and presumably [u], but constructing contexts is difficult) as well as before derived [ē,ō].

3. Prosody: Vowel Length, Tone, Syllables

3.1. Vowel length

Vowel length is significant in the language, and is actually indicated in some orthographic practices. Nevertheless, perfectly-controlled lexical minimal pairs such as *kokeera* ‘to age (of female)’, *kokera* ‘to milk’ are extremely rare. Near-minimal pairs are seen below.

koguomara	‘to grow large’	kugomira	‘to catch’
koheera	‘to breathe’	kohéra	‘to come to an end’
kuhóulla	‘to beat for’	kuhólla	‘to hear’
kokuova	‘to flatter’	kukóva	‘to be partially cooked’
kojooora	‘to get’	kojóra	‘to strip leaves’
kusáámura	‘to slap’	kusamóra	‘to go to work’
kosona	‘to point at’	kosooma	‘to read’
kotóma	‘to send’	kotuuma	‘to jump’
imbíizi	‘warthog’	imbíti	‘hyena’
imbóra	‘rain’	imbóóza	‘strong wind’
mféneesi	‘jackfruit’	mféréji	‘water tap’
mukáádo	‘avocado’	kíkábo	‘basket’
mukóru	‘initiate’	rikóóru	‘pigeon’
eméeri	‘ship’	emére	‘mashed cooked bananas’

Surface distinctions derived by the application of general or construction-specific rules also leads to an opposition between long and short vowels.

vaafúúti	‘they erased me’	vafúúti	‘they erased’
yaakóós _i nikiza	‘he has annoyed me’	yaakos _i nikiza	‘he has annoyed’
aríita	‘he will kill’	arítá	‘he may bury’
varáata	‘they will do surgery’	varata	‘they will bury’;
kodeechi	‘we cooked’	koodéechi	‘we have cooked’

Vowel length is not lexically contrastive before NC clusters, but unlike the situation in some Bantu languages, both long and short vowels are surface possible before NC.

nzámbááyaa	‘I am swinging’
nɪmbáa	‘I am singing’
nómbákáa	‘I am building’
nééngaa	‘I am brewing’
nííngokaa	‘I am melting’
nóóombooraa	‘I am over-pouring’
ímbwá	‘dog’
zíimbwá	‘dogs’
mji	‘fly’
ziinji	‘flies’

3.2. Tone

Logoori is a tone language, and it distinguishes two surface tones, H and L (the former marked with acute accent). Again, lexical strict minimal pairs are rare.

kwíizoriza	‘to remember’	kwíízoriza	‘to fill’
koviimba	‘to roof’	koviimba	‘to swell’

However, tonal minimal pairs reflecting grammatical differences are frequent in the language.

váámíga	‘they strangled’	váámiga	‘they strangled me’
yáákagura	‘he has bought’	yaakagura	‘he bought’
umúúndú yááváriza	‘the person counted’		
umúúndu yááváriza	‘the person who counted’		

Viewing tone from the syllabic perspective, there are three surface tone distinctions, namely High (H), Low (L) and Fall (F). F only occurs on a long syllable, and is notated as a combination of vowel with H plus L (unmarked), e.g. *kodéeka* ‘to cook’. F is highly restricted in the language. There are grammatical and lexical contrasts between F and H in the penultimate syllable, for example:

ijóumbi	‘salt’
éng’éende	‘jigger’
ikiráato	‘shoe’
umusáaza	‘husband’
iráánji	‘color’
orobááng’a	‘panga’
ekékóómbe	‘cup’
ɪnááɲa	‘tomato’
kodéeka	‘to cook’
yaakadéeka	‘he just cooked’
akedééchi	‘he cooked it’
yáádééka	‘he cooked (remote)’
akeróonda	‘he is dreaming’

However, expected falling tones may be realized as a level tone, thus ‘to cook’ may be realized as *kodééka* – 7 of 28 tokens of this infinitive have level H. Some speakers optionally change F into H. It should be noted that penult F is rare in CVVCV nouns, compared to level H.

In utterance-final syllables, which can be contrastively long in Logoori, there is no contrast between F and H, and level H tokens can occur as well as F tokens e.g. _[em]*yúká'ráá* ‘he is cutting himself’, _[em]*vaqñí' mbíráá* ‘they are singing for me’.¹⁴ The choice of H vs. F on a long prepausal syllable is free. Before the penult, F is almost entirely non-existent. The most common context where it appears in the transcriptions is when a long vowel with H tone immediately precedes an independent H, for example *wéendéve* ‘chairman’, which is also realized *wé'éndéve* and *wéé'ndéve*. The realization of phonologically concatenated H tones is discussed below, but it is a general rule that when adjacent syllables have their own H tones, the second tone is realized in a lower register, notated with the downstep marker (*wéé'ndéve*). The timing of the drop in register is somewhat fluid, and *cṽṽ'cṽ* may be realized as *cṽ'ṽcṽ* or *cṽvcṽ*. Such differences were noted in the transcriptions since it was not certain that there was no contrast, but phonologically speaking, *cṽ'ṽcṽ* or *cṽvcṽ* can be translated into *cṽṽ'cṽ*.

Another context where phonological F is widely encountered is in certain verb inflections where ‘prominence’ is given to the subject prefix. This prominence is realized as vowel lengthening in some contexts but as a H tone – phonetically as F – when the subject prefix stands before a vowel.

