Ministry of Scientific Research and Innovation

A Phonological Overview of Iceve-Maci

Bruce Cox

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B.P. 1299, Yaounde

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This paper concerns the Iceve-Maci language, spoken in Manyu Division, in the South West Region of Cameroon

ISO 639-3 language code: bec

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1 Background

Language:	Iceve-Maci
Ethnologue name:	Iceve-Maci
ISO 639-3 code:	bec
Country:	Cameroon and Nigeria
Major language family:	Bantoid (Southern)
Minor language family:	Tivoid
Dialect:	Oliti
Population:	12000

Iceve-Maci (ALCAM [895], under the name Iceve) is a Tivoid language spoken in Cameroon and Nigeria. In Cameroon, it is spoken in the area around Akwaya town, Manyu Division, South West Region. In Nigeria, it is spoken in five villages along the Cameroon border in Obanliku Local Government Area, Cross River State (Lewis et al 2013). Two dialects are recognised: Becheve and Oliti. Becheve is spoken in Nigeria and in three villages in the highlands to the south-west of Akwaya town in Cameroon. Oliti is spoken primarily in Cameroon.

1.1 Research description

The primary objective of this research is to make phonological information pertinent to the development of an orthography available to the Iceve-Maci speaking community. This research aims particularly to study the phonology of the Oliti dialect of Iceve-Maci. It is based on data collected between 2008 and 2013 by the author and his wife, Kathy Cummins. Most of this data was collected in Ogalawen quarter of Enjawbaw village, where the Oliti dialect is spoken. The data includes a word list which was initially based on the SIL Comparative African Word List (Snider & Roberts 2004) but has subsequently

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been considerably expanded. It currently includes 2285 items (including items elicited more than once), of which 800 are basic nouns and 564 are basic verbs.[1]

While this study focuses primarily on the phonology of the Oliti dialect, it also touches on the salient distinctions between Oliti and Becheve in order to support the development of a single orthography. An early version of the word list was sent to linguist ODO Gloria of Nigeria. She annotated the word list to indicate differences between the Becheve dialect spoken in Amana, Nigeria, and the given Oliti data. Some data were also checked by Pa ABINE Augustine, a Becheve-speaking resident of Akwaya town.

The data corpus has been further augmented by a number of texts that have been collected (from both dialects) and transcribed. Some of these are documented in Cummins & Cox (2010). These have also stimulated the elicitation of a number of different verb forms.

1.2 Previous studies

Very little has been written about Iceve-Maci, beyond language survey. ALCAM (1983) identified Iceve [895] as a language of Akwaya subdivision. Regnier & Starr (2008 [1990]) confirmed the coherence of Iceve-Maci as a single language, while also identifying the two dialects. Cummins & Cox (2010) presented a collection of texts (folk tales and other stories, songs and riddles) interlinearised to word-level; the main aim of that paper was anthropological rather than linguistic.

1.3 Acknowledgements

This research has benefited enormously from the contributions of others. Several members of the Iceve-Maci community have had input in the development and correction of the word list. Two deserve particular acknowledgement: ALUM Austin Otavesima and APA Augustine Okawa. Alum worked through all 1700 items in the SIL Comparative African Word List, identifying equivalents and verifying consistency of transcription. In time, this latter task fell mostly to Apa, who very patiently endured the tedium of going through list after list, checking tone, checking vowel quality, checking ... everything.

The analysis and presentation of the research was also improved by the advice of Dr Robert Hedinger, Dr Keith Snider and Ginger Boyd at various points. One can only regret that such advice, although available, was not sought nearly often enough.

The people of Ogalawen, in particular those of the compound of EZA Emmanuel Ondafi, are also owed a debt of gratitude. Without their friendship and provision of food and housing, life in the area (not to mention the collection of data) would have been considerably more onerous.

Despite all these contributions, it is certain that inaccuracies remain in the database and inconsistencies and infelicities in the linguistic analysis; that blame belongs only with this linguist is equally clear.

[1] Data which consist of a minimally inflected monomorphemic stem are described as “basic”. For the purposes of counting the data, “basic” actually means marked as such in the database; such marks are not wholly accurate, however so the actual figures will vary slightly.

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2 Consonants

2.1 Phonemic inventory

The inventory of the consonant phonemes of Iceve-Maci is shown below. There are four main places of articulation: labial, coronal, velar and labial-velar. All series of plosives and nasals are represented at each of these places. Fricatives and approximants are attested at fewer (and slightly modified) places of articulation. Examples of these consonant phonemes illustrating contrast can be found in B.[2]

	Labial	Coronal	Velar	Labialvelar	Laryngeal
Plosives	p	t	k	kp	
	b	d	g	gb	
	ⁿb	ⁿd	ⁿg	ⁿgb	
Fricatives	f	s			h
	v				
Affricates		ts			
		dz			
		ⁿdz			
Nasals	m	n	ŋ	ŋm	
Liquids		l			
Approximants		j	ɯ	w	
		ⁿj		ⁿw	

There are also some consonants whose phonemic status is not absolutely clear. In particular, there are several labialised or palatalised consonants that contrast with their unmodified counterparts in certain, rather restricted, environments (in particular, before /a/). In this paper, these modified phones are not considered to be phonemic. Rather, they arise when certain consonant phonemes occur before [+high] vowels, as discussed further in §4 below.

The process of palatalisation is also interpreted as generating both alveolar [s ts dz nz] and postalveolar [ʃ tʃ dʒ nʒ] phones from the coronal affricates and fricative. As with the other palatalised phones, there is good contrast before /a/. There are, however, a few differences. Postalveolar phones are much more common than other palatalised phones; there is considerable dialectal or idiolectal variation in the environment that triggers this type of palatalisation; and, there are instances of phonological opacity where the coronal fricative fails to palatalise where it might be expected to. Moreover, the postalveolar fricative sometimes occurs as the second consonant of a root, where no other palatalised phone occurs. The phonetic realisation of the coronal affricates and fricative are considered in detail in §2.2.

The phonemic status of the prenasalised voiced plosives (and affricate) /ⁿb ⁿd ⁿg ⁿgb ⁿdz/ is debatable. For the most part, prenasalised plosives occur in complementary distribution with the unmodified voiced plosives (the latter occurring root-initially and the former elsewhere). There are, however, a few

[2]There is no voiceless velar (or labialvelar) fricative, but there is a laryngeal fricative.

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root-initial occurrences. While these are somewhat restricted in distribution[3], suggesting they are diachronically derived from nasal + plosive sequences or the elision of a root-initial vowel, it seems that they are synchronically realised as genuine root-initial phonemes.

Only a single voiced fricative is recognised as phonemic: /v/.[4] Its identity is being eroded in some contexts: it is often elided in noun class suffixes, and certain words have idiolectal variants where /f/ or /w/ is being used in its place(see §2.2).

The phonemic status of /ɯ/ is very uncertain. Related languages (Tiv, Ugare) have been described as having a velar fricative [ɣ]. Cassetta & Cassetta (1994:7) state that in Ugare, it "is pronounced clearly and distinctly in some cases, but in other cases it is quite faint and may only be realized as a lengthening of the previous vowel." Abraham (1968:12), similarly, distinguishes two pronunciations in Tiv, helpfully contrasting the faint sound produced when it occurs within a root ("root gh") from the richer sound resulting from its use in an affix ("mobile gh").

Iceve-Maci, too, has a similar phone. In roots, as in Tiv, it has a rather faint sound and does not occur root-initially or after a round vowel. It is interpreted here as an approximant [ɯ], which could be construed as an allophone of /j/ (which only occurs root-initially)[5]. The same (faint) sound emerges in various noun class suffixes ("mobile gh"), particularly in Becheve. In Becheve, it also occurs in the negative particle [ɯa] (Oliti [ga]), and it is reported also to occur in a (rather uncommon) class prefix. Diachronically, it is clearly derived from a velar phoneme is these environments. Synchronically, that character has been eroded almost to the point of non-existence. Nevertheless, in this paper, /ɯ/ will be interpreted as a phoneme in its own right.[6]

The sequences [ɲ(j)] and [ŋw] are interpreted as prenasalised approximants. There is no palatal series of consonants to justify /ɲ/ as a phoneme in its own right. While there are some palatalised alveolar and many labialised velar phones (which arise from underlying CGV sequences), they do not occur in the same position in the word. In addition, [ŋw] is better-attested root-initially that /ŋ/, which seems unlikely if [ŋw] results from /ŋʊV/.[7]

The labialvelar nasal /ŋm/ is only attested in one datum. The velar nasal /ŋ/ is attested root-initially in only three data, at least one of which is unknown in the Becheve dialect. It is more common root-medially, however.

---

[3]Prenasalised voiced plosives only occur root-initially in certain noun classes (§5.1), which suggests they may once have been nasal class prefixes. Only /ⁿb ⁿg/ are attested root-initially in verbs and at least one such verb is cognate to a vowel-initial root in Tiv (§5.2).

[4]Although see the following paragraph on the status of /ɯ/; other Tivoid languages would interpret /ɯ/ as a voiced velar fricative /ɣ/.

[5]There is only one, possibly debatable, example of [w] after a non-round vowel. It is possible, therefore, that the contrast between /j/ and /w/ is totally neutralised outside of root-initial position, resulting in a single approximant phoneme with allophones [j w ɯ] according to the preceding vowel.

[6]It is possible that two phonemes are involved, with "root gh" being an allophone of an approximant, while "mobile gh" being an allophone of something else (perhaps /g/). However, given that no particular contrast between faint and rich realisations of these sounds has been remarked in Iceve-Maci, the interpretation offered here seems to be the simplest.

[7]This interpretation raises the question of the non-existence of /ⁿɯ/. In fact, /ɯ/ is not attested root-initially (except in affixes) and prenasalised approximants are extremely rare outside of root-initial position, so the "gap" is not unexpected.

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2.2 Phonetic realisation

A number of processes result in allophonic variation among consonants:

1. Labialisation: Non-coronal plosives, nasals and fricatives are labialised root-medially in the environment $V_{[+\text{round, }+\text{high}]}$ _ $V_{[-\text{round}]}$ (effectively, u_e or ʊ_a). Curiously, labial consonants (/ⁿb m f/) are only attested in the environment u_e. Dorsal consonants (/ⁿg ŋ/) are primarily found in the environment ʊ_a; where they occur in the [+ATR] environment, the process does not appear to apply consistently.
2. Optional labialisation: Velar plosives are optionally labialised before /ʊ/.
3. Devoicing: Prenasalised plosives are devoiced utterance-finally.
4. Palatalisation: Coronal affricates and fricative are palatalised before a front vowel[8]. This process interacts with others in the language to give rise to a number of instances of opacity; it is discussed in some detail below.
5. Velar palatalisation: Velar plosives in monosyllabic roots /Ce/ are (usually) palatalised in Oliti. An alternative, which seems to be preferred in Becheve, is to realise the vowel instead as [ə].[9]

The outcome of these processes is described by the following table of phonetic realisations (examples can be found in appendix B). Note in addition that all plosives are realised without aspiration, the prenasalised affricates are realised as prenasalised fricatives, the lateral varies between flap and approximant realisations and the prenasalisation of /ⁿw/ only assimilates to the velar part of the labialvelar.

/p/	→	[p]	
/b/	→	[b]	
/ⁿb/	→	[mbw]	/ $V_{[+\text{round, }+\text{high}]}$ _ $V_{[-\text{round}]}$, root-medially
		[mb̥]	utterance-finally
		[mb]	elsewhere
/t/	→	[t]	
/d/	→	[d]	
/ⁿd/	→	[nd̥]	utterance-finally
		[nd]	elsewhere
/k/	→	[kw ~ k]	/ _ ʊ
		[kj ~ k]	/ _ e, within a CV root
		[k]	
/g/	→	[gw ~ g]	/ _ ʊ
		[gj ~ g]	/ _ e, within a CV root
		[g]	

[8]The precise environment that triggers palatalisation varies somewhat with dialect and/or speaker. The difference between Oliti and Becheve in this regard is discussed further in §10.

[9]The difference between /e/ and [ə] is that the former is [+back] and the latter [−back]. The presence of a [+back] velar gives this process phonetic plausibility; it is not clear why it does not apply more generally than just within a monosyllabic root.

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/ⁿg/	→	[ŋgw ~ ŋg]	/ _ ʊ
		[ŋgw]	/ $V_{[+\text{round, }+\text{high,-ATR?}]}$ _ $V_{[-\text{round}]}$, root-medially
		[ŋgj ~ ŋg]	/ _ e, within a CV root
		[ŋg̊]	utterance-finally
		[ŋg]	elsewhere
/kp/	→	[kp]	
/gb/	→	[gb]	
/ⁿgb/	→	[ŋmgb]	[10]
/ts/	→	[tʃ]	/ $V_{[+\text{front}]}$
		[ts]	elsewhere
/dz/	→	[dʒ]	/ $V_{[+\text{front}]}$
		[dz]	elsewhere
/ⁿdz/	→	[nʒ]	/ $V_{[+\text{front}]}$
		[nz]	elsewhere
/m/	→	[mw]	/ $V_{[+\text{round, }+\text{high}]}$ _ $V_{[-\text{round}]}$, root-medially
		[m]	elsewhere
/n/	→	[n]	
/ŋ/	→	[ŋw ~ ŋ]	/ ʊ
		[ŋ]	elsewhere
/ŋm/	→	[ŋm]	
/f/	→	[fw]	/ $V_{[+\text{round, }+\text{high}]}$ _ $V_{[-\text{round}]}$, root-medially
		[f]	elsewhere
/v/	→	[v]	
/s/	→	[ʃ]	/ $V_{[+\text{front}]}$
		[s]	elsewhere
/h/	→	[h]	
/l/	→	[l ~ ɻ]	[11]
/j/	→	[j]	
/w/	→	[w]	
/ɯ/	→	[ɯ]	
/ⁿj/	→	[ɲj]	
/ⁿw/	→	[ŋw]	

[10] The prenasalised labialvelar plosive is attested once root-medially, but the datum is not susceptible to Final Vowel Deletion and involves only [−round] vowels. This gap could well be accidental, in which case utterance-final deletion (and perhaps labialisation as other non-coronal prenasalised plosives) would be expected.

[11] The lateral flap is preferred in fast speech, and between short high vowels. The approximant is preferred after a (derived) long vowel.

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A few items show speaker or dialectal variation in which /f/ alternates with /v/ in root-medial/root-final positions (1). This is not free allophonic variation, however; the contrast between /f/ and /v/ is maintained in the same positions elsewhere (2).

(1) a. /tíf ~ tív/ [tɨfa ~ tɨva] [¯ ◝] greet![12]

(2) a. /jíf/ [jɨfa] [¯ ◝] be heavy!
b. /jív/ [jɨva] [¯ ◝] kill!

There is also some variation between speakers whereby /v/ is weakened to /w/.

(3) a. /vùl/ [vule ~ wule] [_⁻] spill!
b. /ì-kʊ̀la-ví/ [ɪkʊlavɨ ~ ɪkʊlawa] [___⁻] pig[13]

As noted above, the coronal affricates and fricative are palatalised before front ([−back]) vowels, being phonetically realised as postalveolars. These also occur before /a/, however, resulting in phonetic contrast. This is not taken to reflect an underlying phonemic contrast between alveolar and postalveolar consonants at this stage. Rather, the coronal affricates and fricative coalesce with the [+high, −back] vowel /i/ before /a/; the contrast is then between the underlying vowel sequences /ia/ and /a/, as shown in (4-5).[14]

(4) a. /sá/ [sa] [¯] scatter
b. /sià/ [ʃa] [¯] sell

[12]A detailed guide to the presentation of data in this paper is given in appendix D. Briefly, wherever possible, data is displayed in its underlying form, with its phonetic form (both segmental and pitch) alongside and a gloss at the end. Underlying forms include morpheme breaks and tone, where these have been analysed. Not every underlying vowel is marked with tone; it is presumed there are rules (not yet fully articulated) that specify how underlying tone melodies are assigned to tone-bearing units in the course of the derivation (see §8).

Abbreviations are occasionally used in glosses; a list of those used in this paper can be found in appendix E.

[13]This example can be further weakened to [ɪkʊla:] [__◞]. The class 8 suffix /-vV́/ is frequently realised by eliding the /v/ altogether (see §6.1).

[14]It is not clear at this stage exactly how these vowel sequences arise, although it is assumed that morphology is involved. This question is taken up again in the case of verbs in §5.2.

The postalveolar phone is also attested once before [o] (i). This datum is an interjection; it is possible that it is morphologically complex.

(i) /tsí-ò/ [tʃo] [◝] no!!

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(5)

a.	/tsá/	[tsa]	[¯]	dwell, inhabit
b.	/tsiá/	[tʃa]	[¯]	respect
c.	/í-dzá^{n}gɨ/	[ɪdzaŋgɨ]	[¯¯¯]	branch
d.	/ì-dziâ-vɨ́/	[ɪdʒavɨ]	[_¯_]	father

Unlike the non-prenasalised affricates, however, the coronal fricative occurs in a verb prefix and some suffixes that are subject to vowel harmony (see §7.1), and often as the second root consonant. In both of these environments, [s] sometimes occurs before [i] or [e].

The verb prefix data suggest that vowel harmony and palatalisation are in a counterfeeding relationship. The underlying form of the first person plural prefix is /sɨ-/. When vowel harmony applies, the vowel is changed to [i], resulting in [si]. If palatalisation were still to apply, the wrong output [*ʃi] would be generated. But with palatalisation ordered before vowel harmony, its conditions are not met ([ɨ] is not [+front]) and so it applies vacuously to the prefix, as shown in (6).[15]

(6)

Input	/sɨ-sim-V/ 1PL-remove-CAUS	/sɨ-te/ 1PL-show
Palatalisation	sɨ-ʃim-i	—
Vowel Harmony	si-ʃim-i	si-te
Output	[siʃimi]	[site]

The same rule interaction may apply to the derivational suffix /-sɨ/.[16] This suffix is present in (7b) and (7e) (which appear to be derived from the same root as (7a) and (7d), respectively). Again, vowel harmony only applies after palatalisation has vacuously applied, at least for some speakers, making phonetic realisations with [s] before a front vowel possible. But while the postalveolar is an acceptable variant in these words, the alveolar phone is *not* acceptable in another word which appears on the surface to have a very similar phonological shape (7c); in this word, the coronal fricative /s/ is crucially part of the root.[17]

(7)

a.	/té/	[te]	[¯]	point, show; teach
b.	/tè-sɨ/	[tesi ~ teʃi]	[_¯]	think
c.	/wès/	[weʃi (*wesi)]	[_¯]	sweep

[15]The emergence of syllables [si] and [ʃi] via this process, along with the existing contrast before /a/, suggests that [ʃ] is well on its way to being phonemicised in Iceve-Maci as /ʃ/.

[16]No detailed study of nominal or verbal derivation has been undertaken as yet.

[17]Indeed, it may be that the root determines whether /s/ is realised as [s] or [ʃ], and not the following vowel. It is likely that verbs normally have a CVC structure, with a harmonising final vowel. Since the final vowel indicating imperfective aspect (see next paragraph) does not promote palatalisation, it is a bit unreasonable to justify the palatalisation in examples like (7c) from the (perfective or epenthetic) final vowel.

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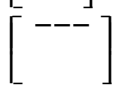
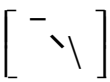
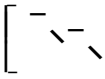
d. /ó-kú/ [oku] death

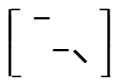
e. /í-kú-sɨ/ [ikuse ~ ikuʃe]  mourning

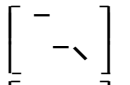
In the same vein, the imperfective suffix /-a/ alternates between [-a] with [−ATR] roots and [-e] with [+ATR] roots. It also does not affect the realisation of /s/ when it appears as the final root consonant, as shown in (8). Note that Final Vowel Deletion has targeted the vowel [u] in (8a).

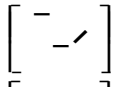
(8) a. /mɨ-â-kî-tús-ù/ [makɨtus]  I will push again

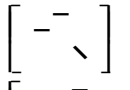
b. /mɨ-â-kî-tús-à/ [makɨtuse]  I will go on pushing again

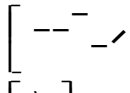
The remaining data where [s] is sometimes (or even always) produced before a [−back] vowel or word-finally where Final Vowel Deletion (see §7.2) has targeted a [−back] vowel are presented in (9).

