A grammar of Ik (Icé-tód) : Northeast Uganda's last thriving Kuliak language

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2 Segmental Phonology

Ik segmental phonology involves a relatively rich inventory of contrastive consonants and vowels and phonological and morphophonological variations. Although a full account of Ik phonology is beyond the scope of this book, its basics are offered here as a gateway into the broader grammar.

2.1 Consonants

Ik uses thirty (30) contrastive consonants, presented in (1) below. This is a high number compared to the neighboring Eastern Nilotic language Turkana which has only seventeen (Dimmendaal 1983:7). But it is not so high in the greater Rift Valley language area where the East Cushitic language Dhaasanac has twenty-five (Tosco 2001:16) and the South Omotic language Dime has thirty-three (Mulugeta 2008:9). Unlike Turkana, but like Dhaasanac and Dime, Ik has glottalic (im)plosives in addition to pulmonic.

(1) *Ik contrastive consonants*

	Labial	Alveolar	Lateral	Palatal	Velar	Glottal
Plosives, vl.	p	t			k	
Plosives, vd.	b	d			g	
Implosives	ɓ	ɗ		ʄ		
Ejectives		ts’	(tl’)		ƙ	
Fricatives, vl.	f	s	(ɬ)	ʃ		h
Fricatives, vd.		z	(ɮ)	ʒ		ɦiy
Affricates, vl.		ts		c		
Affricates, vd.		dz		j		
Liquids		r	l			
Nasals	m	n		ɲ	ŋ	
Glides	w			y		

With Table 1 still in mind, note that those sounds whose orthographic symbols differ from the IPA include: j̨ [ʃ], ƙ [kʼ/ɠ], c [tʃ], j [dʒ], y [j]. Three sounds in Table 1—tlʼ, ɬ, lʒ—are in parentheses because they are all but lost from the form of Ik spoken at the time this grammar was being written.

2.1.1 Consonant contrasts

Some evidence for the existence of the thirty contrastive consonants comes from sets of segmentally similar nouns (in the NOM case) like those below. High tone is marked with an accent, while low tone is unmarked. Low tone before a floating high tone is pronounced with mid level pitch (see §3.2):

(2)	pakw$^{a\acute{}}$	‘cave’
	bakuts$^{a\acute{}}$	'chest’
	ɓaláŋ	‘Toothbrush tree’
	fádw^{a}	‘scale’
(3)	taß$^{a\acute{}}$	‘boulder’
	dakw$^{a\acute{}}$	‘tree’
	ɗam´	‘brain’
(4)	karats^{a}	‘stool’
	gasar	‘Cape buffalo’
	ƙaƙ^{a}	‘hunt’
(5)	tsʼol	‘drop’
	sore´	‘boy’
	zɔt^{a}	‘chain’
	tsól	‘Bee-eater (bird sp.)’
	dzon	‘well’
(6)	ram	‘pile of dried *Euphorbia* branches’
	lar	‘tobacco pipe’

(7) matáŋ ‘cheek’
nakús ‘sleeping place’
ɲatal´ ‘custom’
ŋamur´ ‘duiker’

(8) yáŋ ‘my mother’
wa ‘greens’

For the palatal set, which is considerably rarer, sufficiently similar nouns are not available for all the sounds, so a few verbs have to be included:

(9) ʝɛʝ- ‘stay’
jeje ‘leather mat’
céŋ ‘joke’
ʃaɤʷ ‘meat left on skinned hide’
ʒaɓúd- ‘be soft’

2.1.2 Consonant realizations

All consonants except for glottals are produced with an egressive airstream from the lungs. The glottals are made with an airstream produced in the larynx—implosives with an ingressive airstream and ejectives with egressive. The voice quality and articulators (active and passive) of all Ik consonants, as well as notes on phonetic realization, are provided below.

/p/ is a voiceless bilabial plosive.
/t/ is a voiceless lamino-alveolar plosive [t̪].
/k/ is a voiceless dorso-velar plosive.

/b/ is a voiced ‘fortis’ bilabial plosive [b̪̈].
/d/ is a voiced ‘fortis’ lamino-alveolar plosive [d̪̈].
/g/ is a voiced ‘fortis’ dorso-velar plosive [g̈].

All six Ik plosives may be unreleased before a pause. This only occurs when a pre-pause devoiced vowel is deleted entirely. Moreover, the three voiced plosives are (partially) devoiced before a pause or a devoiced vowel. Thus the voiceless plosives have [pˀ, tˀ, kˀ] as allophones, and the voiced plosives have devoiced [b̥, d̥, g̊] and unreleased devoiced [b̥ˀ, d̥ˀ, g̊ˀ] as allophones.

The lamino-alveolars /t, d/ are audibly fronted, nearly dental, but not quite. For some speakers, this fronting is more pronounced, the tongue even being visible against the teeth. Perhaps this is an areal feature: Dhaasanac contrasts 'dental oral stops' and 'post-alveolar stops' (Tosco 2001:16), while in the Eastern Jebel language Gaahmg, "the dental stops are made with the tongue tip touching the back of the top teeth" (Stirtz 2004:128).

The voiced plosives /b, d, g/ can also be described as 'fortis' in the following sense: They sound as though they are made with greater supralaryngeal pressure and slightly delayed release, especially in slower speech. According to De Jong, a fortis-lenis distinction is an areal feature in at least Southwest Surmic languages like Didinga and Eastern Nilotic languages like Lopit and Lotuxo (2004:146). With the prevalence of ejectives in Ethiopian languages, one wonders if for Ik these fortis plosives have their origin in ejectives like /pʼ/ and /tʼ/ that are long since lost.

/ɓ/	is a voiced bilabial implosive.
/ɗ/	is a voiced apico-post-alveolar implosive [ɖ̪].
/ʄ/	is a voiced lamino-palatal implosive [ʄ̟].

Like the plosives, the implosives are partially devoiced before a devoiced vowel and may optionally be unreleased. This means they have [ɓ̥, ɖ̪̊, ʄ̟̊] and [ɓ̥ˀ, ɖ̪̊ˀ, ʄ̟̊ˀ] as allophones. Also, the apico-post-alveolar /ɗ/ sounds nearly retroflexed at times (cf. /ɗ/→[ɖ] of Dhaasanac, Tosco 2001:22).

/ʦ'/ is a voiceless lamino-alveolar ejective affricate [t̪s̪'].
(tl') is a voiceless lamino-alveolar lateral ejective affricate [t̪l̪'].
/ƙ/ is a voiceless dorso-velar ejective [k'/ɠ].

Uncommon in the area, Ik ejective affricates /ʦ'/ and (tl') are a link to South Cushitic languages that also have them (Mous 2012:356). The lateral ejective affricate (tl') now seems entirely lost from the language. In five years of fieldwork, the sound was never once heard. Yet, as recent as 1999, it was still considered a rare but present phoneme (Heine 1999). Based on reconstructions, the sound is replaced by the palatal implosive /ʄ/, as in **tl'ɔt → ʄɔtᵃ* '*Adenium obesum* (plant sp.)' and **tl'ábú-gwa → ʄábú-gwa* 'guinea-fowl'. A similar trend is observed today among young children who substitute /ʄ/ for /ʦ'/ as in *áʄóƙɔtíakᵃ* 'I have eaten it up' versus *áʦ'óƙɔtíakᵃ*.

The dorso-velar ejective /ƙ/ has several allophones including a dorso-velar voiced implosive [ɠ] and fronted and backed variants according to following vowels. Linguists have differed on which of the two sounds (ƙ/ɠ) is phonemic and which is allophonic. Tucker (1971) was the first to mention the implosive as a phone in Ik along side the ejective, while Heine (1999) claims that the implosive is the phoneme that has replaced the ejective still used by elderly speakers. Contrary to what Heine claimed, the velar ejective is still very much in use today, though the implosive is a common allophone of it. Younger speakers often seem to prefer the implosive, and it tends to show up in faster and more casual speech. The ejective may even weaken to the point of becoming merely a glottal stop [ʔ] (see §2.3.3).

/f/ is a voiceless labio-dental fricative.
/s/ is a voiceless lamino-alveolar fricative [s̪].
(ɬ) is a voiceless lateral fricative.
/ʃ/ is a voiceless lamino-post-alveolar fricative [ʃ̪].
/h/ is a voiceless glottal fricative.

The voiceless lamino-post-alveolar fricative /ʃ/ is the heir of the old Ik voiceless lateral fricative (ɬ), which is now only used by the eldest of speakers. As such, (ɬ), like (tl'), is considered marginal. Any given speaker tends to use either (ɬ) or /ʃ/ but not both. Occasionally one may hear a middle-aged Ik speaker pronounce /ʃ/ with a slight laterality. Also, for younger speakers and those in contact with Teso-Turkana languages, (which lack [ʃ] as a phoneme), /ʃ/ may freely vary with [tʃ] or [dʒ].

/z/ is a voiced lamino-alveolar fricative [z̪].
(ɮ) is a voiced lateral fricative.
/ʒ/ is a voiced lamino-post-alveolar fricative [ʒ̪].
/ɦy/ is a lightly palatalized voiced glottal fricative [ɦʲ].

The voiced lamino-alveolar fricative /z/ is partially devoiced before a devoiced vowel, making [z̪̥] an allophone. Also, some speakers, like those with more influence from Teso-Turkana languages, may freely alternate /z/~/s/. The voiced lamino-post-alveolar fricative /ʒ/ is one of two heirs of an old Ik voiced lateral fricative (ɮ), which may now only be heard rarely among the most elderly speakers (the reason it is considered marginal). (ɮ) split into /ʒ/ and /ɦy/, probably within the last 50–100 years.