<i>ndáaganagani</i>	‘I thought’
<i>yáakakuza</i>	‘he died’
<i>váakaveezegera</i>	‘they belched’

Such syllables can also be realized with level H, e.g. *yáákakáraanga* ‘he fried’, presumably owing to the general optional rule realizing F as level H. F arises at the phrasal level from the merger of a final H toned vowel plus an initial L toned vowel

<i>imbw-íindara</i>	‘1 dog’
<i>mb-ééneengero</i>	‘give me a brew pot’
<i>naahíim-íngorovi</i>	‘he will hunt the pig’
<i>rw-áakaraangizi</i>	‘when he fried up’
<i>rw-áacheerizi</i>	‘when he greeted’
<i>n-íngorovi</i>	‘with a pig’

The combination *Cṽ+V* may also be realized with level H, cf. *n-íjnama* ‘with meat’, *n-éérefu* ‘with 1000’.

An underlyingly H tone will typically spread leftwards to preceding vowels. For example, *kwaakagura* ‘we bought’ has no H tones, whereas *ekékóómbe* ‘cup’ has penultimate H. In the phrase *kwáákágór-ékékóómbe* ‘we bought a cup’, the vowels preceding the noun have a higher pitch. Indeed, in the citation form of the noun, there is

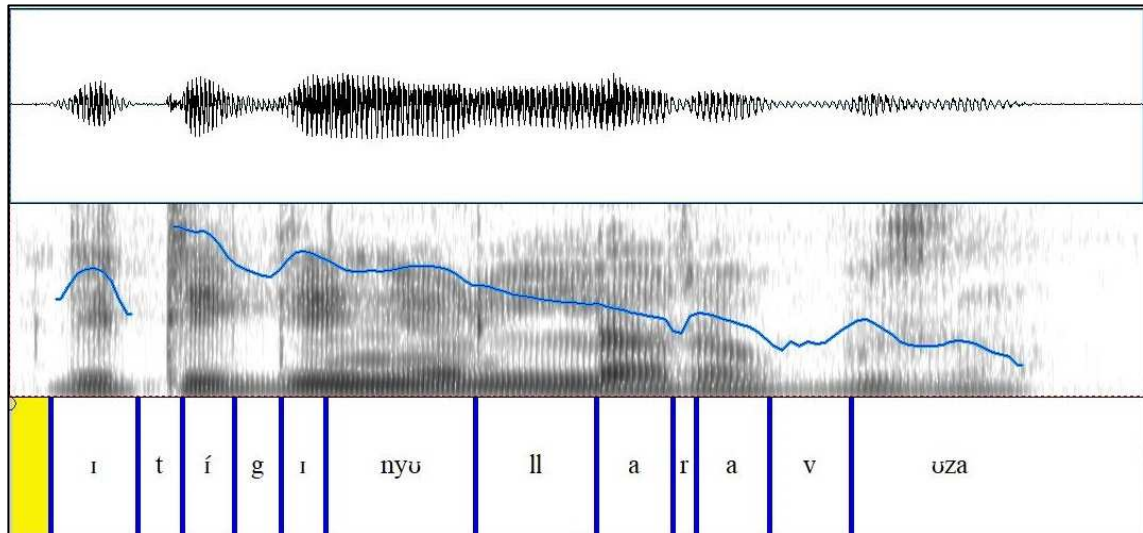
¹⁴ Phonetic fall is much more common compared to level H in final position.

generally raising at least of the syllable *ke*, thus *ekékóómbe*. The question is whether there is a categorial phonological rule spreading H to the left, or is the process due to phonetic implementation. The main reason for treating this as a categorial phonological rule is that it is impossible to correctly describe when H is anticipated and when it is not, based solely on phonetic criteria. For example, there is no such spreading in *máng'oombe yéyo* 'towards that cow', exemplifying the *má-* construction. A characteristic of this construction is that the noun following *má-* is L toned, meaning it will lose any lexical H tones and also is not assigned H by any process. There are various contexts where leftward spreading of H is blocked, and thus the process will be treated as a categorial phonological one, though one that may be some optional.¹⁵

