

# **A Description of the Phonology of the Sandawe Language**

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**Abstract:**

This paper is a phonological description of Sandawe, a Khoisan language spoken in central Tanzania. We begin by discussing the distribution of the consonant and vowel phonemes in the language. Particular attention is given to a comparison of contrastive click accompaniments, which is illustrated by waveform graphs. We then present an analysis of tone in Sandawe, beginning with an account of how surface tone patterns are derived from underlying tones and moving on to consider tone melodies and some phrase and sentence-level tonal phenomena. In the following sections we consider syllable structure and the segmental effects of morphological processes. The paper ends with a brief explanation of the Sandawe orthography.

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# 1 The Sandawe language

## 1.1 Ethnographic context

The Sandawe people live north of Dodoma in the Kondoa District of central Tanzania. The area populated by the Sandawe is about 50 km in diameter from north to south and from east to west. In addition, a relatively large group of Sandawe lives on the outskirts of Arusha.

We estimate that there are approximately 40,000 Sandawe. A figure of between 70,000 and 90,000 has also been suggested (Wright et al. 1995:1). Significant numbers of people from other ethnic groups also live in the area of the Kondoa District populated by the Sandawe. The main groups represented are the Nyaturu, Rangì, Gogo, Maasai, and Datooga.

Interaction often takes place between the Sandawe and the other ethnic groups living among them, though conversation is normally carried out in Swahili. Some people from other ethnic backgrounds report being able to understand Sandawe, but the language is rarely spoken by non-Sandawe. Inter-marriage between the Alagwa, a Cushitic group and the Sandawe in the past led to the incorporation of a part of the Alagwa into the Sandawe ethnic group (ten Raa 1986). The Sandawe-speaking Alagwa are considered to be a clan of the Sandawe. The remaining Alagwa continue to speak their own language.

## 1.2 Linguistic context

The linguistic affiliation of Sandawe has not been conclusively decided. Sandawe, Dahalo (spoken in Kenya), and Hadza (spoken in northern Tanzania, near Lake Eyasi) are the only three languages in eastern Africa using clicks as regular consonants in their phonological inventories. Dahalo is a Southern Cushitic language and the classification of Hadza remains even more contentious than that of Sandawe. Wright et al. (1995:1) states that the three eastern African click languages share certain typological similarities in the way in which the clicks pattern that are not found in the southern African Khoisan languages. Westphal (1971:401) objects to the classification of Sandawe and Hadza with the Khoisan languages because the proposed relationship leans heavily on the similarities of the two languages to the southern African Khoisan languages and not to each other.

However, the position stated in Greenberg (1950), that Sandawe belongs to the Khoisan language phylum, is supported by a number of people who have studied the language in recent times. Ehret (1986), for example, maintains that Sandawe and Hadza are both Khoisan, the former more definitely so. Elderkin (1982, 1986, 1989), whose work has focused on Sandawe, states that Sandawe's Khoisan affiliation 'cannot be challenged' (1982:79). Further support for this position comes from Sands (1995) in a dissertation on linguistic relationships. She concludes that 'it seems a little more likely than not that the Northern, Southern, Central Khoisan groups along with Sandawe are related' (1995:193–194). However, recent research has cast doubt on the position that a Khoisan family exists (Güldemann and Vossen 2000).

Along the main road through the area where the Sandawe people live (Dodoma – Kwa Mtoro – Singida), most Sandawe also speak Swahili, although the level of proficiency has not been determined. Some of the older people have a very limited understanding of Swahili and do not speak it. In the more remote areas, we have even met teenagers who do not know Swahili. Children attending school, however, are required to learn Swahili and teaching is in Swahili.

The Sandawe refer to their language as *Sandaweegki*<sup>1</sup> (*/sàndàwě:kí/*). This word does not have a meaning or use other than as the name for the language. According to a study on Sandawe dialects undertaken by ten Raa (1970), the Sandawe themselves recognize two varieties within their language: *Dtelha* in the west and *Bisa* in the east. The dividing line between these two varieties runs through the center of the Sandawe speaking area from the northeast to the southwest. According to ten Raa, the term *Dtelha* is a Sandawe word and means ‘true, genuine’.<sup>2</sup> *Bisa* is the name of a clan within the Sandawe. Ten Raa (1970:148) observed that three main features distinguish the two varieties. Firstly, the Dtelha speak more quickly than the Bisa. Secondly, Dtelha speakers drop vowels which the Bisa retain. And thirdly, the two dialects exhibit some lexical differences. Dialectal differences are ‘gradual and slight’ (1970:147) and mutual intelligibility exists between speakers of the two dialects.

In 2003, we conducted a dialect survey in seven villages in the Sandawe speaking area (Eaton, Hunziker and Hunziker 2004).<sup>3</sup> Like ten Raa, we found that Sandawe may be divided into two dialects.<sup>4</sup> The differences between the two dialects are slight and include speech speed, other pronunciation features, lexis, grammatical phenomena and the use of taboo language. However, unlike ten Raa, we found no Sandawe who described any dialect as Dtelha and none who was willing to describe his own dialect as Bisa. Therefore we have chosen to adopt the more neutral terms *western Sandawe* for Dtelha and *eastern Sandawe* for Bisa.

### 1.3 Previous research

A lot of the early investigation into the Sandawe language centered on the issue of its linguistic classification and its relation to the Khoisan language family, as alluded to in the previous section. Aside from this, much of the previous research on Sandawe has focused on phonetic and phonological phenomena in the language, and, in particular, on the nature of clicks, nasalization and tone.

According to Tucker and Bryan (1977), the three places of articulation for Sandawe clicks are best described as dental, post-alveolar, and alveolar lateral. Wright et al. (1995) investigated the nature of the click accompaniments, or effluxes, and concluded that there are five

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<sup>1</sup>The name is written here using the Sandawe orthography which was agreed upon by a committee of Sandawe speakers at meetings in Kwa Mtoro in November 2002 and June 2004 (see section 7).

<sup>2</sup>We have found that this word is used today with the meaning ‘completely, genuine’.

<sup>3</sup> See <http://www.sil.org/silesr/yearindex.asp?year=2007>, then (2007-014).

<sup>4</sup>Our research also suggests that western Sandawe can be divided into two sub-varieties, with one being labeled *western* and the other *central*. The differences between these two sub-varieties are not as great as those which differentiate the western and eastern dialects (Eaton, Hunziker and Hunziker 2004).

contrastive click accompaniments: voiceless unaspirated, voiceless aspirated, voiced, voiced nasalized, and glottalized. The issue of predictable nasality before clicks in Sandawe is considered by Elderkin (1992). Further work by Elderkin (1986, 1989, 1991, 1992) has concentrated on the use of tone and pitch in Sandawe. He explored the interaction of syntax, tone, and information structure and claimed that pitch levels for words in Sandawe are predictably determined by the twin influences of syntactic structure and information structure.

In the area of grammatical description, some brief grammatical comments are contained in Nigmann (1909), together with lists of vocabulary. More detailed grammatical exposition is found in Dempwolff (1916), as part of a linguistic and ethnographic study of the Sandawe. Drexel (1929) investigated gender in noun and pronoun endings in Nama and Sandawe. Further grammatical description of Sandawe is found in van de Kimmenade (1936). In more recent times, Dalgish (1979) claimed to have observed a system of *subject identification* strategies in Sandawe, which involved word order and subject marking morphemes. Kagaya (1990, 1994) also looked at the patterns evident in the restrictions on word order and subject marking morpheme distribution in the language, although he concluded that these patterns were influenced by information structure, rather than by a requirement for subject identification. Elderkin (1994) also considered information structure and investigated its realization in texts. Most recently, Eaton (2001, 2002, 2003) has investigated the relationship between focus and its realization in different sentence types in Sandawe. She concluded that constituent order, subject marking, and tone are all mechanisms used in focus realization in the language and that their use in various sentence types, while very different at first glance, is fundamentally similar.

## 1.4 The present study

This paper is a descriptive study of Sandawe phonology. The findings are based on a corpus of 1450 Sandawe words. This data was collected from Nestori Michaeli, who comes from the village of Magambua in the western part of the Sandawe speaking area.<sup>5</sup> We have also worked with other Sandawe speakers from both the western and eastern parts of the Sandawe speaking area. Throughout the following sections we have noted where the two dialects exhibit phonological differences. For further details on dialectal differences in the area of phonology, see Eaton, Hunziker and Hunziker (2004).

In sections 2 and 3, we consider the consonant and vowel phonemes found in Sandawe and their distribution. Tone at the lexical and morphological levels will then be discussed, together with some features of intonation. The structure of the syllable is considered in section 5 and this is followed by a look at some of the major morphophonological processes in Sandawe. A brief discussion of the current trial orthography for the language forms the last main section of this paper.

The data examples in the following sections are written using the International Phonetic Alphabet and surface tone is marked according to table 1.1.

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<sup>5</sup>We would like to record here our thanks to Nestori Michaeli for his essential contribution to this study.

Table 1.1. Tone markings

á, á:	high tone on a short and long /a/
ā, ā:	mid tone on a short and long /a/
à, à:	low tone on a short and long /a/
â, â:	high falling tone on a short and long /a/
à̃	mid falling tone on a short /a/
à̄, à̄:	low falling tone on a short and long /a/
ã:	rising tone on a long /a:/

## 2 Consonants

In section 2.1, we consider the pulmonic and glottalic consonants found in Sandawe. This is followed by section 2.2 on the velaric consonants (clicks). Within the first of these two sections, the consonants are grouped according to their manner of articulation. In the second section, the clicks are grouped according to the nature of their click accompaniment. As well as a phonetic description of the sounds, an account of the distribution of each group of consonants is given.

### 2.1 Pulmonic and glottalic consonants

The following pulmonic and glottalic consonant phonemes are found in Sandawe.<sup>6</sup>

Table 2.1. Pulmonic and glottalic consonants

	<i>Labial</i>	<i>Alveolar</i>	<i>Post-alveolar</i>	<i>Palatal</i>	<i>Lateral</i>	<i>Velar</i>	<i>Labio-velar</i>	<i>Glottal</i>
<i>Voiced stop</i>	b	d	d̥ʒ		d̥ʒ	g		
<i>Voiceless stop</i>	p	t	t̥ʃ		t̥ʃ	k		ʔ
<i>Aspirated stop</i>	p <sup>h</sup>	t <sup>h</sup>	t̥ʃ <sup>h</sup>			k <sup>h</sup>		
<i>Ejective stop</i>		t̥s'			t̥ʃ'	k'		
<i>Nasal stop</i>	m	n						
<i>Fricative</i>	f	s			ʃ	x		h
<i>Approximant</i>				j	l		w	
<i>Tap</i>		r						

#### 2.1.1 Oral stops and affricates

The bilabial, alveolar, and velar oral stops each occur in three different forms: as voiced [b, d, g], voiceless [p, t, k], and aspirated [p<sup>h</sup>, t<sup>h</sup>, k<sup>h</sup>]. Voicing and aspiration are not

<sup>6</sup>Labio-velarized phonemes are considered in section 5.2. Those phonemes transcribed using a ligature in the table are transcribed without one in the following sections for reasons of typographical ease.

predictable in this series of consonants and therefore these sounds are analyzed as phonemes.<sup>7</sup> These consonants are exemplified in the three tables below:<sup>8</sup>

Table 2.2. Examples of /b, p, p<sup>h</sup>/

	/b/ <i>Voiced bilabial stop</i>		/p/ <i>Voiceless bilabial stop</i>		/p <sup>h</sup> / <i>Aspirated voiceless bilabial stop</i>	
<i>Word-initial:</i>	bǎ:nǐ	grave hole	pě:	to put (sg. obj.)	p <sup>h</sup> áló	small knife
	bârǐ	rainy season	pǒ:ndê	water pipe	p <sup>h</sup> ǎ:nǐ:	pumpkin
	bàʔé	to be big	póró:	cowbell	p <sup>h</sup> ê	tomorrow
	bèrě:	millet	pùé	to pound	p <sup>h</sup> éré	stake
	bǒ:k'ô	spoon	pǔ:lí:	last rain	p <sup>h</sup> ó:	white
<i>Word-medial</i>	bábáʔtò	cockroach	góxpé:	arrow shaft	dʒìp <sup>h</sup> á	thigh
<i>(syll.-initial):</i>	bòbà	mushroom	hàpú	you	p <sup>h</sup> úmp <sup>h</sup> úsô	sacrifice
	gólóbâ	evening	ǐúpâ	grass	tǐ'ùp <sup>h</sup> é	to pound
	jàʔbé	to work	pòpótô	thick milk	<sup>n</sup>   ùmp <sup>h</sup> á	to smoke
	sómbá	fish	sùpé	arrow (type)	! 'úp <sup>h</sup> á	cigarette ashes

Table 2.3. Examples of /d, t, t<sup>h</sup>/

	/d/ <i>Voiced alveolar stop</i>		/t/ <i>Voiceless alveolar stop</i>		/t <sup>h</sup> / <i>Aspirated voiceless alveolar stop</i>	
<i>Word-initial:</i>	dǎ:	to be able to	tǎ:	to untie	t <sup>h</sup> â	to run (sg. subj.)
	dê:	scar, crack	té:	to count	t <sup>h</sup> ě:	tree
	dǐ:	stone	téǐâ	completely	t <sup>h</sup> éká	leopard
	dìʔá	egg	tìné	to trap	t <sup>h</sup> ìné	to sew
	dóró	zebra	tónó	back of head	t <sup>h</sup> wìndǐ:	grasshopper
<i>Word-medial</i>	dàdàwá	stork	hétékâ	to marry; to	ʔànt <sup>h</sup> á	honey gourd
<i>(syll.-initial):</i>	dʒìgídâ	heart		take (pl. obj.)	ʔít <sup>h</sup> â	far
	kìdìbá	small pot (type)	kéntó	callous skin	k'ǒ:t <sup>h</sup> ô	to smell (trans.)
	ts' àdé	sleeping hide	kótó	thorn fence	ts' ít <sup>h</sup> ík'ê	pimple
	wàdé	friend (f. to f.)	kùtùmté	to kneel	ts' ì:nt <sup>h</sup> ê	unripe, young
			pòpótô	thick milk		

<sup>7</sup>We have observed that some word-medial stops are aspirated for some speakers and unaspirated for others. For example, we have recorded both [wék<sup>h</sup>é] and [wéké] with the meaning 'wind'. This variation does not appear to be a dialectal phenomenon (see Eaton, Hunziker and Hunziker 2004).