The phonetic nature of /ɦy/ has been extremely hard to ascertain. What is clear is that it never surfaces only as [ɦ] without tongue being raised toward the palate. Perhaps the tongue raising is phonetic remnant of the tongue position of (ɮ), while the voicing of /ɦy/ is a phonetic remnant of the voicing of (ɮ). Lexemes containing /ɦy/—*ɦyɔ* 'cow', for example—have been transcribed variously as [ɦìɔ̀], [ɦɛ̀ɔ̀], and [ɦʲɔ̀]. Of this sound, Heine said, "word-initially, y is pronounced as a sound intermediate between a palatal semivowel and a voiced glottal fricative" (1999:15). As such, /ɦy/ could be represented phonetically as [ɦʲ] or [ʱj]. For some speakers, especially younger ones, /ɦy/ may lose either its voicing or its stridence, leading to free variants [hj] or simply [j]. /ɦy/ is only found word-initially.

/ts/ is a voiceless lamino-alveolar affricate [t̪s̪].
/c/ is a voiceless lamino-post-alveolar affricate [t̻ʃ̻].

/dz/ is a voiced lamino-alveolar affricate [d̪z̪].
/j/ is a voiced lamino-post-alveolar affricate [d̻ʒ̻].

The voiceless affricate /ts/ is replaced by /s/ by some speakers, particularly from certain areas. The voiced affricate /dz/ has the partially devoiced allophone [d̪z̥] before devoiced vowels before a pause. This does not affect /j/ because it is only found in word-initially and word-medially.

/r/ is a voiced lamino-alveolar rhotic flap/tap [ɾ̪].
/l/ is a voiced lamino-alveolar lateral approximate [l̪].

The rhotic flap /ɾ/ may be rolled [r] in any position but especially in word-medial and word-final positions. Emotional intensity and rhetorical flourishes in speech seem to increase the frequency of rolling. Also, before devoiced vowels, the rolled flap is devoiced [r̥] and often lengthened [r̥ː]. The lateral approximate is partially devoiced [l̥] before a pause or a devoiced vowel and may optionally be unreleased [l̥˺].

/m/ is a voiced bilabial nasal.
/n/ is a voiced lamino-alveolar nasal [n̪].
/ɲ/ is a voiced lamino-palatal nasal [n̻].
/ŋ/ is a voiced dorso-velar nasal.

/w/ is voiced bilabial/dorso-velar glide.
/y/ is a voiced lamino-palatal glide [j̻].

The glides are partially devoiced [w̥, ẏ] before a pause or a devoiced vowel, and depending on syllabification, may occasionally be analyzed as vowels.

2.1.3 Consonant distribution

Most Ik consonants can occur in any position. However, nasals, glottal fricatives, and the affricate /j/ have distributional restrictions, as do implosives vis-à-vis their plosive counterparts. First, nasals that immediately precede another consonant must be made at the same place of articulation as that consonant. Some of the personal pronouns provide evidence of this restriction. In the left column of (10), the pronouns are shown with an archi-phonemic nasal (N), followed by surface realizations. Note the velar, alveolar, and palatal places of nasal articulation in the right column:

(10)	Nk^{a}	I:NOM	→	[ŋ̣kạ̰]
	Nc^{i}	I:OBL	→	[ɲ̣tʃḭ]
	Ngw^{a}	we:NOM	→	[ɲ̣gʷạ̰]
	Nt^{a}	they:NOM	→	[n̡tạ̰]

An exception to nasal assimilation occurs when a nasal-stop sequence arises from vowel syncope, as when *maraŋ-it-et-és* ‘to make good’ → *maraŋ̣-t-et-és*.

Second, the voiceless glottal fricative /h/ only occurs word-initially in Ik. Historically, this restriction may be related to the universal tendency to avoid onsetless syllables, as in Dhaasanac (Tosco 2001:42), Turkana (Dimmendaal 1983:45), and So (Carlin 1993:15). Unlike in Dhaasanac, the Ik glottal fricative is a phoneme, but even so, it is rare, occurring in less than twenty noun and verb roots. Currently, Ik does not show a strict onset principle that is consistently satisfied by a glottal fricative. This can be seen from the pair *hɔn-* ‘drive’ and *oní-* ‘abandoned village’ in which /h/ and zero are clearly contrasted word-initially. Nevertheless, speakers do prefer an onset before the back vowel /u/, giving words like *úd* ‘grass sp.’ and *úg-* ‘dig’ surface pronunciations like [^{w}ûḍ̰] or [^{h}ûḍ̰] and [^{w}ûg̰] or [^{h}ûg̰].

The voiced glottal fricative /ɦy/ also only occurs word-initially. This restriction was created when (ɮ) split historically to /ɦy/ word-initial and /ʒ/ elsewhere. Examples of this include *ɦyɔ* 'cow' and *gózow*^{a} 'mist'.

Third, the voiced lamino-post-alveolar affricate /j/ is attested only in word-initial and word-medial positions. As a phoneme, it is quite rare, known to be present in only five noun lexemes: *jeje* 'leather mat', *jíje* 'opposite side/slope', *lejé* 'mental illness', *ɲjín* 'we INCL.', *ɲájarán* 'sewing machine'. Similarly, in nearby Dhaasanc, /ɟ/ is a very rare sound (Tosco 2001:17).

Lastly, implosives/ejectives and their plosive counterparts at the same place of articulation do not occur in the same root. The only exceptions are /ɗ/ and /d/, presumably because their places of articulation differ slightly. The three instances are *dod*^{a} 'vagina', *dʊɗér* 'water-beetle', and *ɲoɗód*^{a} 'ant-bear'.

2.2 Vowels

Ik uses nine (9) contrastive vowels, shown in (11) below. These include the low vowel /a/ and four pairs whose members differ only in Advanced Tongue Root [ATR] value. In its basics, the Ik vowel system is quite similar to those of Surmic languages like Didinga and Eastern Nilotic languages like Turkana. But it differs substantially from others in the wider area like those of the Cushitic Dhaasanac and Omotic Dime which lack ATR distinctions.

(11) *Ik contrastive vowels*

	Front		Central	Back	
	+ATR	-ATR	-ATR	+ATR	-ATR
High	i	ɪ		u	ʊ
Mid	e	ɛ		o	ɔ
Low			a		

2.2.1 Vowel contrasts

Some evidence for the existence of nine contrastive vowels comes from segmentally similar pairs of nouns like the following:

(12) *Evidence of vowel contrasts*

/i–ɪ/	ínwᵃ	‘animal’	gidᵃ	‘cloud’
	ɪnwᵃ´	‘Milk-bush’	gɪzá	‘stone surface’
/e–ɛ/	céŋ	‘joke’	édᵃ	‘name’
	cɛŋ´	‘wood-pecker’	ɛ́bᵃ	‘horn’
/a–ɛ/	lar	‘pipe’	habᵃ	‘tree-hive’
	lɛr	‘Naivasha Thorn’	ɲyɛgᵃ	‘bone marrow’
/u–ʊ/	gúr	‘heart’	kur´	‘shade’
	gʊr	‘Sickle Bush’	kúra	‘Wait-a-bit Acacia’
/o–ɔ/	nos´	‘male leopard’	tsól	‘bee-eater’
	nɔs	‘noise’	tsɔ́r	‘baboon’
/a–ɔ/	kakᵃ´	‘leaf’	fádwᵃ	‘scale’
	kɔkᵃ	‘small reeds’	fɔ́dᵃ	‘loincloth’

On the surface, vowel length is also contrastive in Ik, as the following show:

(13) *Contrastive vowel length*

	V		VV	
/i–ii/	ɗiɗᵃ	‘donkey’	ɗiitᵃ´	bird sp.’
/ɪ–ɪɪ/	ts’ɪkᵃ´	‘bee’	tsɪɪr´	‘narrow ridge’
/e–ee/	segᵃ	‘Acacia sp.’	seekwᵃ´	‘broth’
/ɛ–ɛɛ/	ɗɛrétᵃ	‘Acacia sp.’	ɲɛréétᵃ	‘marsh’
/a–aa/	kwar´	‘mountain’	kwaár	‘baboon troop’
/ɔ–ɔɔ/	kɪlɔ́rítᵃ	‘tree sp.’	bílɔɔr	‘bird sp.’
/o–oo/	tsól	‘bee-eater’	coór	‘leg bangle’
/ʊ–ʊʊ/	tsʊɓᵃ	‘bird tail’	tsúúr	‘White Thorn’
/u–uu/	tulú	‘rabbit’	lúulú	‘firewood chips’

The phonetically long vowels shown in the VV column in (13) above are analyzed in this grammar as sequences of individual short vowels, not vocalic units with a length feature. A similar analysis is posited for the Teso-Turkana languages which have heavily influenced Ik (Dimmendaal 1994:154). In addition to the sequences of identical vowels listed in (13), Ik also exhibits many sequences of dissimilar vowels (see §2.2.3 below).

2.2.2 Vowel realizations

All nine Ik vowels are fully voiced, except before a pause where they are devoiced. The four vowels with advanced tongue root [+ATR] have a deeper resonance phonetically and can be characterized as 'heavy' or 'breathy'. The five vowels with a neutral tongue root [-ATR] are less resonant due to a narrower pharyngeal cavity. They can be characterized as 'light' or 'flat'. Precise feature specifications for the vowels are as follows:

/i/ is a close front unrounded vowel with [+ATR].
/ɪ/ is a close front unrounded vowel with [-ATR].
/e/ is a mid front unrounded vowel with [+ATR]
/ɛ/ is a mid front unrounded vowel with [-ATR].
/a/ is a low central unrounded vowel with [-ATR].
/ɔ/ is a mid back rounded vowel with [-ATR].
/o/ is a mid back rounded vowel with [+ATR].
/ʊ/ is a close back rounded vowel with [-ATR].
/u/ is a close back rounded vowel with [+ATR].