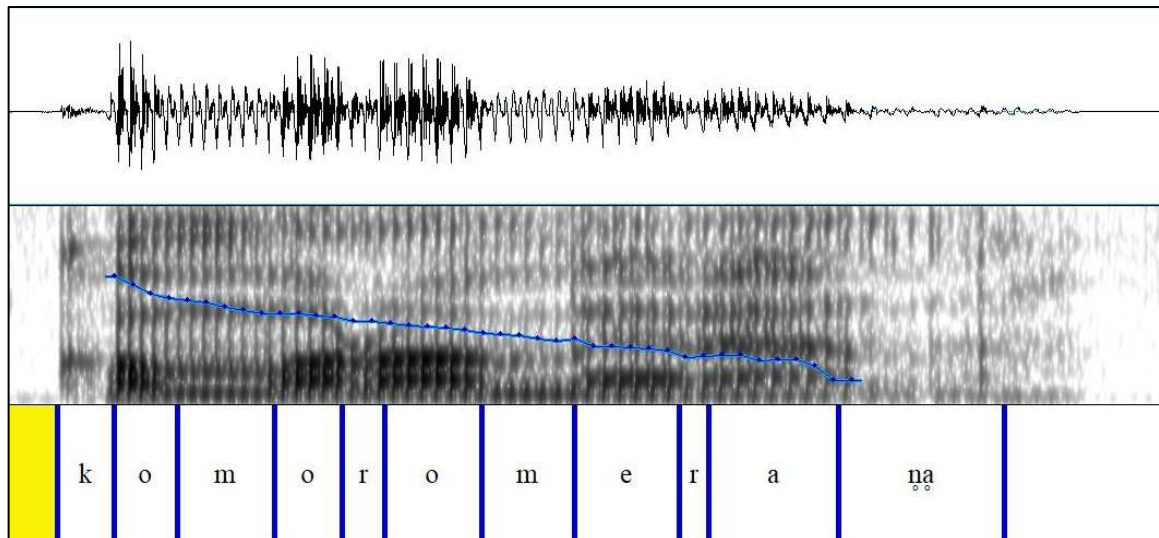
Logoori also has the contrastive register-lowering operation known as downstep, in fact downstep always and only occurs between two autonomous H tones. For example, the noun *imbwá* 'dog' has a final H, and the verb *yáágwa* 'it fell' has initial H. When these two words are combined, a downstep appears – *imbwá'yáágwa* 'the dog fell'. Given a phrasal combination of a word with H followed by a word with H, and underlyingly L toned syllables between, when leftward tone spreads, the two H tones abut at the point of the first syllable, and there is downstep, thus *váá'ná varáhi* 'good children' from /váána varáhi/. Downsteps can arise within the word when there are two H tones, for example *mí'dógá* 'cars', from /mí-dogá/. Word-internal downstep typically involves non-adjacent vowels, and when Hs might be directly concatenated within the word, one of the Hs is generally deleted. These processes are taken up in the chapters on tonal phonology.

The phonetic realization of H and L tones in Logoori is challenging, since syllables are not suddenly high or low pitched depending on whether they have H vs L tone. One noticeable tendency is for pitch to gradually descend after H, in a sequence HL*. Phonologically, only the syllable [tí] in [itíginyo llara voza] 'just 1 heel' has H tone, but the pitch trace shows that pitch slopes continuously down from the peak on [tí].

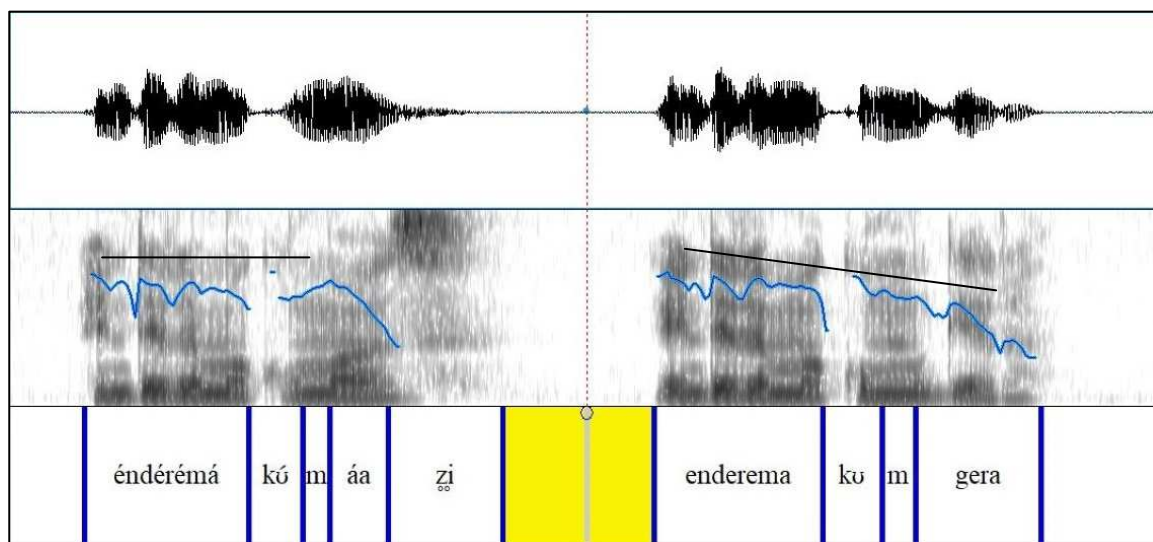
¹⁵ The alternative which could render this spreading a process of phonetic implementation posits a surface contrast between marked L and unmarked Ø, thus *máng'oombè yéyo* versus *eng'oomb-éenéne* 'big cow', transcribed as *eng'óómb-éenéne*. There is no phonetic difference between marked L and a tonally unmarked vowel – the distinction would be based strictly on behavior. Indeed, a better transcription under this account might be *èng'oomb-éenéne*, with grave accent indicating that there is no raising of the first vowel. Since there is no phonetic difference between [e] and [è], disposing of transcriptions of the leftward-spread effect via L-marking would be misleading. Note though that grave (and acute) accent *is* used here to mark syllabicity of nasals, rather than introducing the syllabicity diacritic [ṁ, ṅ].