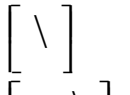
(9) a. /í-gòse/ [igose]  green mamba

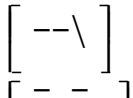
b. /á-gòs-e/ [agose]  he talks a lot

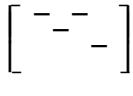
c. /í-kùse-ɯV́/ [ikuse]  maggot

d. /ì-ⁿgísè/ [iŋgise ~ iŋgiʃe]  day before yesterday

e. /í-kisili í-tɨ́-ɯV́/ [ikisil ɪtɨɯ]  (tree) stump

f. /kés/ [keʃ ~ kes]  cut

g. /ì-tsèⁿgísì/ [itʃeŋgis]  pumpkin seed

h. /í-kìsi ó-vô-ɯV́/ [ikis ~ ikiʃ ovou]  wrist

What is striking about this data is that in each case, the previous consonant is a velar plosive. It is conceivable that the backness of these consonants somehow inhibits the palatalisation of the following consonant, although it is unclear how this effect could leap over a [−back] vowel when it intervenes. It also must be admitted that there are also two data where only the postalveolar fricative is attested after a velar plosive (10).

(10) a. /jìⁿg-VsV/ [jiŋgiʃ] swing, go back and forth

b. /nìⁿg-VsV/ [niŋgiʃ] splinter, sprain

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2.3 Distribution

There is no restriction on which consonants can occur word-medially and almost every consonant is also attested in word-initial position. Three exceptions are the voiced prenasalised labialvelar plosive /ⁿgb/ and the velar and labialvelar nasals /ŋ/ and /ŋm/. All these phonemes are quite rare root-initially; the labialvelars are rare in any position. All do occur initially in noun roots, but these can never be word-initial because of the obligatory class prefix. The absence of all three from the initial position of verb roots (which are word-initial in the imperative) could just be an accidental gap.

Word-finally, consonants are much more restricted. Word-final consonants emerge primarily as a result of Final Vowel Deletion (see §7.2). This process leaves the second or later consonant of a stem in word-final position. Word-final consonants in nouns or verbs with simple stems are consequently restricted to those that can occur as the second (or later) root consonant. This includes only voiced prenasalised plosives, fricatives, nasals, the lateral and approximants (except /j/). These are identified in (11) as *common* word-final consonants.

(11)

	Word-initial	**Word-final**
Common	Most consonants	/ᵐb ⁿd ᵑg/
		/f v s/
		/m n ŋ/
		/l/
		/w ɯ/
Rare	/ᵐb ⁿd ᵑg/	/p t ts/
		/b/
Never	/ᵐgb ŋ ŋm/	/kp gb ᵑgb ŋm/
		/k/
		/d dz g ⁿdz/
		/j h/

Nevertheless, as indicated in (11), other consonants (non-prenasalised plosives and affricates) do occasionally occur word-finally. The data in question are ideophones and other adverbs (12a–c), and a few nouns that are presumed to have a complex stem (12d–f), as tentatively reconstructed below.[18]

(12)

a.	/fʊáp/	[fwap]	[ˉ]	shallow
b.	/bʊàp/	[bwap]	[ˎ]	broad and flat
c.	/tsɨ̀b(ɨ) tsɨb(ɨ)/	[tsɨb tsɨb][19]	[ˉˎ]	really, truly
d.	/ì-gɨ̀lá-gɔ̀-tsì/	[ɪgɨlagɔtʃ]	[ˉˉˉˎ]	sp. tree

[18]It is interesting that the only words known to end in [t] were both elicited as meaning slime. This adds weight to the supposition that /tɨ/ could be an underlying morpheme in a complex stem.

[19]Given that prenasalised plosives are devoiced utterance-finally, one might expect that unmodified voiced plosives would also be. This does not seem to be the case.

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e. /ì-kpɨ̀-tɨ̀/ [ɪkpɨt] [_˨] slime (dregs of something)

f. /ì-ⁿbɨ̀-tɨ̀-ⁿbɨ̀-tɨ̀/ [ɪmbɨtɨmbɨt] [___˨] slime

3 Vowels

3.1 Phonemic inventory

The inventory of vowel phonemes in Iceve-Maci is shown in (13).

(13)

	Front	Central	Back
High, +ATR	i		u
High, −ATR		ɨ[20]	ʊ
Mid, +ATR	e		o
Mid, −ATR			ɔ
Low		a	

Iceve-Maci has an eight-vowel system. The system itself is quite balanced[21] and the eight vowels can be neatly distinguished by means of the features [high, round, ATR], all of which are active in the phonology.[22] It does not appear that [low] is active in Iceve-Maci. The phonetically low vowel can be adequately described with the features [−high, −round, −ATR]. Backness, on the other hand, does appear to be active in Iceve-Maci: front ([−back]) vowels promote palatalisation of the alveolar affricates and fricative (see §2.2).[23] The feature [back] is accordingly included along with [high, round, ATR]. The feature system of Iceve-Maci vowels (including two allophones; see §3.2) is shown in (14).

(14)

	[−back] [−round]	**[+back] [−round]**	**[+back] [+round]**
[+high, +ATR]	i		u
[+high, −ATR]	[ɪ]	ɨ	ʊ
[−high, +ATR]	e	[ə]	o
[−high, −ATR]		a	ɔ

Examples demonstrating contrast between all pairs of vowel phonemes differing by one of [high, round, ATR] are provided in appendix C.

[20]The IPA alphabet does not provide a symbol for a high, central, [−ATR] vowel. It would be possible to transcribe it using a diacritic, as [ï]. This is, however, rather unwieldy, so in this paper, both the phoneme and the corresponding phone will be transcribed with barred-i: /ɨ/ and [ɨ].

[21]The symmetry is slightly hidden in that the [−round] vowels are spread through a much greater vowel space than the [+round] vowels, in terms of both height and anteriority.

[22]For example, [+round] spreads rightward onto a [+high] vowel (§3.5), Final Vowel Deletion targets [+high] vowels with Low tone (§7.2), and [ATR] harmony is pervasive (§7.1).

[23]In addition, both /i/ and /a/ have two alternants which emerge under ATR harmony and which appear to be distinguished by the feature [back]: /i/ ([+ATR]) alternates with [ɪ] ([−ATR, −back]) and /ɨ/ ([−ATR, +back]), while /a/ ([−ATR]) alternates with /e/ ([+ATR, −back]) and [ə] ([+ATR, +back]). See §7.1.

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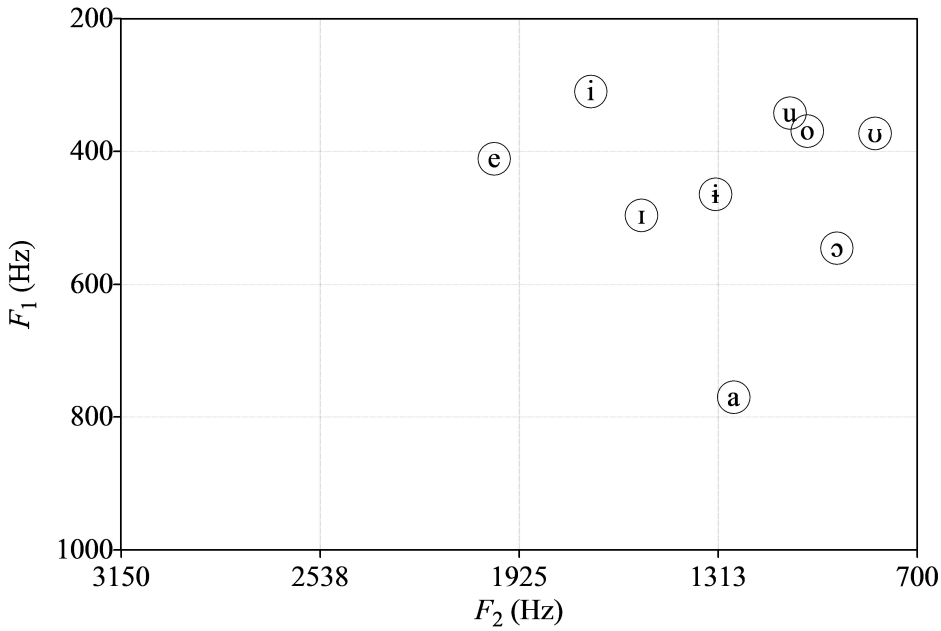
The Iceve-Maci inventory is similar in some respects to the six-vowel system of Tiv: /i e a; u o ɔ/. Both inventories comprise an even number of vowels, which divide naturally into two groups based on the feature [+round]. The main difference is that Iceve-Maci has a highly-developed ATR-based system of vowel harmony, while Tiv does not.[24] The Tiv vowel system has accordingly been analysed using the feature [low] instead of [ATR] in Archangeli & Pulleyblank (1994).

3.2 Phonetic realisation

Within roots, most vowel phonemes have a fairly consistent phonetic realisation, as represented by the symbol used for the phoneme. A plot of vowel formants is shown in (15):

(15)



Two points must be remarked. First, three of the [+round] vowels are tightly clustered and acoustically quite difficult to separate. Nevertheless, good contrast exists to differentiate /u/ and /o/ (see appendix C.1), and ATR-harmony marks the differences between these two and /ʊ/ (see also appendix C.3).

Secondly, the first formant frequency (F_1) of /ɨ/ is considerably higher (i.e., it sounds lower) than the other [+high] vowels, and even lower than the [−high, +ATR] vowels /e, o/. This is by no means impossible. Casali (2008:507-508) notes that the primary acoustic correlate of both [ATR] and [high] is a change in F_1. The two effects on F_1 compete against each other in [+high, −ATR] and [−high, +ATR] vowels with the result that there can be no *a priori* expectation that one will sound higher than the other. It appears in Iceve-Maci that the change induced by [ATR] is more significant than that induced by [high].

[24] *Pace* Ladefoged (1968:38) who claims that Tiv displays "some form of vowel harmony in [its] use of affixes". The source cited (Arnott 1958) does not appear to support his statement.

Vowel harmony has been briefly described in another Tivoid language (Iyive; ISO 639-3 code: uiv) by Foster (2012:18-20). In this language, certain prefixes alternate corresponding to the vowel qualities in the root; no featural analysis has been presented.

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In any case, /ɨ/ functions like the other [+high] vowels in a number of contexts. It alternates with /i/ ([+high, +ATR]) in certain affixes, not with /e/ ([−high, +ATR]) and is phonetically quite similar to another allophone of /i/ ([ɪ], [+high, −ATR, −back]) which occurs in harmonising prefixes; see §7.1 for further details. It is subject to Final Vowel Deletion; see §7.2. There are also a number of morphemes where the choice of vowel is always one of /i ɨ ʊ u/; the other features [round, ATR] in the surface alternant can be explained by spreading rules. One example is the verbal extension -V́ applied to CVC roots, discussed in §6.2.

One additional phone occurs in two exceptional verb roots (16). These have a central vowel, but unlike words like /bɨ́/ invite, they take [+ATR] prefixes.[25]

(16) a. /kuá/ [kwə] [−] die

b. /(w)uà/ [wə] [−] pass[26]

The same phone also occurs as one of two [+ATR] realisations [e ə] of the prefix /a-/ [+ATR] stems, as noted in §7.1. The criteria determining which allophone is selected are not clear at this stage, however.

3.3 Vowel length

Surface vowel length is highly correlated with tone. All vowels with rising or rising-falling pitch patterns are significantly longer than (most) vowels with level or falling patterns. Nevertheless, level or falling vowels do occasionally exhibit a surface length contrast (17).

(17) a. /á-kpálɨ-́/ [akpalɨ] [ˉˉˉ] scars

b. /á-kpáalɨ-́/ [akpaalɨ] [ˉˉˉ] amulets

c. /ì-ŋgɔ́lʊ̀/ [ɪŋgɔl] [−\ ] money

d. /ì-sɔ́ɔ̀lʊ/ [ɪsɔɔl] [−\ ] betrothed[27]

These contrasts are interpreted as being derived from an underlying sequence of vowels, rather than as phonemically long vowels. In some cases, the vowel sequence appears to be monomorphemic; in several others, a morpheme break brings two vowels together, resulting in surface vowel length.

Many occurrences of long vowels occur in stems of the form CVVC(V). Verb stems of this shape are interpreted as a CV root followed by a -VCV extension.[28]

[25]The two central vowels involved are also phonetically distinct.

[26]The proposed underlying forms in these examples are somewhat speculative (although cf /ó-kú/ death). The idea is that the glide vowel /u/ is incorporated into the onset consonant, while /a/ is realised as the [+back, +ATR] alternant [ə]. See also §5.2.

[27]Contrast also the plurals of (17c-d): /á-ⁿgồlʊ-́/ [aŋgɔlʊ] [ˉˉ_] and /á-sɔ́ɔ̀lʊ-́/ [asɔɔlʊ] [ˉ\−] respectively.

[28]All extensions of shape -VCV appear to be underlyingly toneless. Imperative forms are always realised with alternating High and Low tones. Other verb forms are different, but are

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The long vowel arises at the morpheme boundary where the two vowels enter into hiatus.

(18) a. /tsà-VlV/ [tsaal] [ˊ\ ] sit!

b. /dzó-VlV/ [dzoulu] [\−] run![29]

Long vowels may also be derived when the extension -Ý is affixed to a CV verb root. In the imperative, these forms are marked by tone. While unextended CV stems are always realised with high pitch (regardless of the root tone), extended stems have either rising or falling[30] pitch (19). However, it is only the rising pitch forms that appear phonetically long.[31] It is unclear at this stage if phonetic length is realised in other verb forms.

(19) a. /tí/ [ti] [¯] boil, heat

b. /tì-Ý/ [tii] [ˊ] see

c. /fí-Ý/ [fi] [\ ] ask

Some long vowels arise as a result of a diachronic process of consonant deletion. See §7.4 for further details.

(20) /kíⁿd-ii/ (</kíⁿd-VɯV/) [kindii] [¯ˊ] trample

Vowels with rising or rising-falling pitch contours are realised with longer duration than (short) vowels with level or falling pitch.

3.4 Vowel nasality

Vowel nasality is not contrastive in Iceve-Maci.

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equally predictable without positing underlying tone. This is, however, an area of ongoing research.

[29]The first of these is perhaps derived from /tsá/ dwell. The second may be related to /dzà/ go. The vowel change could perhaps arise from the verbal extension; consider also [tsoulu] [ˎ−] stand still which might also be derived from /tsá/. However, there are also tonal changes that are difficult to explain.

[30]The High tone on the extension appears to dissimilate after a High-toned root.

[31]The non-lengthening with falling pitch might also be explained as an instance of Final Vowel Deletion. However, some CV-Ý verb stems have a [−high] vowel and Final Vowel Deletion does not normally target [−high] vowels (see §7.2).

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3.5 Distribution

Word position is not a highly significant factor in the distribution of vowels. However, the fact that almost all roots are consonant-initial effectively limits the possible word-initial vowels to those that occur as vowel-initial prefixes: /i-/ , /o-/ ~ /ɔ-/ and /a-/ (~ /e-/).

Within a root, any of the eight vowels may occur as the first vowel. However, the possible second vowels are severely restricted, as shown in the table below:

V1	**[+high] V2**	**[−high] V2**
i or e [+ATR, −round]	i	e
ɨ or a [−ATR, −round]	ɨ	a
u or o [+ATR, +round]	u	e
ʊ or ɔ [−ATR, +round]	ʊ	a

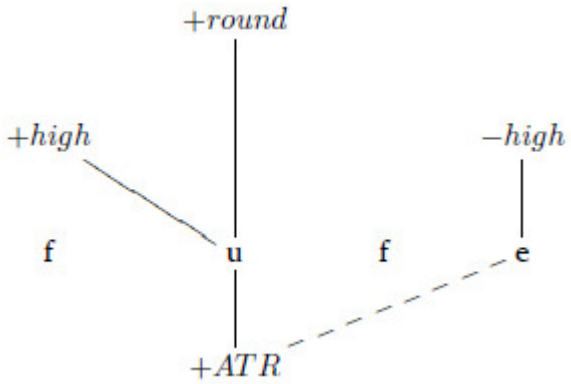
V1 always agrees with V2 in terms of [ATR], but [high] may be freely specified. Note that [+round, −high] vowels do not occur in V2 position. The value of [round] is retained only when V2 is [+high].

One way to explain this distribution is that the features [round, ATR] only occur lexically on the more prominent V1 root-positions; the associated contrast is neutralised in less prominent positions. The feature [high] is lexically specified on each root vowel. The surface form emerges through spreading rules:

- [ATR] spreads throughout the root.
- [+round] spreads rightward only when it is followed by a [+high] vowel.

The failure of [+round] to spread onto a [−high] vowel is illustrated in (21) for the root /fúfe/ fellow-wife. In the second example (22), [+round] does spread onto the [+high] second vowel of /tsɔ́lʊ̀/ intestines. Note that [+ATR] does spread in both cases.

(21)



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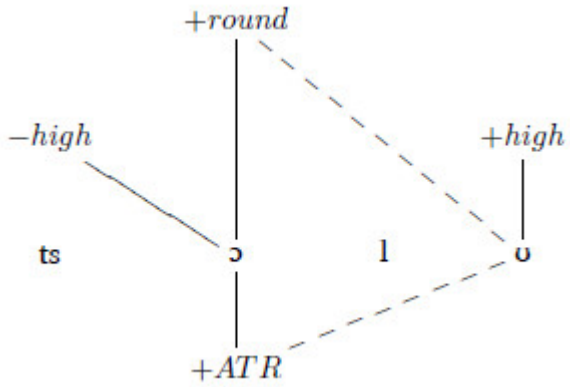
(22)



These spreading rules apply more widely than just within the root. Spreading of [ATR] applies generally from roots to affixes in a well-developed system of vowel harmony, and is described in §7.1.

[Round]-spreading also applies to affixes. Imperfective aspect is marked with a Low-toned, [−high] vowel suffix. Consistent with the spreading rule, it is always [−round].[32] Perfective aspect is not marked, but consonant final stems (i.e., underived CVC roots) have a final vowel epenthesised with polar height (23). The remaining features ([round, ATR]) are derived from the root by employing the above spreading rules. When the first vowel is [+high] (as in the third and fourth examples below), the (segmental) contrast between perfective and imperfective aspect is neutralised.

(23)

Stem	**Perfective**	**Imperfective**
fòl snatch, seize	-fol-u	-fol-e
vɔ̀l tell	-vɔl-ʊ	-vɔl-a
tún judge	-tun-e	-tun-e
wʊ̀nd sharpen	-wʊnd-a	-wʊnd-a
wès sweep	-wes-i	-wes-e

4 Syllable Structure

The best-attested syllable structures in Iceve-Maci are CV and V, which occur in all positions. However, CVC (and occasionally VC) syllables also occur word-finally as the result of Final Vowel Deletion. Furthermore, word-medial V syllables may merge with the preceding syllable, being realised with a phonetically long vowel or diphthong; this produces (at least optionally) syllable structures CVV and CVVC.

CV syllables occur in all positions without restriction (24).

(24)

a. /mí-kúle-mǐ/ [mu.ku.le.mi] [‾‾‾ _] oil

b. /kús-VlV/ [ku.su.lu] [‾ _‾] fold!

Many noun and verb prefixes consist of single vowel (25); this establishes the V syllable structure word-initially.

[32] Of course, the suffix could be specified [−round].

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(25) a. /â-vá/ [a.va] 3SG.came

b. /í-té/ [i.te] name

Vowel-initial noun or verb roots are very rare; only one example is known (26).

(26) /ò-ánɨ/ [wanɨ] child

Syllables of type V may also occur word-medially in some circumstances. Morphology may bring two vowels into hiatus. When verbal extensions of shape -VCV or -V́ are suffixed to a CV verb root, the resulting stem has underlying syllable structure CV.V.CV or CV.V. These stems may be realised on the surface in this case with a phonetically long vowel or diphthong (surface CVV).

(27) a. /pí-VlV/ [pi.i.li ~ pii.li] pour out!

b. /tì-V́/ [ti.i ~ tii] see!

c. /gò-V́/ [go.u ~ gou] bend/pull down!