The back vowels /o, ɔ, u, ʊ/ can be desyllabified before an adjacent vowel, yielded [w] as a semi-vocalic allophone. The front vowels /i, ɪ/ can also be desyllabified, producing [y] as their semi-vocalic allophone. Whether the mid front vowels /e, ɛ/ can desyllabify to [y] is an analytical issue touching on the interpretation of diphthongs (see §2.2.3 below). Dimmendaal 1995 argues that for Nilotic languages, so-called diphthongs should be reanalyzed as glide+vowel sequences. But Ik diphthong-like units (vowels with two

targets) include combinations of mid and low vowels like [e̯a], making a [ya] interpretation inappropriate. So if the diphthong analysis is rejected, the existence of mid-level semi-vowels [ĕ, ĕ] must be posited instead.

Using Speech Analyzer software, the following four nouns were compared in terms of the duration of their vowel targets. The approximate measurements from a single Ik speaker indicate that the duration of a diphthong-like sound is longer than for single vowels but shorter than for double vowels:

(14) *Vowel length measurements*

V	ak[a]	'mouth'	(~0:0.1600)
V	ekw[a]	'eye'	(~0:0.1700)
V̯V	e̯akw[a]	'man'	(~0:0.1900)
VV	seekw[a]	'broth'	(~0:0.2050)

The question of diphthongs versus glide + vowel combinations is taken up again below in §2.2.3, where a list of representative words is presented.

All nine Ik vowels are devoiced before a pause as a general rule. This is a clear example of the phonology-syntax interface: A syntactic boundary (clause-finally and before a pause) is the conditioning environment for vowel allophony. Non-voiced vowels are an areal trait; they are found in various language families around Sub-Saharan Africa, including the local Teso-Turkana languages and more distant Cushitic languages like Oromo, Burunge, Alagwa, and K'abeena (Mous 2012:353). Vine gives them the 'phonetically neutral' label 'shadow vowels' (1981:385), while Novelli calls them 'breathed' (1985:29). 'Whispered' is also a term found in the literature. According to Vine, voiceless vowels are either 1) allophones of underlyingly voiced vowels, 2) surface realizations of underlyingly voice*less* vowels, or 3) the result of the auto-segmental behavior of largyngeal features (1981:409).

The Ik vowels of this type are called called 'devoiced' here to reflect the analysis that they are underlyingly voiced vowels that have undergone

devoicing. Following a tradition started by Crazzolara 1967, the Ik devoiced vowels are written with the superscript symbols [ⁱ, ɪ, ᵉ, ɛ, ᵃ, ɔ, ᵒ, ʊ, ᵘ]. Even though their occurrence is allophonic, the devoiced vowels are written throughout this grammar. Perhaps because their conditioning environment is syntactic as well as phonological, native speakers seem much more aware of devoiced vowels than other consonantal or vocalic allophones.

In the neighboring languages of Toposa (Schröder & Schröder 1987) and Turkana (Dimmendaal 1983), non-voiced vowels have been analyzed as distinct phonemes, contrasting with voiced vowels. Dimmendaal writes that "With regard to the position of non-voiced vowels, it is noted that they only occur in word-final position (i.e. potentially in the position before pause), but so may voiced vowels. It is, therefore, not predictable synchronically in Turkana when a vowel is [+voiced], or [-voiced]" (1983:31). But in Ik, it is generally predictable: *Any vowel before a pause is devoiced, and any vowel not before a pause is voiced.* For Turkana it is claimed that underlying non-voiced [-voiced] vowels become voiced "in the position other than before pause", as the following examples illustrate (Dimmendaal 1983:31):

(15)	lo-mugi̥ ||	→	[lomug^{h}i̥]	'the mauve-colored one'
	lo-mugi̥ lo	→	[lomugi lo]	'this mauve-colored one'

The opposite interpretation is given for Ik: *Underlyingly voiced vowels become devoiced before a pause*. Such a view helps explain apparent evidence for phonemic voicing contrast in examples like the following:

(16)	ín-o	||	→	ínᵒ [íno̥]	'with (an) animal(s)'
	ínó-o	||	→	ínó [ínó]	'from (an) animal(s)'

In (16), the noun root *ínó-* 'animal(s)' takes two case suffixes. In the first line, the instrumental case suffix {-o}, which first subtracts the root-final vowel /o/, is devoiced before a pause. In the second line, the ablative case suffix, also {-o}, which preserves the root-final vowel, gets devoiced and

actually deleted, leaving the root final vowel fully voiced. So what first appears to be a case of contrastiveness between voiced and non-voiced vowels is really a syntactically conditioned type of allophony. The devoiced/deleted vowels in (16), when in a clause-medial position, surface as fully voiced in line with their underlying voicing specification:

(17)	ín-ó = ni	→	ínó = ni	[ínónì]	‘with these animals’
	ínó-o = ni	→	ínóo = ni	[ínóônì]	‘from these animals’

The examples above in (16) illustrate another trait of Ik devoiced vowels: Depending on the vowel preceding them, they may be completely inaudible. As such, a further allophone of all nine vowels is simply zero [∅]. A devoiced vowel is inaudible when it is identical or very close in quality to the vowel that immediately precedes it, for example in:

(18)	baro-o	→	baro^{o}	[bàrò]	‘from the corral’
	dakú-o	→	dakú^{o}	[dākú]	‘from the tree’
	ɲɛkɛ-ɛ	→	ɲɛkɛ^{ɛ}	[ɲèkɛ̀]	‘of hunger’
	sɪsí-ɛ	→	sɪsí^{ɛ}	[sīsí]	‘in the honey-beer’

As noted above, pre-pause vowel devoicing is a general rule. The rule is supsended in the following four environments: 1) when the phrase or clause has interrogative intonation, 2) when the phrase or clause has solicitive intonation, 3) when the anaphoric demonstratives =ˈ*dɛ́ɛ́* (sg.) or =ˈ*díí* (pl.) are present, and 4) when the vowel in question is part of a deictic demonstrative. In environments (1)-(2), the syntax and therefore the phonology iconically reflect the pragmatic notion that the clause lacks the level of finality needed for devoicing. For a question, this entails waiting for an answer. For solicitation, this entails waiting for the desired response:

(19) *Ƙaa naa awak.* INDICATIVE
ƙa-a = náa awá-k^{e}
go-3SG = PST1 home-DAT
S/he went home.

(20) *Ƙaa naa awee?* INTERROGATIVE
ƙa-a = náa awé-e
go-3SG = PST1 home-DAT
Did s/he go home?

(21) *Ƙaa naa aweee?* SOLICITIVE
ƙa-a = náa awé-eé
go-3SG = PST1 home-DAT
S/he went home, okay?

For environment (3)—after anaphoric demonstratives—it is not known why devoicing is suspended. Perhaps there is a historical explanation:

(22) *Ƙaa naa awee dee kona.*
ƙa-a = náa awé-é = ˈdéé kɔn-a (**kɔn-∅)
go-3SG = PST1 home-DAT = ANPH.SG one-REAL
S/he went to that very home.

Lastly, many deictic demonstratives consist only of a consonant and a vowel, making the devoicing of the sole vowel impractical. For example:

(23) *Ƙaa naa awee ne.*
ƙa-a = náa awé-é = ne (**n)
go-3SG = PST1 home-DAT = DEM.SG
S/he went to that home.

2.2.3 Vowel distribution

Ik vowels can occur in any position within a word. For all nine vowels in a word-medial position, please refer back to §2.2.1 above. The data below show vowels in word-initial and word-final positions. A hyphen is used to signify that nouns are in their lexical forms to show their final vowels. (In isolation, nouns take the nominative case which deletes root-final vowels).

(24)	Word-initial		Word-final	
	ínó-	'animal'	ŋókí-	'dog'
	ɪnɔ́-	'Milkbush'	sɪsí-	'honey beer'
	ekú-	'eye'	ɓóré-	'corral'
	ɛkɛ́ɔ-	'muscle fiber'	ɲɛɬɛ-	'hunger'
	aká-	'mouth'	kwará	'mountain'
	ɔlírí-	'female hyrax'	ɲɔtɔ́-	'men'
	oní-	'abandoned village'	ɗéró-	'rat'
	úzɛtɪ-	'Uzet clan'	kafʊ-	'thorn'
	úde-	'soft grass sp.'	dakú-	'tree '

As already noted, sequences of identical and non-identical vowels occur. Please refer to (13) above for sequences of same vowels. Sequences of different vowels are shown below in a couple of phonological syllable types:

(25)	*CVVC*		
	ɪɔ	míɔkɔ-	'mamba'
	ɪa	mɪlíárɪ-	'plant sp.'
	ei	keídzo-	'wild potato-like plant sp.'
	eu	leúzo-	'charcoal'
	ɛʊ	mɛʊra-	'Superb starling'
	aɪ	gwaíts'í-	'giraffe'
	aʊ	lɔkaʊɗé-	'weevil'
	au	kaúdzo-	'plant sp.'
	ɔɪ	kɔíná-	'whiff'

	ou	lóúpee-	‘plant sp.’
	ua	lósuaɲa-	‘stone anvil’

(26) *CVV*

ia	emusia-	‘plant sp.’
io	tsarió-	‘weaver-bird’
ɪɛ	aríé-	‘small intestines’
ɪʊ	ɟɪlíú-	‘bird sp.’
ɛa	dɛá-	‘leg/foot’
ai	loɓáí-	‘bone disease’
ao	máó-	‘lion’
oi	isókói-	‘Euphorbia sp.’
oe	tsoé-	‘hunting dog’
ʊɛ	yʊɛ́-	‘falsehood’
ue	cué-	‘water’

Vowel pairs not attested in the data include: *ie, iu, uo, oa, ɛɪ, ɛɔ, ʊɪ, ʊa, ʊɔ, ɔɛ, ɔʊ, ɔa, aɛ*, and *aɔ* (though they are found across morpheme boundaries).