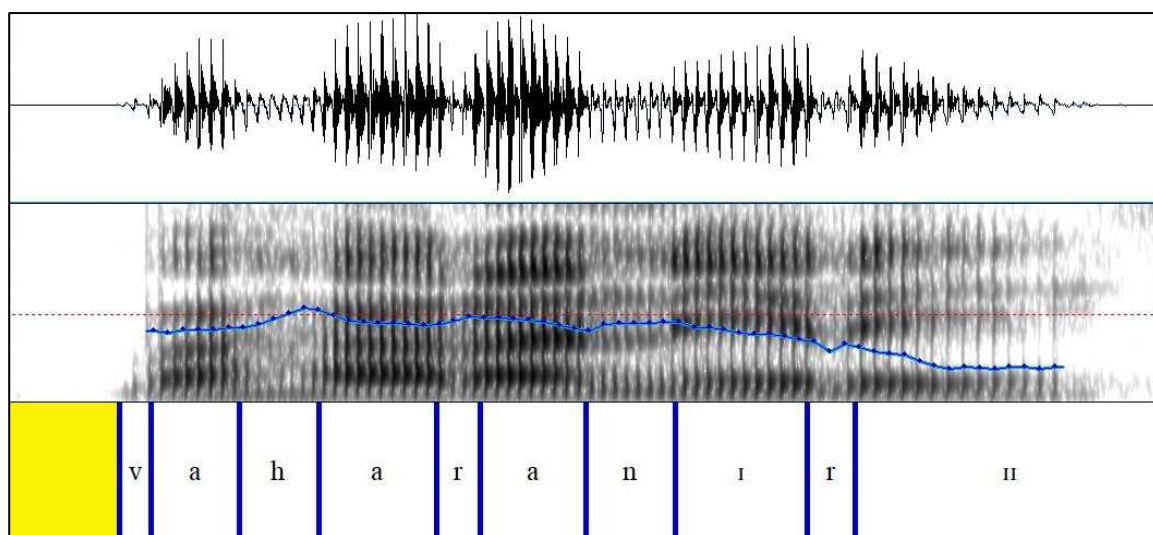
This downward sloping trend does not require a preceding H, as can be seen in the example [komoromerana] ‘to speak for e.o.’.



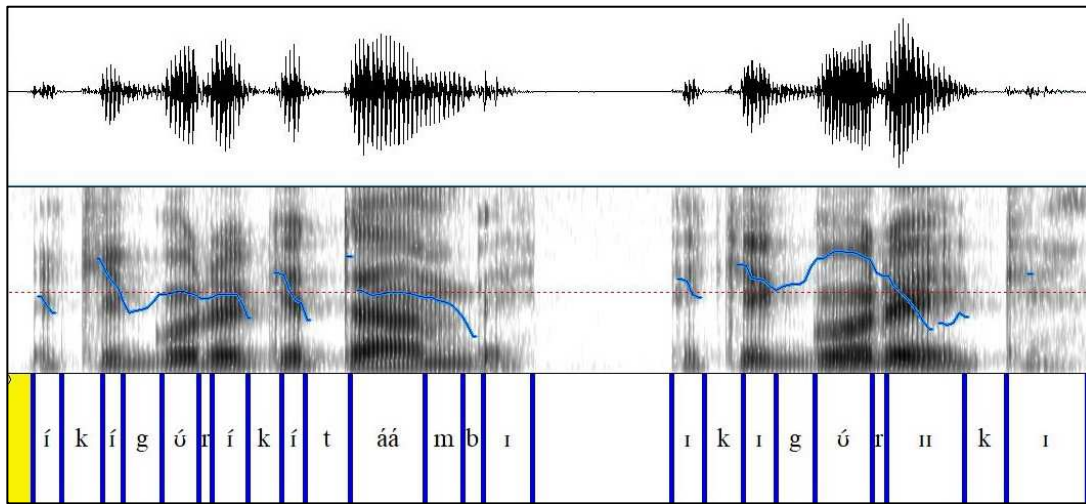
The general phonetic pattern is that in a sequence of final Ls, pitch falls continuously, meaning that the initial pitch of the first L may be raised compared to later Ls, in order to accommodate this descending pitch profile. This can lead to extreme raising and near-neutralization between L* and HL*. In [enderema kumgera] ‘enderema at the river’, the initial pitch of *enderema* is comparable to that found in [éndérémá kómáazi] ‘enderema at the water’. The difference lies not in the absolute pitch level of *enderema* in these two contexts, but rather in the fact that in [éndérémá kómáazi], the pitch level is flatter and falls abruptly with the falling toned syllable [máa], whereas in [enderema kumgera] there is a subtle decrease in pitch across all syllables.



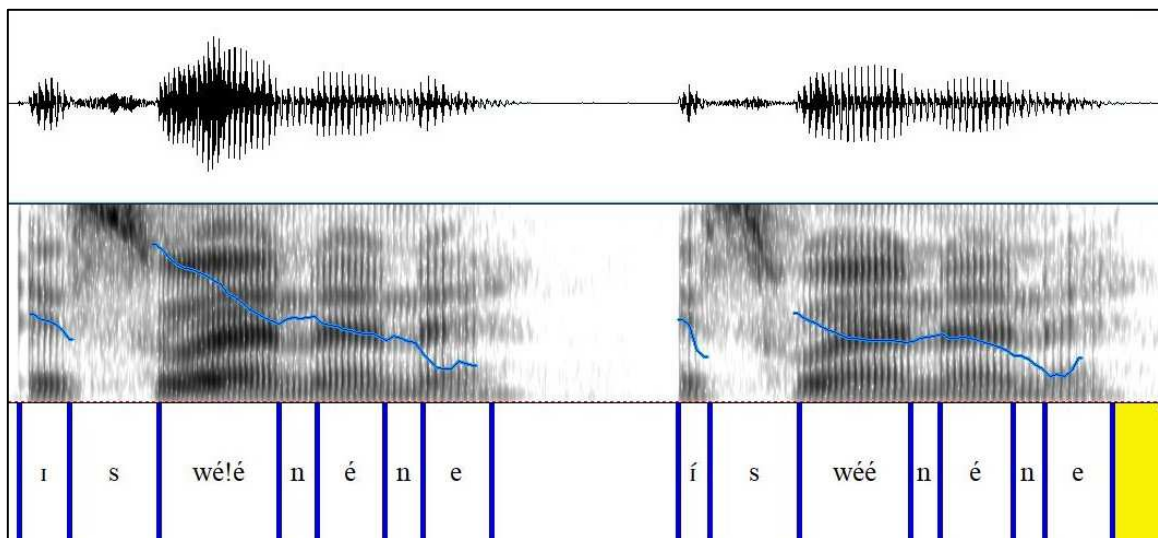
Frequently, pitch slopes more rapidly downwards in the last two syllables, as illustrated in *vaharaniri* ‘they smoothed for e.o’. This may give the impression that the tone pattern in HHHLL.