<sup>8</sup>In the tables which follow, an analysis of tone and syllable structure in Sandawe is assumed. This analysis is given in sections 4 and 5. Three syllable types are proposed: CV, V, and CVC. The V syllable does not occur word-initially. The CVC syllable occurs in any position when C<sub>2</sub> is a glottal stop and in word-medial position only when C<sub>2</sub> is a nasal. In most cases in the tables that follow, five example words are given to illustrate a particular phoneme in each word position. Where fewer than five words are given, this indicates that our data set contains only these examples of the sound in a certain context. Example words are monomorphemic, unless otherwise indicated. Verbs are given in stem form.

Table 2.4. Examples of /g, k, k<sup>h</sup>/

	/g/ Voiced velar stop	/k/ Voiceless velar stop	/k <sup>h</sup> / Aspirated voiceless velar stop
<i>Word-initial:</i>	gàlà <sup>n</sup> mà rope (type) gáwâ hill gélé baobab tree gìtì'é clothes gòrò post	kàsìnté to chew cud kê to climb kèlèmbá skin, hide kèrèmbú bird nest kókó chicken	k <sup>h</sup> ǎ: to hit k <sup>h</sup> éʔé to hear k <sup>h</sup> õ: house k <sup>h</sup> óllô to go around k <sup>h</sup> úʔ to spill
<i>Word-medial</i> <i>(syll.-initial):</i>	bégérô plant (type) bõ:gólâ to clear field after burning dʒágô hunting net hògòrí price !ógòrì tree (type)	ká:kâ dog pá:ŋkí light (noun) súkâ to sieve milk !ákí forked branch ! <sup>h</sup> éké craziness	bìk <sup>h</sup> é to leave lòŋk <sup>h</sup> á fighting stick mùk <sup>h</sup> ùlâ wound wák <sup>h</sup> á: firewood ! <sup>w</sup> ák <sup>h</sup> wâ to cool off (trans.)

As is shown by the three tables above, the bilabial, alveolar, and velar pulmonic stops occur in syllable-initial position, either word-initially or word-medially. They do not occur in syllable-final position, either word-medially or word-finally.

The distribution of the glottal stop differs from that of the other oral stops considered above, as is shown in table 2.5:

Table 2.5. Examples of /ʔ/

	/ʔ/ Voiceless glottal stop
<i>Word-initial:</i>	ʔàǎ: candelabrum tree ʔé:râ corn blossom ʔíé to stay (sg. subj.) ʔòróríâ bird (type) ʔúll <sup>h</sup> û to cough
<i>Word-medial</i> <i>(syll.-initial):</i>	bàʔé to be big dìʔá egg làʔó: spell, disease lá:ʔê hare saʔútâ ostrich
<i>Word-medial</i> <i>(syll.-final):</i>	díʔrâ: spring hare bábáʔtò cockroach jaʔbé to work sàwàʔtê to yawn s <sup>w</sup> éséʔmò wall stick
<i>Word-final:</i>	g <sup>w</sup> éʔ to hurt (intrans.) ǎéʔ later músúʔ to smile tónóʔ small ax llóʔ to beg (imperative stem)

The glottal stop is not restricted to syllable-initial position, but also occurs syllable-finally, both word-medially and word-finally.

There are two affricate series in Sandawe, post-alveolar and lateral. The post-alveolar series has the forms [dʒ, tʃ, tʃ<sup>h</sup>]:

Table 2.6. Examples of /dʒ, tʃ, tʃ<sup>h</sup>/

	/dʒ/ <i>Voiced post-alveolar affricate</i>		/tʃ/ <i>Voiceless post-alveolar affricate</i>		/tʃ <sup>h</sup> / <i>Aspirated voiceless post-alveolar affricate</i>	
<i>Word-initial:</i>	dʒàk <sup>h</sup> á	bush	tʃě:	head	tʃ <sup>h</sup> ǎ:	tears
	dʒágô	hunting net	tʃí	I	tʃ <sup>h</sup> ékeri	to leave
	dʒík'é	milk	tʃũ:	animal	tʃ <sup>h</sup> ĩ:	mushroom
	dʒĩ:ʔ	bird (type)	tʃ <sup>w</sup> ǎ:má:	mongoose		(type)
	dʒ <sup>w</sup> ǎ:	stick	tʃ <sup>w</sup> é:	whistle noise	tʃ <sup>h</sup> î:	honey
					tʃ <sup>h</sup> wǎ:	bee larvae
<i>Word-medial</i> <i>(syll.-initial):</i>	ʔèrě:ndʒê	plant (type)	ʔô:ntʃê	than (comp.)	ʔítʃ <sup>h</sup> â	to look for
	dʒí:dʒí:	wasp	hótʃô:	what	g <sup>w</sup> ètʃ <sup>h</sup> é:	wild dog
	ʔìndʒá	sheep			mántʃ <sup>h</sup> â	food, to eat
	k <sup>w</sup> èndʒǎ	to look for			<sup>h</sup> àtʃ <sup>h</sup> ú	lion
		food			'étʃ <sup>h</sup> ó	to hiccup
	múndʒù	squash				

The unaspirated phoneme /tʃ/ occurs less frequently than the other two affricates in the post-alveolar series. There are only six words in our data set of 1,450 words in which /tʃ/ occurs word-initially and only the two multimorphemic words shown in table 2.6 in which /tʃ/ occurs word-medially.

A dialectal difference can be seen in the phonetic realization of the post-alveolar affricate series. In the eastern dialect of Sandawe, [tʃ] and [dʒ] are often fronted, resulting in [tʃs] and [dʒz]. We have also observed the fronting of [tʃ<sup>h</sup>] to [tʃs], but this seems to be a less frequent process. In a variant fronting process, the voiced affricate [dʒ] may commonly be weakened to [z] by speakers of the eastern dialect.

The lateral affricate series lacks an aspirated form and consists only of two phonemes: voiced /dʒ/ and voiceless /tʃ/. These phonemes occur very infrequently, with /dʒ/ found in only three monomorphemic forms in our data set and /tʃ/ in only seven. In all these examples, the lateral affricate occurs word-initially:

Table 2.7. Examples of /dʒ, tʃ/

	/dʒ/		/tʃ/	
	<i>Voiced alveolar lateral affricate</i>		<i>Voiceless alveolar lateral affricate</i>	
<i>Word-initial:</i>	dʒàní	arrow	tʃâ	door
	dʒòmó	to buy	tʃáná	tusk, horn
	dʒòʔî	behind	tʃàŋká:	francolin
			tʃã:sì	to die (sg. subj.)
			tʃé:	to be ready

### 2.1.2 Ejective stops

Sandawe has three ejective stop phonemes: /tsʰ, tʃʰ, kʰ/. Their distribution is illustrated in table 2.8:

Table 2.8. Examples of /tsʰ, tʃʰ, kʰ/

	/tsʰ/		/tʃʰ/		/kʰ/	
	<i>Voiceless ejective alveolar affricate</i>		<i>Voiceless ejective lateral affricate</i>		<i>Voiceless ejective velar stop</i>	
<i>Word-initial:</i>	tsʰâ	water	tʃʰǎ:	to take (pl. obj.)	kʰámé	beer (local)
	tsʰě:kʰâ	to burp	tʃʰábísó	stomach	kʰé:	to cry
	tsʰĩ:kʰá:	tree (type)	tʃʰábô	roof	kʰó:	to lick
	tsʰǒ:	rhinoceros	tʃʰítʰé	to butcher	kʰùŋkʰú	blunt
	tsʰúkʰâ	smoke	tʃʰòŋgé	to stab	kʰwé:	to kill
<i>Word-medial</i> <i>(syll.-initial):</i>	kʰú:ntsʰâ	incline	gítʃʰ'é	clothes	báŋkʰwá	mouse (type)
	kʰótsʰô	tree (type)	kʰítʃʰ'é	to be angry	bǒ:kʰô	spoon
	létsʰímâ	spell	màtʃʰ'ě:	sunrise	híkʰì	to go (sg. subj.)
	màlatsʰĩ:ndó:	dusk	mòtʃʰ'ì	side	súkʰútó	calf, lower leg
	xátsʰâ	steppe	!ʰě:tʃʰ'â	ant	'ékʰâ	blood

The ejective series occurs in syllable-initial position, both word-initially and word-medially.

The ejective velar affricate [kʃʰ] is also heard in Sandawe. It occurs only before /u/ or /w/ and is in complementary distribution with the ejective lateral affricate [tʃʰ]:

Table 2.9. Distribution of [tʃʰ, kʃʰ]

[kʃʰ] preceding /u/ and /w/		[tʃʰ] in other environments	
kʃʰ'û	arm, hand	gítʃʰ'é	clothes
kʃʰ'ùŋgù	cloud, sky	mòtʃʰ'ì	side
kʃʰ'wâ:	rain	tʃʰ'àxé	to hack off
kʃʰ'wé:	witchcraft	tʃʰ'òŋgé	to stab

Therefore, the ejective velar affricate [kɿ'] and the ejective lateral affricate [tɿ'] can be analyzed as allophones of the same phoneme. This phoneme is represented here by /tɿ'/ since the allophone [tɿ'] is the less restricted of the two allophones in its distribution.

It can be noted at this point that the lateral ejective /tɿ'/ is auditorily very similar to the glottalized lateral click //'/ (as also commented upon in Wright et al. 1995:2). The two waveform displays below illustrate this using the examples /tɿ'ã:/, 'mongoose' and //'ã:/, 'warthog', respectively:

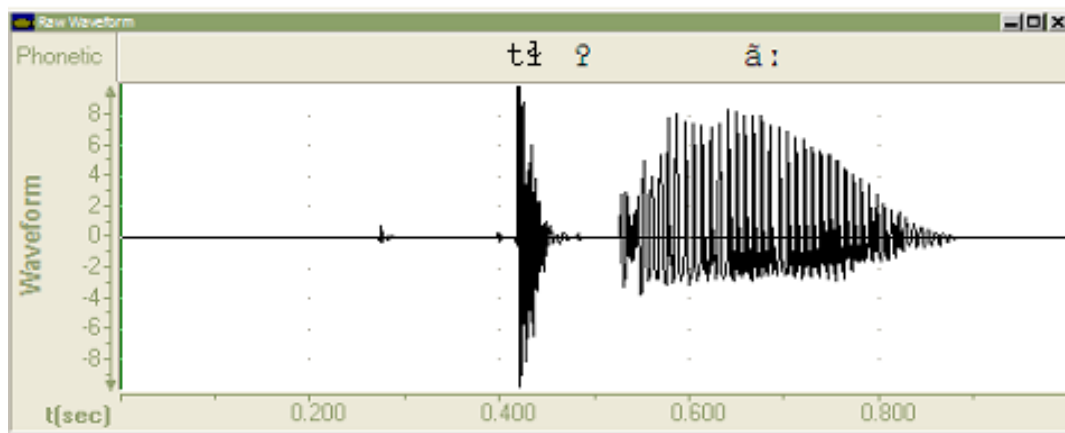


Figure 2.1. Glottalized lateral affricate.

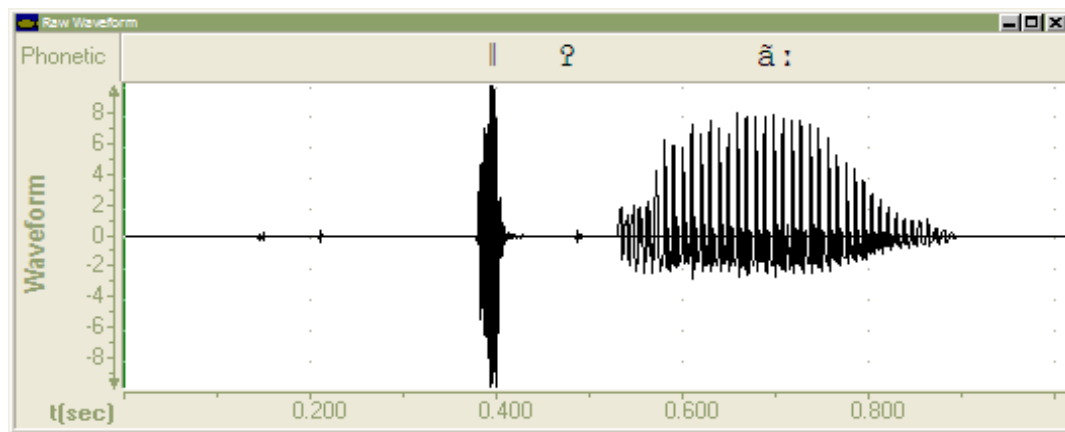


Figure 2.2. Glottalized lateral click.

The difference between the two sounds can be seen in the slightly extended period of high frequency noise in the ejective, in comparison with the click, where the noise ends more abruptly. Note also how the ejective has a steeper burst than the click.

### 2.1.3 Nasal stops

The distribution of the nasal stop phonemes /m/ and /n/ is shown in table 2.10.

Table 2.10. Examples of /m, n/

	/m/ <i>Voiced bilabial nasal</i>		/n/ <i>Voiced alveolar nasal</i>	
<i>Word-initial:</i>	màǎé	to sort, choose	náʔ	to burn (intrans.)
	mántʃ <sup>h</sup> â	food, to eat	nárágû	hunger
	màràrà	tree (type)	náráʔ	shelf for arrows
	mĩ:!'â	to grind	níʔ	to go (pl. subj.)
	mõ:k <sup>h</sup> ô	taboo	nòrí	bird's nest
<i>Word-medial</i> <i>(syll.-initial):</i>	hùmǎ:	to win, defeat	ʔǎ:nákǎ	to dry (trans.)
	k'âmé	beer (local)	bõ:nâ	tree (type)
	màmá	grandmother	dǵàní	arrow
	nòmǎ	mud	hòná	to harvest honey
	wák <sup>h</sup> áʔmā	black mamba	sáná	beeswax
<i>Word-medial</i> <i>(syll.-final):</i>	góxómpé:	arrow shaft	ʔànt <sup>h</sup> á	honey gourd
	k <sup>h</sup> òmbó	yearning	gèndzá	poison of snake, bile
	sómbá	fish	k <sup>h</sup> ú:nts'â	incline
	n   ùmp <sup>h</sup> á	to smoke cigarette	p <sup>h</sup> àndé	to split
	!'ámbá	spleen	l á:ntímâ	fly

Unlike the oral stops, the nasal stops occur in syllable-final position word-medially. The two nasals are clearly contrastive in syllable-initial position, but the third row of the table above suggests that in syllable-final position, /m/ and /n/ are in complementary distribution, with the bilabial /m/ preceding bilabial consonants and the alveolar /n/ preceding alveolar ones. However, the language does contain examples of multimorphemic words which contain heterorganic nasal and consonant clusters, as will be discussed below in the section on syllable structure (5.1.3). Nasal and obstruent clusters, whether homorganic or heterorganic, do not occur in word-initial position, except in loan words such as /ndóà/ 'marriage' from Swahili *ndoa*.<sup>9</sup>

Alongside /m/ and /n/, the velar nasal stop [ŋ] can be heard in Sandawe, but only in a restricted phonological environment:

<sup>9</sup>An exception is the native Sandawe word /mbô/ 'word', which is an abbreviated form of /ʔìmbô/. This word can also be pronounced as /bô/. The two longer forms are associated with the eastern dialect and the shorter form with the western dialect.