Velar Deletion also results in two vowels coming together (28). The phonetic realisation in this case is sometimes (as in (28c)) a clear rearticulation of the vowel, rather than a long vowel.

(28) a. /kíⁿd-ii/ (</kíⁿd-VɯV/) [ki.ndi.i ~ ki.ndii] trample

b. /í-tê-ɯV́/ [i.te.i ~ i.tei] pot

c. /í-tsíⁿdɨ-ɯV́/ [ɪ.tsɨ.ndɨ.ɨ] calabash

Closed syllables surface word-finally (29).

(29) a. /gbóf/ [gbof] bark

b. /jàf-VlV/ [ja.fɨl] yawn

c. /ò-lɔ́ŋù/ [ɔ.lɔŋ] trousers

d. /ì-kìla-kàsɨ/ [ɪ.kɨ.la.kas] the shivers

e. /tsà-VlV/ [tsa.al ~ tsaal] sit![33]

[33]Note how morphology and Final Vowel Deletion interact in this example to produce either a VC or CVVC syllable on the surface.

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As noted in §2.3, word-final consonants emerge primarily when Final Vowel Deletion (§7.2) applies to an underlying CV.CV sequence. In principle, therefore, any consonant could appear word-finally. In practice, non-prenasalised plosives and affricates are rare in this position (and some are not attested). This is because they only occur root-initially, so to be targeted by Final Vowel Deletion, they must occur in a compound stem.

Prenasalised plosives occur in word-initial and word-medial positions and could be split to produce a syllable closed by a nasal. However, when native speakers make syllable breaks, the prenasalised plosives are invariably treated as a unit (30). Thus CVC syllables are limited to word-final position.[34]

(30) a. /dzàⁿb-VlV/ [dza.mbɨl] [−\ ] condole

b. /ò-ⁿbɔ̀nʊ/ [ɔ.mbɔn] [_◝] path, road

Palatalised and labialised phones appear in some (rather problematic) stem-initial surface structures, as illustrated in (31).

(31) a. /miàⁿg-VmV/ [mja.ŋgɨm] [−\ ] flash lightning!

b. /í-liàⁿdɨ-ɯV́/ [ɪlja.ndɨ] [¯ _◜] grass used to offer peace

c. /í-kʊàlâ/ [ɪ.kwa.la] [¯ _\ ] sp. of grasshopper

The first example above (31a) is particularly interesting. It cannot easily be interpreted as underlyingly CV.V.CV.CV (surface *[mi.a.ŋgɨm]), because the verbal tone pattern in the imperative alternates High and Low on every syllable.[35] It would be possible to posit series of palatalised and labialised consonants, at the cost of a greatly expanded consonant inventory and the obligation to explain why they only occur contrastively in a very restricted environment (before /a/ only, for most modified consonants). Two other alternatives are:

1. To posit /ʲa/ and /ʷa/ (at least) as "vowel" (diphthong) phonemes; or,
2. To recognise a CGV syllable structure (where G is a [+high] glide vowel and V is [−high], i.e., /a e/).

Both these possibilities share the difficulty of explaining why these "vowels" or this syllable structure occur only in root-initial syllables; presumably the additional contrast is tolerated there because these are prominent, "stressed"

[34]A CVC syllable may arise in the middle of a word as a result of reduplication. This is evidence that the grammatical word consists of two phonological words in this instance.

(i) /à-kúŋ~kúŋ/ [əkuŋ-kuŋ] [_−−−] elbow

[35]Moreover, prenasalised plosives typically occur as second root consonants. They are rare root-initially and are not attested in derivational suffixes. In both (31a–b), a syllabification of (V.)CV.V.CV.CV would move the prenasalised plosive to *third* root position, or force the recognition of a compound stem where the second root has either the prenasalised plosive (rare) or a vowel (exceedingly rare) in initial position.

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syllables (see §9). For the purposes of this paper, we will adopt the second option and will occasionally write /ia/ in a single syllable even though they are not ATR-harmonic (as in (31a) above); /ɨ/ does not have the same power to promote palatalisation as the [−back] vowel /i/.[36]

Not all instances of palatalisation or labialisation on the surface derive from underlying CGV syllables. As discussed in §2.2, many consonants are labialised in the environment / V[+round, +high] _ V[−round], and velar consonants are optionally labialised before /ʊ/.

Some instances of labialisation arise in the resolution of hiatus. This occurs across word breaks (32a), and perhaps may be seen within compound nouns (32b).[37]

(32) a. [kwaɲjɨ]
/kɔ a-^{n}jɨ/
scrape.IMP C6-tooth
brush teeth!

b. [ɔkwɪja]
/ɔ-kɔ-ja/
C3-scrape-eat?
sandpaper tree

5 Root Structure

5.1 Noun roots

Noun roots generally have CV or CVCV structure.[38] CVCV roots in classes 1 and 9 only may be subject to Final Vowel Deletion (see §7.2), resulting in a surface CVC syllable. Final Vowel Deletion is blocked in all other classes by a High tone somewhere in the class suffix.

All consonant phonemes (other than /ɯ̨/) are attested in root-initial position. Prenasalised voiced plosives are not attested in class 7, even though it is quite large, nor in the structurally similar (albeit smaller) class 15. This might suggest that the prenasalisation was once morphological. However, both prenasalised and non-prenasalised voiced plosives contrast in the remaining classes (33).

(33) a. /ó-^{n}gɔ̀-ˊ/ [ɔŋgɔ] [‾ _] C3-hornbill

b. /ó-gʊ̀-ˊ/ [ɔgwʊ] [‾ _] C3-hill

[36]A third, rather speculative, possibility adopts the idea presented in §5.2 below, that an underlying /Cʊ/ verb root surfaces (in the imperative) as [C^{w}a]. If [ɪ] is reinterpreted, not as an allophone of /i/, but as a phoneme in its own right from which the allophone [ɨ] was phonemicised, /Cɪ/ roots would be expected to surface as [C^{j}a]. This process could be extended to longer roots: /mɪ^{n}g/ → m^{jn}g → m^{j}a^{n}g → [mjaŋg].

[37]There is at least a reorganisation of the vowel and semivowel sounds, resulting in a labialised phone.

[38]There is one known vowel-initial root: /ò-áni/ [wanɨ] child.

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The second root consonant is more restricted. Prenasalised voiced plosives, nasals and the lateral are very common, and fricatives (and to a lesser extent, approximants) are also well-attested (34a–e). Labialised and palatalised[39] phones do not occur, except as allophones conditioned by the surrounding vowels. Non-prenasalised plosives only occur in the second stem-position in a handful of data (34f); of these, most have other evidence that the stem is a complex stem.[40]

(34)

a.	/ì-sù^{n}dú/	[ɪsʊndʊ]	[__⁻]	C9-antelope
b.	/ì-sím̀a/	[ɪsɨma]	[_⁻⁻]	C9-heart
c.	/ì-tsʊ̀lʊ́/	[ɪtsʊlʊ]	[__⁻]	C9-raffia palm
d.	/ì-sávì/	[ɪsav]	[⁻\ ]	C9-regime
e.	/ì-kʊ̀wʊ́/	[ikowu]	[__⁻]	C9-chicken
f.	/ò-bà-gʊ̀/	[ɔbagʊ]	[__˪]	C1-red monkey

Stems with three consonants are considered to be complex. Most have other overt indications that this is the case.[41] Among those that are not clearly complex, more than half have /l/ as the third stem consonant, a third have /n/ and a few are attested with /m/, /s/, /v/ or /ŋ/. Most of these consonants are also attested in verbal extensions (where /l/ is also the most common). /v/ is not; however, it does occur in a noun class suffix. These observations lend support to the assertion that these are complex stems.

5.2 Verb roots

Verb roots in Iceve-Maci have the structure CV or CVC.[42]

With the exception of prenasalised voiced plosives, all kinds of consonants are well-attested as the onset of CV roots. Only three with prenasalised plosive onsets are attested, two of which always occur with a -V́ extension. The third is cognate with a vowel-initial verb root in Tiv (35).[43]

[39][ʃ] does occur as the second root consonant, normally as an allophone of /s/. There are a few exceptions that have not yet been adequately explained; these were presented in §2.2 above.

[40]In the case presented, the unusual sequence of /a/ followed by /ʊ/ (cf §3.5).

[41]Indications other than pure length include: vowel co-occurrences other than those described in §3.5; presence of non-prenasalised plosives (which only occur root-initially), and unusual tone patterns.

[42]Glide vowels are permissible as well, making CGV and CGVC roots possible.

[43]Pulleyblank (1985:469-474) offers the verbal paradigm of <ungwa> as the tonal exemplar of disyllabic High-toned verb roots.

The phonemic status of prenasalised plosives was discussed in §2.1.

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(35) a. /ⁿgʊà/ [ŋgwa] [−] hear!
b. /ⁿgʊà/ (Tiv)

Most vowels are attested in surface forms, with the exception of [ʊ]. There are, however, a few data with surface form [Cʷa]. These may be underlyingly /Cʊ/. In this case, the vowel [a] surfaces after the consonant labialises, either as an epenthetic vowel or as a final vowel which is always present in the morphology but is often deleted in other CV roots. However, it is more straightforward to propose /Cʊa/ as the underlying structure here, having tentatively motivated CGV syllables in §4.

Both /Cu/ and /Cua/ roots exist, but they are not at all common. Since the two vowels in the latter are ATR-disharmonic, the [+ATR] allophone [ə] of /a/ surfaces (36).

(36) a. /tsʊà/ [tswa] [−] accuse!
b. /tsú/ [tsu] [−] deceive!
c. /kuá/ [kwə] [−] die!
d. /wuà/ [wə] [−] pass!

A few roots are palatalised on the surface. These are similarly derived from underlying /Cia/ forms.

(37) a. /lià/ [lja] [−] cry!
b. /viá/ [vja] [−] be ready!

The coronal affricate /ts/ is attested with a particularly wide variety of vowels in C(G)V verb roots (38).

(38) a. /tsiá/ [tʃa] [−] fear!
b. /tsɨ́/ [tsɨ] [−] keep, save!
c. /tsì/ [tʃi] [−] poke in eye!
d. /tsè/ [tʃe] [−] stir!
e. /tsá/ [tsa] [−] stay!
f. /tsú/ [tsu] [−] deceive!
g. /tsɔ̀/ [tsɔ] [−] destroy!

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h. /tsʊà/ [tswa] [¯] accuse!

As is apparent from the previous examples, CV roots are realised in the imperative form with High tone, regardless of the underlying tone on the verb root. Other tone patterns are possible on open surface-monosyllabic imperative verbs; these arise from complex verb stems, however, and will be discussed in §6.2.

The most common verb root shape is CVC. All vowels are well-attested in such roots. Almost any consonant may occur in root-initial position. Prenasalised plosives are again rare in this position, and /ⁿd/ in particular is unattested. These may be derived diachronically from an extended vowel initial root VC-VCV (by elision of the initial vowel, producing C-VCV). However, -VCV extended stems never end with a final [−high] vowel, unlike some verbs with a stem-initial prenasalised plosive (39a). Synchronically, then, such data must be interpreted as CVC roots. In any case, true contrast between the prenasalised and non-prenasalised forms also may be found in this position (39).

(39) a. /ᵐbʊ̀l/ [mbʊla] [_¯] hide!

b. /bʊ́l/ [bʊla] [¯ ◝] burst!

The second root consonant is limited to prenasalised plosives, nasals, the lateral, fricatives and (less convincingly) approximants (40).

(40) a. /dzèⁿd/ [dʒendi] [_¯] walk!

b. /nɨ́m/ [nɨma] [¯ ◝] bite!

c. /kʊ́l/ [kʊla] [¯ ◝] heap up!

d. /tɔ́w/ [tɔw] [\ ] talk!

6 Word Structure

6.1 Nouns

Nouns in Iceve-Maci are grouped into classes and marked by a prefix and, in most classes, a suffix as well. A table of the class affixes is presented as (41).

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(41) Noun class prefixes and suffixes

Singular		Plural	
Class	**Affixes**	**Class**	**Affixes**
1	ò-, ì-, à-; some á-, í-; mì-	2	v(ɨ)-; ó-, í-
3	ó- ... -́		
5	í- ... -́	6	á- ... -́
7	(k)í- ... -ɯV́	8	(v)í- ... -vV́
9	ì-	10	í- ... -́
12	(k)á- ... -ɯV́	6a	mí- ... -mǐ
15	(k)ó- ... -ɯV́		

The most common gender pairings are: 1/2, 3/10, 5/6, 7/6, 7/8, 9/6, 9/10, 12/6a and 15/6.[44]

Class 1 nouns are most commonly marked with the prefix /ò-/, but a significant proportion are attested with /ì-/ or /à-/. This variation in prefix does not appear to be predictable. A second group of prefixes has High tone; these are discussed further in §8.1. Another prefix /mì-/ is often used to derive a noun from a verb; it also occurs on some nouns which do not appear to have been derived in this way, however.

The primary class 2 prefix /v(ɨ)-/ is unique in that it does not attach directly to the root, but rather to whole singular noun, singular prefix included. The vowel of the prefix is elided except before the nominalising prefix.[45]

(42)

Singular (class 1)		**Plural (class 2)**	
/ò-bé/ [obe]	law	/vɨ-ò-bé/ [vobe]	
/ì-mà/ [ɪma]	wall	/vɨ-ì-mà/ [vɪma]	
/à-kpà/ [akpa]	box	/vɨ-à-kpà/ [vakpa]	
/í-pê/ [ipe]	comb	/vɨ-í-pê/ [vipe]	
/mì-ná/ [mɨna]	gift	(no plural form)	
/mì-fʊà/ [mɨfwa]	chief	/vɨ-mì-fʊà/ [vɨmɨfwa]	

Three elements of particular phonological interest surface in nouns. The first of these is the process of vowel harmony that impinges on all the class affixes. This process applies more generally than just to noun class affixes, however, and is discussed in detail in §7.1.

[44]These are the most common in the sense that a significant proportion of singular nouns in the first class have their plural in the second class. Class 12 is a rarely attested class; however, whenever a noun is class 12 has a plural, it is in class 6a. A few other gender pairs are attested, but they represent a much smaller proportion of the plurals: 1/6, 1/8, 1/10 and 15/2.

[45]Alternatively, the prefix is just /v-/ and a vowel is epenthesised before the nominalising prefix.

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A second process, Final Vowel Deletion, is equally general and discussed in §§7.2 and 8.1. The process only targets Low-toned final vowels; the High tone in most suffixes prevents the process from applying except in class 1 and 9. This is particularly evident in gender pairs 1/6, 1/10, 9/6 and 9/10 (43).

(43)
a. /ɔ̀-ⁿbɔ̀nʊ/ [ɔmbɔn] [_˨] C1-path, road
b. /á-ⁿbɔ̀nʊ-́/ [ambɔnʊ] [¯_⁻] C6-path, road-C6
c. /ì-sànɨ/ [ɪsan] [_˨] C9-spark
d. /á-sànɨ-́/ [asanɨ] [¯_⁻] C6-spark-C6

The third element of interest involves the suffixes of classes 7, 12 and 15. The phonetic realisation of this suffix depends especially on the previous stem vowel, although other factors (stem length, tone, dialect) also play a role. Realisations of this suffix on monosyllabic roots of class 7 are shown in (44).

(44)
a. /í-tê-ɯV́/ [iteɯ ~ itei] [¯\ ] C7-pot-C7
b. /í-sî-ɯV́/ [iʃiɯ ~ iʃi] [¯\ ] C7-face-C7
c. /í-tɨ́-ɯV́/ [ɪtɨ.ɨ ~ ɪtɨɯɨ] [¯¯¯] C7-tree-C7
d. /í-kà-ɯV́/ [ɪkaɯɨ] [¯/] C7-basket-C7
e. /í-fɔ̀-ɯV́/ [ɪfɔ(w)ʊ] [¯/] C7-shell-C7
f. /í-tô-ɯV́/ [ito(w)u] [¯\ ] C7-head-C7
g. /í-fú-ɯV́/ [ifuˑ] [¯¯¯] C7-foam-C7

In most cases, the suffix includes a [+high] vowel.[46] (An alternative might be to consider that a vowel is epenthesised to repair the disfavoured closed syllable.) The velar approximant is always weak. It is especially so after [−back] vowels (44a–b), where it is almost inaudible. After [+round, −high] vowels (44e–f), the approximant is realised rather as [w].[47] It many cases, it seems the approximant has vanished altogether (cf Velar Deletion, §7.4). After [−high] vowels, this results in the emergence of diphthongs [ei], [ou] and [ɔʊ] which are not otherwise attested in Iceve-Maci; after [+high] vowels, a slight lengthening of the vowel may be detected.

The realisation of the suffix is even weaker on longer roots.[48] Only a few disyllabic roots have [−high] vowels as the final vowel; these are always [−round]

[46]The other features of the vowel are derived by the spreading rules enunciated in §3.5.

[47]See the discussion on the phonemic status of /ɯ/ in §2.1.

[48]It is possible that Iceve-Maci has a metrical preference for disyllabic feet, which causes the suffix to be emphasised when it is affixed to a monosyllabic root, and deemphasised when it is affixed to a longer root.

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(see §3.5). After /e/, the suffix is realised similarly to the monosyllabic case, although the diphthongal pronunciation is less distinctive (45a). After /a/, the approximant is only detectable in a slight lengthening after High-toned roots; where the root contains a Low-tone, it is still just audible (45b–c). After [+high] vowels, it is again just the slight lengthening that betrays the suffix (45d).

(45)

a.	/í-kífe-ɯV́/	[ikifeɯ ~ ikifei]	˗˗˗	C7-bone-C7
b.	/í-bɨ́la-ɯV́/	[ɪbɨlaˑ]	˗˗˗	C7-palm flower-C7
c.	/í-gɨ̀ⁿba-ɯV́/	[ɪgɨmbaɯ]	¯ _/	C7-beeswax-C7
d.	/í-kúⁿdʊ-ɯV́/	[ɪkʊndʊˑ]	˗˗˗	C7-hat-C7

The class 8 suffix is often realised in exactly the same manner as the above suffix, especially in disyllables or after [+round] vowels,[49] even though the consonant involved is different. There are two reasons for this. First, the consonant /v/ tends to weaken to an approximant /w/; word-medially, there is little (if any) difference between the approximants (see §2.1). Second, class 8 typically occurs as the plural of class 7. There may be a trend to reanalyse the root + suffix as a single immutable stem.

(46)

a.	/ví-tê-vV́/	[vitevi]	¯¯ _	C8-pot-C8
b.	/ví-sî-vV́/	[viʃivi]	¯¯ _	C8-face-C8
c.	/ví-tɨ́-vV́/	[vɪtɨvɨ]	˗˗˗	C8-tree-C8
d.	/ví-kà-vV́/	[vɪkavɨ]	¯ _˗	C8-basket-C8
e.	/ví-ⁿjɔ̀-vV́/	[vɪŋjɔ(w)ʊ]	¯ /	C8-iron-C8
f.	/ví-tô-vV́/	[vito(w)u]	¯ \	C8-head-C8
g.	/ví-jú-vV́/	[vijuwu]	˗˗˗	C8-talking drum-C8
h.	/ví-jìle-vV́/	[vijilevi ~ vijilei]	¯ __˗	C8-domestic animal-C8
i.	/ví-tsɨ́là-vV́/	[vɪtsɨlaˑ ~ vɪtsɨlavɨ]	¯¯ /	C8-palm rat-C8
j.	/ví-kúⁿdʊ-vV́/	[vɪkʊndʊˑ]	˗˗˗	C8-hat-C8

[49]This depends to a good extent on the speaker, and the context. In the context of having just given plurals for monosyllabic roots, the /v/ in the suffix was clearly realised after [−round] vowels in disyllabic roots. This is obviously not a normal context, however.

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6.2 Verbs

Finite verbs in Iceve-Maci have the following structure:[50]

(SubjectMarker-(Modal-)(Repetitive-))Root(-Extension)-Aspect/Final[51]

Only the verb root and aspect/final suffix are obligatory, although Final Vowel Deletion or other processes may prevent the latter from surfacing. Vowel Harmony, as presented in §7.1, affects the realisation of all these affixes. As noted in §2.2, the interaction of vowel harmony and palatalisation rules results in a phonologically opaque realisation of the prefix /sɨ-/ 1p as [si-] when it occurs before a [+ATR] root.