Some vowel sequences must be analyzed as diphthongs or as glides + vowels because a) they clearly consist of two vocalic targets and b) they consist of one tone-bearing unit (see discussion under §2.2.2). These include: *ɪ̯ɛ, ɪ̯a, ɪ̯ɔ, ɪ̯ʊ, e̯a, ɛ̯a*, and *e̯o*, and are found in few words like the following:

(27)

ɪ̯ɛ/yɛ	ɪ̯ɛ́ɓ-	‘cold’
	ɪ̯ɛɗ-	‘be far’
ɪ̯a/ya	ɪ̯án-	‘converse’
	ɪ̯áŋ-	‘rest’
	ɪ̯át-	‘add’
ɪ̯ɔ/yɔ	ɪɔ́k-	‘flower (v)’
ɪ̯ʊ/yʊ	ɪ̯ʊm-	‘capture a bride’
e̯a/ĕa	e̯akw^{a}	‘man’
	e̯as	‘truth’

e̯o/ĕo	e̯ód-	‘be full’
ɛ̯a/ĕa	ɛ̯án	‘sister-in-law, co-wife’
	ɛ̯áát[a]	‘his/her sister’

The Ik diphthong-like sounds are found only root-initially. In all but two identified cases, this means they come word-initially. But if a root is reduplicated, the sound may appear stem-internally, as in the following:

(28)	ɪ̯au-ɪ̯au-	(yawɪyaw[a])	small stream
	i̯uk-u̯úk-	(yukúúk-)	force in

2.3 Summary of allophonic realizations

The preceding sections describe Ik contrastive consonant and vowel sounds. They also introduced a variety of allophones arising from different phonological and syntactic environments. The present section summarizes these allophonic realizations according to environment because many environments affect both consonants and vowels in similar ways.

2.3.1 Devoicing

The Ik phonology-syntax interface strictly observes the right-edge of speech and does so by universally devoicing the final segment (consonant or vowel), regardless of the morpheme type involved. Voiced consonants are partially devoiced in this environment, and voiced vowels are either fully devoiced, reduced to a feature (like labialization) or deleted (rendered inaudible). This devoicing can be captured in the following aphorism:

(29) *Phonological Rule 1 (P1)—Final Devoicing*

- “A voiced vowel devoices before a pause.”
- “A voiced consonant devoices before a pause whether followed by a devoiced vowel or not.”

The data below illustrate devoicing in consonants and vowels. The first column of (30) gives the abstract lexical form of the nouns (to show their final vowels), and the second column shows how the nouns surface phonetically in the final-form of the oblique case (see §6.3.1):

(30)	rébe-	→	[rêb̥e̥]	‘finger millet’
	édi-	→	[êd̥i̥]	‘name’
	sega-	→	[sèg̊ḁ]	‘Umbrella Thorn’
	taɓá-	→	[tāɓ̥ḁ]	‘rock’
	moriɗo-	→	[mòrìɗ̥o̥]	‘beans’
	emé-	→	[ēm̥]	‘meat’
	eŋúnú-	→	[ēŋúnʷ]	‘lastborn’
	wɛla-	→	[wɛ̀l̥]	‘opening’
	baro-	→	[bàr̥]	‘herd’

As (30) shows, if the devoiced vowel is a back vowel, it may leave a trace of labialization on the preceding nasal, as in *eŋúnú-* ‘lastborn’ → [ēŋúnʷ].

The impact that pre-pause devoicing has on final consonants and vowels ultimately depends on the particular combination of consonant and vowel. This is also true for neighboring Toposa (Schröder & Schöder 1987:19) and Turkana languages (Dimmendaal 1983:32). In Ik, there is a general but violable tendency for devoiced vowels to become completely inaudible after fricatives /f, s, z, ʒ/, nasals /n, m, ɲ, ŋ/, and liquids /l, r/. The degree to which holds true depends on such factors as idiolect, speech rate, and other yet unknown articulatory or pragmatic factors. If, however, the devoiced vowel in question is needed for meaning, it is pronounced as whispered regardless of the preceding consonant. This happens, for example, with the instrumental case. Compare the following final (pre-pause) forms of nouns with the nominative suffix {-a} and the instrumental suffix {-ɔ}:

(31)	*Nominative*	*Instrumental*	
	bíbᵃ	bíbᵒ	‘dove’
	ɓiɓᵃ	ɓiɓᵒ	‘egg’
	kucᵃ	kucᵒ	‘hyrax den’
	édᵃ	édᵒ	‘name’
	ɗiɗᵃ	ɗiɗᵒ	‘donkey’
	kaf	kafᵓ	‘thorn’
	dzógᵃ	dzógᵒ	*Pappea capensis* tree sp.
	kíʝᵃ	kíʝᵒ	‘land’
	cúrúkᵃ	cúrúkᵒ	‘bull’
	ɗɛrɛ́ƙᵃ	ɗɛrɛ́ƙᵓ	‘wasp’
	ɲól	ɲólᵒ	‘dik-dik’
	ʝʊm´	ʝʊmᵓ´	‘soil’
	kwan´	kwanᵓ´	‘penis’
	lewɛɲ	lewɛɲᵒ	‘ostrich’
	cɛŋ´	cɛŋᵓ´	‘wood-pecker’
	kopᵃ	kopᵓ	‘vulture’
	gúr	gúrᵒ	‘heart’
	bos	bosᵒ	‘ear’
	botᵃ´	botᵒ´	‘load’
	bakutsᵃ´	bakutsᵒ´	‘chest’
	ƙʊtsʾᵃ´	ƙʊtsʾᵓ´	‘insect’
	sɛwᵃ	sɛwᵓ	‘stick’
	ƙwaz	ƙwazᵒ	‘article of clothing’
	míʒɪʒ	míʒɪʒᵓ	*Hippocratea africana* plant sp.

Ik nouns spoken in isolation are typically in the nominative case. So throughout this grammar, the nominative case suffix {-a} in its non-final form is written as a raised vowel everywhere except after /f, s, z, ʒ, m, n, ɲ, ŋ, l, r/. Even though there is some variation among speakers, the line must be drawn somewhere in terms of how to represent such forms.

Even after consonants other than fricatives, nasals, and liquids, the tendency to soften the final element of a word or phrase may lead an Ik speaker to eliminate the final vowel entirely, leaving only a consonant. This type of consonantal unrelease is in free variation with releasing the final vowel in a whispered puff. Compare the two possible surface pronunciations of five nouns in the final-form oblique case:

(32)	rébe-	→	[rêb̥ẹ̥]	/	[rêb̥ˀ]	‘finger millet’
	édi-	→	[êd̥i̥]	/	[êd̥ˀ]	‘name’
	sega-	→	[sèg̊ą̊]	/	[sèg̊ˀ]	‘Umbrella Thorn’
	taɓá-	→	[tāɓ̥ą̊]	/	[tāɓ̥ˀ]	‘rock’
	moriɗo-	→	[mòrìɗo̥]	/	[mòrìɗˀ]	‘beans’

As note above in §2.2.2, vowels can surface fully voiced before a pause. This can happen, for example, when a stem ends in a VV sequence. The last vowel in the pair is devoiced, allowing the first to surface with voicing. If the two vowels are identical, the devoiced vowel tends not to be audible at all—in other words, deleted. If the vowels are different, the devoiced vowel will remain as a whispered puff. A devoiced /a/ can at times cannot be distinguished from a mere puff of aspiration. These tendencies are illustrated below with a set of nouns ending in VV in the oblique case:

(33)	didii-	→	[dìdì]	‘rain’
	séí-	→	[séi̥]	‘quartz’
	sábai-	→	[sábài̥]	‘fatty stomach lining’
	muceé-	→	[mūtʃē]	‘path’
	ŋǩwaá-	→	[n̪̄kʼwāʰ]	‘traditional healer’
	girúu-	→	[gīɾú]	‘locust’
	ɗóɗoo-	→	[ɗóɗò]	‘sheep’
	demio-	→	[dèmìo̥]	‘Wild Olive tree’
	ɗaʊ-	→	[ɗàʊ̥]	‘knife’

2.3.2 Place assimilation

Ik consonants and vowels may shift their place of articulation slightly to accommodate to other nearby segments. On the side of consonants, this assimilation affects nasals and velars. Nasals must be articulated at the same place as a consonant immediately following them (except when vowel syncope is involved; see §2.1.3 above), and velars shift slightly forward [Ç̣] before front vowels and slightly backward [Ç] before back vowels, as in:

(34)	ƙʊtsʾᵃˊ	→	[k̟ʾʊ̄tsʾa̰]	‘insect’
	ƙɔɓᵃ	→	[k̟ʾɔ̰ɓa̰]	‘navel’
	ƙíwᵃ	→	[k̟ʾíw̰a̰]	‘leather strap’
	ƙɛƙér	→	[k̟ʾɛ̄k̟ʾér̰]	‘grasshopper’
	ƙaƙᵃ	→	[kʾàkʾa̰]	‘hunt’

A similar situation is found in neighboring Turkana where [q, χ, ɣ, ʁ] are all allophones of /k/ (Dimmendaal 1983:9), and in Dhaasanac where /k/ is uvularized to [q] before back vowels /a, o, u/ (Tosco 2001:21).

On the side of vowels, place assimilation raises the low central vowel /a/ to [a̰] or [æ] following palatal consonants like /c, ɟ, ɲ/:

(35)	ɟanˊ	→	[ʃǣn̰]	‘broom’
	caál	→	[tʃǣːl̰]	‘hearth-stone’
	ɲátatsᵃˊ	→	[ɲætātsa̰]	‘spike trap’

Ik vowel height assimilation recalls Dhaasanac where /a/ also raises to [æ], before instead of after palatal consonants and glides (Tosco 2001:27). Similarly, a few words traceable back to Teso-Turkana (T-T) origins show the raising of /a/ to [æ] after the (semi-)vocalic target /ɪ/ or /ts/:

(36)	ɻán-ɔ́n	→	[ɻǽnɔ́n̥]	‘to converse’	(T-T *ak-ɪan*)
	ɻát-és	→	[ɻǽtés]	‘to add’	(T-T *ak-ɪat-akin*)
	ɪtsan-ɛs´	→	[ītsǣnēs]	‘to disturb’	(T-T *ak-ɪcan*)
	tsam-és	→	[tsǣmés]	‘to like’	(T-T *a-camɪtt*)

With the latter two examples of (36), Ik speakers often reanalyze the raised /a/ as /ɛ/, thereby rendering *ɪtsɛnɛs´* ‘to disturb’ and *tsɛmés* ‘to like’.