Table 2.11. Distribution of [ŋ] and /m, n/

[ŋ] preceding a velar stop		/m/ and /n/ in other environments	
gòŋgò	fighting game	bìmbírí:	spirit
kǒ:ŋgó:	squash	gàndà	to be thin
kòŋkòrǐ	rooster	hénté	to limp
k'ùŋk'ú	blunt	kéntó	callous skin
lòŋk <sup>h</sup> á	fighting stick	ts'ĩ:nt <sup>h</sup> ê	immature, unripe, young

The sound [ŋ] does not occur word-initially, but only word-medially before velar oral stops. Since neither [n] nor [m] is found in this environment, [ŋ] can be analyzed as an allophone of one of these sounds, which occurs word-medially before velar oral stops. It is proposed here (somewhat arbitrarily) that /n/ be considered the underlying phoneme in these cases. The issue of the difference between an oral vowel followed by [ŋ] plus a velar stop and a nasal vowel followed by a velar stop will be discussed below in section 5.3.

## 2.1.4 Fricatives

There are five fricative phonemes in Sandawe: labio-dental /f/, alveolar /s/, lateral /ɬ/, velar /x/<sup>10</sup>, and glottal /h/. There are no voiced fricatives. The distribution of the voiceless fricatives is shown in tables 2.12 and 2.13.

Table 2.12. Examples of /s, ɬ, x/

	/s/ <i>Voiceless alveolar fricative</i>		/ɬ/ <i>Voiceless lateral fricative</i>		/x/ <i>Voiceless velar fricative</i>	
<i>Word-initial:</i>	sáná	beeswax	ɬǎ:	goat	xàɬé	to tease
	sá 'à	weaverbird	ɬáɬâ	grave	xáráɬô	rake
	séxémâ	snake (type)	ɬàɬǎ:	twigs on roof	xé	to carry
	sòsòbé	to harvest	ɬéʔ	later	xùmé	partition wall
	sùkà	to sieve milk	ɬíbâ	to plaster	xǔ:nú:	spine
<i>Word-medial</i> <i>(syll.-initial):</i>	ʔísólì	arrow (type)	ʔàɬě:	candelabrum tree	ɬóxómā	broth (type)
	k <sup>w</sup> èsègà	to think	hùbàɬé	to be hazy	xóxó:	millipede
	s <sup>w</sup> éséʔmò	wall sticks	màɬé	to sort, choose	màxé	to be crafty
	gǒ:sá:	bee (type)	ʔǔ:ɬí:	salt	ts'ě:xá:	dew
	!ǎ:sō	moon	x <sup>w</sup> áɬâ	to brew beer	<sup>n</sup>   ǎ:xô	to spread out
<i>Word-medial</i> <i>(syll.-final):</i>	káská:sǐ	temple (anat.)			góxpé:	arrow shaft
	mùst <sup>h</sup> ě:	pestle				
	t <sup>h</sup> ásnó:	liver				

<sup>10</sup>As noted by Kagaya (1993:vi), the velar fricative can be accompanied by uvular trilling.

Table 2.13. Examples of /f, h/

	/f/ <i>Voiceless labio-dental fricative</i>		/h/ <i>Voiceless glottal fricative</i>	
<i>Word-initial:</i>	fàré	to lie (say untruth)	hàbá	to give birth (for animals)
	fógó:	to be clear	hápú	you
	fùruʔmé	to castrate	hàwé	to get water
			hól 'ó	to fill with liquid
			hùmbù	cow, cattle
<i>Word-medial</i>	ʔáfâ	tree (type)	làhânì	promise, pawned item
<i>(syll.-initial):</i>	ʔáfúrê	ox	mèhèmbè	single person

All the fricatives occur word-initially and word-medially in syllable-initial position. Only the fricatives /s, x/, as shown in the first of the two tables, occur word-medially in syllable-final position. It seems likely that these syllable-final fricatives were once followed by vowel, which has since been elided (see section 5.3 on word-medial consonant clusters). /h/ occurs word-medially in only two monomorphemic words in the data set. /f/ occurs in only the five items shown in table 2.13.

### 2.1.5 Approximants and /r/

There are three voiced approximants in Sandawe: lateral /l/, palatal /j/, and labio-velar /w/. The distribution of these sounds is tabulated in table 2.14, together with /r/:

Table 2.14. Examples of /r, l, j, w/

	/r/ <i>Voiced alveolar tap</i>	/l/ <i>Voiced lateral approximant</i>	/j/ <i>Voiced palatal approximant</i>	/w/ <i>Voiced labio-velar approximant</i>
<i>Word-initial:</i>	rík'ísâ thick milk rínɡó: to go around rítímô arrow head rǒ:gó knife rô: voice	làbâ much later làʔmá fruit (type) lá:ʔê hare lèlèŋɡɪ to shake (intrans.) lé:bâ tree (type)	jàjá cousin jàʔbé to work jàʔmé to get used to	wàdé friend (f. to f.) wák <sup>h</sup> á: firewood wàràŋɡě: God wá:râ tree (type) wèré to walk
<i>Word-medial</i> <i>(syll. - initial):</i>	ʔárá: truth dèrɥ chin dɪʔrâ: spring hare <sup>n</sup> !èrâ: to leak ! 'òròrǒ: frog	báló: to herd ɡàlàmə rope màʔlé something l 'ùmá lá: ant !áʔlō swallow	bójó seed jàjá cousin k'ǎ:jâ tree (type) múʔjō fruit (type) sàjò to speak	ɡáwâ hill nòwé to grind tòwé to dip (food) ts'èwé to twist ! 'àwé to fall over (sg.subj.)
<i>Word-medial</i> <i>(syll.-final):</i>	ɡwàrt <sup>h</sup> à goat (m.) márk <sup>h</sup> á equal tùrté to visit ts'óbórsà gizzard xǔ:rtɪ'ó: arrow (type)			

The three approximants occur only word-initially and word-medially in syllable-initial position. The tap /r/ is also found in syllable-final position word-medially. As with the syllable-final fricatives recorded in the previous section, it can be assumed that syllable-final /r/ was once followed by a vowel.

The palatal /j/ is quite rare. There are only three words in the data set in which it occurs word-initially and only eight in which it is found in a word-medial position. The distribution of the labio-velar [w] as a consonant modification will be considered in section 5.1.

## 2.2 Velaric consonants (clicks)

There are three points of articulation for the Sandawe clicks: dental, apical post-alveolar, and lateral. There are five different click accompaniments which may be found with each of the three click types, resulting in the fifteen different clicks shown in table 2.15.

Table 2.15. Velaric consonants

	<i>Dental</i>	<i>Post-alveolar</i>	<i>Lateral</i>
<i>Voiceless</i> <sup>11</sup>		!	
<i>Aspirated</i>	<sup>h</sup>	! <sup>h</sup>	<sup>h</sup>
<i>Voiced</i>	g	g!	g
<i>Glottalized</i>	'	!'	'
<i>Nasalized</i>	<sup>n</sup>	<sup>n</sup> !	<sup>n</sup>

The phonetic features of these clicks will be briefly considered below.<sup>12</sup> For the purposes of comparison, the voiceless clicks will not be discussed in their own section, but rather will be used to highlight the features of the other click types. After the phonetic descriptions of the click types, the distributional patterns of the different clicks will be discussed.

### 2.2.1 Aspiration

As with the pulmonic oral stops, aspiration is contrastive in clicks. This can be illustrated by the following minimal pairs which display an opposition between a voiceless click and an aspirated click:

Table 2.16. Minimal pairs of aspirated and unaspirated clicks

<i>Unaspirated voiceless click</i>			<i>Aspirated voiceless click</i>		
/ /	ímé	to be deep	/  <sup>h</sup> /	<sup>h</sup> ímé	to sing
/  /	â	to plant	/   <sup>h</sup> /	<sup>h</sup> â	to brush off

Figure 2.3 shows the waveform for /|<sup>h</sup> ímé/, 'to sing', which contains the aspirated dental click [|<sup>h</sup>]:

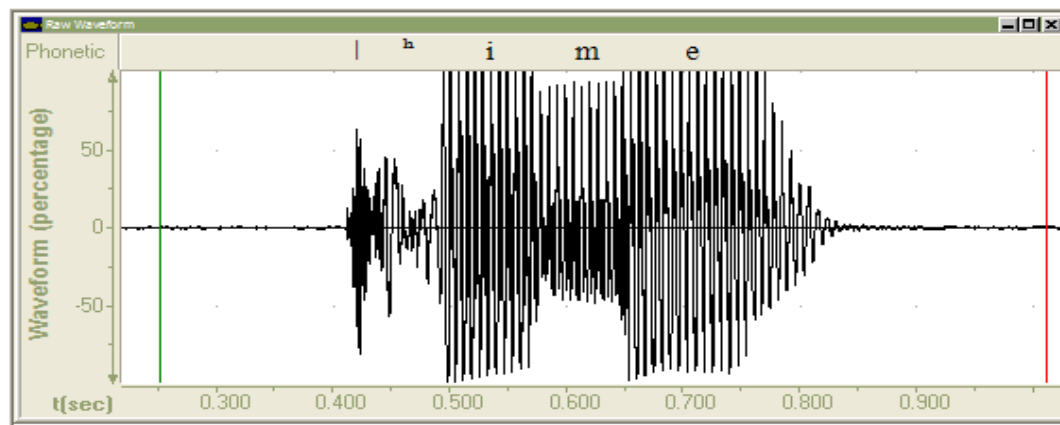


Figure 2.3. Aspirated dental click.

<sup>11</sup>The click type described as *voiceless* not only lacks voicing, but also aspiration, glottalization, and nasalization. For ease of labeling, it is referred to here simply as voiceless.

<sup>12</sup>For more information on the phonetic aspects of Sandawe clicks, see Wright et al. (1995).

This can be contrasted with the unaspirated dental click in /límé/ ‘to be deep’, which is shown in figure 2.4. The release of the click goes more quickly into the vowel /i/:

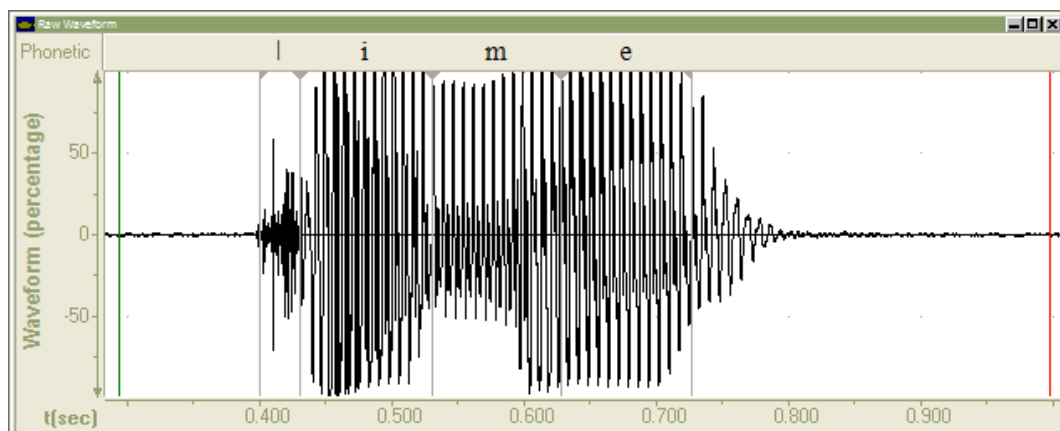


Figure 2.4. Unaspirated lateral click.

## 2.2.2 Voicing

Voiced clicks are very rare in Sandawe. We have only five words containing voiced clicks in a data set of 320 words containing clicks, as shown in table 2.17:

Table 2.17. Voiced clicks

/ʒ /	ʒ ǐ:ʒ ó:	bird (type)
/ʒ!/	ʒ!àk <sup>h</sup> íná	to carry in a concealed fashion
	ʒ!ék <sup>h</sup> é	fruit (type)
	ʒ!òk <sup>h</sup> ómí	greater kudu
/ʒ  /	ʒ  ó:ʒ  ê	greater kudu (male)

Some speakers pronounce these five words with voiceless aspirated clicks instead.<sup>13</sup>

Figure 2.5 shows the waveform of /ʒ! àk<sup>h</sup>íná:/ ‘to carry in a concealed fashion (sg. obj.)’:

<sup>13</sup>Cf. Tucker and Bryan (1977:307), who report that voiced clicks vary with voiceless unaspirated ones.

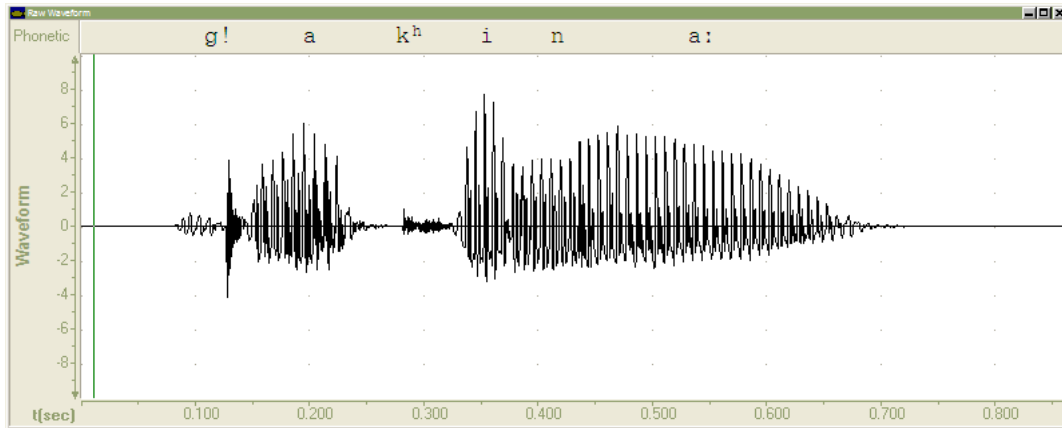


Figure 2.5. Voiced post-alveolar click.