The marking of aspect is particularly interesting, especially as it is realised on CVC verb stems. Perfective and imperfective aspects are distinguished, the latter by a [−high, −round] suffix /-a/ which has the typical alternants [-a] and [-e] (depending on the [ATR] feature of the root). Perfective aspect, on the other hand, appears generally to be unmarked. However, CVC roots (which are perhaps the only example of consonant-final stems), are marked by an epenthetic final vowel whose [high] feature is the opposite of that of the root vowel (47). (Note that the [+high] vowel /ɨ/ added in (47c) is deleted again as it meets the conditions for Final Vowel Deletion.)

(47) a. /jìl/ [jile] disappear!

b. /jèl/ [jeli] act, do!

c. /tám/ [tam] chew!

d. /tɨ́m/ [tɨma] send!

This height polarity is not observed with CV roots.[52] Nor does it occur in complex stems including a extension of shape -VCV (48). In fact, it is this that indicates that the extension ends with a vowel, rather than having the form -VC. Otherwise, one would expect [*juŋgule], where the final vowel exhibits height dissimilation, instead of (48b).

(48) a. /jú^{n}g/ [juŋgwe] smell, emit odour!

b. /jú^{n}g-VlV/ [juŋgulu] smell, detect odour!

[50]No exhaustive study of verbs in Iceve-Maci has been completed as yet. The structure presented here approximates the data so far observed. It does not incorporate details such as the imperative plural marker (/dzà-nini/ go-IMP.PL), or objects of the verb (which cliticise to the right end of the verb).

[51]A non-finite form used in a progressive(?) form has the structure: /i-Root(-Extension)-a-na/. The suffix /-a/ is very plausibly the imperfective aspect suffix and has alternants [-a] and [-e] according to vowel harmony. The final suffix /-na/ is not subject to vowel harmony.

[52]It may perhaps be seen in the derivation /Cʊ/ → [C^{w}a], where the [+high] root vowel is incorporated into the onset consonant, and the [−high] vowel /a/ is epenthesised to avoid the final consonant.

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A smaller (but significant) number of CVC or CVCV verb forms are attested where the expected polar vowel does not occur in perfective aspect forms; the vowel is always [+high].

(49) a. /fɨn-V́/ [fɨnɨ] [_⁻] set (a trap)!
b. /kàl-V́/ [kalɨ] [_⁻] cross!
c. /tòm-V́/ [tʊmʊ] [_⁻] sing!
d. /tsíl-V́/ [tʃil] [\ ] know![53]

These result from CVCV stems derived from a CVC root and a -V́ extension, as suggested by (50). This is further confirmed by the tonal behaviour of these derived verb stems, as discussed in §8.2.

(50) a. /sìm/ [ʃime] [_⁻] come out!
b. /sìm-V́/ [ʃimi] [_⁻] take out!

The same extension occurs frequently on CV roots. The effect is first of all tonal; CV roots are realised with high pitch in the imperative (regardless of underlying tone), while CV-V́ stems having either falling or rising pitch according to the underlying tone (High or Low, respectively).[54] The vowel element of the extension, which is always [+high] when affixed to a CVC root, rarely surfaces as such with CV roots; only after /Co/ roots is it evident (51).[55]

[53]Final vowel deletion applies to delete the non-polar vowel in this instance.

[54]This may be explained as a case of dissimilation to avoid two adjacent High tones. The tone on the extension is similarly realised as Low after a High-toned CVC root (i), in which case Final Vowel Deletion applies.

(i) /vɨ́l-V́/ [vɨl] [˩] put!

[55]The [+high] /u/ also surfaces with High-tone roots in other verb forms: e.g., /a-tsó-V́/ [etsou] [˩˧˧] 3SG-pierce-?. It is perhaps conceivable (although highly speculative) that the extension is, in fact, [+high] and suffers Final Vowel Deletion in the imperatives with falling pitch (and comparable verb forms). A subsequent process "repairs" resulting diphthongs (other than [ou]) into long(?) vowels. Note that in Tiv, [ou] is an attested allophone of /o/, particularly before <gh>; see Arnott's introduction to Abraham (1968:v).

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(51)

High-tone root	**Low-tone root**
/vú-V́/ [vu] [\ ]	/gù-V́/ [guu] [ˊ]
open!	close!
/tsó-V́/ [tso] [\ ]	/tsò-V́/ [tsou] [ˊ]
pierce!	bless!
/kú-V́/ [kwʊ] [\ ]	/kù-V́/ [kwʊʊ] [ˊ]
force water!	shave!
/kɔ́-V́/ [kɔ] [\ ]	(no datum)
cuddle!	
/tsí-V́/ [fi] [\ ]	/tì-V́/ [tii] [ˊ]
ask!	see!
/sé-V́/ [ʃe] [\ ]	/hè-V́/ [hee] [ˊ]
accompany!	begin!
(no datum)	/gì-V́/ [gɨɨ] [ˊ]
	criss-cross!
/ká-V́/ [ka] [\ ]	/^{n}bà-V́/ [mbaa] [ˊ]
fry!	be first!

This extension may also apply to a root with syllable structure CGV, especially /CʊA/. High-toned roots are realised in the imperative with a labialised (or palatalised) consonant; Low-toned roots are realised with a vowel sequence (52).[56]

(52)

High-tone root	**Low-tone root**
/tsʊá-V́/ [tswa] [\ ]	/tsʊà-V́/ [tsʊa] [ˊ]
draw (water)!	pluck (chicken)!
/fiá-V́/ [fja] [\ ]	(no datum)
lie, be wrong!	

The combination of CV roots and extensions of shape -VCV produces long vowels (and diphthongs, again in the case of [ou]) on the surface (53), as discussed earlier in §3.3. In each case, the second and final vowels are predictable

[56]It is unclear if a similar result would obtain from Cua root. Several Low-toned roots are realised as Cu(w)e; the only High-toned root with that shape has /j/ for the consonant, which perhaps resists labialisation.

There are no known underlyingly Low-tone Cia roots that take the extension -V́.

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from the first (the second repeats the first, except when it is [o], and the last is always [+high]).[57]

(53)
a. /kpí-VlV/ [kpiili] [\−] tie (knot)
b. /tsé-VlV/ [tʃeeli] [\−] be clean
c. /sì-VlV/ [sɨɨl] [́\ ] leave
d. /vá-VlV/ [vaalɨ] [\−] strip off (bark)
e. /wʊ́-VsV/ [wʊʊsʊ] [\−] prepare
f. /wɔ̀-VlV/ [wɔɔl] [́\ ] brush off
g. /pú-VlV/ [puulu] [\−] boil
h. /dzó-VlV/ [dzoulu] [\−] run

6.3 Other word classes

Aside from nouns and verbs, the largest class of words is filled by adjectives and adverbs. These are variously structured, including simple roots, reduplicated roots, compounds of a root and a reduplicated morpheme, and complex stems composed of a root and the suffix /-aŋ/ (54). The latter is subject to vowel harmony, as discussed in §7.1.

(54)
a. /wá/ [wa] [−] empty
b. /gèli-gèli/ [geligel] [__◝] same
c. /dzɨ́lɨ̀-tɨ̀-tɨ̀/ [dzɨlɨtɨtɨ] [¯ ___] straight
d. /vìⁿg-VlV-aŋ/ [viŋgileŋ] [¯¯¯] round

As is typical of Bantoid languages, there is a subclass of these (called ideophones) which exhibit certain phonological peculiarities word-finally: non-prenasalised plosives or protracted vowels or nasals (55). The use of protracted sounds sometimes has a clear iconic or onomatopoeic function, as in (55d).

[57]There could perhaps be a connection between /dzà/ go and /dzó-VlV/ run, which would raise the question of whether the latter is really /dzà/ extended by an extension that specifies the feature [+round]. There is also a tonal discrepancy, however.

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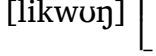
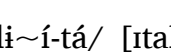
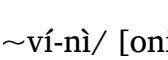
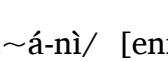
(55)
a. /bʊàp/ [bwap] broad and flat
b. /tsɨb(ɨ)-tsɨb(ɨ)/ [tsɨb tsɨb] truly
c. /pú::/ [puuu] white
d. /bèm::/ [bemm] slow

Numerals in Iceve-Maci follow a base 20 system. There are individual roots for the numbers one to five, ten and twenty;[58] other numbers are constructed from combinations of these. Of these, the word for ten is interesting in that it has a voiceless plosive word-internally (56) and that it never shows agreement with noun class.[59] Given the proto-Bantu reconstruction *di-komi C5-ten, it seems likely that an old form of the class 5 prefix has been preserved in this datum.

(56) /lí-kóŋ/ [likwʊŋ]  C5-ten (10)

The remaining numbers are formed by various combinations of the base numbers. Six and eight are of special interest; they appear to be (approximately) reduplicated forms of three and four, respectively (57).[60] Agreement with noun class is generally manifested before both the base and the reduplicant. This brings two vowels together (the vowel of the base and the vowel of certain class prefixes) in the numeral eight (57f).

(57)
a. /táli/ [talɨ] three
b. /tálɨ~tá/ [talɨta]  six
c. /í-tálɨ~í-tá/ [ɪtalɪta] C10.six
d. /ⁿjíní/ [ɲjin]  four
e. /ó-ní~ví-ní/ [onivini]  eight
f. /á-ní~á-ní/ [enieni] C6.eight

6.4 Affixes and function words

As has been seen above, affixes in Iceve-Maci have a variety of syllable structures. Several noun class prefixes and subject markers, the imperfective aspect suffix, the future/modal prefix and one verbal extension, consist of a single

[58]There is also a word for one hundred, but it does not appear to be commonly used.

[59]In addition, it appears to have a closed syllable without a pitch pattern that indicates Final Vowel Deletion.

[60]Although with eight, either the initial consonant is modified from /ⁿj/ to /n/, or it is the second part of the root /ⁿjini/ which is reduplicated.

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vowel. Several other class affixes and subject markers have CV shape. Two noun class suffixes have been analysed as consisting of a single consonant -C (although a vowel may be epenthesised in these cases). Another verbal extension has -VCV structure, while one noun class suffix consists solely of a floating High tone.

Little detailed research into function words has been attempted to date. The different demonstratives and possessive forms have been collected; some are presented phonetically in (58).

(58) Noun class demonstratives and first person singular possessive

Class	**This**		**That**		**My**	
1	[owe]	˥˩	[ʊwɔ]	˥˩	[ʊwamɨ]	˥˩˥
2	[ve]	˧	[vɔ]	˧	[vambɨ̀ɨ́]	˥˧
3	[owe]	˩˧	[ʊwɔ]	˩˧	[ʊwamɨ]	˥˥
5	[je]	˧	[jɔ]	˧	[ɪjamɨ]	˥˥
6	[aje]	˩˧	[ajɔ]	˩˧	[ajamɨ]	˥˥
6a	[me]	˧˥	[mɔ]	˧˥	[mambɨ(m)ɨ]	˥˧
7	[kje]	˧˥	[kwɔ]	˧˥	[kaŋgɨ(ɯ)ɨ]	˥˧
8	[je]	˧˥	[jɔ]	˧˥	[jambɨ(v)ɨ]	˥˧
9	[ije]	˥˩	[ɪjɔ]	˥˩	[ɪjamɨ]	˥˩˥
10	[je]	˧	[jɔ]	˧	[ɪjamɨ]	˥˥
12	[kje]	˧˥	[kwɔ]	˧˥	[kaŋgɨ(ɯ)ɨ]	˥˧
15	[kje]	˧˥	[kwɔ]	˧˥	[kaŋgɨ(ɯ)ɨ]	˥˧

The first person singular possessive is constructed in two different ways. The possessives of classes 1, 3, 5, 6, 9 and 10 have a vocalic prefix and the common element /amɨ/. The prefix is essentially identical to the dominant noun class prefix for the class; the class 1 and 3 prefixes seem to be realised as [ʊ] instead of [ɔ], however. The remaining possessives have a structure C_1áNC_2ɨ̀(C_3)ɨ́. In most cases, all three consonants are realised at (approximately) the same place of articulation.[61] The second consonant is always a prenasalised plosive. The third is usually weakened to the point of deletion, similarly to how the suffixes of

[61] Class 8 is an exception here. Note that the prefix element in the possessive conforms to the noun class prefix; the class suffix consonant /v/ emerges in the rest of the possessive.

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classes 7, 8, 12 and 15 are typically realised. This weakening is less common in class 6a; the suffix on the possessive is regularly articulated in normal speech.[62]

Two tone classes can be clearly identified among the possessives. Classes 1 and 9 begin with a Low tone, while all the rest begin with High tone.

The distinction between the proximal and distal demonstratives is marked solely by the final vowel ([e] and [ɔ],[63] respectively). The demonstratives of classes 2, 6a, 7, 8, 12 and 15 begin with the same initial consonant as the corresponding possessive. All except class 2 have a rising-falling pitch pattern. The remaining demonstratives vary in that some begin with a full vowel (classes 1, 3, 6 and 9), while others (classes 5 and 10) are reduced to a semivowel. This variation makes it harder to discern the tone classes involved, although the tone contrasts in the classes with a full vowel clearly support classes 1 and 9 as being marked with Low tone.

7 Phonological Alternations and Processes

Iceve-Maci has a number of processes. Of these, the most significant are Vowel Harmony and Final Vowel Deletion. These and some others, are described in the following sections.

7.1 Vowel harmony

Iceve-Maci has a pervasive system of ATR vowel harmony. Its effect is noticeable both within roots and across morpheme boundaries. Within roots, vowels are either all [+ATR] or all [−ATR]. Further restrictions on vowel co-occurrence are more fully articulated in §3.5.

The [ATR] feature spreads from a root to its affixes (both prefixes and suffixes). A number of highly productive phonemic alternations arise as a result in noun class prefixes (and suffixes), verb prefixes (especially subject markers) and suffixes (aspect). There is also an adjective suffix which has been lexicalised in a small group of data.

A table of the attested vowel alternations is presented as (59).

(59)

UF	**[+ATR]**	**[−ATR]**
/i/	[i]	[ɪ]
/a/	[(a)e] or [(a)ə]	[a]
/o/	[o]	[ɔ]
/ɨ/	[i] (or [u]?)	[ɨ] or ([ʊ]?)

Firstly, it should be observed that the [−ATR] allomorph of /i/ is not /ɨ/ (as might be expected) but a somewhat fronted phone [ɪ] that only occurs in affixes (60).

[62]Note that the class 6a suffix on nouns is always realised; presumably /m/ is less prone to deletion than /v/ and /ɯ/. It is not known definitively at this stage whether the class 2 possessive can ever be realised with a third consonant; /v/ may be suspected.

[63]It is not absolutely certain whether this vowel is [ɔ] or [ʊ]. The latter would have the advantage of explaining nicely why the consonant /k/ in classes 7, 12 and 15 is labialised; it is simply the normal realisation before /ʊ/ (as [kj] is before /e/ in a monosyllabic root; see §2.2).

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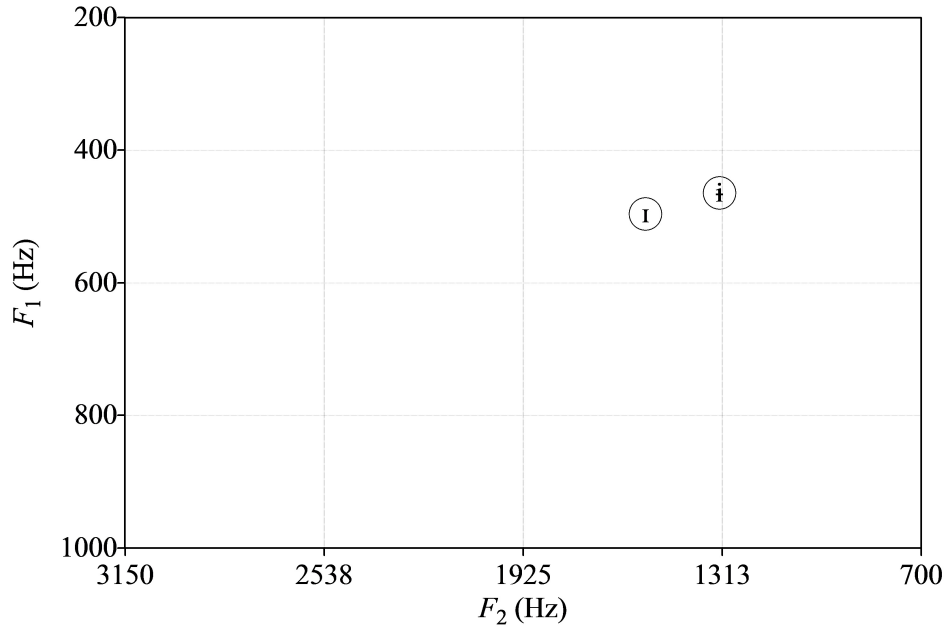
(60)



This alternation occurs in several noun class prefixes (/í-/: classes 5, 7, 8 and 10, /ì-/: class 9) and the corresponding verb subject prefixes. Examples of the alternation from class 9 are presented in (61).[64]

(61)

+ATR	**−ATR**
/ì-dzìmé/ [idʒime] [_ _ ⁻]	/ì-tsɨ́ⁿbɨ̀/ [ɪtsɨmb̥] [⁻\ ]
back	navel
/ì-vé/ [ive] [_ ⁻]	/ì-tá/ [ɪta] [_ ⁻]
monitor lizard	bag
/ì-kówu/ [ikowu] [_ ⁻⁻]	/ì-sɔ̀/ [ɪsɔ] [_ ˎ]
spoon	elephant
/ì-dzù/ [idzu] [_ ˎ]	/ì-jʊ́/ [ɪjʊ] [_ ⁻]
fist	fence

The alternation /ɨ/ → [i] or [ɨ] appears quite similar. In fact, this alternation represents a series of consonant-initial prefixes: /mɨ-/ 1SG, /wɨ-/ 2SG, /sɨ-/ 1PL, /nɨ-/ 2PL, /mɨ́-/ C6A, /mɨ-/ NMLZ. In at least some cases, it appears that [+round] spreads from the stem onto the prefix as well, generating the further alternants [u] and [ʊ]. It may be possible to construe some or all of these prefixes as consisting of just a consonant with an epenthetic vowel added.[65]

[64]A few nouns in class 1 also have one or the other of these prefixes; the subject prefix used for these is, of course, the normal class 1 prefix /a-/.

[65]Further research on the phonetics of these prefixes, and whether an analysis of vowel epenthesis actually has explanatory value, is still needed. It is perhaps worth noting that in verbal extensions -VCV where the vowel qualities are also entirely predictable, a vowel epenthesis solution cannot work. This is because after a CV root, surface vowel length is generated; if the underlying structure was CV-C(V), there would be no motivation to epenthesise an additional vowel.

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It is somewhat surprising to find an alternation of [−high, +round] vowels: /o/ → [o] or [ɔ]. One would expect rather /u/ → [u] or [ʊ]. Indeed, some speakers are more inclined to produce [u].[66] It may be that, given the neutralisation of height-contrast in [+round] affixes, the actual phonetic realisations are somewhat intermediate. The prefix /ó-/ occurs as the noun prefix for classes 3 and 15, as well as the corresponding subject prefixes, while /ò-/ is the most common class 1 noun prefix. Class 5 examples are presented in (62).

(62)

+ATR	**−ATR**
/ó-tsí-´/ [otʃi] [‾‾]	/ó-fɨ́-´/ [ɔfɨ] [‾‾]
place	beehive
/ó-pé-´/ [ope] [‾‾]	/ó-vá-´/ [ɔva] [‾‾]
threshing-floor	granary
/ó-nò-´/ [uno] [‾_]	/ó-ⁿgɔ̀-´/ [ɔŋgɔ] [‾_]
mouth	hornbill
/ó-tú-´/ [otu] [‾‾]	/ó-gʊ̀-´/ [ɔgwʊ] [‾_]
type	hill

There is also some variation in the realisation of /a/ in [+ATR] domains. There are two [−high, −round, +ATR] phones used in Iceve-Maci: [e] and [ə]. The latter seems to be used adjacent to a velar consonant or in the domain of a back vowel; however, the precise situation is still unclear.