Another often-encountered feature of Logoori tone is raising of the pitch of a H which stands before a L toned syllable. This can be seen in the following pair which compares *íkígór-íkítáámbi* ‘tall hill’ versus *íkígór-iki* ‘this hill’. In the first example, the noun *íkígór* is all L toned and H spreads leftward from the adjective *kítáámbi*. In the second case, H is assigned to the penultimate syllable of *íkígór* because of the following demonstrative. The pitch profiles of these two examples differ. In the former case, F0 remains around the same level up to the penult (average 106 Hz), which level is indicated by the dashed line. In the latter case, the first two syllables are at roughly the same pitch compared to *íkígór-íkítáámbi* then on the syllable *gú*, pitch rises substantially (average 130 Hz).



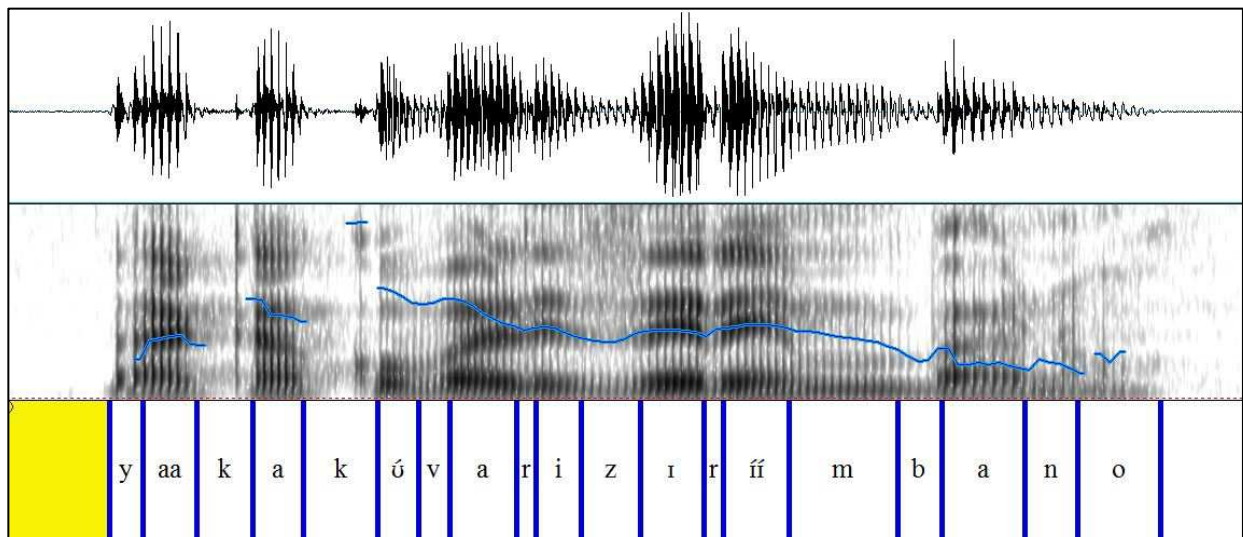
Such pitch-boosting can be seen even when there no overt L tone, in a H¹H sequence.



This example compares *ɪswé!énéne* ‘big termite’ from /ɪswá enéne/ and *ɪswéénéne* ‘big female chicken’ from /ɪsu enéne/. If downstep is interpreted as a floating L, we can explain the higher pitch on the second syllable by reference to this boosting process. However we can also explain it by dint of the fact that there are two autonomous H tones in the former example and only one in the latter, so to make room for two H-defined pitch registers, the first H would naturally have to be raised above the second. Because of this pre-L boosting of pitch, it is difficult to determine whether the preceding syllables have phonological H (via leftward spreading) but the last H is physically higher by a bit – i.e. is the form [íkígörɪkɪ] – or are the first two syllables phonologically toneless / L toned but having raised pitch because the process boosting the pitch of [gó] raises the pitch of preceding syllables?