The voicing of the click starts 73 milliseconds before the release of the post-alveolar closure of the tongue. This time of prevoicing is much shorter than it is with other Khoisan languages (Wright et al.1995:22).

### 2.2.3 Glottalization

The glottalized clicks can be recognized by the short silence immediately after the click. After the release of the click, the glottis is opened for a following vowel. This can be seen in figure 2.6 which shows the waveform of a glottalized post-alveolar click in /! 'î/ 'lice eggs':

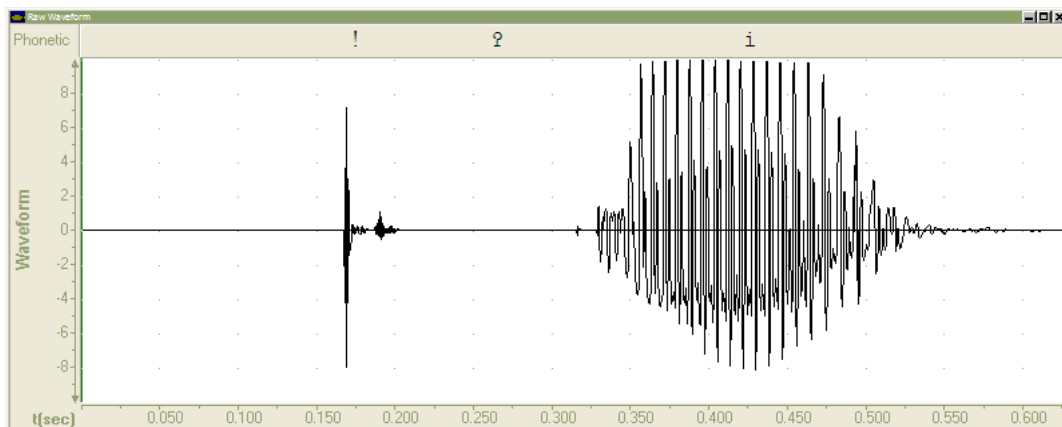


Figure 2.6. Glottalized post-alveolar click.

In contrast, in a voiceless click the glottis stays open during the pronunciation of the click and therefore the click can be released directly into the following vowel. Figure 2.7 shows the waveform of a voiceless post-alveolar click in the word /! 'î/ 'bone':

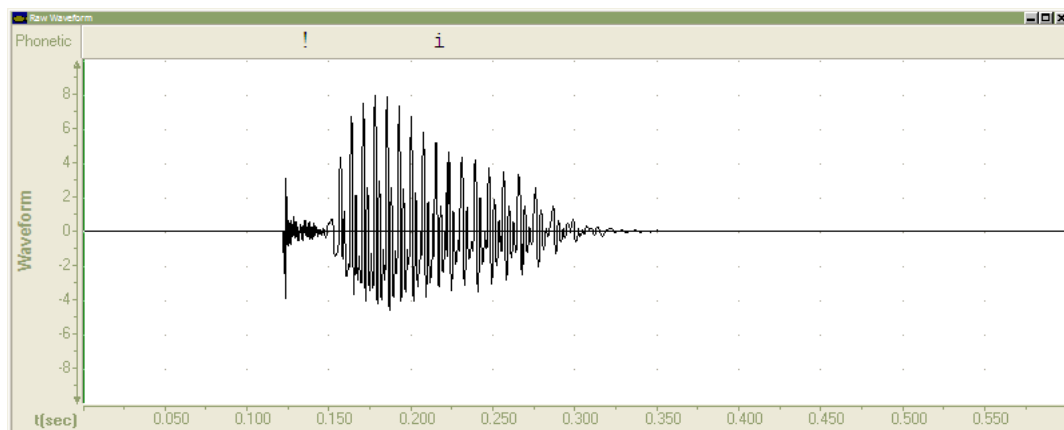


Figure 2.7. Voiceless post-alveolar click.

Within a word, a vowel followed by a glottalized click is usually nasalized. Elderkin (1989: 51) refers to this predictable nasalization as ‘accidental nasality’ and also notes that a word-final vowel may be nasalized when it is followed by a word beginning with a glottalized click. Glottalization in clicks involves both the constriction of the glottis and the lowering of the velum, the latter of which results in the nasalization of a preceding vowel. Elderkin (1992) discusses some possible explanations for this velic opening.

We have observed that the degree to which vowels are nasalized in the environments described above varies freely. In some instances, the relevant vowel may only be weakly nasalized, whereas on other occasions, it is more strongly nasalized.<sup>14</sup> In the phonological transcription used in this paper, we leave vowels which are accidentally nasalized unmarked for nasality. However, we have been unable to clearly determine whether some vowels immediately preceding a glottalized click are phonologically, rather than accidentally, nasalized.

## 2.2.4 Nasalization

The nasalized clicks in Sandawe are described by Elderkin (1989:52) as being preceded and accompanied by ‘an [ŋ] which, before the release of the click influx, is coarticulated with a nasal homorganic to the place of articulation of the click’. He prefers not to describe these clicks as ‘prenasalized’ since they frequently occur in word-initial position and the language does not have prenasalized word-initial consonants, except in loan words (see section 2.1.3). Furthermore, the nasal portion of the segment cooccurs with the click as well as precedes it, and therefore in phonetic terms, these clicks are not best described as ‘prenasalized’.

Figure 2.8 shows the waveform for the nasalized click in /<sup>n</sup> | wǎ : / ‘elephant’:

<sup>14</sup>See Wright et al. (1995:12–15) for a discussion on variation in the relative timings of the different articulations involved in producing a glottalized click in Sandawe and the resulting effects on accidental nasality.

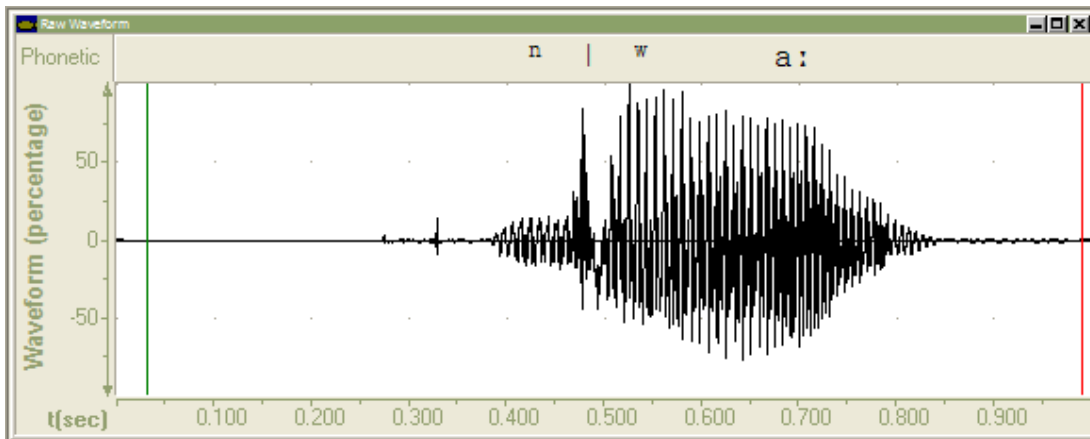


Figure 2.8. Nasalized dental click.

The nasal portion before the release of the click is 82 milliseconds long.

## 2.2.5 Examples of clicks

Tables 2.18, 2.19, and 2.20 give examples of clicks in the language:<sup>15</sup>

Table 2.18. Examples of /l, l<sup>h</sup>, l', n|/

	/l/ <i>Voiceless dental click</i>	/l <sup>h</sup> / <i>Aspirated dental click</i>	/l'/ <i>Glottalized dental click</i>	/n / <i>Nasalized dental click</i>
<i>Word-initial:</i>	l'ànǐ bow l'ǎ: leaf l'ě:kâ to be heavy l'í to come (sg. subj.) l'wě: eye	l <sup>h</sup> àwé to tighten l <sup>h</sup> î to delay l <sup>h</sup> ímé to sing l <sup>h</sup> ǐ:â dik-dik l <sup>h</sup> wě: dirt	l'íná earth l'ǐ: snake l'ô: shade l'wá: wound l'wě: opening	n àtǐ to come (pl. subj.) n ě: to cut n íâ to yield n î: meat n wé: thorn; to make
<i>Word-medial (syll.-initial):</i>	sǎ:lâ tree (type)		hǐl'á to tie mál'â to crumble má:l'â lice sál'à weaverbird	

<sup>15</sup>The voiced clicks are omitted from these tables as their overall frequency of occurrence is so low (see table 2.17 in section 2.2.2).

Table 2.19. Examples of /!/, !<sup>h</sup>, !', <sup>n</sup>!/

	/!/ Voiceless post-alveolar click	/! <sup>h</sup> / Aspirated post-alveolar click	/!'/ Glottalized post-alveolar click	/ <sup>n</sup> !/ Nasalized post-alveolar click
<i>Word-initial:</i>	!â full moon !ě: rib !î bone !ógôrî tree (type) !wàʔá eland	! <sup>h</sup> éké craziness ! <sup>h</sup> ê: tongue ! <sup>h</sup> ó: to fall (pl.) ! <sup>h</sup> ùmé flour ! <sup>h</sup> wé: hole	!'ásî to sleep, rest (pl. subj.) !'ě: ant hill dirt !'î lice eggs !'òmí large frog !'wâ hole	<sup>n</sup> !á: to hold <sup>n</sup> !ě: to laugh <sup>n</sup> !î: root <sup>n</sup> !òmá to crawl <sup>n</sup> !wâ river
<i>Word-medial (syll.-initial):</i>	há!â to call !ú:!ê kidney		hí!'â to distribute hó!'ô forehead k'á!'â to grind k'ùrɥ!'é to rub má!'ó to taste	k'á <sup>n</sup> !á to lose

Table 2.20. Examples of /||, ||<sup>h</sup>, ||', <sup>n</sup>||/

	/  / Voiceless lateral click	/   <sup>h</sup> / Aspirated lateral click	/  '/ Glottalized lateral click	/ <sup>n</sup>   / Nasalized lateral click
<i>Word-initial:</i>	â to plant   íné to pluck   òká dry season   ǒ: path   wâ name	<sup>h</sup> â to brush off    <sup>h</sup> émé to pay    <sup>h</sup> òpí tree (type)    <sup>h</sup> ô: hollow    <sup>h</sup> wă: fruit (type)	'aʔ to get stuck   'ě: to skin   'íâ to dance   'ǒ: to harvest   'wě: to try	<sup>n</sup>   ákō war <sup>n</sup>   ě: to arrive <sup>n</sup>   íné to sleep, rest (sg. subj.) <sup>n</sup>   ó: to milk <sup>n</sup>   ǒ: child
<i>Word-medial (syll.-initial):</i>		ʔú   <sup>h</sup> û to cough	hó  'ó to fill k <sup>h</sup> ó  'ô to go around wá  'á to vomit x <sup>w</sup> ă:  'â to scrape   'ò  'á baboon	hí <sup>n</sup>   í: to paint sé <sup>n</sup>   á tree (type)

Clicks in Sandawe are found in syllable-initial position. They are most commonly found word-initially, but may also occur word-medially. Word-medial clicks are more likely to be glottalized clicks than voiceless, aspirated, or nasalized ones. In comparison with the southern African Khoisan languages, clicks occur much more freely in non-word-initial position in Sandawe (Wright et al. 1995:2).

### 3 Vowels

The following vowel qualities are found in Sandawe:

Table 3.1. Vowel qualities

	<i>Front</i>	<i>Mid</i>	<i>Back</i>
<i>Close</i>	i, [i̥], i:, î:		u, [u̥], u:, û:
<i>Mid</i>	e, e:, ê:		o, o:, ô:
<i>Open</i>		a, a:, â:	

All of the five qualities occur as short oral, long oral, and long nasal vowels. These fifteen vowels make up the phonemic vowel inventory of the language. In addition, there are two voiceless oral vowels, /i̥/ and /u̥/, which are allophones of /i/ and /u/, respectively.

### 3.1 Oral vowels

#### 3.1.1 Voiced vowels

The voiced oral vowels can be short or long. Vowel length is contrastive in the language, as shown in table 3.2:

Table 3.2. Examples of long and short oral vowels

a	ʔàmé	to keep, raise
a:	ʔá:mé	to break(3m.sg.obj.)
a	mâ	to be sweet
a:	má:	to be few

There is a partial relationship between tone and vowel length. Rising tones occur only on long vowels and low tones occur mainly on short vowels (see section 4.1).

Long vowels are approximately 1.5 times longer than short vowels. Long vowels, in word-final position, may be drawn out and therefore can be slightly longer than long vowels in other word positions.

#### 3.1.2 Voiceless vowels

As noted by Elderkin (1989: 212), the short oral vowels /i̥/ and /u̥/ can be devoiced when they are low toned and in morpheme-final position. Elderkin (1989: 38) also observed that voiceless vowels do not occur after /w, j, h/ and our data supports this finding. Table 3.3 illustrates the occurrence of devoiced vowels:

Table 3.3. Examples of voiceless vowels

/i̥/	bâri̥	rainy season
	bút̥i̥	red
/u̥/	nâmu̥	tree (type)
	dèru̥	chin

Speakers of the western dialect of Sandawe are more likely to pronounce words with voiceless vowels than speakers of the eastern dialect. The form /kònkòrì/ 'rooster', for example, is a western pronunciation corresponding to the eastern pronunciation /kònkórí/.

Other non-phonemic voiceless vowel qualities can be found in Sandawe. Sometimes, a short voiceless vowel with the quality of an adjacent vowel (usually the preceding one) is heard after a glottal stop (Elderkin 2003:6). This can occur in, for example, /kwàʔáná/ 'five'.

In lexical items, the quality of the voiceless vowel appears to be at least partly predictable according to the preceding segments. The unrounded front vowel /i̥/ tends to occur after alveolar consonants, and the rounded back vowel /u̥/ after bilabial and velar consonants. (See exception in footnote 19.) Other examples suggest a link between the quality of an elided vowel and that of the previous vowel in the word. For example, /xú:ɿ̥/ 'niche' can be contrasted with /hě:ɿ̥/ or /hĩ:ɿ̥/ 'to bark', and /núk'w̥/ 'to be tight' with /hík'ɿ̥/ 'to go'. In these cases, there is vowel harmony in terms of frontness and backness. These patterns are not evident in grammatical morphemes, as can be seen if we compare the first person singular, low toned PGN<sup>16</sup> morpheme /-s̥i̥/ with the third person feminine, singular, low toned PGN morpheme /-s̥ù/.