Further variation emerges depending on where this alternation occurs. One category of use is the class 6 noun and verb prefix /a-/. While some speakers simply use one of the above [+ATR] phones in this context (especially in normal speech), others produce a diphthong [ae] or [aə] (63).

(63)

+ATR	**−ATR**
/á-sì-´/ [eʃi ~ aᵉʃi] [‾_]	/á-ⁿjɨ́-´/ [aɲjɨ] [‾‾]
eyes	teeth
/á-té-´/ [ete ~ aᵉte] [‾‾]	/á-jà-´/ [aja] [‾_]
names	nests
/á-fó-´/ [əfo ~ aᵊfo] [‾‾]	/á-ⁿdzɔ́-´/ [anzɔ] [‾‾]
pregnancies	debts
/á-kù-´/ [əku ~ aᵊku] [‾_]	/á-jʊ̀-´/ [ajʊ] [‾_]
clouds	fences

[66] It is also the case that some speakers use /e-/ in the place of /i-/. For these speakers, the [−ATR] allophone is therefore [ɛ]. This then calls into question the analysis of /ɨ/ since it is phonetically very similar to the [−high] allophone.

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This diphthongisation does not occur in the few examples of the class 12 prefix /ka-/ which are realised either [ka-] or [kə-]. Nor does it occur in the imperfective suffix /-a/, which admits only the realisations [-e] and [-a] (64).

(64)

+ATR		**−ATR**	
/mí-dzíf-à/ [midʒife]	ˉˉ \	/mí-dzɨ̀ⁿd-à/ [mɨdzɨnda]	ˉ ˍˍ
I am weeding		I am chasing	
/mí-tèm-à/ [miteme]	ˉ ˍˍ	/mí-káf-à/ [mɨkafe]	ˉˉ \
I am shelling		I am hoeing	
/mí-kó-V́-à/ [məko]	ˉ \	/mí-kɔ́ⁿb-à/ [mɨkɔmba]	ˉˉ \
I am announcing		I am waiting	
/mí-kùl-à/ [məkulwe]	ˉ ˍˍ	/mí-kʊ̀l-à/ [mɨkʊla]	ˉ ˍˍ
I am finishing		I am chasing[67]	

The (not highly productive) suffix /-aŋ/ marks a small group of adjectives or adverbs. It shows the alternants {-aŋ ~ -eŋ}.

(65)
a. /sʊ́ⁿd-VlV-aŋ/ [sʊndʊlaŋ] ˉˉˉ narrow
b. /víⁿg-VlV-aŋ/ [viŋgileŋ] ˉˉˉ round[68]

7.2 Final vowel deletion

The final vowel of a phonological word is deleted when certain conditions are met.

Only [+high] vowels which have Low tone are deleted. Table (66) shows imperatives of underlyingly CVCV verbs with all attested vowel combinations and both attested surface pitch contours. The final vowel is only deleted in imperatives with a High-Low pitch contour, and only where the second vowel is i, ɨ, u or ʊ (i.e., [+high]).

[67]No complete analysis of the tone of verb forms has been completed. There are evidently other morphemes involved in this examples.

[68]Compare /sʊ́ⁿd-VlV/ [sʊndʊlʊ] [¯_−] make smaller and /víⁿg-VlV/ [viŋgili] [¯_−] roll.

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(66)

Vowels	**High-Low imperatives**	**Low-High imperatives**
CiCi	[tʃil] [\ ] know	[ʃimi] [_⁻] take out
CeCi	[lenḍ] [\ ] beg	[gbeli] [_⁻] wound
CɨCɨ	[jɨv] [\ ] soak	[kɨvɨ] [_⁻] believe
CaCɨ	[tam] [\ ] chew	[falɨ] [_⁻] untie
CuCu	[kul] [\ ] return, go back	[tulu] [_⁻] brush off
CoCu	[gbof] [\ ] bark (dog)	[folu] [_⁻] snatch
CʊCʊ	[fʊl] [\ ] shave	[jʊmʊ] [_⁻] go up
CɔCʊ	[kɔmḅ] [\ ] scrape	[kɔndʊ] [_⁻] fasten
CiCe	[timbe] [¯ ◝] know	[ʃime] [_⁻] come out
CɨCa	[jɨva] [¯ ◝] kill	[kpɨla] [_⁻] drag
CuCe	[kule] [¯ ◝] cook	[kule] [_⁻] finish
CʊCa	[sʊla] [¯ ◝] find	[wʊnda] [_⁻] sharpen

Note that the only attested word-final low vowels in the imperatives listed above are /a e/. This is a direct consequence of the constraints on [+round]-spreading discussed in §3.5: [+round] only spreads onto [+high] vowels so [−high, +round] vowels do not occur as the second (or later) vowel of a root.

Note also that the Low tone is not deleted. Rather, it reattaches to the preceding syllable, resulting in a falling pitch-contour on the surface in the above examples. In other contexts, the preceding syllable may also be Low tone in which case the tone of the deleted vowel has no further effect (67).

(67)

a.	/ò-ⁿbɔ̀nʊ/	[ɔmbɔn]	[_◝]	C1-path, road
b.	/á-ⁿbɔ̀nʊ-́/	[ambɔnʊ]	[¯ _⁻]	C6-path, road-C6
c.	/ì-sànɨ/	[ɪsan]	[_◝]	C9-spark
d.	/á-sànɨ-́/	[asanɨ]	[¯ _⁻]	C6-spark-C6

Final vowel deletion only applies when the Low tone associated with the vowel is final in the phonological word. In particular, a floating High tone prevents Final Vowel Deletion from taking place. This phenomenon is particularly evident in certain noun class gender pairs where the plural class adds a floating High tone suffix (68). Note that the floating High tone also causes the final vowel in the plurals to be realised with low-level instead of low-falling pitch.

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(68)

a.	/ì-tí^{n}dì/	[itin̥d]	[−\ ]	C9-meaning
b.	/á-tí^{n}dì-´/	[a^{e}tindi]	[‾‾ _]	C6-meaning-C6
c.	/ì-jálɨ̀/	[ɪjal]	[−\ ]	C9-buffalo
d.	/í-jálɨ̀-´/	[ɪjalɨ]	[‾‾ _]	C10-buffalo-C10

There are a few data where [+high, +round] vowels do not delete. Some are CV noun roots (69); in this case, deletion would produce an obviously unacceptable form.[69]

(69)

a.	/ò-^{n}jù/	[oɲju]	[_◝]	a hair
b.	/ò-^{n}bù/	[umbu]	[_◝]	problem
c.	/ì-jù/	[ɪjʊ]	[_◝]	fence
d.	/ò-pù/	[ɔpʊ]	[_◝]	basket

There are also two data ending with /ʊ/ which appear to be compounds (70).[70]

(70)

a.	/ò-bà-gù/	[ɔbagʊ]	[__◝]	red monkey
b.	/à-kà-mù/	[akamʊ]	[__◝]	pap

There do not appear to be any exceptional cases where [+high, −round] vowels fail to delete. No CV noun root is attested with a [+high, −round] vowel and Low tone except in classes with a floating High tone suffix. On the other hand, a few data suggest these vowels may be deleted even when they occur as the first vowel of a second or later root in a compound (71).[71]

(71)

a.	/ì-gɨ̀lá-gɔ̀-tsì/	[ɪgɨlagɔtʃ]	[‾‾‾ _]	sp. of tree
b.	/ì-kpɨ̀-tɨ̀/	[ɪkpɨt]	[_◝]	C9-slime
c.	/à-kpɨ̀-tɨ̀-´/	[akpɨtɨ]	[‾ _‾]	C6-slime-C6

[69]Stress falls on the stem-initial syllable; Final Vowel Deletion is perhaps limited to unstressed vowels.

[70]The unusual vowel combination a_ʊ, together with the non-prenasalised plosive in (70a) support this analysis.

[71]Voiceless plosives and affricates only occur root-initially. Interestingly, a second word elicited for slime ([ɪmbɨtəmbɨt]) is the only other word attested ending in /t/, which is at least consistent with a morpheme /tɨ/ with a meaning consonant with sliminess.

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This difference in treatment between [+round] and [−round] vowels functions to maintain the distinction in salient positions.

In summary, a final vowel is deleted when:

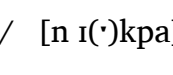
1. The vowel is [+high];
2. The tone associated with it is Low and final (i.e., there are no floating tones);
3. It is not the first stem vowel;
4. It is not both [−round] and the first vowel of a root.

7.3 Hiatus resolution

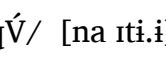
No in-depth research has been done specifically on the area of hiatus resolution. Nevertheless, various strategies for resolving hiatus have been observed: elision, coalescence, glide formation and heterosyllabification.

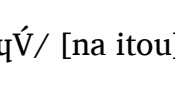
Elision of the first vowel is probably common, although little data has been elicited to date.[72] The process is clearly attested when the first verb has CV structure (72). There seems to be a slight, compensatory lengthening in this case.

(72) a. /ná ì-sí̱ma/ [n ɪ(˙)si̱ma] give heart!

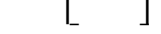
b. /ná ì-kpà/ [n ɪ(˙)kpa]  give box!

CV verbs do not appear to allow elision before class 7 nous with monosyllabic roots, however (73). This is probably related to the consonant /k/ which sometimes occurs prefix-initially in this class. It is typically deleted, but evidently only after inhibiting elision.

(73) a. /ná í-tí̱-ɯ̨V́/ [na ɪti̱.i̱]  give tree!

b. /ná í-tô-ɯ̨V́/ [na itou]  give head!

In some cases, coalescence occurs instead of elision. The only attested examples show /a+i/ being resolved as /e/. However, not all vowel combinations are represented in the data available.

(74) /ná í-bĭ-´/ [nebi]  give needle!

Glide formation was illustrated in §4 as (32), repeated here as (75). There is no compensatory lengthening in these examples.

[72]Some data is available where a verb which in isolation is vowel-final precedes a vowel-initial object. However, the final vowel on CVC verb stems has been analysed in §6.2 as epenthetic, so these do not constitute cases of hiatus at all.

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(75) a. [kwaɲjɨ]
/kɔ a-^{n}jɨ/
scrape.IMP C6-tooth
brush teeth!

b. [ɔkwɪja]
/o-kɔ-ja/
C3-scrape-eat?
sandpaper tree

Glide formation is also attested when CoC-V́ verb stems appear in the "just doing" form, which involves reduplication (76a–b). However, the process is dependent on the identity of the second root consonant (76c); it is possible that only those phonemes that are labialised in the environment u_e (see §2.2) admit glide formation in this context.

(76)	a.	/á-bòf-V́~á-bòf-V́/	[əbofwəbofu]	he's just chipping
	b.	/á-mò^{n}b-V́~á-mò^{n}b-V́/	[əmombwəmombu]	he's just expanding
	c.	/á-fòl-V́~á-fòl-V́/	[əfoləfolu]	he's just seizing[73]

Finally, there are cases where hiatus is resolved via heterosyllabification. CV verbs in the same "just doing" form provide a variety of examples of this (77). Note that in some cases, the vowels are identical and may be realised either with a rearticulated vowel or with vowel length (77e).

(77)	a.	/á-fò~á-fò/	[əfoəfo]	he's just overcoming
	b.	/á-fí~á-fí/	[efiefi]	he's just asking
	c.	/á-dù-V́~á-dù-V́/	[adʊadʊʊ]	he's just burning
	d.	/á-gò-V́~á-gò-V́/	[egoegou]	he's just burning
	e.	/á-ká~á-ká/	[aka.aka ~ akaːka]	he's just frying[74]

7.4 Velar deletion

From a diachronic perspective, it is clear that velar consonants have sometimes been deleted. This can be seen in the contrast between the Oliti and Becheve words for corn:

(78) a. [ikulii] [¯ ˊ] corn (Oliti)

b. [ikuleke] [¯ _ ¯ ?] corn (Becheve)

While in (78), it is a velar plosive that is deleted, in most cases, it is the velar approximant/fricative which is deleted. This sometimes results in complex pitch contour where it is otherwise unexpected. Polysyllabic verb imperatives, for example, do not typically have complex pitch contours on a final open syllable. There are three exceptions to this: (79a,79c–d). Note that the first has

[73]The pitch contour of all three examples is [¯ ¯ ¯ _ ¯].

[74]The pitch contours of these examples are: (77a) [¯ ¯ ¯ _], (77b, e) [¯ ¯ ¯ ˎ] and (77c–d) [¯ ¯ ¯ ˊ].

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a known cognate in Tiv, given as (79b). This cognate has a "lexical extension" involving the consonant <gh>, which is absent in the Iceve-Maci word. This suggests a process where underlying /*kíⁿd-VɰV/ is reduced to /kínd-ii/. Similarly, we may hypothesize underlying /*kùs-VɰV/ (resp. /ⁿjà-VɰV/) which would be reduced to /kùs-uu/ (resp. /ⁿjà-aa/) and then to [kusu] (resp. [ⁿjaa]) by Final Vowel Deletion (see §7.2).[75]

(79) a. [kindii] ˉ ˊ trample!
b. <kindigh> to ram earth (Tiv)
c. [kusu] ˉ\ hem!
d. [ⁿjaa] ˊ\ prepare!

The noun class suffix /-ɰV́/ C7; C12; C15 is discussed in §6.1. The velar consonant in the suffix is very weak, and in many cases appears to be deleted altogether. The prefixes of these classes may also include a velar consonant /k/. The presence of the prefix velar appears to be obligatory in some words, inappropriate in others, and optional in still others. It seems plausible that these class prefixes and suffixes all once began with a velar plosive; the suffix consonant particularly has progressively weakened (and still is weakening) [g → ɣ → ɰ → ∅].

8 Tone

Iceve-Maci is a tonal language. It has two contrastive tone levels, High and Low. These are illustrated in (80). Note that a word-final Low tone is normally realised with low falling pitch (80c), but that low level pitch is used when there is a following floating High tone (80e).

(80) a. /ì-vú/ [ivu] _ˉ C9-goat
b. /í-vú-´/ [ivu] ˉˉ C10-goat-C10
c. /ì-kpà/ [ɪkpa] _ˎ bag
d. /ì-kpá/ [ɪkpa] _ˉ sp. of tree
e. /í-káⁿbɨ-´/ [ɪkambɨ] ˉˉ _ sp. of grasshopper
f. /í-káⁿbɨ-´/ [ɪkambɨ] ˉˉˉ crab
g. /ì-kòwú/ [ikowu] __ˉ chicken
h. /ì-kówu/ [ikowu] _ˉˉ spoon

[75]Exact cognates are not known in the latter two cases. Within Iceve-Maci, /kúsùlú/ fold may be related to /kùsû/ hem. The root tone appears to change, however.

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Downstep is well-attested in Iceve-Maci. Low tones cause a phonetic lowering of register. Automatic downstep (where the Low tone is overt) is particularly noticeable in High-Low-High tone patterns, which are realised with the very common high-low-mid pitch pattern (81). Subsequent Low tones are also lowered (81c).

(81) a. /tá^{n}b-VlV/[76] [tambɨlɨ] ˉ_– listen

b. /í-fɨ^{n}ga-´/ [ɪfɨŋga] ˉ_– nose

c. /ò-nú^{n}bùsú/ [ɔnʊmbʊsʊ] ˉ–_– man

Downstep also applies when the Low tone is floating (nonautomatic downstep). In the "future"[77], the contrast between High- and Low-toned verbs is realised via high-mid and high-low pitch patterns, respectively (82).

(82) a. /mɨ́-â-tsíle-`/ [metʃile] ˉ–◟ I will cover

b. /mɨ́-â-vì^{n}ge-`/ [meviŋge] ˉ_◟ I will fly

There are also a small number of nouns in class 1 whose tone pattern and segmental prefix are both unusual. In both these cases, a floating Low tone is postulated to be part of the prefix (83).

(83) /î-kpálà/ [ɪkpala] ˉ–◟ C1-stool

However, there are some cases where downstep fails to occur. In (84a), the first Low tone appears to be realised in the *same* phonetic register as the preceding High tone. In (85), the High tones are realised in a *higher* register than the preceding Low tone; the final Low tone is then realised in the original (lower) register. It is probably significant that most examples of these phenomena have an independently motivated floating High tone at the right margin, but a full analysis has not yet been attempted.[78]

(84) a. /ó-lìfɨ́lì-´/ [olɨfɨli] ˉˉ_ tongue

b. /mɨ́-sɔ̀lú-mɨ̌/ [mɨsɔlʊmʊ] ˉˉ_ alcohol

(85) /gìf í-jáŋ̀ɨ-´/ [gifɪjaŋɨ] _ˉˉ_ forget ground

[76]The extension -VlV is toneless, but every tone-bearing unit in imperative verb forms is realised with polar tone.

[77]The form is commonly used to express future time, but it may also be used to express a desire.

[78]The tonal structure of (84b) is less certain, as it belongs to a small noun class with a distinctive -CV suffix.

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The tone-bearing unit in Iceve-Maci is the syllable. A detailed study of how tone is assigned has not yet been performed. However, it appears helpful at this stage to conceive of morphemes as being associated with a tone melody (an ordered sequence of underlying tones). At a certain point or points in the derivation of the surface form, unlinked tones are linked left-to-right to the tone-bearing units, that is, to the syllables. Thus, in (86), the root-melody is Low-High. The Low tone is linked to the first root syllable (/sɔ/),[79] the High tone to the next syllable to the right (/ⁿgʊ/). The prefix Low tone links to the prefix. Finally, the last tone spreads onto the remaining, still toneless syllable (/lʊ/).[80]

(86) /ì-sɔ̀ⁿgʊ́lʊ/ [ɪsɔŋgʊlʊ] [_ _ − −] throat

Syllables, therefore, are typically only linked to a single tone. However, as discussed in §4, various processes act in Iceve-Maci to merge two syllables into one. These processes appear mostly to apply *after* tone has already been linked. These tones are not lost; rather, where they are different, the resulting syllable is linked to both and a complex pitch contour arises. The following paragraphs illustrate this process.

Word-final falling contours emerge frequently as a result of Final Vowel Deletion (§7.2). This process entails the deletion of a final Low-toned vowel, replacing two syllables with one (CV.CV becomes CVC). Both tones are then linked to the one CVC syllable, as shown in (68), repeated here as (87).

(87)

a.	/ì-tíⁿdì/	[itin̥d]	[−\ ]	C9-meaning
b.	/á-tíⁿdì-ˊ/	[aᵉtindi]	[− − _]	C6-meaning-C6
c.	/ì-jálɨ̀/	[ɪjal]	[−\ ]	C9-buffalo
d.	/í-jálɨ̀-ˊ/	[ɪjalɨ]	[− − _]	C10-buffalo-C10

Complex pitch contours also may occur where long vowels are derived in various ways as discussed in §3.3. Examples previously given of CV verb roots suffixed by vowel-initial extensions (88a–d),[81] and a case where Velar Deletion has applied within an extension (88e), are repeated below. (Recall that imperative verb forms are marked by alternating High and Low tones, even though extensions of shape -VCV do not contribute any tone melody).

[79]Some mechanism is needed to ensure that the root melody is linked to the root. This could be a lexical phonology approach where the root and its melody are processed first, then other affixes (see Pulleyblank (1986) for an analysis of Tiv); or simply prelinking the first tone of the melody to the first syllable of the root.

[80]Some evidence for this model of tone assignment can be found in (90) and the subsequent discussion.

[81]As noted in §3.3, it is not clear that the /CV-V́/ examples do exhibit vowel length. An alternative view is that the word-final hiatus CV.V is resolved after tone-assignment by eliding the final vowel.

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(88)
a. /tì-V́/ [tii] [ˊ] see!
b. /fí-V́/ [fi] [\ ] ask!
c. /tsà-VlV/ [tsaal] [ˊ\ ] sit!
d. /dzó-VlV/ [dzoulu] [\−] run!
e. /kíⁿd-ii/ (<*kíⁿd-VɰV) [kindii] [¯ˊ] trample!

After velar deletion has applied, a pitch contour can occasionally involve a sequence of three tones on a single (but always phonetically long) vowel.