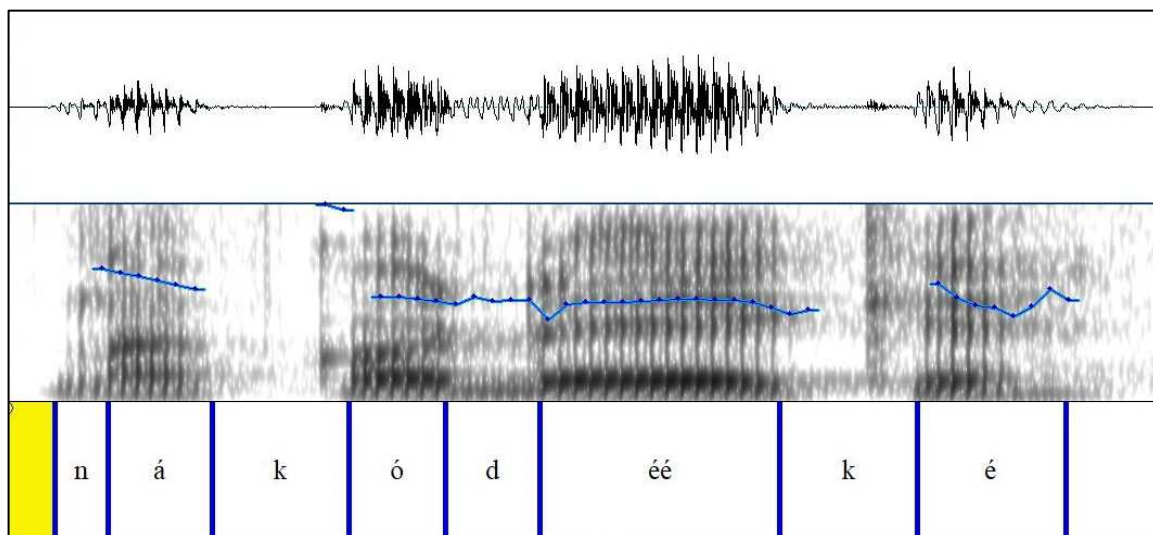
In the following example (*yaakakóvarizɪ-ímbano* ‘he counted knives for us’) we see some typical features of tone implementation in Logoóri. In the first two syllables,

pitch is somewhat raised compared to that in the last two syllables: *ka* has higher pitch than *yaa*, and lower pitch than *kú*.¹⁶ The phonological interpretation is non-obvious, in lieu of a contrast. The increase of pitch culminating in highest pitch on the third syllable could reflect a single H linked to three syllables, with an extended delay in reaching that peak; or, perhaps only the third syllable has phonological H, and higher pitch on the second syllable is anticipatory raising at the phonetic level. Or, perhaps H spreads one syllable to the left, leaving out the utterance-initial syllable. Whatever the analysis of the first three syllables is, we see that after the peak on the third syllable, pitch drops over the following two non-H syllables, then starts to rise for the next H tone, whereafter pitch falls again to the end of the utterance.



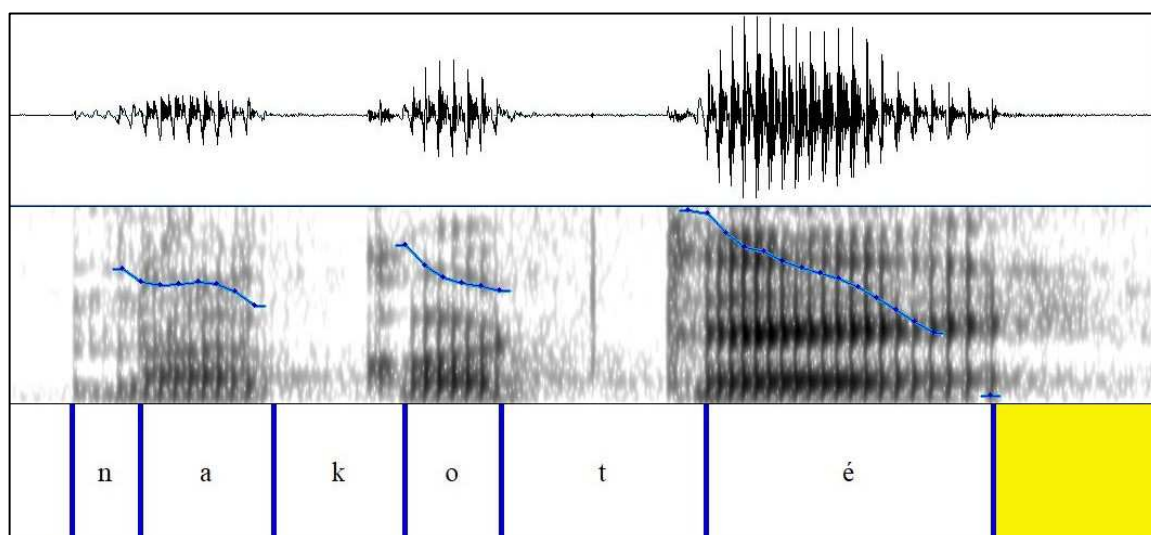
There is also a phonetic process (optional) whereby an utterance ends with a relatively flat slightly raised pitch, if that string phonologically ends with a H tone. An example of this is the following token of /na kodeeké/ ‘we will cook’.

¹⁶ The transcription reflects the judgement that the first two syllables in this token have a sufficiently low pitch that they do not count as ‘phonologically H’, reflecting leftward spreading. There is further discussion of leftward spreading below’.



This might be transcribed as [ná kódééké] (as in the spectrogram annotation). However, the pitch level in such tokens is lower and flatter than usual H spans, to the point that one might transcribe the sequence as ending in a string of mid tones. In the data, this is reported using the “non-falling” diacritic, viz, [na kodeeke°]. This is not a distinct phonological tone, it is a way of capturing facts about the phonetics of a given token.