### 3.2 Nasal vowels

Nasal vowels in Sandawe are normally long vowels, but are phonetically shortened in certain contexts.<sup>17</sup> Some phonetically short nasal vowels can be analyzed as the result of reduplication processes, as in /!ò! ókówá:gáʔ/<sup>18</sup> 'they are weak/brittle', which is derived from /!ó:/ 'to break'. Nasal vowels are also shortened before glottal stops in word formation, as can be seen when we compare /s̥í:gés̥i̥/ 'I gave you (pl.) it', with /s̥í?wā:s̥i̥/ 'I gave you (pl.) them'. The underlying form of the second person plural object is /s̥í:/. Other short nasal vowels appear to be short oral vowels which have acquired nasalization after a nasal consonant has been elided. An example of this is the form /<sup>n</sup>llú̥k̥ù/ 'to cause to stand', which can be compared with /<sup>n</sup>llú̥mé/ 'to stand'. It is also possible for short nasal vowels to occur as the result of accidental nasality before a glottalized click (see section 2.2.3 for examples and further discussion). In addition, nasal vowels which are long in slow or careful speech may be realized as short vowels in faster speech. During a survey of Sandawe dialects, we noted that speakers of the western dialect in particular were likely to pronounce the nasal vowels of monosyllabic words

<sup>16</sup>In Sandawe, a word may, under certain conditions, be suffixed with a morpheme indicating either its own person, gender and number status or that of another word, such as the subject, in the same construction. This morpheme is referred to here as a *PGN morpheme* (Elderkin 1986:133, after Hagman 1977:41 for Nama). Two sets of PGN morphemes can be identified, a high tone set and a low toned set. These morphemes have various functions and are used in agreement with the subject in certain sentence types, as well as in adjective agreement, copular constructions, nominal derivations, and the marking of nouns for specificity.

<sup>17</sup>Elderkin reports that 'the native part of Sandawe only has long nasalised vowels (except where shortened vowels occur in word formation)' (1989:62).

<sup>18</sup>Our thanks go to Ed Elderkin (pc, 2003) for suggesting examples of phonetically short nasal vowels to be investigated.

with a high falling tone pattern, such as /! <sup>h</sup>ê:/ ‘tongue’, as short vowels (Eaton, Hunziker and Hunziker 2004).

### 3.3 Examples of vowels

The following tables give examples of the fifteen vowel phonemes in Sandawe:

Table 3.4. Examples of /i, i:, î:/

	/i/	/i:/	/î:/
<i>Syllable-initial:</i>	dáîjā: cousin ɛ̀òí noise		
<i>Syllable-final</i> <i>(word-medial):</i>	ʔíó: mother ʔísólî arrow (type) bìk <sup>h</sup> é to leave behind bîrî bed sìkă waterbuck	dʒí:dʒí: black wasp hî:kîrî owl mî:ll'â lightning sî:sî: bird (type) tî:gâ leftovers	ʔîî:ʔó: bird (type)
<i>Syllable-final</i> <i>(word-final):</i>	dʒàní arrow nòrí bird's nest !'î lice eggs !'ómí large frog ll <sup>h</sup> òpí tree (type)	ʔû:îí: salt bîmbîrí: spirit dʒîdʒî: spring p <sup>h</sup> ă:ní: pumpkin <sup>n</sup> líní: corn	ʔîîî: to close dî: stone îî: mucus tî'î: to get up quickly (pl. subj.) ll'î: fire

Table 3.5. Examples of /u, u:, û:/

	/u/	/u:/	/û:/
<i>Syllable-initial:</i>	gîlàú bee larvae kéûtò pig màúlé: someone (m.) ll'èú sandy area		
<i>Syllable-final</i> <i>(word-medial):</i>	ʔúll <sup>h</sup> û to cough dúrû area k <sup>h</sup> úrú tortoise súk'útó calf (anat.) l'úmú waist	kàrîpû:pû butterfly k <sup>h</sup> àbû:mbú: hill nú:nú: toy, pacifier xû:nú: spine	!'ú:!'ê kidney
<i>Syllable-final</i> <i>(word-final):</i> *	ʔùnt <sup>h</sup> ú pipe ʔúll <sup>h</sup> û to cough gùmbû: to be bent kû rope l'úmú waist	ɛ̀ùmbúrú: vegetable (type) nú:nú: toy, pacifier p <sup>h</sup> û: to spit out tʃû: animal xû:nú: spine	tɛ̀'û: arm <sup>n</sup> !'û: mouth

\*In monomorphemic words, the vowel in the syllable preceding a word-final /u/ is always /u/. This restriction does not hold when the word-final /u/ is devoiced, as in /nâmû/ ‘tree (type)’ and /dèrû/ ‘chin’, or when the word-final /u/ is syllable-initial.

Table 3.6. Examples of /e, e:, ē:/

	/e/	/e:/	/ē:/
<i>Syllable-initial:</i>	ʔíé to stay (sg. subj.) pùé to pound millet síé to take tɿ' àé to rest	llàě: new	
<i>Syllable-final (word-medial):</i>	ʔáíénà monitor lizard bégerô plant (type) dèmà area dèrɿ chin hèsó they	ʔé:râ corn blossom bé:bâ near k <sup>h</sup> ě:kɿ to be jealous k' ímé:t <sup>h</sup> ê midday tě:térâ seed	
<i>Syllable-final (word-final):</i>	ʔútê yesterday màíé to sort, choose tɿíné to build wàré friend (m. to m.) l' ímé to clear	góxómpé: arrow shaft íé: to stand (pl. subj.) mé: big pě: to put (sg. obj.) ʔàíě: candelabrum tree	bèrě: millet k <sup>w</sup> éíé: to enter quickly k' <sup>w</sup> ê: neck !ě: rib ! <sup>h</sup> ê: tongue

Table 3.7. Examples of /o, o:, ô:/

	/o/	/o:/	/ô:/
<i>Syllable-initial:</i>	ʔíó: mother		
<i>Syllable-final (word-medial):</i>	bójó seed boʔé to be fat dóró zebra dɿgòmó to buy kòkó grandfather	bõ:k' ô spoon kõ:nâ to spoil (trans.) kó:ʔâ stake, peg rõ:gó knife sõ:sô chick	<sup>g</sup> lló: <sup>g</sup> ê greater kudu (male)
<i>Syllable-final (word-final):</i>	kókó chicken mátó gourd sàmbò power, strength xáráɿô rake ! 'ébô medicine (local)	báló: to herd kõ:ŋgó: squash (plant) ríŋgó: to go around sé:ŋkó: small ax !èkõ: finger millet	dô: rim, edge, lip hónó: bone marrow kòlõ: hoe k' óbó: to bend over t <sup>h</sup> òlõ: soft spot on neck

Table 3.8. Examples of /a, a:, ā:/

	/a/		/a:/		/ā:/	
<i>Syllable-</i>	kě:â	iron				
<i>initial:</i>	kìàlě:	porcupine				
	núá	corn porridge				
	l <sup>h</sup> ĩ:â	dik-dik				
	ll'íâ	to dance				
<i>Syllable-</i>	ʔàlálá:	scorpion	ʔǎ:nákà	to dry (trans.)		
<i>final</i>	ʔáǎénà	monitor lizard	ʔǎ:ná:	corn		
<i>(word-</i>	sákâ	chest	ká:kâ	dog		
<i>medial):</i>	dʒàk <sup>h</sup> á	bush	tǎ'ǎ:ŋgá:	lizard (type)		
	wák <sup>h</sup> á:	firewood	má:ʔâ	tree type		
<i>Syllable-</i>	hétékâ	to marry; to take	ʔàlálá:	scorpion	kímá:	arrow poison
<i>final</i>		(pl. obj.)	dǎ:	to be able to	ts'ìgǎ:	cobra
<i>(word-final):</i>	mòrà	necklace	k <sup>h</sup> ǎ:	to hit	ts'ímá:	mosquito
	mírâ	udder	tǎ'ǎ:ŋgá:	lizard (type)	tʃ <sup>h</sup> â:	fat, oil
	sákâ	chest	wák <sup>h</sup> á:	firewood	! 'àk <sup>h</sup> ǎ:	tooth
	tĩ:gâ	leftovers				

Vowels do not occur word-initially in Sandawe. A relatively small number of words contain syllable-initial vowels in word-medial position. Oral vowels occur far more frequently overall than nasal vowels. As the tables show, we have no examples of nasal vowels in vowel clusters and only three examples of nasal vowels in word-medial position (see section 5.3 for further discussion of this last point). Within a word, there is a tendency for any oral vowel preceding a nasal vowel to be of the same quality as the nasal vowel.

## 4 Tone

In the following first section, a comparison of surface tone in monomorphemic and multimorphemic Sandawe words is presented. This is followed by an analysis of these surface patterns in terms of underlying tones and tone bearing units. The second section looks at tone melodies in monomorphemic Sandawe words and discusses whether the association of these melodies to tone-bearing units is predictable. This is followed by a section containing further observations on the tone patterns evident in multimorphemic words. Phrase and sentence-level tonal phenomena are then discussed, with particular attention paid to the use of tone in noun phrases and the tonal behavior of verbs.<sup>19</sup>

<sup>19</sup>The sections on tone in this paper have benefited greatly from initial assistance given by Keith Snider of SIL International and from many instances of personal communication with Ed Elderkin. Our thanks go to both these linguists and also to Ken Olson, Oliver Stegen, and Mike Cahill of SIL International, who reviewed earlier versions of the tone section in this paper.

## 4.1 Surface and underlying tone

The examples in table 4.1 illustrate the different surface tones found in monomorphemic and multimorphemic Sandawe words:<sup>20</sup>

Table 4.1. Surface tones in monomorphemic and multimorphemic words

	<i>Tone</i>	<i>Monomorphemic</i>	<i>Multimorphemic</i> <sup>21</sup>	<i>Distribution</i>
1	high, short ´	gélé baobab tree	gélé-kí baobab tree-add.	No restriction
2	high, long ´	!´wá: pigeon	gélé-á: baobab tree-SF	No restriction
3	mid, short -	kérémbū tick	t <sup>h</sup> éré-kī pot-add.	Follows high tone
4	mid, long -	mámā: health	t <sup>h</sup> éré-ā: pot-SF	Follows high tone
5	low, short `	hùmbù cow	mìndà-tà-sǎ field-at-3f.sg.PC	Non-word-final
6	low, long `	mè:mbè bachelor		Non-word-final
7	high falling, short ^	t <sup>h</sup> érê pot	gélé-sâ baobab tree-3f.sg.PC	Word-final or before syllable containing voiceless vowel
8	high falling, long ^	k´wê: neck	llê: /llê-é/ throw-3m.sg.obj.	If monomorphemic, nasal vowel only and word-final only
9	mid falling, short ˘		t´s´á-kī-sǎ water-add.-3f.sg.PC	Follows mid tone, word-final
10	low falling, short ˘	mìndà field	k <sup>h</sup> wà-sǎ return-3f.sg.PC	Word-final or before syllable containing voiceless vowel
11	low falling, long ˘	dò: mkola tree	mìndà: [mìndà-à] field-3m.sg.PC	Word-final If monomorphemic, nasal vowel only
12	rising, long ˘	sĩ:ndí: puppy	hùmbù-ǎ: cow-SF	No rising tone on short vowels

The first tones with restricted distribution in table 4.1 are the two mid tones, which are exemplified in rows 3 and 4. The fact that these tones never occur word-initially, but always after a surface high tone, suggests that they could be downstepped high tones. This possible analysis is supported by the multimorphemic examples. If we assume that the /-ki/ and /-a:/ suffixes are high toned at the underlying level (see the multimorphemic examples in rows 1 and 2), then their realization as mid toned, when suffixed to the stem /t<sup>h</sup>érê/ ‘pot’, can be explained. The stem-final low tone, which follows a high tone, causes the following high tone of

<sup>20</sup>Surface forms created by the suffixation of suprasegmental affixes are discussed in section 4.3.4.

<sup>21</sup>The abbreviations used here are *add.* for additive, *SF* for subject focus, and *PC* for pronominal clitic.

the suffix to be downstepped to a mid tone. The absence of a low tone in the surface realization of these examples can be explained as the result of a rightward high tone spread process:

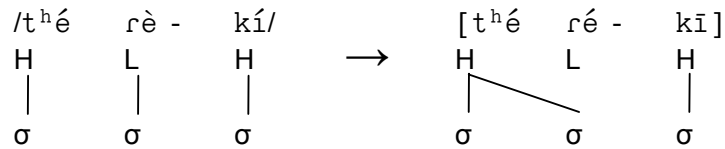


Figure 4.1. Rightward high tone spread in a multimorphemic word.

The same downstep analysis can be used to account for the mid tones in the monomorphemic examples in rows 3 and 4. That is, a low tone occurring between two high tones causes the downstep of the second high tone to a mid tone. The low tone is no longer realized in the surface tone pattern because of rightward high tone spread:

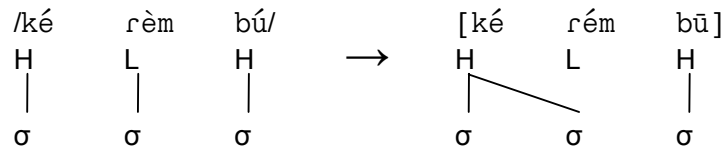


Figure 4.2. Rightward high tone spread in a monomorphemic word.

This analysis obviates the need for positing a mid tone at the underlying level in Sandawe.

Other examples of surface mid tones in monomorphemic words are preceded by a consonant cluster, such as in /!áʔlō/ ‘swallow’. There are no monomorphemic words containing a consonant cluster which have high toned vowels both preceding and following the cluster<sup>22</sup> and, therefore, we analyze words such as /!áʔlō/ as having a floating low tone between the consonants of the cluster, which causes the following high tone to be downstepped:

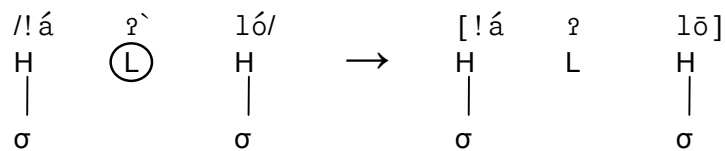


Figure 4.3. Downstep in word containing consonant cluster.

Thus, both associated and floating low tones occurring after a high tone cause the downstep of a following high tone. A similar analysis can be applied to the example /!ǎ:sō/ ‘moon’. The existence of the alternative pronunciation /!ǎ:bᵛsō/ for this word suggests that the downstep of the word-final high tone to a mid tone in the first pronunciation is caused by a preceding floating low tone.