(89)
a. /í-dɨ̂ɨ-ɰV́/ [ɪdɨɨ] [¯\ˊ] pool
b. /ⁿjà-VɰV/ [ⁿjaa] [ˊ\ ] prepare

8.1 Nominal tone

As discussed in §6.1, nouns in Iceve-Maci have the structure ClassPrefix-Stem(-ClassSuffix). Noun roots usually have one of four underlying tone melodies: Low, High, High-Low or Low-High; compound stems may have additional melodies. These are illustrated in (90) by CVCV noun roots of gender 9/6. Class 9 nouns have a Low-tone prefix /ì-/ and no suffix; class 6 nouns have a High-tone prefix /á-/ and floating High-tone suffix /-ˊ/.

(90)

UM	Singular (class 9)	Plural (class 6)
H	/ì-tsíⁿbɨ/ [ɪtsɨmbɨ] [_−−]	/á-tsímbɨ-ˊ/ [atsɨmbɨ] [¯−−]
	C9-fish	C6-fish-C6
L	/ì-bèle/ [ibele] [−−\ ]	/á-bèle-ˊ/ [ebele] [¯_−]
	C9-pap	C6-pap-C6
LH	/ì-sàⁿgí/ [ɪsaŋgɨ] [−−−]	/á-sàⁿgí-ˊ/ [asaŋgɨ] [¯_−]
	C9-seed	C6-seed-C6
HL	/ì-dzíⁿgà/ [ɪdzɨŋgɨ] [−¯\ ]	/á-dzíⁿgà-ˊ/ [adzɨŋga] [¯¯_]
	C9-pencil	C6-pencil-C6

The above example provides further illustration of the procedure of tone assignment suggested above. Observe first in the singular how the tones of the underlying root melody are assigned to the root from left to right. In the case of the underlying melodies L and H, the single underlying tone then spreads onto the final and still toneless syllable. In the plural, the tone assignment continues with the floating High tone suffix before any spreading takes place; this

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neutralises the contrast between underlying L and LH melodies in class 6.[82] If there are no remaining targets (that is, syllables which are not yet linked to a tone), the suffix tone remains floating; this prevents otherwise final Low tones from being realised with low falling pitch. This is particularly evident in the example with HL melody above.

Classes 3, 5 and 10 have the same tonal structure as class 6,[83] and most nouns in class 1 the same as class 9. Classes 7, 12, 15 and 8 differ from class 6 slightly, in that the suffix in these classes has /-CV́/ shape. The consonant (/ɯ/, or /v/ in class 8 only) is very weak, often effectively realised by a slight lengthening of the final root vowel. It does, however, prevent the High suffix tone from being realised on the root proper, frequently resulting in a rising tone on the lengthened syllable. Examples from gender 7/6 are shown in (91). It is not clear why no data with underlying melody LH are attested.

(91)

UM	**Singular (class 7)**	**Plural (class 6)**
H	/í-kpáli-ɯV́/ [ɪkpaliˑ] [˥˥˥]	/á-kpáli-´/ [akpali] [˥˥˥]
	C7-scar-C7	C6-scar-C6
L	/í-làli-ɯV́/ [ɪlaliˑ] [˩˧]	/á-làli-´/ [alali] [˩˥]
	C7-palm branch-C7	C6-palm branch-C6
HL	/í-gási-ɯV́/ [ɪgasiˑ] [˥˧]	/á-gási-´/ [agasi] [˥˩]
	C7-rafter-C7	C6-rafter-C6

Class 1 appears to have some subclasses which can be distinguished by tone. In particular, there are 18 attested nouns in this class which have a high-pitched prefix. All except one of these[84] ends with a low pitch, which suggests that this subclass may have a floating Low suffix. The pitch contrasts in the first root syllable are between downstepped-High and Low with CVCV roots (92).[85]

[82]There is one noun with plural in class 6 (as well as three other roots with plurals in the tonally identical class 10) which surfaces with pitch pattern [˥˩˩] (i). All four nouns have /ŋ/ as the second stem consonant, which suggests these may be complex stems with a Low-tone bearing affix /-ŋV̀/.

(i)

Singular	**Plural**
/í-dzì-ŋ̀i-´/ [ɪdziŋ̀i] [˥˩˩]	/á-dzì-ŋ̀i-´/ [adziŋ̀i] [˥˩˩]
C5-egg-C5	C6-egg-C6
/ì-dzì-ŋ̀i/ [idʒiŋ] [˩˨]	/í-dzì-ŋ̀i-´/ [idʒiŋ̀i] [˥˩˩]
C9-fly	C10-fly-C10

[83]There are three nouns in class 3 with a tone pattern [˥˨] unparallelled in classes 5, 6 and 10. It is interesting that the same pattern occurs in some puzzling data from class 1 (see also 85).

[84]The one example (i) differs in both respects: although disyllabic, it fails to downstep after the prefix, and there is no sign of a Low suffix.

(i) /á-lɔ́mʊ/ [alɔmʊ] [˥˥˥˥] hare

[85]Curiously, all three attested monosyllabic roots in class 1 with a high-toned prefix deviate from this pattern.

(i) /í-pé(e)-`/ [ipe] [˥˨] comb

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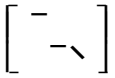
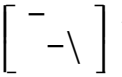
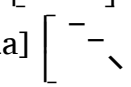
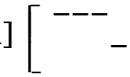
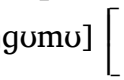
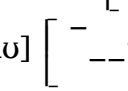
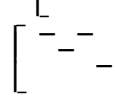
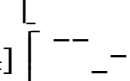
(92) **UM Class 1 - HL prefix subclass**

L	/î-gòse-`/ [igose]	 green mamba
LH	/î-kàlá-`/ [ɪkala]	 big hoe
HL	/î-dzálà-`/ [ɪdzala]	 latrine

The remaining noun class (class 6a) has a high prefix /mí-/ and a suffix /-mǐ/, the tone of which is difficult to identify precisely. The data are not extensive but it appears there could be internal variation depending on whether the noun is a plural of class 12 or noun representing a mass noun. The attested CVCV patterns are presented in (93).

(93) **UM Class 6a noun**

H	/mí-kúle-mǐ/ [mukulemi]	 oil
H (plural)	/mí-kú^{n}gʊ-mǐ?/ [mʊkʊŋgʊmʊ]	 sp. of bird
L	/mí-nùsʊ-mǐ/ [mɪnʊsʊmʊ]	 pimples
LH	/mí-sɔ̀lʊ́-mǐ/ [mɪsɔlʊmʊ]	 alcohol
HL	/mí-káŋì-mǐ/ [mɪkaŋɪmɪ]	 salt[86]

Among monosyllabic roots, High, Low and (to a lesser extent) High-Low melodies are well attested. A few words might also represent an underlying Low-High melody, although at least one could be derived by Velar Deletion;[87] these are mostly in class 1. Illustrations from this class are given in (94).[88]

Not only is there no downstep, but (assuming the floating Low tone suffix), the underlying melody could well be High, which was not attested among the CVCV roots.

[86]It appears that the root tone spreads over the entire root. The Low suffix tone might merge with an adjacent Low tone, allowing the High tone to surface for underlying melodies L and HL. Otherwise the Low targets the suffix and the High floats. An alternative is to consider the suffix to have polar tone, but then it is not clear where the floating High tone comes from for underlying melodies H and LH.

[87]The word /ì-lě/ [ilee] [_˗] cola nut is cognate with Ipulo <iligh>.

[88]Three data surface with rising-falling pitch. Since Low-High-Low melodies are not attested among CVCV stems, it is presumed that these are complex stems that have been subjected to Velar Deletion. The underlying forms suggested in (i) are speculative.

(i) a. /ò-lɔ̀-ɔ́ɰɔ̀/ [ɔlɔɔ] [−˗˖]
gorilla
b. /ì-ŋɔ̀-ɔ́ɰɔ̀/ [ɪŋɔɔ] [−˗˖]
sp. of mushroom
c. /ò-tò-óɰò/ [otoo] [−˗˖]
type of bean pod

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(94)

	UM	Class 1 noun
H	/ò-bé/ [obe]	[_⁻] law
L	/ò-fà/ [ɔfa]	[_˪] slave
HL	/ò-kû/ [oku]	[⁻\ ] shirt
LH	/ò-wǒ/ [ɔwɔɔ]	[_˪] cotton

The above describes most of the tonal patterns attested in nouns. There remain a few tonal oddities, however, which are presented in (95).

(95)

a.	/í-bi-´/	[ibi]	[⁻_] C5-needle-C5
b.	/ì-ⁿde/	[inde]	[_⁻] C9-sack
c.	/á-ⁿde-´/	[ende]	[¯\ ] C6-sack-C6
d.	/ì-gʊa/	[ɪgwa]	[_⁻] C1-"uncle"
e.	/í-gʊa/	[ɪgwa]	[¯_] C2-"uncle"

The first (95a) contrasts with the tone in /í-sì-´/ [iʃi] [¯_] eye and /í-té-´/ [ite] [¯¯] name. The remaining pairs are surprising in that the tone pattern on the root appears totally different in singular and plural forms.

8.2 Verbal tone

Verb roots are either High- or Low-toned in Iceve-Maci. This generally results in two tone patterns for any given combination of verb form and syllable profile of the stem (prior to Final Vowel Deletion). However, the underlying tone contrast of CV roots is neutralised in the imperative; all are realised with High tone (96).[89]

[89]It is interesting to note that the imperative is marked by alternating High and Low tones on every tone-bearing unit. The same neutralisation of tone contrast in monosyllables, and polarity in disyllables is reported in Tiv; trisyllabic stems in Tiv do not have the same polarity as in Iceve-Maci (Pulleyblank 1985).

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(96) Tone in imperative verb forms

Stem profile	**High tone**	**Low tone**
CV	/vá/ [va] [¯]	/dzà/ [dza] [¯]
	come!	go!
CV-V́	/fí-V́/ [fi] [\ ]	/tì-V́/ [tii] [´]
	ask!	see!
CVC	/kʊ́l/ [kʊla] [¯ ◝]	/kʊ̀l/ [kʊla] [_¯]
	heap up!	wait!
CVC-VCV	/tsív-VlV/ [tʃivili] [¯_¯]	/tsìv-VlV/ [tʃivil] [¯\ ]
	respect!	blink!

All -VCV extensions appear to be toneless.[90] However, the -V extension has High tone.[91] This is particularly noticeable when the extension is affixed to a CVC root. In the unmarked (perfective aspect) case, the extension displaces the epenthetic final vowel. The derived and non-derived forms are in some cases tonally indistinguishable (as in the imperative). In fact, tonal distinction only emerges when the root is Low-toned; presumably the extension tone conflates with the tone on a High-toned root and has no further effect. The tonal effects of this extension are illustrated via the imperative and "future" forms of the verb in (97). Note also how the extension tone inhibits Final Vowel Deletion in the second example.

(97)

Stem structure	**Imperative**	**Future/Modal**
CV̀C	/kàl/ [kalɨ] [_¯]	/a-â-kàl-`/ [akal] [¯ ◝]
	mark out!	he will/wants to mark out
CV̀C-V́	/kàl-V́/ [kalɨ] [_¯]	/a-â-kàl-V́-`/ [akalɨ] [¯ _¯]
	cross!	he will/wants to cross
CV́C	/nɨ́s/ [nɨsa] [¯ ◝]	/a-â-nɨ́s-`/ [anɨsa] [¯¯◝]
	beat!	he will/wants to beat
CV́C-V́	/vɨ́l-V́/ [vɨl] [\ ]	/a-â-vɨ́l-V́-`/ [avɨl] [¯ \ ]
	put!	he will/wants to put

The above example also shows the effect of the future/modal prefix /â/. Note how the High-toned roots (lines three and four) are realised at a downstepped high pitch, in contrast to the low pitch of the Low-toned roots in lines one and two.

[90] That is, the tone on the extended stem is always predictable; in the case of the imperatives, it is marked by polar tones.

[91] A handful of verb forms exhibit vowel combinations or tone patterns that deviate from the dominant patterns described here.

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8.3 Grammatical tone

Tone is very significant in the formation of complete verb forms, with a number of forms only distinguishable in their surface form by their tone pattern, as illustrated in (98).

(98) a. [asaŋgɨ] [_–] he wrote

b. [asaŋgɨ] [¯ _–] he is writing

c. [asaŋgɨ] [¯ _] he will write

The individual morphemes involved in these constructions have not been fully identified as yet, however. Preliminary analysis suggests that the "future" involves at least two morphemes: a prefix /â-/ and a suffix /-ˋ/. The former merges segmentally with the subject prefix in (98c), so only a slight tonal effect is observed, while the latter has no effect as a result of the High tone in the verbal extension. With other verbs, the floating Low tone suffix may promote Final Vowel Deletion, as in (97) above.

9 Stress

Stress in Iceve-Maci generally falls on the first stem syllable, but does not have a very prominent realisation. Stress does not play a highly significant role in the phonology. There are nevertheless a few observations that may be related to stress.

- Final Vowel Deletion does not apply to the "stressed" syllable (see §7.2, in particular footnote 69).
- CGV syllables were posited in §4 to account for palatalised and labialised phones in some *stem-initial* surface structures. This additional contrast is consistent with this being the stressed or prominent position in the word.
- The realisation of the suffixes of noun classes 7, 8, 12 and 15 are realised more distinctively when affixed to a CV root than to the less prominent second syllable of a CVCV root, as described in §6.1.
- Similarly, velar plosives K in the sequence /Ke/ tend to be realised with palatalised phones monosyllabic (and therefore generally stem-initial) roots (e.g., /ⁿge/ [ŋgje] carry), as described in §2.2.

10 Dialectal Variation

This research has been primarily based on the Oliti dialect. There is some segmental data also on the Becheve dialect (see §1.1), although very little has been verified carefully. Nevertheless, it is possible to give some impressions of how Oliti and Becheve differ.

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There are some variations in the domain of consonants. The most notable of these is that coronal affricates and fricatives are more often realised with postalveolar phones in Becheve. In particular, palatalisation is frequently triggered by the [+high, +back] vowel /u/,[92] and also occurs in derived environments where it fails to occur (opaquely) in Oliti.

(99)	**Becheve**	**Oliti**
	[ʃune] bow down	[sune]
	[oguʃu] fire	[ogusu]
	[teʃi] think	/tè-sɨ/ [tesi]
	[tʃuwa] draw water	/tʊá-V́/ [tswa]

Some /v/-initial roots in Oliti are realised in Becheve as /w/-initial (100). This type of alternation has already been observed within the Oliti dialect.

(100)	**Becheve**	**Oliti**
	[uwulu] moon	[ovolu]
	[uwoɣo] arm	/ó-vô-ɯV́/ [ovou]

The phonemes /f/ and /h/ are sometimes transposed. (Note that this type of alternation is also relevant between of Iceve-Maci [both dialects] and Tiv. For example, /falɨ/ two vs Tiv [haː], /ifɨⁿga/ nose vs Tiv [ihiŋga], /afɔmʊ/ fat vs Tiv [ahɔm].)

(101)	**Becheve**	**Oliti**
	[uhwa] slave	[ɔfa]
	[fule] bend	[hule]

Becheve also gives the impression of maintaining a stronger pronunciation of /ɯ/. In this regard, note also that evidence given in §7.4 (example (78)) showed that in some words, Velar Deletion has applied in Oliti but not in Becheve. The sound [ɣ] also occurs word-initially in a few data in Becheve; almost all of these correspond to a (sometimes optional) velar plosive in Oliti (102).[93] In these cases, it appears rather that Becheve prefer [ɣ] as a *weaker* pronunciation of /k/, albeit still stronger than when it is deleted altogether in Oliti.

(102)	**Becheve**	**Oliti**
	[ɣa] NEG	[ga]
	[ɣetɔː] liver	/(k)í-tɔ̀-ɯV́/ [ɪtɔʊ]
	[ɣəwasə] cheek	/(k)ó-wásì-ɯV́/ [ɔwasɨˑ]
	[ɣəbə] sp. of grasshopper	
	[ɣelowu] gall bladder	[mʊlʊmʊ]
	[ɣasəɣə] blessing	Cf. /kí-sɨɯ́ɨ́/ [kɪsɨɯɨ] he/it is kind
	[ɣajiva] (it is) bitter	/kâ-jɨ̀va/ [kaɲɨva]
	[ɣabuwe] (it is) wide	/kâ-bùwe/ [kəbuwe]

[92]The Becheve data at present does not generally distinguish between /u/ and /ʊ/.

[93]The Oliti word elicited for gall bladder is also the word for bile. But compare also /(k)í-ⁿjàsi-ɯV́/ [ɪɲjasiˑ] bladder and /mí-ⁿjàsi-mɨ̌/ [miɲjasimɨ] urine.

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There is also one interesting correspondence between a prenasalised and simply voiced plosive in root-initial position. Recall that prenasalised plosives are rare in this position and may perhaps be derived from vowel-initial roots (see §2.1); Oliti and Becheve may sometimes have phonologised the result differently.

(103)

Becheve	**Oliti**
[ɔmbɔ] mat	[ɔbɔ]

In the area of vowels, the data are far less clear and there has been little opportunity to subject them to careful verification. Nevertheless, it does appear that the class 7 prefix /(k)í-/ tends to be realised with [i] (instead of [ɪ]) even before a [−ATR] root.[94]

Becheve is also perhaps less inclined to palatalise a velar plosive before /e/ (cf. §2.2).

(104)

Becheve	**Oliti**
/ò-ké-ɯ/ [okəɯ] woman	[okjeɯ(i)]

There are some data where a final vowel is attested in Oliti, but not in Becheve (105). This has been particularly noted in class 6a, where the tonal structure of the suffix is far from clear. This may have some bearing on the application of Final Vowel Deletion in these cases.

(105)

Becheve	**Oliti**
[miɲjim] smoke	[miɲjimi] [ˉˉ_]
[miɲjasɨm] urine	[miɲjasɨmɨ] [ˉ_ˉ_]
[idzos] scorpion	[idzoosu] [ˉ_]

Finally, some of the pronouns are slightly, but noticeably, different (106).

(106)

Becheve	**Oliti**
[wusu] 1PL	[esu]
[wunu] 2PL	[enu]

A. Swadesh 100 Word List

Note that the phonetic transcriptions of parts of speech other than nouns and verbs (which occur frequently in this list) have not been checked rigorously.

001	/ò-mɨ́/	[ɔmɨ]	[_ˉ]	I
002	/ò-wé/	[owe]	[_ˉ]	you (sing.)

[94] Another possibility, however, is that [ɪ] is realised acoustically higher in Becheve (or among some speakers of it) than in Oliti (cf. §3.2 regarding the first formant frequency of /ɨ/ and [ɪ]). In this case, the transcriptions may be in error.