This token can be compared to the following, [na koté] ‘we will bury’, where the final syllable is distinctly higher than the preceding syllables, and where pitch falls substantially from the beginning of the syllable.

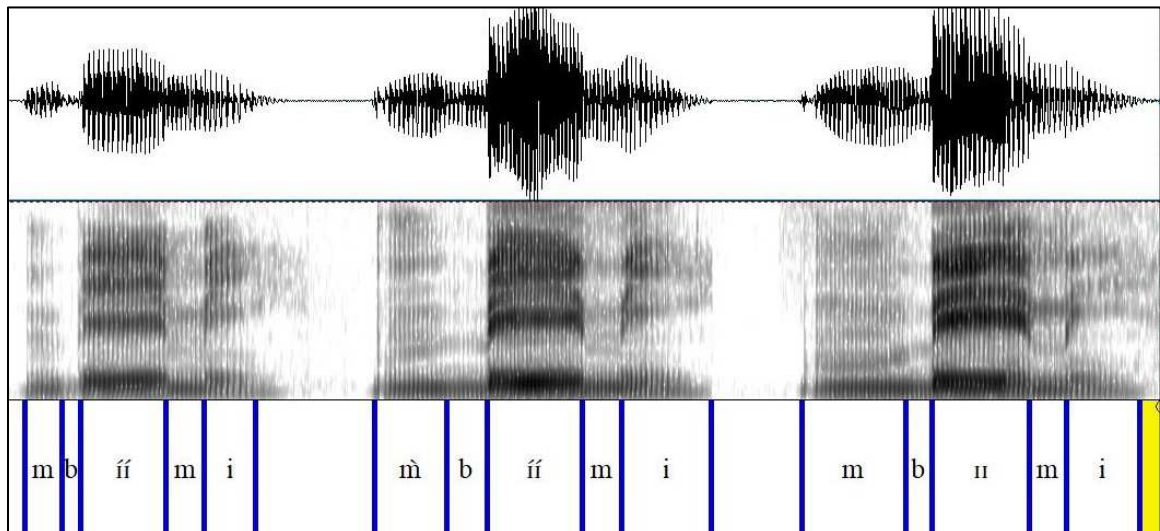


In the data given in this work, some tokens may be presented as e.g. [na kodeeke°], which is a notational variant [ná kódééké], plus an indication that the degree of final fall is significantly less than in tokens like [na koté].

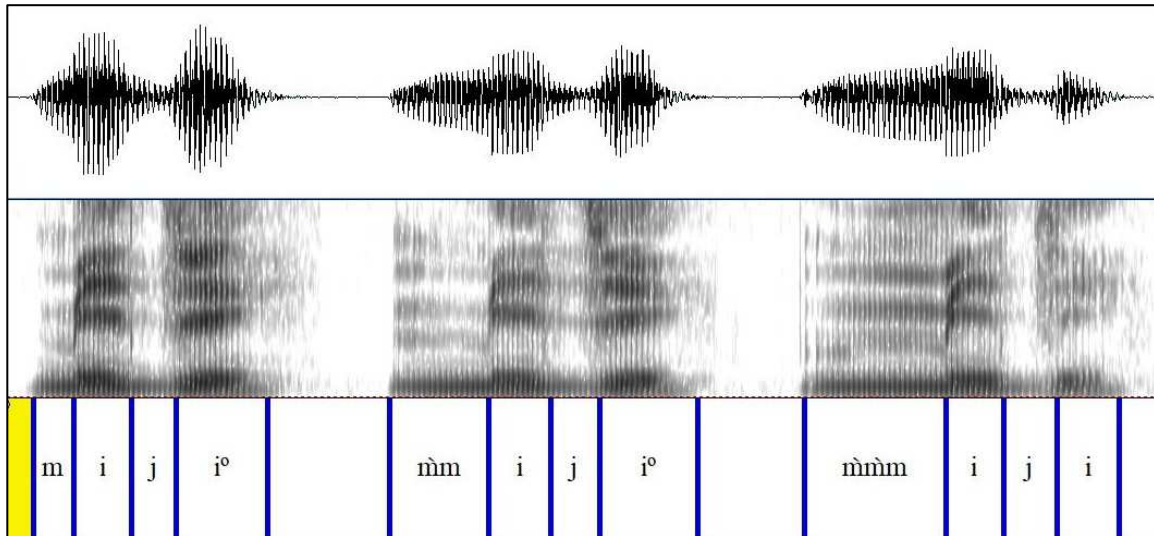
3.3. Syllabicity

While there is no underlying distinction between syllabic and non-syllabic segments, there are derived syllabic nasals as found in *mgera* ‘river’, which is phonetically [m̥gera]. Syllabic *m* derives from /mʊ/ by rules discussed in X, and [m̥gera] can also be realized as [mʊgera]. In this case, the fact of being syllabic can be easily recovered on the surface from the fact that the nasal and following consonant are not homorganic, whereas all non-syllabic nasals are homorganic with the following consonant. Reduction of /mʊ/ is particularly frequent, indeed almost universal and possible obligatory for many speakers before labials *p b v f m*. Before a nasal, the tactic of reading syllabicity off of the homorganicity of the nasal and following consonant does not work. In certain cases, a labial nasal plus labial always has a syllabic nasal, for example /mʊ-píra/ ‘ball’ → [mpíra]. A nasal before another nasal, a fricative, or a voiceless stop is always syllabic. There is only one context where syllabicity of a labial nasal is distinctive, and that is before *b*, as exemplified by [mbárízi] ‘I counted’ versus [m̥bárízi] ‘2p counted’, the latter from /mʊ-várizi/. Syllabicity on (nasal) consonants is notated with grave or acute accent, depending on whether it bears L versus H tone.