<sup>22</sup> Some multimorphemic examples containing a syllable-final glottal stop do have high toned vowels in this environment. An example of this kind is /mɛ́-ʔwá:/, which consists of the adjective /mɛ́:/, ‘big’, and the plural agreement morpheme /-ʔwá:/.

The two types of low tones found on short vowels are in complementary distribution and, therefore, can be analyzed as one tone at the underlying level. The level low tone is found word-medially (row 5) and the falling low tone is found word-finally (row 10) or before a syllable containing a voiceless vowel (as in, for example, /dèrɥ/ ‘chin’). Low tones found on long vowels show a similar pattern of complementary distribution (see rows 6 and 11), but, with the exception of long, low falling tones in multimorphemic words, they occur very rarely.<sup>23</sup> We have, in our data set, three examples of long low level tones in monomorphemic words: /tɪ̀à:kî/ ‘nothing’, /mè:mbè/ ‘single person’, and /bà:bé:/ ‘moon’. The first of these can also be pronounced as /tɪ̀àkî/ and the long vowel, in the second example, can be assumed to be derived from the elision of a consonant, as the form /mèhèmbè/ has also been recorded. The third example is not the normal word for ‘moon’, but one which can be used with a child. We also have only three examples of long low falling tones in monomorphemic words: /gõ̀:/ ‘circumcision drum’, /dõ̀:/ ‘mkola tree’, and /tɪ̀ ɪ̀:/ ‘get up quickly (plural subject)’.<sup>24</sup>

The short high falling tone (row 7 in table 4.1) does not occur frequently in word-medial position. This is to be expected since, in the preceding discussion, a process of rightward high tone spread was posited, as illustrated in rows 3 and 4 in the table, and this results in some word-medial underlying short high falling tones being realised as level high tones. The presence of the short high falling tone in word-final syllables suggests that rightward high tone spread does not occur in such syllables as, otherwise, the word-final short, high falling tones would be realized as level high tones. A further restriction on the process is indicated by the presence in the data set of two monomorphemic words containing a word-medial short high falling tone: /kónḡôrmā/ ‘pigeon (type)’ and /ts’óbôrsà/ ‘gizzard’. We have also heard a word-medial short high falling tone in the multimorphemic example /hínâmsē/ ‘to thank’. All three of these words have in common a consonant cluster which begins with a sonorant and follows the short falling tone. These examples can be accounted for by positing that the consonant cluster is the result of a vowel elision process which has left a floating low tone. This tone associates to the preceding vowel, resulting in a falling tone. The high tone does not spread rightwards before a syllable containing a voiceless or elided vowel:

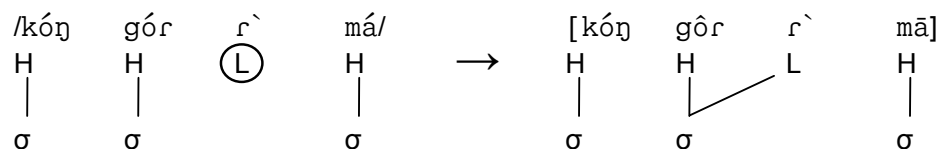


Figure 4.4. Word-medial short high falling tone.

Note here also that the high tone after the HL is downstepped.

Short high falling tones occur word-initially in monosyllabics, such as in /t<sup>h</sup>â/ ‘to run (sg. subject)’ and /ts’â/ ‘water’, and word-finally after low tones, such as in /ɛ̀imbô/ ‘word’ and /ɪ̀ntô/ ‘sinew’. A short high falling tone must be included in an underlying representation of

<sup>23</sup>Short and long level low tones are frequently found in words after a process of *tone lowering* has applied (see sections 4.4.1 and 4.4.2). The comments here apply only to the tone patterns of words in isolation.

<sup>24</sup>Elderkin suggests that /gõ̀:/ ‘circumcision drum’ is a Bantu loan (1989:60).

these tone patterns. However, not all examples of short high falling tones at the surface level need to be analyzed in this way. It was previously stated that an underlying low tone is realized as a low, falling tone word-finally. This can be seen in row 5 of table 4.1, in the example /mìndà-tà-sà/ ‘field-at-3f.sg.PC’. The same final suffix is seen in the multimorphemic example in row 7, /gélé-sâ/ ‘baobab tree-3f.sg.PC’, where it is realized as a high falling tone following a high level tone, as a result of rightward high tone spread. This analysis can be extended to the monomorphemic example /t<sup>h</sup>érê/ ‘pot’, which would therefore be represented as H-L<sup>25</sup> at the underlying level:<sup>26</sup>

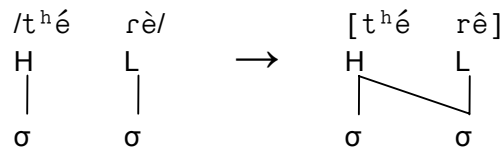


Figure 4.5. Word-final short high falling tone.

This example can be contrasted with an example such as /t<sup>h</sup>a-sà/ ‘run-3f.sg.PC’, which has the *surface* tone pattern of a high tone followed by a low falling tone, but the *underlying* tone pattern HL-L:

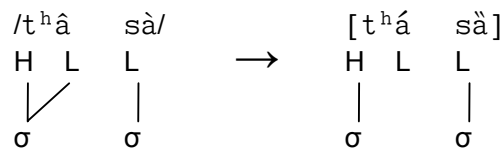


Figure 4.6. Underlying word-initial short high falling tone before a low tone.

The example of /t<sup>h</sup>érê/ H-L ‘pot’ can be compared with /bábaʔtò/ ‘cockroach’. Here, the falling tone following a high tone is low rather than high. This can be attributed to a floating low tone between the two consonants of the word-medial cluster, thus giving the word the underlying tone pattern H-H-L-L:

<sup>25</sup>Underlying tone patterns are transcribed here with hyphens between the syllables.

<sup>26</sup>It is also possible that the high falling tone in such a surface tone pattern may in fact be a high falling tone, and not a low tone, at the underlying level. Since the two underlying tone patterns H-L and H-HL result in the same surface tone pattern, it is not possible to distinguish between them in monomorphemic words. In contrast, these two underlying tone patterns can be distinguished in multimorphemic words, as shown in section 4.3.3. See also row 4 of table 4.2 for a similar example of ambiguity in which either a downstepped high tone or a downstepped rising tone can be analyzed as the origin of a mid tone.

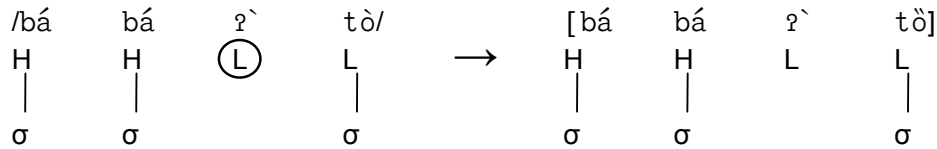


Figure 4.7. Realization of word-final low tone as low.

This analysis is comparable with the one given in figure 4.3 for /! aɤ̀lō/ H-L-H ‘swallow’.

If, as has been analyzed, a low tone is realized as a high falling tone following a high tone and as a low falling tone following a low tone, it might be expected that following a mid tone, it would be realized as a tone that falls from mid to low, as a result of rightward mid tone spread. This is, in fact, what can be observed, as in the multimorphemic example from row 9 of table 4.1, /ts'á-kī-sà/ HL-H-L ‘water-add.-3f.sg.PC’:

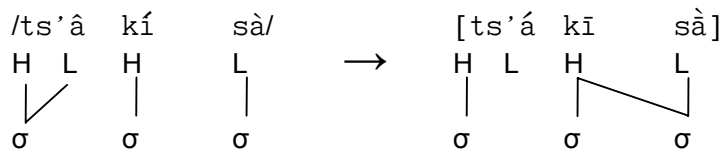


Figure 4.8 Rightward mid tone spread.

We have not encountered any monomorphemic words containing a mid falling tone.

In monomorphemic words, the long high falling tone (row 8 of table 4.1) is restricted to nasal vowels in word-final position. It is therefore in complementary distribution with the short high falling tone, which is restricted to oral vowels in word-final position, or before a syllable containing a voiceless or elided vowel. (Recall that Sandawe does not have short nasal vowels.)

In contrast to the data presented here, Elderkin (1989:43–44) recorded two phonetically distinct long high falling tones. In his analysis, he assigned a short vowel two morae and a long vowel three, thus enabling the two falling tones to be represented differently, as HLL and HHL.<sup>27</sup> The former describes the lexical high falling tone and the latter describes a tone created when a long high tone is suffixed with a floating low tone. Elderkin gives, as an example of this second type of falling tone, the multimorphemic form /k'ê:-pò/, (cry-2sg.) ‘you will cry’, which is realized as /k'ê:pò/. However, we have recorded this same form with the tone pattern /k'ê:pò/. The floating low of the elided irrealis suffix (/-ì/) causes the following low tone to be realized as a low falling tone. The derivation of this example is discussed later.

<sup>27</sup>It is important to note here that, despite differences in data, we do follow Elderkin in describing the tone of long vowels with three tone symbols, in order to account for tone spread phenomena in long vowels, which is discussed later. The question of how to integrate this approach theoretically is not addressed here.

A further difference between Elderkin's data and our own can be mentioned here. He provides examples of non-word-final short high falling tones, as in, for example, /dzìgídâ-sà/ 'heart-3f.sg.PC'. We have checked this form with our main Sandawe speaker and have recorded the tone pattern /dzìgídâ-sà/, in which the final vowel of the stem /dzìgídâ/ has undergone high tone spread. When this example is compared with the difference between Elderkin's /k'ê:pò/ and our /k'ê:pò/, a pattern may be seen. In Elderkin's data, the word-medial low tones are evident in the surface form, whereas in our data they are not. It is possible that these differences are dialectal, since Elderkin's main speaker came from the central area of Usandawe and ours comes from the western area. A dialect survey we have carried out shows that there are slight differences in pronunciation between these two areas (Eaton, Hunziker, and Hunziker 2004).

In Sandawe, rising tones are only found on long vowels, as illustrated in row 12 of table 4.1. In the multimorphemic example /hùm-bù-ǎ:/ 'cow-SF', the rising tone is derived from the suffixation of a high toned morpheme /-ǎ:/ to a low toned stem. This can be analyzed as rightward, low tone spread:

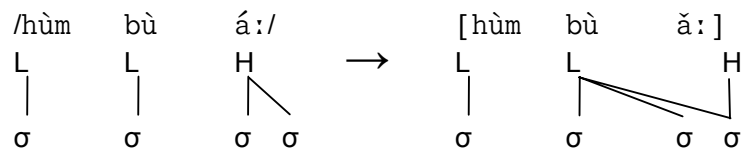


Figure 4.9. Rightward low tone spread.

This analysis reflects how the final vowel (in the example above) starts with a period of low pitch, before rising to a high pitch, as shown in figure 4.10:

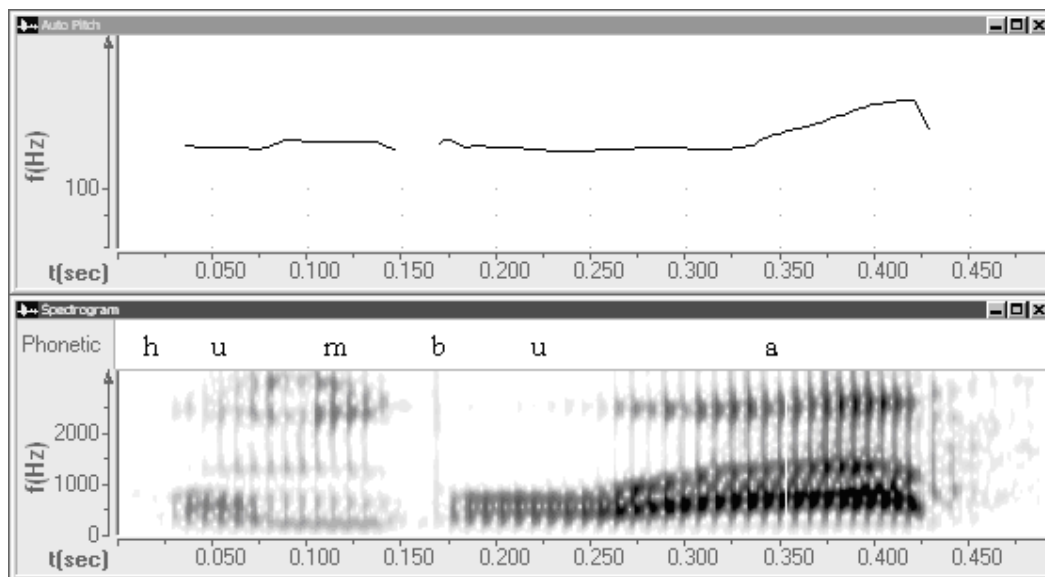


Figure 4.10. Pitch of rising tone.

If a morpheme with a short vowel is suffixed to a low toned stem, the rightward low tone spread process does not apply, as Sandawe does not allow short rising tones. Thus, /hùmbù-kí/ L-L-H ‘cow-add.’, for example, is not realized as \*/hùmbù-kĩ/. Rightward low tone spread can be subsumed together with the high and mid tone spread processes under a general, rightward tone spread process.

Table 4.2 summarizes the proposed derivation of the twelve surface tones listed in table 4.1:

Table 4.2 .Tones in monomorphemic and multimorphemic words

	<i>Monomorphemic</i>	<i>Multimorphemic</i>	<i>Derivation explanation (where relevant)</i>
1	gélé H-H baobab tree	gélé-kí H-H-H baobab tree-add.	
2	! ' wá: H pigeon	gélé-á: H-H-H baobab tree-SF	
3	kérémbū H-L-H tick	t <sup>h</sup> éré-kī H-L-H pot-add.	<i>High tone spreads rightwards, leaving floating low tone. Final high tone is downstepped to mid tone.</i>
4	mámā: HL-H / H-LH / HL-LH health	t <sup>h</sup> éré-ā: H-L-H pot-SF	<i>As examples in 3. All three suggested underlying forms for /mámā:/ derive same surface tone pattern.</i>
5	hùmbù L-L cow	mìndà-tà-sà L-L-L-L field-at-3f.sg.PC	<i>Word-medial low tone is realized as short level low tone.</i>
6	mè: mbè L-L bachelor		<i>Word-medial low tone is realized as long level low tone.</i>
7	t <sup>h</sup> éré H-L pot	gélé-sâ H-H-L baobab tree-3f.sg.PC	<i>High tone spreads rightwards, leaving low tone at word boundary.</i>
8	k' wê: HL neck		
9		ts' á-kī-sà HL-H-L water-and-3f.sg.PC	<i>High tone of first syllable spreads rightwards, leaving floating low tone. High tone of second syllable is downstepped to mid tone because of preceding floating low tone. Mid tone spreads rightwards, leaving low tone at word boundary and resulting in mid falling tone.</i>
10	mìndà L-L field	k <sup>h</sup> wà-sà L-L return-3f.sg.PC	<i>Word-final low tone is realized as short low falling tone.</i>

11	dò: L mkola tree	mìndà: /mìnda-à/ L-L-L field-3m.sg.PC	<i>Word-final low tone is realized as long low falling tone.</i>
12	sĩ:ndí: LH-H puppy	hùmbù-ǎ: L-L-H cow-SF	<i>In the multimorphemic example, low tone spreads rightwards, leaving high tone at word boundary.</i>

The following processes have been noted: downstep and rightward tone spread. Downstep in Sandawe applies within a word containing the underlying tone sequence H-L-H. The second H tone is realized as a mid tone. Any H tone following a downstepped H tone (within the same word) is also realized as a mid tone. Rightward tone spread applies to both high and low tones, including those high tones which have been downstepped to mid tones. The limits to the domain of the tone spread process will now be considered.