A final lexeme of unknown etymological origin exhibits /a/-raising without apparent phonetic motivation, and that is: *kwaár* → [kwǽːɾ̥] ‘baboon troop’.

Place assimilation processes in Ik are verbalized in the following aphorisms:

(37) *Phonological Rule 2 (P2)—Place Assimilation*

- “Nasal consonants must be articulated at the same place as a consonant immediately following (except after syncope).”
- “Velar consonants shift slightly back or front to accommodate the back or front vowel that follows them.
- “The low central vowel /a/ is raised slightly when following high segments like palatals, alveolars, or high vowels.”

2.3.3 Glottalic effects

Two types of allophony have to do with glottalic consonants: implosives and ejectives. The first type affects consonants and involves a) the weakening of an ejective to an implosive (*Implosivization*) or b) the weakening of either an ejective or implosive to a glottal stop (*Debuccalization*). The second type involves vowels given a creaky quality (*Laryngealization*) when surrounded by glottalic consonants. Glottalic effects on consonants are discussed first.

Implosivization: The velar ejective /ƙ/ often surfaces as a voiced velar implosive [ɠ]. Schrock 2011 offers an hypothesis on the articulatory motivation for this allophony. Based on observation and on practice making

these sounds, it seems that making the ejective requires more muscular tension and articulatory effort than does the implosive. So, in fast or casual speech, the speaker makes only half an attempt at the ejective, and this results in a sound approximating an implosive. Examples include:

(38)	ƙɛƙɛ́r	→	[ɠɛ̄ɠɛ́r̥]	‘grasshopper’
	tɔƙɔtɔƙ́	→	[tɔ̄ɠɔ̄tɔ̄k̟˺]	‘slug/snail’
	ƙaƙa-aƙɔ-kᵉ	→	[ɠàɠà:k̟ɔ̀k̟ɛ̯]	‘for hunting’

In Ik, implosivization appears to be an historical as well as a current phenomenon. As Heine pointed out, older Ik speakers often retain ejective sounds where younger ones prefer implosives (1999:14). Take for example the following set of three, adapted from Heine:

(39)		*Older*	*Younger*	
	/tl’→ɟ/	tl’aɓú-gwa	ɟaɓú-gwa	‘guinea-fowl’
	/ts’→ʄ/	ts’ań	ʄań	‘louse’
	/ƙ→ɠ/	zɛƙẃ	zɛɠẃ	‘sit’

In such lexical pairs, Heine certainly captured a chronolectal variation, but the situation today is not so clear cut. True, the lateral affricate ejective /tl’/ is entirely lost, but /ts’/ and /ƙ/ are still widely used across generations.

Debuccalization: An implosive, or an ejective-turned-implosive, may further weaken into a glottal stop [ʔ]. Although speakers of all ages do this, it is more often heard among the young. Frequent examples include these below:

(40)	bia=ɟɪ	→	[bīāʔī]	‘you (sg.) too’
	ntsíó ɗa=ke	→	[n̤tsíó ʔà kè]	‘There it is!’
	ŋƙáƙá-kwɛtᵃ́	→	[ŋ̤ʔáʔá-kwɛ̄tạ̯]	‘right hand’
	ƙéd-ayé	→	[ʔêdājé]	‘there’
	ɓɛƙés	→	[ɓɛ̄ʔés]	‘to walk’

(40) shows that glottal stops arising from weakened glottal consonants can occur word-initially and word-medially. No glottal stops have been found word-finally, or as allophones of the bilabial implosive /ɓ/ or the alveolar affricate ejective /ts'/. Therefore only /ɗ/, /ʄ/, and /ƙ/ are affected.

Finally, vowels may be creaky (laryngealized) in the vicinity of glottalics like ejectives or a glottal stop. Examples include: *ŋƙáƙ*^{a} → [ŋ̄k'a̰k'a̰] 'food', *ɓɛƙés* 'to walk' → [ɓɛ̰̄k'ḛ̰s], and *ƙɛƙér* 'grasshopper' → [k'ɛ̰̄k'ḛ̰r̰].

To conclude, glottalic allophonic processes can be summarized as follows:

(41) *Phonological Rule 3 (P3)—Glottalic Consonant Weakening*

- "A velar ejective may weaken to an implosive."
- "The implosives /ɗ, ʄ/ and the ejective /ƙ/ may further weaken to a glottal stop [ʔ]."

Phonological Rule 3 (P3)—Vowel Laryngealization

- "A vowel adjacent to glottalic consonants may become creaky."

2.4 Syllables

The concept of the syllable is invoked here to account for peaks of vocal energy or sonority and the types of sounds that can enclose them. It is also a useful analytical tool for describing phenomena like: epenthesis, syncope, haplology, desyllabification, and metathesis. Because of the pre-pause devoicing of vowels in Ik, it is necessary to distinguish phonological syllables from phonetic syllables. In the phonological, or underlying syllable structure, the devoiced vowels are fully present. Whereas in the phonetic syllable, they are not. This means that for Ik, syllable structure differs significantly between the underlying and surface levels.

2.4.1 Phonological syllables

In Ik, all phonological syllables can be generated by the template: (C)V. This maximal syllable template produces the open syllables V and CV:

(42) *Ik phonological syllable types*

V	single vowel
CV	open with single vowel

Any V can be a vowel, diphthong, or syllabic nasal (only directly before another non-nasal consonant). And any consonant (C) may be a simple consonant or a complex consonant (consonant plus glide). The absence of VV sequences in underlying representations is due to their being analyzed as two syllabic peaks. This is because they do not behave as a single unit. The same has been claimed for neighboring Turkana (Dimmendaal 1983:34, 50) and for some languages in wider Eastern Nilotic (Dimmendaal 1995:151). Ik VV sequences consist of two tone-bearing units and can involve nearly any sequence of like or different vowels (see §2.2.1 and §2.2.3 above).

The following lexical noun roots illustrate a few phonological syllable combinations. At the surface level, with phonetic syllable types, each of these words would syllabify according to different parameters:

(43) *Phonological syllabification*

V.CV	í.nó-	‘animal’
	é.di-	‘name’
	a.ká-	‘mouth’
	ɔ́.za-	‘bottom’
	ú.de-	‘soft dry grass’
CV.CV	sɪ.sí-	‘honey-beer’
	ce.kí-	‘woman’
	ƙa.ƙa-	‘hunt’

	ɓó.ré-	‘corral’
	gú.ró-	‘heart’
CV.V	ƙí.ɔ́-	‘leather strap’
	dɛ.á-	‘leg’
	má.ó-	‘lion’
	tso.é-	‘wild hunting dog’
	ku.a-	‘grass’

Syllabic nasals are found in just a few environments, for example:

(44)	V.CV	ŋ̍.ka	[ŋ̍kạ]	‘I’
		n̩.tsa´	[n̩̄tsạ]	‘s/he/it’
		ŋ̍.ƙe´	[ŋ̍̄k’ẹ]	‘Eat!’

Complex onsets involving a consonant-glide (CG) combination are rather more common. In Ik, these come from two sources: 1) desyllabified high vowels that lose their mora, causing compensatory lengthening on the following vowel and 2) lexicalized consonant-glide complexes. The first type is discussed below in §2.4.3, while the second type is exemplifed in (42). At the phonological level, these CG sequences are found only in onsets:

(45) *Consonant-glide combinations*

di.kwá-	‘dance, song’
gwa.á-	‘bird’
kwa.rá-	‘mountain’
ƙwa.za-	‘clothing’
ŋwa.á-	‘female’
gwá.mó.ni-	‘to stand’
i.ɓwa.te.sí-	‘to handle roughly’
i.mwá.ŋɔ́.ni-	‘to shift the eyes’

	i.rwa.te.sí-	‘to sprinkle’
	i.twa.re.sí-	‘to chase away’

The semi-vowel /y/ may also appear in an onset, though more rarely:

(46)	i.syó.nó.ni-	‘to have pity’
	i.tsyá.ké.to.ni-	‘to begin’
	i.tsyá.tó.ni-	‘to be resistant’
	i.tya.ke.sí-	‘to forge’

Semi-vowels of the second type mentioned above can be analyzed as back vowels underlyingly. Though at present it is not possible to recover whether a given Cw, for example, is Co, Cɔ, Cu, or Cʊ, there is evidence they have the same moraic value as other vowels. As described ahead in §4.2.1, the assignment of Ik pluratives in some cases references the number of moras in a noun root. Nouns with two moras take a particular suffix, while nouns with three or more take a different one. As it turns out, nouns with the profile CGVCV pattern not with CVCV nouns but with CVCVV and CVCVCV nouns. This means that in terms of syllable weight, at least, the semi-vowel is ‘read’ as a vowel. In this light, compare the following examples:

(47)	CVCV	ƙɔɓa-	→	ƙɔɓ-ítín	‘navel(s)’
	CVCVV	ƙɔfɔ́ɔ-	→	ƙɔfɔ́-ɪkᵃ	‘small gourd(s)’
	CGVCV	ƙwaza-	→	ƙwáz-ɪkᵃ	‘clothing (pl.)’
	CVCVCV	ƙɔɗɔta-	→	ƙɔ́ɗɔ́t-ɪkᵃ	‘hooked ladder(s)j’

In (47), only the first noun with a CVCV syllable structure takes the plurative {-ítíní-}. Note that the three following nouns all take the plurative {-ɪka}, including the one with a CG sequence: *ƙwaza-* ‘clothing (sg.)’. Apparently then, the semi-vowel has the same moraic value as a vowel. As a result, it is possible to syllabify forms like *ƙwaza-* in the following two ways:

(48)	gwa.sá-	OR	gu.a.sá-	‘stone’
	kwa.rá-	OR	ko.a.rá-	‘mountain’
	kwɛ.tá-	OR	kɔ.ɛ.tá-	‘hand, arm’

Interestingly, other similar words like *kwaní-* ‘penis’ pattern with CVCV nouns, its plural surfacing as *kwanítín* not ***kwánĩk*^{a}. Also, the fact that the noun *dɛá-* ‘leg, foot’ pluralizes as *dɛɪk*^{a} suggests that depressor consonants like /d/ count for one mora in the mora-counting plurative inflection. So there are exceptions, perhaps hiding yet undiscovered relevant factors.