A syllabic nasal may, in fact, be distinctively long, which gives rise to near-minimal triples such as *mbíími* ‘I measured’, *m̥bíími* ‘2p measured’ and *m̄mbíími* ‘2p have measured’. The distinction in these nasals is realized phonetically via the greater duration of the syllabic nasal and the even greater duration of a long syllabic nasal. A salient phonological fact is that a syllabic nasal can bear a distinctive tone.



Preconsonantal non-syllabic [m] has a duration of approximately 75 msc, whereas short syllabic [m̥] has twice that duration, and long [m̄] is about 1.40 times the duration of [m̥]. A difference also exists between non-syllabic, short syllabic and long syllabic *m* in prevocalic position, where a root beginning with /m/ may have the 1s prefix /N/ which deleted before a nasal, vs. /mʊ/ ‘2p’, and the lengthened variant, resulting in the phonological distinction [miji°] ‘I strangled’, [m̥miji°] ‘2p strangled’ and [m̄mmiji] ‘2p have strangled’.



In this case, the overall duration of the nasal is longer in the case of syllabic and long-syllabic nasals where [m̩m] is about 2.5 times the duration of [m] and [m̩m̩m] is about 1.5 times the duration of [m̩m].

Reduction of /#mC/ to [ń ~ ñ] is uncommon except for speaker BK, but is attested with other speakers.

reduced

[bk]ń'góróve
[bk]ń'dógónyi
[sy]ńzókɪ
[em]ńz-útá'dééchí
[em]ńgóv-ínáv'ú
[bk]ñnéke
[sy]ñzogu
[em]ńgóróvé ísíru
[em]ñzí 'ndátáádééka

unreduced

ín'góróve
ín'dógónyi
ínzókɪ
ínz-útá'dééchí
íngóv-ínáv'ú
innéke, rinéke
inzogu
ingóróvé ísíru
inzí 'ndátáádééka

'pig'
'ant sp.'
'bee'
'I who didn't cook'
'sewn clothes'
'Syzygium cordatum'
'elephant'
'stupid pig'
'I who didn't cook'

Although nearly all cases of geminate syllabic *n* derive from optional reduction of an initial syllable, the word ñnya 'mother' is a candidate for having an underlying syllabic nasal. One token from speaker FA presents this word as nyina. In a very few other tokens, the word is given with initial [i], viz. [bk]ínnyá móráhi 'good mother', [em]ínyé'évé 'his mother', [em]inyó'óvó 'your mother', but otherwise this word is simply [ñnya].

Syllabic *m* is reasonably common in word-final position, where it may freely vary with [m̩], for example, rí'mwáám ~ rí'mwáám̩ 'dark.5'. This, again, is the result of reduction of /m̩/, in this case without a following consonant. There do not seem to be any cases of mandatory final [m̩] (H or L toned), though some words like mááram̩ 'crushed rock for roads (murram)' are almost always produced without final [m̩]. The

word ‘needle’ is produced by BK as *isiíndaani* or *siíndaanè*, and otherwise syllabic *n* does not occur finally.

4. Syllable structure

Syllables in Logoori usually have an onset consonant, though syllables may begin with a vowel at the beginning of a word. The stricture in *y* before *i* is sufficient reduced that it is often not perceptible, *omó¹yáá(y)i* ‘boy’, *rivógo(y)i* ‘amaranthus sp.’, *ligúú¹yágúú(y)i* ‘dragonfly’, *dá¹nibóói*. Other apparent vowel sequences include those in *lyá¹úa* ‘flower’, *ring¹ó¹ááni* ‘crested crane’, *ibía* ‘beer’ and *omvjá¹lúó* ‘Luo’, which may also be interpreted as *lyá¹(w)ú(w)a* ‘flower’, *ring¹ó¹(w)ááni* ‘crested crane’, *ibí(y)a* ‘beer’ and *omvjá¹lú(w)ó*. Such an interpretation is possible since underlying prevocalic *w* is nearly non-existent in the language, existing only in *kaháwa* ‘coffee’, *rowááya* ‘wire’.¹⁷ A final example of possible vowel sequences is *ikibí¹ráúúni* ‘saucer’, which however has *h* after *a* for some speakers (*kibí¹ráhóóni*)

Syllables maximally begin with NCG where N is a nasal homorganic with the following consonant, and G is one of the glides *w* and *y*. The nucleus of the syllable is a single vowel, which may be long or short. Other consonant clusters exist in loanwords, for example *ibóósta* ‘post office’, *kondákta* ‘conductor’, *ó¹mstáári* ‘line’: it is unknown whether such clusters are modified in the speech of Logooris with no knowledge of English.¹⁸

There are no generally-applicable phonological tests that establish how many surface syllables exist in *ó¹mstáári* (3 or 4?), *lími* (2 or 3?), *ki¹mwáám* (3 or 4?). Insofar as syllabic consonants derive from the reduction of CV syllables, it will be assumed that those processes are syllable-internal reorganizations which do not reduce the number of syllables.

¹⁷ That is, most instances of [w] derive from morpheme-final /u/.

¹⁸ It is equally unknown if there exist any speakers of Logoori with no knowledge of English.