In the preceding discussion, it was noted that rightward high tone spread is not evident in word-final syllables, such as in /t<sup>h</sup>â/ HL ‘to run (sg. subject)’, and word-medial syllables which precede a syllable containing a voiceless or elided vowel, such as in /kòŋgôrmā/ L-H-L-H ‘pigeon (type)’. However, other data suggests that rightward tone spread may occur in word-final syllables, but only if the syllable contains a long vowel. Our main speaker judged that the long high falling tones in /tʃ<sup>h</sup>î:/ HL ‘honey’ and /tʃ<sup>h</sup>î:-sà/ HL-L ‘honey-3f.sg.PC’ were identical. Recall that a short high falling tone does undergo tone spread when a low toned morpheme is added, as in /t<sup>h</sup>á-sà/ HL-L ‘run-3f.sg.PC’. Therefore, we analyze the falling tone in /tʃ<sup>h</sup>î:-sà/ as also being the result of tone spread. Since the resulting tone is falling, the underlying lexical tone for /tʃ<sup>h</sup>î:/ must therefore be analyzed as HLL, rather than HHL:

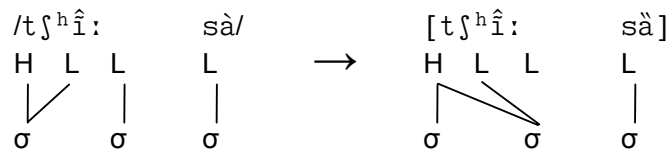


Figure 4.11. Lexical long high falling tone.

Furthermore, since the surface tone pattern of the lexical item in isolation is judged to be the same as when it is suffixed with a low toned morpheme, we posit that the underlying tone pattern HLL always surfaces as HHL and never as HLL.

If this analysis is followed, how can we account for the lack of tone spread in /t<sup>h</sup>â/ HL ‘to run (sg. subject)’, when tone spread does occur in word-final syllables containing a long vowel? This difference can be explained by restricting tone spread to non-word-final morae. The application of tone spread therefore never results in the loss of a word-final contour tone.

If the lexical long high falling tone is analyzed as HLL at the underlying level, it seems appropriate to assign the underlying tone pattern LHH the long rising tone. Assuming that tone spread applies to the rising tone in the way just described for the long falling tone, we can

interpret the rising tone in examples such as /ɿǎ:/ ‘goat’ as the underlying pattern LHH, which surfaces as LLH.<sup>28</sup>

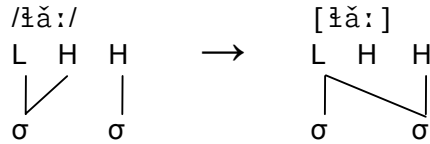


Figure 4.12 Lexical rising tone.

This tone pattern is judged by our main speaker to be identical with that created when the high toned nominative morpheme /-á:/ is suffixed to a word with all low tones, as in /hùmbù-ǎ:/ L-L-H ‘cow-SF’, shown in figure 4.9. In this example, the tone spread process has affected two morae, rather than just one, as in figure 4.12. However, as before, the tone does not spread to the word-final mora and therefore the process does not result in the loss of a contour tone. When the low toned instrumental suffix /-ʔî:/ is suffixed to a high toned stem, we also observe the tone spread process affecting two morae. For example, the final vowel in /mátó-ʔî:/ H-H-L ‘gourd-with’ has the same high falling tone as in /tʃ<sup>h</sup>î:/ HL ‘honey’:

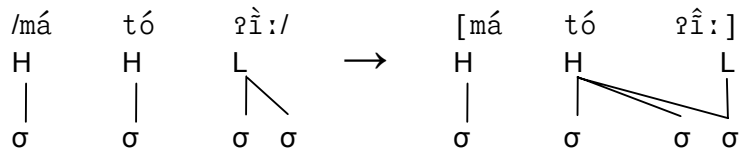


Figure 4.13. Rightward tone spread affecting two morae.

The surface tone of the final syllable in both can be described as HHL.

The analysis of tone spread proposed here restricts its application to one mora to the right, except in multimorphemic examples ending in a long vowel. In such examples, the spreading of a tone two morae to the right does not result in the loss of a contour tone as the word-final mora is unaffected. Similarly, tone spread does not occur in short word-final vowels, where its application would affect the word-final mora. In addition, tone spread does not occur in word-medial syllables which precede a syllable containing a voiceless or elided vowel. In such a context, the mora which immediately precedes the syllable containing a voiceless or elided vowel, and therefore no morae, acts like a word-final mora.

High tone spread occurs both within a syllable, as in /t<sup>h</sup>á-sà/ HL-L ‘run-3f.sg.PC’, and across syllables, as in /gáwâ/ H-L ‘hill’. Low tone spread also occurs both within a syllable, as in /ɿǎ:/ LH ‘goat’, and across syllables, as in /hùmbù-ǎ:/ L-L-H ‘cow-SF’, but its occurrence is more restricted than high tone spread because Sandawe does not allow short rising tones, either in monomorphemic or multimorphemic forms. Thus /gélé-sâ/ H-H-L ‘baobab tree-3f.sg.PC’

<sup>28</sup>Falling and rising tones on long vowels are referred to elsewhere in this section as simply HL and LH, respectively. The use of three symbols to distinguish between HLL and HHL and between LHH and LLH is limited to the discussion of tone spread.

exhibits high tone spread, but /hùmbù-kí/ L-L-H ‘cow-add.’ does not exhibit low tone spread. A further difference between high and low tone spread can be seen when we compare an example like /gáwâ/ H-L ‘hill’ with an example like /tòró:/ L-H ‘insect’. That is, high tone spread applies across syllable boundaries in monomorphemic words as well as multimorphemic words, whereas low tone spread applies across syllable boundaries in multimorphemic words only.

Although voiceless vowels clearly cannot bear tone in the way that voiced vowels do, they can nevertheless be associated with a particular tone. In the case of word-final voiceless vowels, this tone is always low.<sup>29</sup> This can be seen in the tone pattern of such words when they are suffixed with morphemes consisting of a floating tone (see sections 4.3.1 and 4.3.2) and also in the tonal behavior of neighboring words (see sections 4.4.1 and 4.4.2). The same kind of evidence can be adduced for the association of low tone with the voiceless vowel, which may surface after a syllable-final glottal stop.

Some of the words in the data set which end in a voiceless vowel have only high tones on the voiced vowels, whereas others have both high and low tones, as shown in table 4.3.

Table 4.3. Tonal patterns of words ending in voiceless vowels

	<i>Sandawe example</i>	<i>English gloss</i>
1	t <sup>h</sup> í t <sup>h</sup> í	black (for cows)
2	kámák <sup>h</sup> u	cheek
3	tí 'ík' í	morning
4	bârí	rainy season
5	álâmü	arm
6	gêsi	cousin

There is a tendency for those words with an obstruent preceding the voiceless vowel to have only high tones on the preceding voiced vowels (examples 1, 2, and 3, but not 6). In contrast, all the words in the data set in which a sonorant precedes the voiceless vowel have a falling tone on the vowel before this consonant (a high falling tone in examples 4 and 5). The final two syllables of the first five examples in table 4.3 can all be analyzed as having the underlying tone pattern H-L. The falling tone in examples 4 and 5 can therefore be attributed to the effect of the floating low tone associated with the voiceless vowel. That is, this tone becomes associated with the preceding voiced vowel, resulting in a high falling tone:

<sup>29</sup> Word-medial voiceless vowels are arguably present in forms such as /t<sup>h</sup>ásinó:/, ‘liver’. (An alternative transcription of this form is /t<sup>h</sup>ásnó:/, with a consonant cluster.) If this form is analyzed as having a word-medial voiceless vowel, this vowel must be either toneless or associated with a high tone as the tone of the vowel in the following syllable is not downstepped.

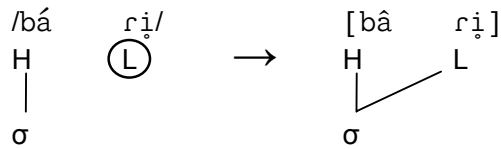


Figure 4.14. Short high falling tone caused by floating low tone of voiceless vowel.

The association of a floating low tone is prevented if an obstruent intervenes. In example 6, the falling tone which precedes the obstruent must therefore be analyzed as a falling tone at the underlying level. Thus, the underlying tone pattern for this word is HL-L:

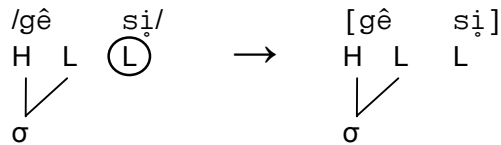


Figure 4.15. Short high falling tone before obstruent preceding voiceless vowel.

The difference between H-L and HL-L as underlying tone patterns in these examples can be clearly seen when the low toned specificity morpheme /-î/ is suffixed to the words. The surface tone pattern of, for example, /bârî:/ 'the (specific) rainy season' contrasts with that of /gêsî:/ 'the (specific) cousin'. As seen in section 4.3.4, these surface tone patterns are consistent with the proposed underlying tone patterns discussed above.

As previously mentioned, the multimorphemic form /k'é:-î-pò/, (cry-irr.-2sg.) 'you will cry', is realized as /k'é:pò/. A full explanation of the derivation of this surface tone pattern can now be given. Two possible analyses can be posited. In the first, the floating low tone remains unassociated with any mora, but its presence at the underlying level is clear from the surface low tone pattern of the following low toned morpheme:

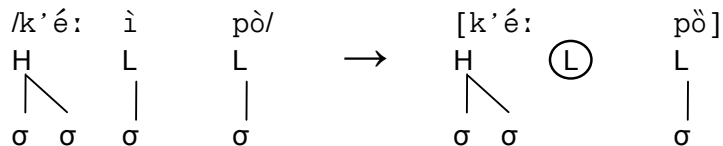


Figure 4.16 Unassociated floating low tone.

If this analysis is held, a restriction must be proposed to account for why the low tone does not attach to the tone of the preceding vowel, as it does in /bârî/ H-L 'rainy season' and /kòŋgôrmā/ L-H-L-H 'pigeon (type)'. Such a restriction would need to refer to the distinction between the floating low tone of a voiceless or elided vowel following a consonant and the floating low tone of an elided syllable.

Alternatively, we can analyze the floating low tone remaining after the elision of the irrealis morpheme as associating to the immediately preceding mora. This results in the tone pattern HHL, which then undergoes rightward tone spread, resulting in the tone pattern HH:

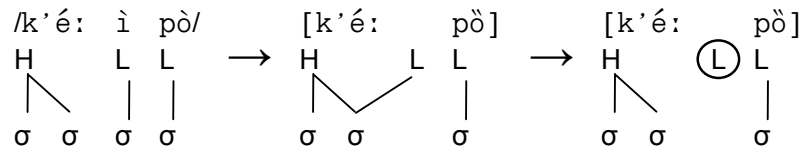


Figure 4.17. Low tone association and rightward tone spread.

If this analysis is held, it must be stated that the low tone association process applies before the rightward tone spread process in the derivation.

Since the data presented in the preceding discussion has already shown how rightward tone spread must be analyzed as occurring after the suffixation of morphemes, the second proposed analysis is preferred. There is therefore no need for a restriction on the association of a floating low tone to the mora of the preceding syllable.

## 4.2 Tone melodies

Sandawe words can be grouped according to the *tone melodies* of the underlying sequences of tones, as shown in table 4.4:

Table 4.4. Tone melodies

Tone melody	Number of syllables			Total in data set <sup>30</sup>
	1	2	3	
H	! 'wá: pigeon H	džík' é milk H-H	tɪ' ák' átó impala H-H-H	189
L	dõ: mkola tree L	hùmbù cow L-L	dʒìràmbè gecko L-L-L	30
HL#1	kû rope HL	gáwâ hill H-L	gólóbâ evening H-H-L	238
HL#2		tátà tip, point HL-L	ʔáɪénà monitor lizard H-L-L	17
LH#1	t <sup>h</sup> wĩ: bird LH	tòró: insect L-H	tɪ' àbísó stomach L-H-H	303
LH#2		bèrě: millet L-LH	kèlèmbá skin L-L-H	94
HLH		mámā: health HL-H / H-LH / HL-LH	kérémbū tick H-L-H	24

<sup>30</sup>The data set referred to here contains nouns, pronouns, and verbs only. Words of four or more syllables were excluded in order to reduce the likelihood of unknowingly including multimorphemic words.

<i>LHL#1</i>	bǒ:k'ô spoon LH-L	dʒìgídâ heart L-H-L	68
<i>LHL#2</i>		mîná:râ tree (type) L-LH-L	20
<i>LHLH</i>	nǎ:ŋg <sup>w</sup> ē: cat LH-LH		6
<i>Total</i>			989

The non-contour tone melodies H and L together make up 22.1% of the data set. The H melody is far more common (19.1%) than the L melody (3.0%).<sup>31</sup>

With the remaining melodies, there exists the possibility that the association of the melodies to words of differing syllabic structures follows predictable patterns. Some evidence of this can be seen in the data. The predominant association pattern involves the high tone being carried on as many syllables as possible, leaving the low tone(s) associated to the syllables at the word boundaries. Thus, in words with LH or LHL melodies, the initial word boundary syllables tend to be low level if short and rising if long, and in words with HL or LHL melodies, the tone of the final word boundary syllables tends to be high falling. This pattern accounts for 82.3% of all the words in the HL, LH, and LHL melody groups combined. These three groups will now be considered in turn.