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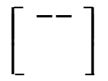
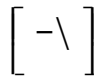
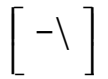
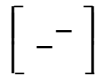
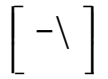
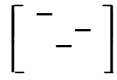
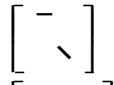
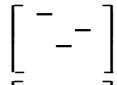
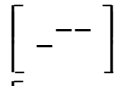
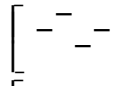
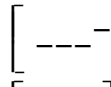
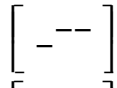
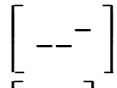
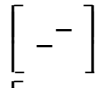
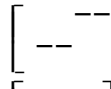
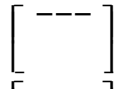
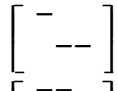
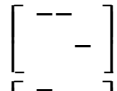
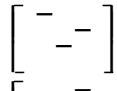
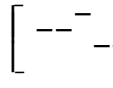
003	/á-sú/	[esu]		we
004	/ò-wê/	[owe]		C1.this
005	/ò-wɔ̂/	[ʊwɔ]		C1.that
006	/ò-ⁿdá/	[ɔnda]		who?
007	/íní/	[ini]		what?
009	/kà-mûem/	[kəmwem]		all
010	/tsîŋː/	[tsɨŋː]		many
011	/kâ-mɔ̂/	[kamɔ]		one (1)
012	/kâ-fàlɨ́/	[kafaɻɨ]		two (2)
013	/bò/	[bo]		(be) big
014	/á-nèl/	[enel]		(be) long
015	/láf-VlV/	[lafɨlɨ]		(be) small
016	/ò-ké-ɯi/	[okjeɯi]		woman
017	/ò-nú^{n}bùsú/	[ɔnʊmbʊsʊ]		man (male)
018	/ò-nùlʊ à-jíma/	[ɔnʊl ajɨma]		human being
019	/ì-tsɨ́^{n}bɨ/	[ɪtsɨmbɨ]		fish
020	/ì-nùnú/	[ɪnʊnʊ]		bird
021	/ì-wá/	[ɪwa]		dog
022	/ò-gùsú kán í-tô-ɯV́/	[ogusu kan itou]		louse
023	/(k)í-tɨ́-ɯV́/	[(k)ɪtɨ(ɯ)ɨ]		tree
024	/ì-sà^{n}gɨ́/	[ɪsaŋgɨ]		seed
025	/ó-kà-ŋì-´/	[ɔkaŋɨ]		leaf
026	/ó-sálì-´/	[ɔsalɨ]		root
027	/(k)í-gù-ɯV́/	[(k)igwuu]		bark (tree)
028	/ó-kɔ-ɯV́ í-jʊ́ɭù-´/	[ɔkɔwɪjʊɭʊ]		skin (of man)

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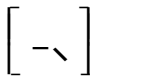
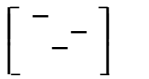
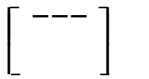
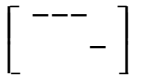
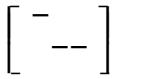
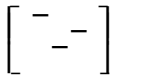
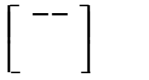
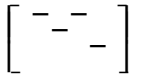
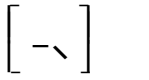
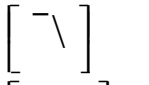
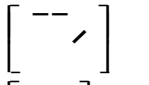
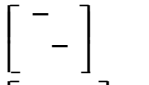
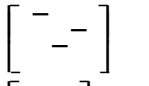
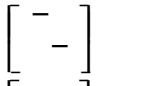
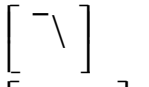
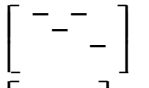
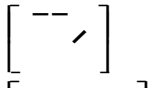
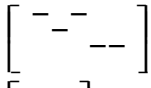
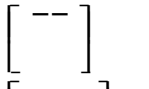
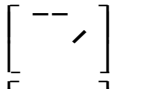
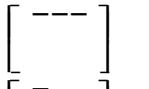
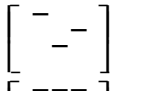
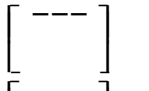
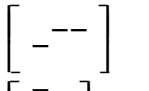
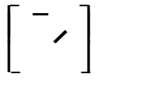
029	/ì-ⁿjàmɨ/	[ɪɲjam]		meat
030	/á-gɔ̀ⁿbʊ-ˊ/	[agɔmbʊ]		blood
031	/í-kífe-ɯV́/	[ikifeɯ ~ ikifei]		bone
032	/mí-kúle-mɨ̌/	[mukuɻemi]		oil
033	/í-dzɨ-ŋɨ̀-ˊ/	[ɪdzɨŋɨ]		egg
034	/ó-kʊ̀ɭʊ-ˊ/	[ɔkwʊlʊ]		horn
035	/ó-tsía-ˊ/	[ɔtʃa]		tail
036	/ó-ⁿjùⁿgúɻù-ˊ/	[oɲjuŋguɻu]		feather
037	/ò-ⁿjù/	[oɲju]		(a) hair
038	/(k)í-tô-ɯV́/	[(k)itou]		head
039	/(k)ó-túŋʊ̀-ɯV́/	[(k)ɔtʊŋwʊˑ]		ear
040	/í-sì-ˊ/	[iʃi]		eye
041	/í-fɨ̂ⁿga-ˊ/	[ɪfɨŋga]		nose
042	/ó-nò-ˊ/	[uno]		mouth
043	/í-ⁿjî-ɯV́/	[ɪɲjɨ(ɯ)ɨ]		tooth
044	/ó-lɨ̀fílɨ̀/	[ɔlɨfilɨ]		tongue
045	/í-kúalɨ̀-ɯV́/	[ɪkwalɨˑ]		claw
046	/í-vàlɨ-ˊ ó-kásɨ-ɯV́/	[ɪvalɔkasɨˑ]		foot
047	/í-nú-ˊ/	[inu]		knee
048	/í-kí-ˊ ó-vô-ɯV́/	[ikovou]		hand
049	/í-fíli-ˊ/	[ifili]		abdomen
050	/ó-mɨ̀nɨ-ˊ/	[ɔmɨnɨ]		neck
051	/ó-tɨ́ⁿba-ɯV́/	[ɔtɨmba(ɯ)ɨ]		breast
052	/ì-sɨ́ma/	[ɪsɨma]		heart
053	/í-tɔ̀-ɯV́/	[ɪtɔʊ]		liver

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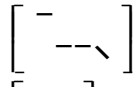
054	/ⁿwá/	[ŋwa]		drink
055	/já/	[ja]		eat
056	/nɨ́m/	[nɨma]		bite (v)
057	/tì-V́/	[tii]		see
058	/ⁿgòa/	[ŋgwa]		hear
059	/tsíl-V́/	[tʃil]		know
060	/jáv/	[jav]		sleep (v)
061	/kúa/	[kwə]		die
062	/jɨ́v/	[jɨva]		kill, murder
063	/tá í-sìaⁿdɨla/	[tɪʃandɨɭa]		swim
064	/vìⁿg/	[viŋge ~ viŋgje]		fly (v)
065	/dzèⁿd/	[dʒendi]		walk
066	/vá/	[va]		come
067	/jáv í-jáŋ̀ɨ-́/	[jav ɪjaŋ]		lie down
068	/tsà-VlV/	[tsaal]		sit
069	/tsó-VlV/	[tsoulu]		stand
070	/ná/	[na]		give
071	/á-là/	[ala]		say
072	/ì-jáⁿgɨ/	[ɪjaŋgɨ]		sun
073	/ó-vólu-́/	[ovolu]		moon
074	/ì-kúnè/	[ikune]		star
075	/ì-dzɔ̀lʊ/	[ɪdzɔl]		water
076	/ó-vɨ́la/	[ɔvɨla]		rain
077	/í-gònu-́/	[igonu]		stone (small)
078	/í-síaⁿdà-sía/	[ɪʃandaʃa]		sand

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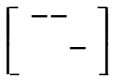
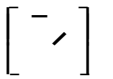
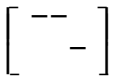
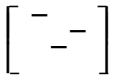
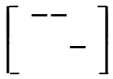
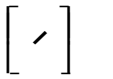
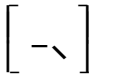
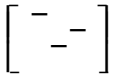
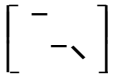
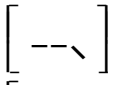
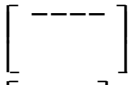
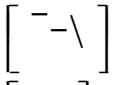
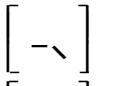
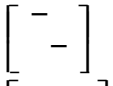
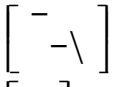
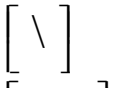
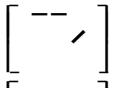
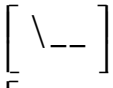
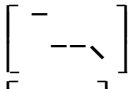
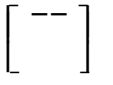
079	/í-jáŋì-´/	[ɪjaŋɨ]		ground, land
080	/(k)í-kù-ɯV́/	[(k)ikuu]		cloud
081	/mɨ́-ⁿjí-mɨ̌/	[miŋjimi]		smoke
082	/ó-gùsu-´/	[ogusu]		fire
083	/mɨ́-tó-mɨ̌/	[mʊtʊmʊ]		ashes
084	/dò-V́/	[dʊʊ]		burn
085	/ò-ⁿbɔ̀nʊ/	[ɔmbɔn]		path, road
086	/í-kɔ̀ⁿgʊ-´/	[ɪkɔŋgʊ]		mountain
087	/á-bò-bò/	[əbobo]		(be) red
088	/dìⁿd-VlV-aŋ/	[dindileŋ]		(be) green
090	/siálɨ-tɨ́-tɨ́/	[ʃalɨtɨtɨ]		(be) white
091	/kpílì-kpílì/	[kpili-kpil]		(be) black
092	/ì-fè/	[ife]		night
093	/ká-sʊà/	[kaswa]		(be) hot
094	/ká-lìálɨ̀/	[kalial]		(be) cold
095	/jɨ́v-V́/	[jɨv]		(be) full
096	/ká-féŋì´/	[kefeŋiˑ]		(be) new
097	/kâ-sɨ̀va/	[kasɨva]		(be) good
098	/gélì-tì-tì/	[gelititi]		(be) round
099	/kâ-jímà/	[kajɨma]		(be) dry
100	/íté/	[ite]		name

B. Illustrative Examples of Consonants

Examples of consonants have been chosen to demonstrate contrast. To facilitate this, the examples are presented in two sections. In the first, examples are arranged approximately by place of articulation; within the groups labial,

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coronal, dorsal and labialvelar, examples are chosen to show contrast between different manners of articulation (and different root-positions) at that place of articulation.

In the second section, consonants with the same manner of articulation are grouped together. This allows the similarities in how one group of phonemes is realised to be seen more easily.

B.1 Consonants by place of articulation

The examples in this section demonstrate contrast between consonants produced at similar places of articulation.

B.1.1 Labials

This section illustrates and contrasts the labial phonemes, in particular, /p b ^{n}b m f v/, along with the labialvelar approximant /w/. Contrasts are only shown between the most similar pairs; thus /b/ is contrasted with /m/, and /p/ with /b/, but /p/ is not explicitly contrasted with /m/. The non-prenasalised plosives do not occur in root-noninitial position; /^{n}b/ is thus contrasted with /v/ in this position, but not root-initially (where /b/ is more similar).

Examples demonstrating the contrast between labials and labialvelars are found in B.2.

(107) /p/ vs /b/

a. /pɨ́s/ [pɨsa] [¯ ˎ] polish

b. /bɨ̀f/ [bɨfa] [_¯] hiss

c. /ó-pé-´/ [ope] [¯¯] threshing floor

d. /ò-bé/ [obe] [_¯] law

(108) /p/ vs /f/

a. /pú-VlV/ [puulu] [\¯] boil (water)

b. /fú-VlV/ [fuulu] [\¯] hide by wrapping

c. /í-pê/ [ipe] [¯\ ] comb

d. /ì-fè/ [ife] [_ˎ] darkness

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(109) /b/ vs /ⁿb/

a. /búl/ [bʊla] burst

b. /ⁿbúl/ [mbʊla] hide

c. /ó-bɔ́-ˊ/ [ɔbɔ] mat

d. /ò-ⁿbɔ̀nʊ/ [ɔmbɔn] path, road

(110) /b/ vs /m/

a. /bó/ [bo] be big

b. /mò-V́/ [mou] push to disembed

c. /í-bǐ-ˊ/ [ibi] needle

d. /í-mì-ˊ/ [imi] dew

(111) /b/ vs /v/

a. /biá/ [bja] abuse

b. /viá/ [vja] be ready

c. /ò-bóolu/ [oboolu] paw-paw

d. /ó-vólu-ˊ/ [ovolu] month

(112) /b/ vs /w/

a. /búl/ [bʊla] burst

b. /wú-V́/ [wʊ] wash

c. /ó-bɔ́-ˊ/ [ɔbɔ] mat

d. /ò-wɔ̌/ [ɔwɔ] thread

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(113) /ⁿb/ vs /m/

a.	/ⁿbʊà-V́/	[mbʊ(w)a]	ˍ⁻	boil over
b.	/mʊà-V́/	[mʊ(w)a]	ˍ⁻	leave, go away
c.	/á-ⁿbɔ̀nʊ-́/	[ambɔnʊ]	¯ˍ⁻	paths, roads
d.	/á-mɔ́lʊ-́/	[amɔlʊ]	¯¯¯	lumps in food
e.	/dùⁿb/	[dumbwe]	ˍ⁻	be sad
f.	/dùm/	[dumwe]	ˍ⁻	thunder
g.	/í-kùⁿbʊ-́/	[ɪkʊmbʊ]	¯ˍ⁻	juju
h.	/í-kúmʊ-́/	[ɪkʊmʊ]	¯¯¯	corpse

(114) /ⁿb/ vs /v/; second root position

a.	/táⁿb + ɨ/	[tamb̥]	\	bewitch, cast spell
b.	/táv + ɨ/	[tav]	\	be strong
c.	/ì-vàⁿbɨ/	[ɪvamb̥]	ˍ\	sp. of antelope
d.	/í-vávɨ-́/	[ɪvavɨ]	¯¯¯	wound

(115) /m/ vs /v/

a.	/mà/	[ma]	¯	build
b.	/vá/	[va]	¯	come
c.	/ò-mánɨ/	[ɔmanɨ]	ˍ¯¯	thing
d.	/í-vánɨ-́/	[ɪvanɨ]	¯¯¯	arrow
e.	/jám/	[jam]	\	shine
f.	/jáv/	[jav]	\	lie down
g.	/ì-kìmɨ/	[ɪkɨm]	ˍ\	old barren woman
h.	/ì-kɨ̀vɨ/	[ɪkɨv]	ˍ\	example

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(116) /m/ vs /w/

a. /mís/ [miʃe] throw away

b. /wís/ [wiʃe] wither

c. /ì-mà/ [ɪma] wall

d. /ì-wá/ [ɪwa] dog

(117) /f/ vs /v/

a. /fà/ [fa] butcher

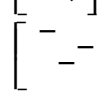
b. /vá/ [va] come

c. /ó-fólu-´/ [ofolu] pus

d. /ó-vólu-´/ [ovolu] month

e. /jɨ́f/ [jɨfa] be heavy

f. /jɨ́v/ [jɨva] kill

g. /í-dzɨfa-´/ [ɪdzɨfa]  sp. of caterpillar

h. /ì-kɨva/ [ɪkɨva] dassie rat

(118) /v/ vs /w/

a. /vú-V́/ [vu] open

b. /wù-V́/ [wuu] smoke

c. /ó-vá-´/ [ɔva] granary

d. /ó-wâ-´/ [ɔwa] path, road

B.1.2 Coronals

This section similarly illustrates and contrasts the coronal phonemes, in particular, /t d ⁿd ts dz ⁿdz n s l/.

(119) /t/ vs /d/

a. /tè/ [te] show

b. /dè/ [de] stop

c. /ì-tùmú/ [itumu] bundle

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d. /ì-dùmú/ [idumu] container

(120) /t/ vs /ts/

a. /tɔ́w/ [tɔw] talk

b. /tsɔ́w/ [tsɔw] choose

c. /ó-tálɨ-´/ [ɔtalɨ] world

d. /ó-tsàlɨ-´/ [ɔtsalɨ] bridge

(121) /t/ vs /s/

a. /tá^{n}g/ [taŋǧ] float

b. /sá^{n}g/ [saŋǧ] pick out

c. /à-tò/ [əto] bungalow

d. /à-sò/ [əso] plum

(122) /d/ vs /^{n}d/

a. /à-dá/ [ada] hunting net

b. /á-^{n}dà-´/ [anda] buckets

(123) /d/ vs /dz/

a. /dɨ̀m-V/ [dɨmɨ] be short

b. /dzɨ̀m/ [dzɨma] lock

c. /ì-dùmú/ [idumu] container

d. /ì-dzú/ [idzu] fist

(124) /d/ vs /n/

a. /dùm/ [dumwe] thunder

b. /nùm/ [numwe] embed into the ground

c. /ò-dà/ [ɔda] shelter

d. /ó-náfɨ-´/ [ɔnafɨ] paddle

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(125) /d/ vs /l/

a. /dù-Ý/ [dʊʊ] burn

b. /lú-VlV/ [lʊʊlʊ] be wise to

c. /ì-dɨmá/ [ɪdɨma] road

d. /í-lɨmâ/ [ɪlɨma] headmaster

(126) /ⁿd/ vs /ⁿdz/

a. /ò-fàⁿda/ [ɔfanda] sp. of tree

b. /ó-fáⁿdzù-´/ [ɔfanzʊ] umbrella

(127) /ⁿd/ vs /n/

a. /ì-ⁿdùwú/ [induwu] cricket

b. /í-nú-´/ [inu] knee

c. /áⁿd/ [kanḍ] lose weight

d. /kán/ [kan] stamp

e. /ì-síⁿdi/ [iʃindi] ring

f. /ò-sìní/ [oʃini] shadow

(128) /ⁿd/ vs /l/; second root position

a. /kúⁿd/ [kunde] get well

b. /kúl/ [kule] cook

c. /ì-sùⁿdú/ [ɪsʊndʊ] sp. of antelope

d. /á-sùlâ/ [asʊla] sp. of mushroom

(129) /ts/ vs /dz/

a. /tsó-VlV/ [tsoulu] stand

b. /dzó-VlV/ [dzoulu] run

c. /ì-tsɨ́ⁿgɨ̀/ [ɪtsɨŋg̊] circumcision

d. /ì-dzɨ́ⁿgà/ [ɪdzɨŋga] pencil

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(130) /ts/ vs /s/

a. /tsíl/ [tsile] cover

b. /síl/ [sile] descend, go down

c. /ó-tsàlɨ-´/ [ɔtsalɨ] bridge

d. /ó-sálɨ̀-´/ [ɔsalɨ] root

(131) /dz/ vs /ⁿdz/

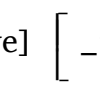
a. /dzíf/ [dʒife] weed

b. /ⁿdzìɯ̨/ [nʒiɯ̨e] pulverise

c. /ì-dzɔ̀lʊ/ [ɪdzɔl] water

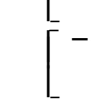
d. /ì-ⁿdzɔ́/ [ɪnzɔ] debt

(132) /ⁿdz/ vs /n/

a. /ⁿdzùw/ [nzuwe]  be confused

b. /nùm/ [numwe] embed into the ground

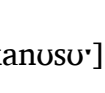
c. /ì-ⁿdzɔ́/ [ɪnzɔ] debt

d. /í-nô-ɯ̨V́/ [inou]  feast

(133) /n/ vs /l/

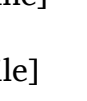
a. /nìⁿg-VsV/ [niŋgiʃ] splinter, sprain

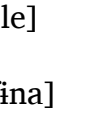
b. /lìⁿg-V́/ [liŋgi] dress

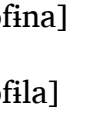
c. /ká-nʊ̀sʊ-ɯ̨V́/ [kanʊsʊˑ]  pimple

d. /ó-lʊ̀sʊ-´/ [ɔlʊsʊ] stinger

e. /vín/ [vine] break

f. /víl/ [vile]  ascend, go up

g. /ò-fɨ́ná/ [ɔfɨna]  rat

h. /ó-fɨ́la-´/ [ɔfɨla]  speargrass

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B.1.3 Dorsals

This section illustrates and contrasts the dorsal phonemes, in particular, /k g ⁿg ŋ ɯ/. Examples demonstrating the contrast between labials and labialvelars are found in B.2.

(134) /k/ vs /g/

a. /kɔ̀/ [kɔ] brush, scrape

b. /gɔ̀/ [gɔ] grind

c. /ò-kàⁿbɨ́/ [ɔkambɨ] rope

d. /ò-gàⁿbɨ́/ [ɔgambɨ] granary

(135) /g/ vs /ⁿg/, /g/ vs /ŋ/ (/ŋ/ is very rare root-initially)

a. /gò-VlV/ [goul] belch

b. /ⁿgó-VlV/ [ŋgoulu] gnaw

c. /ó-gò-ˊ/ [ɔgwʊ] hill

d. /ó-ⁿgɔ̀-ˊ/ [ɔŋgɔ] hornbill

e. /ì-ŋɔ̀-ɔ́ɯɔ̀/ [ɪŋɔ·] sp. of mushroom

(136) /ⁿg/ vs /ŋ/, second root position

a. /sáⁿg/ [saŋǧ] pick out

b. /sáŋ/ [saŋ] remain

c. /ì-jáⁿgɨ/ [ɪjaŋgɨ] sun

d. /í-jáŋɨ̀-ˊ/ [ɪjaŋɨ] ground

(137) /ⁿg/ vs /ɯ/

a. /wáⁿg/ [waŋǧ] be sick

b. /wàɯ/ [waɯɨ] scratch

c. /í-fɨⁿga-ˊ/ [ɪfɨŋga] nose

d. /ò-bɨɯa/ [ɔbɨɯa] lion

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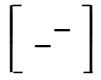
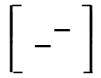
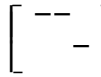
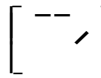
(138) /ŋ/ vs /ɯ/

a.	/jéŋ/	[jeŋ]		rest
b.	/jéɯ/	[jeɯ]		learn
c.	/ó-suáŋì-´/	[ɔswaŋɨ]		compound
d.	/ò-sàɯɨ/	[ɔsaɯ]		womb

B.1.4 Labialvelars

Finally, this section illustrates and contrasts the labialvelar phonemes, in particular, /kp gb ⁿgb ŋ͡m/. Examples demonstrating the contrast between labialvelars and either coronals or dorsals are found in B.2.