Because of the large number of consonants that can form complex onsets with semi-vowels (11 out of 30), it was decided not to treat each complex as a separate phoneme. It could happen that further historical insight into Ik will require the positing of at least some labialized phonemes like the velars.

2.4.2 Phonetic syllables

The universal devoicing of vowels before pauses means that at the surface level, closed syllables are attested. Closed phonetic syllables account for the cases where a final vowel is devoiced, leaving an unreleased final consonant. If, on the other hand, the devoicing leaves a whispered vowel, it may be analyzed as syllabic, non-syllabic, or extra-syllabic. The descriptive framework permits all three interpretations at the phonetic level.

Closed phonetic syllables may contain a complex VV nucleus, though as noted above, these are treated as V.V at the phonological level. This is also what has been claimed for Turkana (Dimmendaal 1983:50). Thus, at the surface level, the template (C)V(V)(C) is a more accurate generator of allowable phonetic syllable types, such as these shown below:

(49) *Ik phonetic syllable types*

V	single vowel
VV	double vowel
CV	open with single vowel
CVV	open with double vowel
CVC	closed with single vowel
CVVC	closed with double vowel

It may be helpful now to make a comparison between phonological and phonetic syllable types. This can be done by syllabifying various items both at an underlying level and at the surface level:

(50)

Phonological syllable		*Phonetic syllable*		
V.V	é.é	VV	[éé]	'yes'
CV.CV	ŋó.kí-	CVC	[ŋókį̥]	'dog'
CV.V.CV	ƙwa.a.tí-	CVVC	[kʼwăátį̥]	'frog'
CV.CV.V	tsʼé.ˡdé.é	CV.CVV	[tsʼêdˡéé]	'there'
CV.CV.V.CV	cu.cwá.á.na	CV.CVVC	[tʃūtʃʷá:n̥]	'It's liquid.'

2.4.3 Syllabification methods

Ik words are syllabified left-to-right, and syllable onsets are maximized. The following lengthy noun and verb stems illustrate normal syllabification:

(51)

a.rá.gwa.nɛ́ɛ́.bɪ.tín	V.CV.CV.CVV.CV.CVC	'new moon'
a.lá.máá.rá.nón	V.CV.CVV.CV.CV.CVC	'to sway'

When morphemes are strung together, the normal method of syllabification may be challenged. In such cases, Ik has ways of resyllabifying the string to form allowable syllable types. These procedures include epenthesis, syncope, haplology, and desyllabification, all described below.

Epenthesis: Whenever a CVC lexical root is fully reduplicated, a disallowed consonant cluster (CVC.CVC) is created word-internally. If this happens, an epenthetic vowel is inserted to break up the cluster. The default epenthetic vowel in Ik is /ɪ/ or /i/ (which may be backed to /ʊ/ or /u/):

(52)	*bot.bot-	→	bo.ti.bot-	'be nomadic'
	*cɛm.cɛm-	→	cɛ.mɪ.cɛm-	'be combative'
	*kɛt.kɛt-	→	kɛ.tɪ.kɛt-	'pitter-patter'
	*sʊr.sʊr-	→	sʊ.rʊ.sʊ́r-	'be lanky'

Syncope: Vowels may be deleted in words for two reasons: 1) They fall between a nasal and non-nasal consonant, or 2) they occur in a disallowed VVV sequence. In the first environment, when a nasal is the onset of a word-medial syllable, and its vowel nucleus is deleted, the nasal then becomes part of the VV nucleus of the preceding syllable as in the following:

(53)	ma.rá.ŋí.té.su.ƙot$^{i\prime}$	→	ma.ráŋ́.té.su.ƙot$^{i\prime}$	'to heal'
	ɪ.tsʊ.ŋʊ.ƙɔt$^{\varepsilon\prime}$	→	ɪ.tsʊŋ.ƙɔt$^{\varepsilon\prime}$	'Burn (it)!'
	ŋí.ki.swa.hí.lí.tod^{a}	→	ŋ́.ki.swa.hí.lí.tod^{a}	'Kiswahili'

In the second environment—when a disallowed VVV sequence appears at the juncture of two morphemes—one of the first two vowels is deleted. This can be illustrated by affixing the non-final Accusative case morpheme {-a} to a couple of noun roots ending in a VV sequence:

(54)	hɔ́tɔɔ-	→	**hɔ́tɔɔ-a	→	hɔ́tɔa…	'egret-ACC'
	muceé-	→	**muceé-á	→	mucéá…	'path-ACC'

Haplology: When two identical or very similar consonants occur in adjacent morphemes, the first similar consonant may be deleted. The loss of a syllable onset means that the string of segments has to be resyllabified:

(55)	ʃá.ní.ni.o muɲ^{u}	→	ʃá.í.ni.o muɲ^{u}	‘from all directions’
	de.ti.duk$^{o\prime}$	→	de.i.duk$^{o\prime}$	‘And you (sg.) bring (it).’

In the first example of (55), the /n/ in *ʃán* ‘direction’ is lost before the /n/ in the possessive plurative {-ını-}. Likewise, in the second example, the /t/ in *det-* ‘bring’ is lost before the /d/ in the second person singular suffix {-ídi-}.

Desyllabification and Compensatory Lengthening: A back vowel /o, ɔ, u, ʊ/ may desyllabify to /w/ if preceded by a consonant and following by another vowel. A front vowel /i, ɪ/ may also desyllabify to /y/ in the same context. If this happens, the mora (syllabic weight unit) of the desyllabified vowel shifts to the vowel of the suffix, causing it to lengthen in compensation:

(56)	bién	→	[byɛ́ːn̥]	‘yours’
	cuán	→	[tʃwɑ́ːn̥]	‘It’s liquid.’
	dzúám	→	[ʣwáːm̥]	‘thief’
	egíade = nak^{a}	→	[ēgyâːdènàkạ̊]	‘I put it there (earlier).’
	ídoe	→	[îdwèː]	‘in the milk…’
	ɟʊés	→	[ʃwɛ́ːs]	‘to roast’
	ŋués	→	[ŋwɛ́ːs]	‘to grab’
	epúáw^{a}	→	[ēpwáːw̥ạ̊]	‘sleeping place’
	taítaíón	→	[tāítāyóːn̥]	‘to spin’
	tsɔa	→	[tswàː]	‘Now?’

At the surface level, desyllabification of this type is the source of many semi-vowels acting as allophones of underlying vowels.

Methathesis: Onsets of successive syllables may swap places with each other. Interestingly, when this happens, the swapped onsets may or may not take the voicing quality of the onset that they replaced. This type of metathesis has only been observed in the following three words:

(57)	zi.kí.bon	→	gi.sí.bon	‘to be tall’
	kí.dzi.me.ton	→	tsí.gi.me.ton	‘to come down’
	gaú.sú.mon	→	saú.kú.mon	‘to be shaggy’

Isolated cases of different kinds of metathesis include *fúlukurú* ‘turaco’ → *kúlufurú* and *nanŋmŋ* ‘axe-head’ → *naŋmŋm*. For the latter case, native speakers argue over which form is original and which one methathesized.

2.5 Morphophonology

Besides the sound changes that happen in phonological environments, some consonant and vowel changes happen in certain morphophonological environments (at the boundaries of specific morphemes and not others). These include haplology, de-affrication, and non-final deletion for consonants; and for vowels, several types of vowel assimilation.

2.5.1 Haplology

For Ik, *haplology* refers to the process whereby the first of two consonants made at the same place of articulation in certain adjacent morphemes is deleted. Presumably this has its origin in ease of pronunciation. Haplology has only been observed affecting the consonants /k, ƙ, n, t/—that is, two velars and two alveolars. Not only does haplology involve only those four consonants but only those four in specific morphological environments, i.e:

(58) *Morphophonological Rule 1 (M1)—Haplology*

- A root-final /k/ or /ƙ/ may be deleted before the andative/completive suffix {-ʊƙɔtí-} or the plurative III {-ɪka-}.
- A morpheme-final /n/ may be deleted before an adjacent morpheme also containing /n/.
- The /t/ in the venitive/inchoative suffix {-ɛt-} and the andative/completive suffix {-ʊƙɔtí-} may be deleted before the /t/ in the 2SG, 1PL.INC, and 2PL subject-marking suffixes.

The first such environment is when a lexical root ending in /k/ or /ƙ/ is followed by the andative/completive suffix {-ʊƙɔtí-}. In this environment, the root-final /k,ƙ/ is deleted, as the following verbs show:

(59) *Luuƙotuk.*
luƙ-uƙót-u-kº → lu-uƙó-tu-kº
swallow-COMP-3SG-SEQ
And s/he swallowed (it).

(60) *Kooƙotuk.*
kɔk-ʊƙɔ́t-ʊ-kᵊ → kɔ-ɔƙɔ́t-ʊ-kᵊ
close-COMP-3SG-SEQ
And s/he closed (it).