(139) /kp/ vs /gb/

a.	/kpìl/	[kpile]		score, crease
b.	/gbèl/	[gbeli]		wound
c.	/ó-kpúmù-´/	[ɔkpʊmʊ]		bottle
d.	/kó-gbúmù-ɯV́/	[kɔgbʊmʊ˙]		upper arm

(140) /gb/ vs /ⁿgb/ vs /ŋ͡m/ (/ŋ͡m/ is only attested once in the database)

a.	/ó-gbɨla-´/	[ɔgbɨla]		vein
b.	/ó-ⁿgbáni-´/	[ɔŋgbanɨ]		sp. of grasshopper
c.	/ò-ŋ͡màŋá/	[ɔŋmana]		facial incision(s)

B.2 Consonants by manner of articulation

The examples in this section illustrate and demonstrate contrast between consonants produced with similar manners of articulation.

(141) Voiceless plosives and affricates

a.	/pí-VlV/	[piili]		pour out
b.	/tì-V́/	[tii]		see
c.	/tsì-V́/	[tʃii]		replace
d.	/tsà-VlV/	[tsaal]		sit

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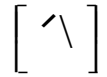
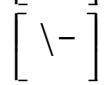
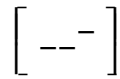
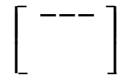
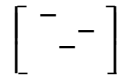
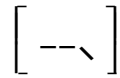
e. /kì-VlV/ [kiil]  return, go back

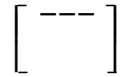
f. /kpí-VlV/ [kpiili]  tie

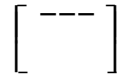
g. /ò-pàvɨ́/ [ɔpavɨ]  cockroach

h. /ó-tálɨ-´/ [ɔtalɨ]  world

i. /ó-tsàlɨ-´/ [ɔtsalɨ]  bridge

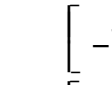
j. /ì-tsìle/ [itʃile]  baboon

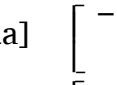
k. /ó-kálɨ-´/ [ɔkalɨ]  spider's web

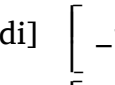
l. /í-kpálɨ-´/ [ɪkpalɨ]  scar

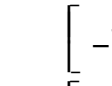
(142) Voiced plosives and affricates

a. /bʊ́l/ [bʊla] burst

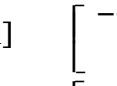
b. /dʊ̀l/ [dʊla]  weed (v)

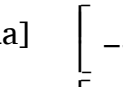
c. /dzɨ́m/ [dzɨma]  lock

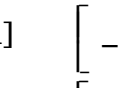
d. /dzè^{n}d/ [dʒendi]  walk

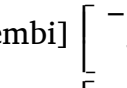
e. /gɔ̀l/ [gɔlʊ]  agree

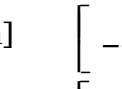
f. /gbòf/ [gbof] bark (v)

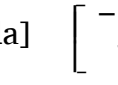
g. /á-bɨ́la-´/ [abɨla]  palm flowers

h. /ì-dɨ̀má/ [ɪdɨma]  road, path

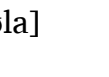
i. /ì-dzɔ̀lʊ/ [ɪdzɔl]  water

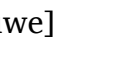
j. /í-dzè^{n}bi-´/ [idʒembi]  axe

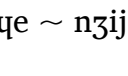
k. /ì-gɨsá/ [ɪgɨsa]  knuckle

l. /ó-gbɨ̀la-´/ [ɔgbɨla]  vein

(143) Prenasalised plosives and affricates; root-initial

a. /^{n}bʊ́l/ [mbʊla]  hide

b. /^{n}dzʉ̀w/ [nzuwe]  confuse

c. /^{n}dzɪ̀ɯ̨/ [nʒiɯ̨e ~ nʒije]  pulverise

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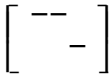
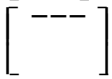
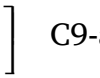
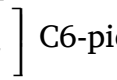
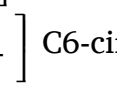
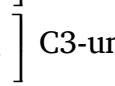
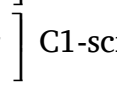
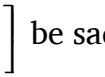
d.	/ⁿgʊ̀l/	[ŋgʊla ~ ŋgwʊla]		scrape
e.	/ⁿgé-V́/	[ŋgje]		carry
f.	/ó-ⁿbílì-´/	[ombili]		hammer, club
g.	/ì-ⁿdà/	[ɪnda]		bucket
h.	/ì-ⁿdzɔ́/	[ɪnzɔ]		debt
i.	/ì-ⁿgɔ́lʊ̀/	[ɪŋgɔl]		money
j.	/ó-ⁿgbáni-´/	[ɔŋmgbani]		sp. of grasshopper

(144) Prenasalised plosives and affricates; root-medial in nouns; also illustrating Final Vowel Deletion and word-final devoicing

a.	/ì-vàⁿbi/	[ɪvam̥b̥]		C9-antelope
b.	/í-vàⁿbi-´/	[ɪvambi]		C10-antelope-C10
c.	/ì-tɨ́ⁿdì/	[ɪtɨn̥d̥]		C9-piece
d.	/á-tɨ́ⁿdì-´/	[atɨndi]		C6-piece-C6
e.	/ì-tsɨ́ⁿgì/	[ɪtsɨŋg̊]		C9-circumcision
f.	/á-tsɨ́ⁿgì-´/	[atsɨŋgi]		C6-circumcision-C6
g.	/ɔ́-fáⁿdzʊ̀-´/	[ɔfanzʊ]		C3-umbrella-C3
h.	/à-háⁿgba/	[ahaŋmgba]		C1-scissors

(145) Prenasalised plosives; root-noninitial in verbs, showing labialisation

a.	/dùⁿb/	[dumbwe]		be sad
b.	/tíⁿb/	[timbe]		pull
c.	/kùⁿd/	[kunde]		stir
d.	/júⁿg/	[juŋgwe]		smell, emit odour
e.	/vìⁿg/	[viŋgje ~ viŋge]		fly
f.	/màⁿg/	[maŋgi]		light (fire)

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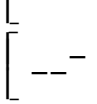
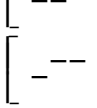
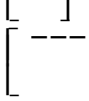
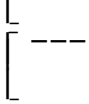
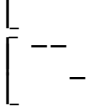
(146) Nasals; root-initial

a.	/màl/	[malɨ]		mend, repair
b.	/nàl-V́/	[nalɨ]		straighten
c.	/ó-mʊ̀sʊ-́/	[ɔmʊsʊ]		light
d.	/ì-nʊ̀nʊ́/	[ɪnʊnʊ]		bird
e.	/ó-ŋàŋɨ-́/	[ɔŋaŋɨ]		fin
f.	/ò-ŋmàŋá/	[ɔŋmaŋa]		facial incision, tattoo

(147) Nasals; root-noninitial

a.	/jʊ̀m/	[jumwe]		stab
b.	/jʊ̀m-V́/	[jʊmʊ]		ascend, go up
c.	/tʊ́n/	[tune]		judge
d.	/tʊ́ŋ-VnV/	[tuŋunu]		heap up
e.	/lʊ́ŋ/	[lʊŋwa]		follow
f.	/ì-kíme/	[ikime]		python
g.	/ì-dzònú/	[idzonu]		hunger
h.	/ì-vóŋu/	[ivoŋu]		sp. of squirrel

(148) Fricatives; root-initial

a.	/fà/	[fa]		butcher
b.	/vá/	[va]		come
c.	/sá/	[sa]		scatter, burst
d.	/sé/	[ʃe]		laugh
e.	/hé^{n}b/	[hemb̥]		break
f.	/ó-fólu-́/	[ofolu]		pus
g.	/ó-vólu-́/	[ovolu]		moon
h.	/í-sónù-́/	[isonu]		sorrow

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i. /í-sì-´/ [iʃi] eye

j. /í-hó^{n}bu-´/ [ihombu] sugar yam

(149) Fricatives; root-noninitial

a. /jɨ́f/ [jɨfa] be heavy

b. /jɨ̀v/ [jɨva] kill

c. /jɨ̀s/ [jɨsa] hit

d. /jís-V́/ [jiʃ] rub

e. /ò-fúfe/ [ofufwe] fellow-wife

f. /ó-náfɨ-´/ [ɔnafɨ] paddle, stirring stick

g. /ó-lìvi-´/ [olivi] eel

h. /í-jɔ́sʊ-´/ [ɪjɔsʊ] marriage

i. /í-jísili-´/ [ijiʃili] bracelet

(150) Lateral; approximant and flap in free variation

a. /lí-V́/ [lii ~ ɺii] look for

b. /kʊ́l/ [kwʊɺa ~ kwʊla] heap up

c. /í-ló^{n}gù-´/ [iloŋgu ~ iɺoŋgu] saliva

d. /í-jʊ́lʊ̀-´/ [ɪjʊɺʊ ~ ɪjʊlʊ] body

(151) Approximants; root-initial

a. /já/ [ja] eat

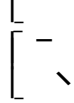
b. /wá/ [wa] put, place

c. /ó-jɔ́lʊ̀-´/ [ɔjɔlʊ] palm needle

d. /ì-wá/ [ɪwa] dog

(152) Approximants; root-noninitial

a. /fùw/ [fuwe] blow

b. /sɨ́ɰ/ [sɨɰa]  rejoice

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c. /ⁿdzìɯ/ [nʒiɯe ~ nʒije] ˍ˗ pulverise

d. /ì-kòwú/ [ikowu] ˍˍ˗ chicken

e. /ì-dzɨwá/ [ɪdzɨwa] ˍˍ˗ penis

f. /ò-sàɯɨ/ [ɔsaɯ] ˍ˪ womb

g. /ó-méɯi-´/ [omeɯi ~ omeji] ˉˉˉ venom

(153) Approximants; noun class suffix

a. /í-tê-ɯV́/ [iteɯ ~ itei] ˉ\ cooking pot

b. /í-kà-ɯV́/ [ɪka(ɯ)ɨ] ˉ/ basket

c. /í-fɔ̀-ɯV́/ [ɪfɔ(w)ʊ] ˉ/ shell

d. /í-tô-ɯV́/ [ito(w)u] ˉ\ head

(154) Prenasalised approximants

a. /ⁿjá/ [ɲja] ˉ defecate

b. /ⁿwá/ [ŋwa] ˉ drink

c. /ò-ⁿjù/ [oɲju] ˍ˪ a hair

d. /à-ⁿwâ/ [aŋwa] ˉ\ cat

e. /ò-káⁿwa/ [ɔkaŋwa] ˍ˗˗ type of rock

f. /à-jáⁿjɨ/ [ajaɲjɨ] ˉ˪ sp. of mongoose[95]

[95]Prenasalised approximants are not clearly attested root-noninitially; it is possible that these last two examples are compounds, with the prenasalised approximant in initial position in the second root.

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C. Illustrative Examples of Vowels

Examples demonstrating contrast between all pairs of vowels differing by only one of the features [high, round, ATR] are given in the sections below.

C.1 Contrast among [+ATR] vowels

(155) /i/ vs /e/

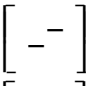
a. /sí/ [ʃi] stay at home

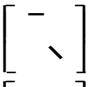
b. /sé/ [ʃe] laugh

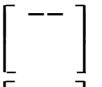
c. /í-fíli-´/ [ifili] abdomen

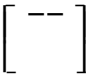
d. /í-félì-´/ [ifeli] hole

(156) /i/ vs /u/

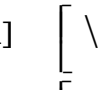
a. /hìl/ [hile]  ferment

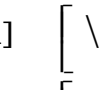
b. /húl/ [hule]  bend

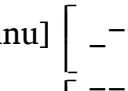
c. /í-tí-´/ [iti]  twenty

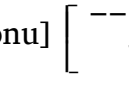
d. /í-tú-´/ [itu]  types

(157) /u/ vs /o/

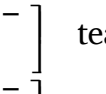
a. /kúl-V́/ [kul]  return, go back

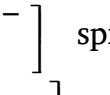
b. /kól/ [kol]  meet

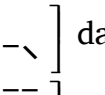
c. /ì-súnu/ [isunu]  red biting fly

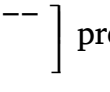
d. /í-sónù-´/ [isonu]  sorrow

(158) /e/ vs /o/

a. /té/ [te]  teach, show

b. /tó/ [to]  spit

c. /ì-fè/ [ife]  darkness

d. /í-fó-´/ [ifo]  pregnancy

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C.2 Contrast among [−ATR] vowels

(159) /ɨ/ vs /a/

a. /jɨ́v/ [jɨv] soak

b. /jáv/ [jav] sleep

c. /á-dzɨ́ⁿgà-´/ [adzɨŋga] pencils

d. /á-dzáⁿgɨ-´/ [adzaŋgɨ] whips

(160) /ɨ/ vs /ʊ/

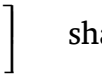
a. /ⁿbɨ̀l/ [mbɨla] heap up

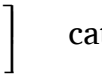
b. /ⁿbʊ́l/ [mbʊla] hide

c. /á-kɨ́mɨ̀-´/ [akɨmɨ] nails

d. /á-kʊ́mʊ-´/ [akʊmʊ] corpses

(161) /ʊ/ vs /ɔ/

a. /fʊ́l-V́/ [fʊl]  shave

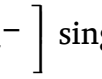
b. /kɔ́l/ [kɔl]  catch

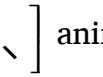
c. /á-jʊ́sʊ-´/ [ajʊsʊ] marriages

d. /á-jɔ́sʊ-´/ [ajɔsʊ] egg-shells

(162) /a/ vs /ʊ/

a. /tám/ [tam] chew

b. /tʊ́m-V́/ [tʊmʊ]  sing

c. /ì-ⁿjàmɨ/ [ɪɲjam]  animal

d. /ì-ⁿjʊ̀mʊ/ [ɪɲjʊm] year

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C.3 Contrast between [+ATR] and [−ATR] vowels

Contrast between [+ATR] and [−ATR] vowels in noun and verb roots is generally evident from allomorphs of any affixes. See examples (61), (62), (63) and (64) in §7.1.

(163) /i/ vs /ɨ/

a. /píl-V́/ [pil] [\ ] quench

b. /vɨ́l-V́/ [vɨl] [\ ] put, place

c. /ì-tí^{n}dì/ [itin̥d] [−\ ] meaning

d. /ì-tɨ́^{n}dì/ [ɪtɨn̥d] [−\ ] piece

(164) /e/ vs /a/

a. /kpé^{n}d-i/ [kpen̥d] [\ ] help

b. /wá^{n}d-ɨ/ [wan̥d] [\ ] protect

c. /í-té-´/ [ite] [−−] name

d. /í-tà/ [ɪta] [_−] bag

(165) /u/ vs /ʊ/

a. /tús-V́/ [tus] [\ ] push

b. /kús-V́/ [kwʊs] [\ ] heal, cure

c. /ì-gù^{n}du/ [igwun̥d] [_◝] hump

d. /ì-gùlʊ/ [ɪgwʊl] [_◝] goiter

(166) /o/ vs /ɔ/

a. /tsów/ [tsow] [\ ] pierce

b. /tsɔ́w/ [tsɔw] [\ ] choose, pick

c. /ò-mómù/ [omom] [−\ ] room

d. /ò-^{n}bɔ̀nʊ/ [ɔmbɔn] [_◝] path, road

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D. Guide to the presentation of data

There is a lot of data presented in this paper. The general philosophy has been to make everything that is already known available in a reasonably compact, yet comprehensible, format. The aim of this section is to enable the reader to understand how what is known is represented, and to have an idea about the kinds of things that are not known.

Wherever possible, each datum consists of four pieces of information: the underlying form, the phonetic segments, a representation of the surface pitch, and a gloss.

Underlying forms are enclosed in slashes (//). The underlying form consists of phonemic representations of morphemes, usually separated by hyphens (-). Where reduplication is involved, that is indicated by using a tilde (~) as the separator. While the morphemes involved in most nouns are well understood, the analysis of the verb is still far from complete. However, the final vowel in some cases has been analysed as epenthetic; it is not included in the underlying form. Several morphemes have a number of allomorphs. In some cases (e.g., noun class prefixes), one allomorph is chosen as the underlying form. In other cases (e.g., several verb extensions, some noun class suffixes), any [+high] vowel (at least) can be realised phonetically, and V is used in the underlying form (e.g., the verbal extension -VlV).

The morphemes in underlying forms are associated with tone melodies. It is presumed there are rules (not yet fully articulated) that specify how these melodies are assigned to tone-bearing units in the course of the derivation. Where these melodies have been determined, they are indicated by the use of accent marks on the leftmost vowels of the morpheme (excluding the glide vowel in a CGV syllable, which only constitutes a single tone-bearing unit; see §§4 and 8). An acute accent (◌́) indicates High tone, while a grave accent (◌̀) indicates Low tone. If the number of vowels in the morpheme are insufficient to represent the entire tone melody, a circumflex (◌̂) or caron (◌̌) may be used on the last (rightmost) vowel of the morpheme to indicate sequences of High-Low or Low-High tone, respectively. If that is still inadequate (e.g., floating tone morphemes that have no vowel), the acute and grave accents may be used by themselves). Note that this representation does not necessarily imply that these tones are linked to the vowels they are on. Although root tones will generally be linked to the root vowels in this fashion, affix tones may well be realised elsewhere.

Some morphemes have been analysed as toneless. This is particularly the case for most verbal extensions. This can cause some confusion; most verb data are given in the imperative form which is always realised with a sequence of polar tones. However, it is unclear at this stage what the underlying form of the imperative morpheme is, so it is not represented in the underlying forms, but it certainly appears in the pitch trace. More generally, many verb forms involve grammatical tone which is not yet analysed and not represented in the underlying form. Let the reader take note!

Morphemes where the underlying tone melody is unknown are sometimes represented with surface tone, and sometimes left with no indication of tone. This affects a few longer (and probably complex) noun stems, and several verb affixes in particular.

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Phonetic forms are enclosed in brackets ([]), using the IPA alphabet. Details of phonetic realisations can be found in §§2.2 and 3.2. Free variation is not always represented.

Pitch traces are also enclosed in (rather larger) brackets and indicated using bar notation. Each syllable is generally represented with a single line, visually indicating the starting and finishing pitches of the syllable. Occasionally a single syllable may have rising-falling pitch and be represented with two lines, and in a number of cases, a rising or falling pitch is indicated on something which could easily be interpreted as two syllables.

Glosses usually gloss the entire word or phrase, without trying to define each individually delineated morpheme. (In fact, it is difficult to assign a definitive meaning to most of the verbal extensions; they have been very much lexicalised.) However, sometimes the morphemes are indicated in the glosses. The abbreviations used for this purpose are explained in appendix E.

E. Abbreviations

The abbreviations used in this paper are as follows:

1	=	first person
2	=	second person
3	=	third person
C1	=	class 1
C2	=	class 2
C3	=	class 3
C5	=	class 5
C6	=	class 6
C6A	=	class 6a
C7	=	class 7
C8	=	class 8
C9	=	class 9
C10	=	class 10
C12	=	class 12
C15	=	class 15
CAUS	=	causative
IMP	=	imperative
NEG	=	negation, negative
NMLZ	=	nominalizer/nominalization
PL	=	plural
SG	=	singular

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