The second morphophonological enviroment involves a noun root ending in /k/ pluralized by the plurative III {-ɪka-}. When this environment arises, the root-final /k/ deletes before the /k/ of the plurative suffix:

(61) *baciika muŋ*
bácík-ik-a muŋ → bácí-ika muŋ
area-PL-NOM all
all areas

The third morphophonological environment involves /n/ and comprises two different morphemic combinations. First, when the impersonal passive suffix {-aní-} is followed by the recent past tense clitic *=náka*, the /n/ in the suffix is deleted before the /n/ in the clitic:

(62) *Ŋjabitetaa nak.*
ŋáb-it-ét-an-a=nakª → ŋáb-it-ét-a-a=nakª
wear-CAUS-INCH-IPS-REAL=PST1
S/he was dressed.

Second, when a noun root ending with /n/ takes the possessive plurative {-ɪnɪ-}, the root-final /n/ gets deleted, as in the following noun phrase:

(63) *xainio muŋ*

ʃán-íni-o	muŋ	→	ʃá-íni-o muŋ
direction-POSS.PL-ABL	all		
from all directions			

The fourth morphophonological enviroment causing haplology involves the venitive/inchoative suffix {-ɛt-}. When this suffix is followed by any of the subject-agreement marking suffixes that contain an alveolar consonant, the /t/ in the suffix is deleted. This happens with 2SG, 1PL.INC, and 2PL, as shown in the following table. Note the missing /t/ in those three root forms:

(64) *Haplology in the venitive/inchoative paradigm*

1SG	det-í	'I bring.'
2SG	dé-íd[a]	'You (SG) bring.'
3SG	det-[a]	'S/he brings.'
1PL.EXC	det-ím	'We (EXC) bring.'
1PL.INC	de-ísín	'We (INC) bring.'
2PL	de-ít[a]	'You (PL) bring.'
3PL	det-át[a]	'They bring.'

The fifth and final haplological environment is similar to the previous one in that in involves /t/ and subject-agreement suffixes. But in this case, it is the andative/completive suffix {-ʊkɔtí-} that loses its /t/ before the 2SG, 1PL.INC, and 2PL verb forms. Take note of the missing /t/ in those forms:

(65) *Haplology in the andative/completive paradigm*

1SG	d-ʊkot-í	'I take.'
2SG	d-ʊkó-íd[a]	'You (SG) take.'
3SG	d-ʊkot[a]	'S/he takes.'
1PL.EXC	d-ʊkot-ím	'We (EXC) take.'

1PL.INC	d-uƙo-ísín	‘We (INC) take.’
2PL	d-uƙo-ít[a]	‘You (PL) take.’
3PL	d-uƙot-át[a]	‘They take.’

That exhaustively completes the recorded instances of haplology in Ik and the morphophonological contexts that induce it. Haplology is marginally optional: It is grammatical for a speaker to circumvent haplology in very careful speech, but by all indications it is vastly preferred in these contexts.

The fact that haplology is restricted to certain morphophonological environments—as opposed to being a general rule—can be amply demonstrated by words such as the following in which it fails to occur:

(66)	/k-k/	kakák[o]	‘It’s a leaf.’
		sısık ák[e]	‘in the middle’
		lókók[a]	‘worker ant’
	/ƙ-ƙ/	dúlúƙuƙú	‘small oval gourd’
		ƙaƙak[e]	‘in the hunt’
		ɲéturuƙúƙu	‘bone on chicken’s back’
	/n-n/	asunán	‘African pencil cedar’
		ımánán	‘Castor-oil plant’
		seínení	‘*Stereospermum kuntianum* tree’
	/t-t/	akatát[a]	‘gourd lid’
		botetam	‘wood chip’
		Tutét[a]	‘Tutet Mountain’

Nevertheless, one instance of intra-morphemic haplology has been observed: *ɲɔ́kɔkɔr* ‘chicken’ → *ɲɔ́ɔkɔr*. This resembles Turkana haplology (Dimmendaal 1983:47-48), and indeed the word is borrowed from Turkana.

Haplology has also left an imprint on the Ik lexicon. The verb roots ‘bring/take and ‘give’ have different forms depending on which verbal extensions are attached to them. They have a shorter root with any verbal suffix but the andative {-ʊkɔtí-} and a longer root form with the andative:

(67)	d-et-és	‘to bring’
	duk-és-úkot[a]	‘to take’
	me-és	‘to give (generally)’
	me-et-és	‘to give (this way)’
	mak-és-úkot[a]	‘to give (out/away)’

Looking at (67), it is not immediately clear whether the root for ‘give’ is *ma-* (*me-* when the vowel is assimilated by the following vowel) or *mak-*. It is also not clear whether the root for ‘bring/take’ is *d-* or *duk-*. Haplology in current Ik phonology gives a clue that the longer forms are original. In the imperative singular forms of these verbs with the andative—*ma-kot-*[e] and *d-ukot-*[e]—the velar /k/ in the root seems to have been deleted before the /k/ in the andative suffix. Speakers then re-interpreted the shorter forms (*ma-* and *d-*) as roots unto themselves and began extrapolating forms like *me-et-és* and *d-et-és* instead of *mak-et-és* and *duk-et-és*.

2.5.2 De-affrication

In the introduction of this grammar, the Ik word for themselves (*Ik*[a]) and the Ik word for ‘head’ (*ik*[a]) were said to be homophonous in the nominative case. In accordance with their homophony, it has been suggested that the Ik people were the ‘head’ of ancient migrations. But their being the same word historically is challenged by the fact that in the other cases, their base forms are different: *icé-* ‘Ik’ and *iká-* ‘head’. Comparing the full case declensions of these two noun roots opens up the discussion of *(de-)affrication*:

(68) *Non-final case paradigm for* icé- *'Ik' and* iká- *'head'*

	'Ik'	'head'
Base form	icé-	iká-
OBL	ice	ika
NOM	ik-a	ik-a
INS	ik-o (ic-o?)	ik-o
ABL	icé-ó/icó-ó	ikó-ó
GEN	icé-é	iké-é
ACC	icé-á	iká-á
DAT	icé-é	iké-é
COP	icé-ó/icó-ó	ikó-ó

As discussed further in §6.3, the Ik nominative and instrumental case suffixes first subtract the final vowel of the root to which they attach. This means that for *icé-* 'Ik', once the /é/ is deleted, the /c/ is directly exposed to the nominative suffix {-a} or the instrumental suffix {-ɔ}. So, unlike in other regional languages where affrication of /k/ to /c/ before high vowels is common (e.g. Luganda), (68) presents a situation in Ik where /c/ de-affricates to /k/ before non-front vowels /a/ and /o/. De-affrication is also attested in other roots similar to *icé-*, like *wicé-* 'children' and *ɲ́ci-* 'I'.

This type of de-affrication applies only at the morpheme boundary between noun root and two case suffixes. If it applied more generally, one would expect words like *caalí-* 'hearth-stone' to become **kaalí-*, which it does not. Ik de-affrication can be captured in the following aphorism:

(69) *Morphophonological Rule 2 (M2)—De-affrication*

- In noun roots ending in the sequence /cV-/, the /c/ 'hardens' to [k] when the final vowel is substracted by the nominative or instrumental case suffixes.

As a final note, a trend toward de-affrication has been noted among younger speakers and those from certain areas (like *Loúsúna* valley). These speakers

like to pronounce words like *jeje-* 'leather mat' as *gege-* and *ɲjíní-* 'we.INC' as *ŋgíní-*. Obviously, in these examples, the phonological motivation (de-affrication before non-high vowels) is not the same as in (68), since both words contain front vowels. So this type of de-affrication may just be an idiosyncratic preference of some speakers, or it may have historical explanations not immediately recognizable today.

2.5.3 Non-final deletion

Non-final deletion refers to the situation where the final consonant of a morpheme is deleted in phrase-medial environments (i.e., not before a pause). So it occurs in the exact opposite environment as devoicing (§2.3.1):

(70) *Morphophonological Rule 3 (M3)—Non-final deletion*

- In many grammatical morphemes ending in the sequence /…CV/, the consonant (C) is deleted in phrase-medial positions.

Although it can affect any class of morpheme, non-final deletion must be considered morphophonological because only certain morphemes are affected and not others. Below is a representative sample of the morphemes known to undergo non-final deletion. The reader is referred to the Affix list for more information on identifying each morpheme.

(71) *Non-final allomorphs*

Morpheme	Underlying	Non-final
ACC	-ka	-a
ADV	=jɪkɛ	=jɪɪ
DAT	-kɛ	-ɛ
DP	=ˊdɛ	=ˊɛ
PRF	-ˊka	-ˊa
PST2	=batse	=bɛɛ

2.5.4 Vowel assimilation

Vowel assimilation is widespread in Ik just as it is in neighboring Turkana (Dimmendaal 1983:29). Being aware the various types of assimilation is one of the keys to unlocking the larger system of Ik grammar. The types of assimilation attested include total and partial, regressive and progressive, adjacent and non-adjacent, in several combinations. Each type occurs between certain morphemes and not others, and no type occurs within single morphemes, but only between morphemes. Refer back to §2.2.3 for evidence of non-assimilated vowel sequences within lexical roots.

(72) *Morphophonological Rule 4 (M4)—Vowel assimilation*

- Particular vowel combinations across particular morpheme boundaries tend to assimilate to each other.

Total Regressive Assimilation is when the second vowel in a two-vowel sequence changes the first vowel to make it identical with it. The process may involve rounding, backing, raising, or lowering, depending on the vowels concerned. In Ik this occurs between noun stems and case suffixes and between verb stems and TAM (tense-aspect-mood/modality) suffixes. All vowels may be assimilated in this way, apart from the high [+ATR] /i/ and /u/ and the mid vowels /o/ and /ɔ/. In some cases, one consonant may intervene, making the assimilation non-adjacent. The table in (73) lists the known sequences resulting from *total regressive assimilation*. The arrow (→) signifies the direction of assimilation, i.e. regressive in this case:

(73) *Types of total regressive assimilation*

Rounding/backing	e←o	=	oo
	ɛ←ɔ	=	ɔɔ
Rounding/backing/raising	a←o	=	oo
	a←ɔ	=	ɔɔ
Rounding/backing/lowering	ɪ←ɔ	=	ɔɔ
Backing/lowering	ɪ←a	=	aa

Lowering	ʊ←ɔ	=	ɔɔ
	ɪ←ɛ	=	ɛɛ
Fronting/raising	a←e	=	ee
	a←ɛ	=	ɛɛ

The sequences of assimilated vowels in (73) are found in noun and verb stems like the following:

(74) *Examples of total regressive assimilation*

mucé-ó	→	mucó-ó	path-ABL/COP
mɛsɛ-ɔ	→	mɛsɔ-ɔ	beer-ABL/COP
ɪɗɪm-ɛt-ɔ́s	→	ɪɗɪm-ɔt-ɔ́s	creature
da-on	→	do-on	be.nice-INF
tsá-ón	→	tsó-ón	be.dry-INF
séda-o	→	sédo-o	garden-ABL/COP
gwa-ɔ	→	gwɔ-ɔ	stomach- ABL/COP
ɓɛƙés-í-ɔ	→	ɓɛƙ-és-ɔ́-ɔ	walk-IPFV-3SG-SEQ
sɪsí-á	→	sɪsá-á	honey.beer-ACC
kafʊ-ɔ	→	kafɔ-ɔ	thorn-ABL/COP
ɓɛƙés-í-ɛ	→	ɓɛƙés-é-ɛ	walk-3SG-SIML
da-és	→	de-és	be.nice-INT
tsá-és	→	tsé-és	be.dry-INT
séda-e	→	séde-e	garden-GEN/DAT
ɓɪsá-é	→	ɓɪsé-é	spear-GEN/DAT

A further example of this kind of assimilation in a clausal context is when the negator verb *ńt-* comes before verbs that begin with a vowel:

(75) *Nte enid.*

ńt-á	en-íd^{i}	→	ńt-é en-íd^{i}
not-REAL	see-2SG[IRR]		

You don't see (it).

Partial regressive assimilation, by contrast, occurs when the second vowel in a sequence of two vowels (adjacent or not) changes the first vowel to be more but not totally like it. This assimilation only takes place in Ik when the first vowel is a high front vowel (/i, ɪ/) and the second vowel a mid back vowel (/o, ɔ/), which for nouns might be the ablative or copulative case and for verbs the sequential or plural imperative suffixes. This type of assimilation involves rounding and backing. *Adjacent* partial regressive assimilation affects only the [+ATR] /i/, while the *non-adjacent* type (with /k/ intervening) affects both the [+ATR] /i/ and the [-ATR] /ɪ/:

(76) *Types of partial regressive assimilation*

Rounding/backing	i←o	=	uo
	ɪ←ɔ	=	ʊɔ

These partially assimilated sequences are take from words like:

(77) *Examples of partial regressive assimilation*

ats-i-o	→	ats-u-o	come-3SG-SEQ
ats-íó	→	ats-úó	come-IMP.PL
ɗí-ó	→	ɗú-ó	ones-ABL/COP
cekí-ó	→	cekú-ó	woman-ABL/COP

The non-adjacent type occurs with the final form (FF) of the copulative case marker and the sequential aspect suffix, both of which contain a /k/:

(78) *Examples of non-adjacent partial regressive assimilation*

ats-i-kº	→	ats-u-kº	come-3SG-SEQ.FF
cekí-kº	→	cekú-kº	woman-COP.FF
áts'-í-kˀ	→	áts'-ú-kˀ	gnaw-3SG.SEQ.FF
kɔnɪ-kˀ	→	kɔnʊ-kˀ	one-COP.FF

Total progressive assimilation is when the first vowel in a sequence of two vowels changes the second vowel to be identical with it. The change may

involve raising, lowering, backing, fronting, rounding, and unrounding. This type of assimilation shows up in three specific morphological contexts:

1. When the non-final form (=ˊe/=ˊɛ) of the dummy pronoun clitic {=ˊdɛ} follows any TAM verbal suffix,
2. When the andative/completive suffix {-ʊkɔtí-} follows either a) the pluractional suffix {-í-} or b) a verb root whose root-final velar consonant has been deleted by haplology (see §2.5.1),
3. When a verb stem whose last vowel is high and back is followed by a) the causative suffix {-ɪt-} or b) the reciprocal suffix {-ínɔ́sí-} (with or without an intervening consonant).

The affected vowel sequences are listed below according to context:

(79) *Types of total progressive assimilation*

Raising	i→e	=	ii
	ɪ→ɛ	=	ɪɪ
Backing/rounding	o→e	=	oo
	ɔ→ɛ	=	ɔɔ
Lowering/backing	a→e	=	aa
	a→ɛ	=	aa
Backing	i→u	=	ii
Lowering	o→u	=	oo
	ɔ→ʊ	=	ɔɔ
Lowering/fronting/unrounding	a→u	=	aa
	a→ʊ	=	aa
Backing/rounding	u→i	=	uu
	ʊ→ɪ	=	ʊʊ

Examples of the first morphological context include the following:

(80) *Examples of total progressive assimilation*

ɦa-iní=e	→	ɦa-iní=i	go-SEQ=DP
kʊt-ɪní=ɛ	→	kʊt-ɪní=ɪ	say-SEQ=DP
ɦa-i-kó=e	→	ɦa-i-kó=o	go-3SG-SEQ=DP
kʊt-ɪ-kɔ́=ɛ	→	kʊt-ʊ-kɔ́=ɔ	say-3SG-SEQ=DP

Examples of the second morphological context include the following:

(81) *More examples of total progressive assimilation*

ɦwaɗ-í-úɦot-át[a]	→	ɦwaɗ-í-íɦot-át-[a]	few-PLUR-COMP-3PL-REAL
ɪlɪɓ-áák-ʊɦɔt-ɪn	→	ɪlɪɓ-á-áɦɔt-ɪn	green-DISTR-COMP-SEQ
kɔk-ʊɦɔt-[ɛ]	→	kɔ-ɔɦɔt-[ɛ]	close-COMP-IMP.SG
ze-ik-áák-uɦot-in	→	ze-ik-á-áɦot-in	big-ADJ.PL-DISTR-COMP-SEQ

Lastly, examples of the third morphological context include:

(82) *Yet more examples of total progressive assimilation*

ɗus-it-es	→	ɗus-ut-es	cut-CAUS-INF
itúr-ít-és	→	itúr-út-és	boast-CAUS-INF
ru-it-et-és	→	ru-ut-et-és	uproot-CAUS-VEN-INF
ɗúl-ínós	→	ɗúl-únós	oppress-RECIP
tolú-ínós	→	tolú-únós	betray-RECIP
ts'ún-únɔ́s	→	ts'ún-únɔ́s	kiss-RECIP

Just as the vowels /ɪ,i/ in this third environment get backed and rounded, the reciprocal suffix {-ínɔ́sí-} also shows vowel rounding after any labial consonants like /b/, /ɓ/, and /m/:

(83)

ts'áb-inós	→	ts'áb-unós	hate-RECIP
sáɓ-ínós	→	sáɓ-únós	kill-RECIP
tsám-ínɔ́s	→	tsám-únɔ́s	like-RECIP

Labially induced assimilation like this also occurs in Ik's sister language So, where it is called 'labial attraction' (Carlin 1993:24, 88). This shows up, for example, when the So word *nɛb-an* 'person-DEM.SG' becomes *nɛb-ɯn*.

Finally, *partial progressive assimilation* is when the first vowel in a sequence of two vowels changes the second one to be more like it but not totally. This only happens when the andative/completive suffix {-ʊkɔtí-} follows a verb root ending in /e/, /ɛ/, or /a/. The affected sequences are:

(84) *Types of partial progressive assimilation*

Fronting	e→u	=	ei
	ɛ→ʊ	=	ɛɪ
	a→u	=	ai
	a→ʊ	=	aɪ

These sequences are derived from verb forms like the following:

(85) *Examples of partial progressive assimilation*

ts'é-úkot-át-a-k^{a}	→	ts'é-íkot-át-a-k^{a}	die-COMP-3PL-REAL-PRF
ɪɓɛ́ɓɛ́-ʊkɔt-á-k^{a}	→	ɪɓɛ́ɓɛ́-ɪkɔt-á-k^{a}	lay.eggs-COMP-REAL-PRF
tsá-úkot-á-k^{a}	→	tsá-íkot-á-k^{a}	dry-COMP-REAL-PRF
ɪlá-úkɔt-á-k^{a}	→	ɪlá-íkɔt-á-k^{a}	go-AND-REAL-PRF

To conclude, the table below shows all the sequences of vowels involved in the various types of assimilation described in the preceding paragraphs:

(86) *Ik vowel assimilation types*

	Progressive			Regressive		
Partial	e→u	=	ei	i←o	=	uo
	ɛ→ʊ	=	ɛɪ	i←kᵒ	=	ukᵒ
	a→u	=	ai	ɪ←kɔ	=	ʊkɔ
	a→ʊ	=	aɪ			
Total	i→e	=	ii	e←o	=	oo
	ɪ→ɛ	=	ɪɪ	a←o	=	oo
	o→e	=	oo	ɛ←ɔ	=	ɔɔ
	ɔ→ɛ	=	ɔɔ	a←ɔ	=	ɔɔ
	a→e	=	aa	ɪ←ɔ	=	ɔɔ
	a→ɛ	=	aa	ʊ←ɔ	=	ɔɔ
	i→u	=	ii	a←e	=	ee
	o→u	=	oo	a←ɛ	=	ɛɛ
	ɔ→ʊ	=	ɔɔ	ɪ←ɛ	=	ɛɛ
	a→u	=	aa	ɪ←a	=	aa
	a→ʊ	=	aa			
	u(C)→i	=	u(C)			
	ʊ(C)→ɪ	=	u			
			ʊ(C)ʊ			