Within the HL melody group, 93.3% of words are high toned up until the last syllable, which is a high falling tone. This is referred to as melody HL#1 in the table above. The melody referred to as HL#2 occurs infrequently in the data. In words with this melody, the final syllable has a low falling tone.

Two different types of LH melody may be observed in the data. The more common melody accounts for 76.3% of all the words with an underlying LH melody. In this melody (LH#1 in the table), the low tone occurs only in the first syllable, which is low if short and rising if long. The remaining syllables carry high tones. This pattern follows the overall predominant association pattern in which low tone occurs at the word boundaries. In contrast, in the LH#2 melody, both the first and second syllables carry low tones.

The LHL melody group makes up only 8.9% of the data set. Two types of LHL melody may be seen in the data. In the more common melody (LHL#1, 68 examples), the predominant association pattern is followed and the low tones occur at the word boundaries. If the final syllable in a disyllabic word belonging to this melody group has a voiceless vowel, then the surface tone pattern of the preceding vowel is rising and then falling, as in /bǎʔnî/ LH-L 'grave hole'. In the LHL#2 melody (twenty examples), the word-initial tone is low if short and rising if long, like the LHL#1 melody, but the following high tone has not spread rightwards.

<sup>31</sup>Elderkin (1986:153) claims that, 'Sandawe has very few noun stems which seem likely to be Khoisan and which have only low tones.' He also notes that no all low toned words in Sandawe contain clicks (pc, 2006).

The remaining two melodies in the table, HLH and LHLH, are unusual in that the contour of their underlying tone sequence differs from that of their surface tone pattern. This is because the required environment for downstep (HLH) is present in both melodies. In the HLH melody, the resulting surface tone melody is HM, whereas in the LHLH melody, it is LHM. We have no monomorphemic examples of words with the melody HLHL, which would be realized as HML.

In summary, the association of tone melody to tone bearing units in Sandawe words shows a high but not complete degree of predictability.<sup>32</sup> The predominant tone association pattern in contour melodies involves the high tone being carried on as many syllables as possible, leaving the low tone(s) associated to word-initial and word-final syllables. The importance of tone melodies in Sandawe will be seen in section 4.4, where we show how certain phrase and sentence-level tonal phenomena make reference to tone melodies.

### 4.3 Tone patterns in multimorphemic words

This section has been divided into five subsections. The first three subsections illustrate the phenomena resulting from the suffixation of morphemes with high, low, and falling tone patterns. The fourth subsection deals with the tonal effects of suprasegmental suffixes and the final subsection briefly considers the tone patterns of reduplicated forms and the assignment of tone patterns to borrowings.

#### 4.3.1 Suffixation of morphemes with a high tone pattern

Table 4.5 shows the various tone patterns resulting from suffixing a morpheme with a high tone. Eight lexical items with particular tone patterns have been chosen to illustrate the different effects of this kind of suffixation. Two high toned suffixes are shown: the consonant-initial suffix /-kɪ/ (add.), which has a short vowel, and the vowel-initial suffix /-á:/ (SF), which has a long vowel.<sup>33</sup>

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<sup>32</sup>It is interesting to note that many of the words which constitute exceptions to the predominant tone association pattern appear to be loanwords.

<sup>33</sup>Multimorphemic words are transcribed in their assimilated forms. Obligatory epenthetic consonants, such as [g] between a nasal vowel and another vowel (as in row 4), are included in the transcription where appropriate. See sections 6.1 and 6.2 for a description of the assimilation processes and epenthetic consonants found in multimorphemic words.

Table 4.5. Suffixation of morphemes with a high tone

	<i>Stem ending</i>	<i>Example</i>	<i>/-kí/ additive</i>	<i>/-á:/ Subject Focus (SF)</i>
1	high tone	gélé H-H Gele	gélé-kí H-H-H Gele-add.	gélé-á: H-H-H Gele-SF
2	rising tone	t <sup>h</sup> ě: LH tree	t <sup>h</sup> ě:-kí LH-H tree-add.	t <sup>h</sup> ě:-á: LH-H tree-SF
3	short high falling tone	<sup>n</sup> !ê HL day	<sup>n</sup> !é-kí HL-H day-add.	<sup>n</sup> !é-ā: HL-H day-SF
4	long high falling tone	tʃ <sup>h</sup> î: HL honey	tʃ <sup>h</sup> î:-kí HL-H honey-add.	tʃ <sup>h</sup> î:-gā: HL-H honey-SF
5	mid tone	!áʔlō H-L-H swallow	!áʔlō-kí H-L-H-H swallow-add.	!áʔlō-ā: H-L-H-H swallow-SF
6	low falling tone in L melody word	hùmbù L-L cow	hùmbù-kí L-L-H cow-add.	hùmbù-ǎ: L-L-H cow-SF
7	voiceless vowel	tɬ'ík'ᵢ H-L morning	tɬ'ík'ᵢ-kí H-L-H morning-add.	tɬ'ík'-ā: H-L-H morning-SF
8	glottal stop	tónóʔ H-H-L small ax	tónóʔ-kí H-H-L-H small ax-add.	tónóʔ- ā: H-H-L-H small ax-SF

A high toned morpheme has three possible tonal realizations: high level, mid level, and rising. The high toned realization surfaces after three of the example stems in the table. In rows 1 and 2, the high toned suffix follows a surface high tone and in row 6, it follows a surface low tone. In the second example of row 6 (/hùmbù-ǎ:/ 'cow-SF'), rightward low tone spread results in a rising tone on the suffix vowel. This process only occurs when the suffix vowel is long, as Sandawe does not allow short rising tones.

All three pairs of examples in the rows mentioned have in common the absence of the environment required for downstep. In contrast, the remaining five pairs of examples in the table all contain a version of the sequence H-L-H, which causes the high tone of the suffix to be downstepped to a mid tone.

In the examples with stem-final short high falling tones (row 3), the low tone causing the downstep process is not observable at the surface level because of rightward tone spread. This tone spread process also occurs in the parallel examples with long high falling tones (row 4), but, as in this environment, the process derives HHL from HLL, there is a low toned mora which is observable at the surface level. In the examples in row 5, both the stem-final tone and the tone of the suffix are downstepped from high to mid.

The examples in the final two rows of the table pattern according to those examples contain a stem-final low tone. This supports the analysis proposed in the previous section of assigning low tone to a stem-final voiceless vowel and to the vowel which may surface after a stem-final glottal stop. These underlying low tones follow high tones in the examples given and therefore cause the downstep of the suffix vowels from a high tone to a mid tone.

Four particular high toned suffixes warrant further explanation. There is the suffix /-sé/, which can be attached to certain verbs and has a causative function. An example of this is /gírìʔ-sé/ 'to stop (trans.)', and is derived from the verb /gíríʔ/ 'to stop (intrans.), wait'. As this example shows, the suffixation of /-sé/ results in all the tones of the stem being realized as low tones. In contrast, a second high toned suffix of particular interest, the morpheme /-ó:/, which can be suffixed to certain verbs and has a nominalizing function, results in all the tones of the stem being realized as high tones. Thus /háwó:/ 'collecting of water' is derived from /hàwé/ 'to collect water'.

The deverbalizer suffix /-t<sup>h</sup>e:/, which derives adjectives from verbs, is a suffix worthy of special mention. Two analyses are possible with respect to the tone of this morpheme. It can be analyzed as /-t<sup>h</sup>é:/, that is, with an initial floating tone. By this analysis, when the morpheme is suffixed to a verb, the floating low tone causes the high tone of the suffix to be downstepped if the verb stem contains a high tone. Thus the adjective /bòʔé-t<sup>h</sup>ē:/, 'fat', which is derived from the verb /bòʔé/, 'to be fat', has a downstepped high tone in the final syllable, which is therefore realized as a mid tone. If the deverbalizer morpheme is suffixed to a verb with a low tone melody, there is no downstep environment and, therefore, the suffix is realized with a rising tone, following the pattern seen in the second example of row 6 of table 4.5. This can be seen in /gànda-t<sup>h</sup>ě:/, 'thin', which is derived from /gàndà/, 'to be thin'. Alternatively, the deverbalizer morpheme can be analyzed as having an underlying rising tone as this would result in exactly the same tonal behavior after suffixation.

Finally, we have observed that the tone of the durative morpheme /-jó:/ need not be downstepped in the normal downstep environment.

- |     |  |                          |            |       |
|-----|--|--------------------------|------------|-------|
| (1) | kǒ:ngó:-á:                               | mántʃ <sup>h</sup> â-jó: | sà:        | hík'ì |
|     | LH-H-H                                   | H-L-H                    | H          | H-L   |
|     | Gkoongoo-SF                              | eat-dur.                 | NC(3f.sg.) | go    |
|     | Gkoongoo carried on eating and then went |                          |            |       |

The verb /mántʃ<sup>h</sup>â-jó:/ 'eat-dur.' has the alternative tonal realization /mántʃ<sup>h</sup>á-jō:/, in which both rightward high tone spread and downstep do occur. In the first tonal realization, the suffix is acting tonally like a separate word, whereas, in the second, it is acting tonally like other high toned suffixes.<sup>34</sup>

<sup>34</sup>Elderkin also recorded an anomalous tone pattern for this suffix and this led him to analyze this suffix as having the highest word key (pitch level) (1989:136). By his analysis, most suffixes do not have independent word keys, but are realized at the pitch level of the word to which they attach.

### 4.3.2 Suffixation of morphemes with a low tone

Table 4.6 shows the various tone patterns resulting from suffixing a morpheme with a low tone. The eight lexical items from the previous table have been selected to illustrate these patterns. Two low toned suffixes are shown: the consonant-initial suffix /-sà/ (3f.sg.PC) and the vowel-initial suffix /-à/ (3m.sg.PC).

Table 4.6. Suffixation of morphemes with a low tone

	Stem ending	Example	/-sà/ 3f.sg.PC	/-à/ 3m.sg.PC
1	high tone	gélé H-H Gele	gélé-sà H-H-L Gele-3f.sg.PC	gélé-à H-H-L Gele-3m.sg.PC
2	rising tone	t <sup>h</sup> ě: LH tree	t <sup>h</sup> ě:-sà LH-L tree-3f.sg.PC	t <sup>h</sup> ě:-à LH-L tree-3m.sg.PC
3	short high falling tone	<sup>n</sup> !ê HL day	<sup>n</sup> !é-sà HL-L day-3f.sg.PC	<sup>n</sup> !é-à HL-L day-3m.sg.PC
4	long high falling tone	tʃ <sup>h</sup> î: HL honey	tʃ <sup>h</sup> î-sà HL-L honey-3f.sg.PC	tʃ <sup>h</sup> î:-gà HL-L honey-3m.sg.PC
5	mid tone	!áʔlō H-L-H swallow	!aʔlō-sà H-L-H-L swallow-3f.sg.PC	!aʔlō-à H-L-H-L swallow-3m.sg.PC
6	low falling tone in L melody word	hùmbù L-L cow	hùmbù-sà L-L-L cow-3f.sg.PC	hùmbù-à L-L-L cow-3m.sg.PC
7	voiceless vowel	tɿ'ík'ᵿ H-L morning	tɿ'ík'ᵿ-sà H-L-L morning-3f.sg.PC	tɿ'ík'-à: H-L-L morning-3m.sg.PC
8	glottal stop	tónoʔ H-H-L small ax	tónóʔ-sà H-H-L-L small ax-3f.sg.PC	tónóʔ-à: H-H-L-L small ax-3m.sg.PC

A low toned morpheme has three possible tonal realizations: high falling, mid falling, and low falling. The high falling tone is realized after a stem-final high tone, as in rows 1 and 2, and the mid falling tone is realized after a stem-final mid tone, as in row 5. The low falling tone is realized after a stem-final low tone, as in rows 3, 4, 6, 7, and 8, including after a low tone which is not evident at the surface level because of rightward high tone spread (row 3) and after a floating low tone associated with a vowel (row 7) or a glottal stop (row 8). However, if the low toned suffix is vowel-initial, it has a high falling tone pattern in these last two contexts and is realized as a long vowel.

We have recorded one example for which our speaker considered both the high falling and the low falling tone patterns to be acceptable for a low toned suffix. This example includes the verb

stem /hě:ɿi/ 'bark'. When this stem is suffixed with the third person feminine singular PC /-sà/, two alternative pronunciations are acceptable: /hě:ɿi-sà/ and /hě:ɿi-sâ/. In the first, a floating low tone from the voiceless vowel influences the tone pattern of the suffix, whereas in the second pronunciation, the presence of the voiceless vowel has no effect and the tonal realization of the suffix is as for a stem-final high tone. This second pronunciation is perhaps the newer of the two and represents the final stage in the loss of the /î/ vowel, a stage in which all segmental and tonal traces of the vowel have been lost.

While we are dealing with low toned suffixes, one further point should be made. Elderkin (1989:46-48) observed length and tonal differences between the second person singular and third person masculine singular PCs when they were suffixed to a long high toned vowel. This led him to the analysis of the former as the 'syllable closure' /-j/ and the latter as the vowel /-â/. We have not adopted this analysis as the data we have collected does not provide evidence of such differences. We transcribe the second person singular morpheme as the vowel /-î/. However, it is important to mention that we do note one interesting tonal phenomenon with respect to this morpheme. When reproducing the tone patterns of Sandawe forms by whistling, our main native Sandawe speaker does not make a separate whistle for the /-î/ suffix on a word, irrespective of whether it has been assimilated into the stem. In contrast, when he whistles the tone patterns for words suffixed with other vowel initial suffixes, the suffix has a separate whistle, unless it has been assimilated into the stem or unless it is the same vowel quality as the stem-final vowel. Thus /k' é:-î/ 'cry-2sg.PC' has one whistle, whereas /k' é:-â/ 'cry-3m.sg.PC' has two. Other morphemes which are not whistled separately are the pronominal morpheme /-î/, the irrealis morpheme /-î/, the subordinate clause morpheme /-îʔ/, and the low toned third person masculine singular PGN morpheme /-ù/. Furthermore, unlike vowels in other morphemes, the vowels in these morphemes cannot assimilate to the stem to which they attach.

### 4.3.3 Suffixation of morphemes with a high falling tone

Table 4.7 shows the various tone patterns resulting from suffixing a morpheme with a high falling tone. The eight lexical items from the previous two tables have been selected to illustrate these patterns. Two suffixes with high falling tones are shown: /-gê/ (declarative) and the /-sê/ (3m.sg. possessive).<sup>35</sup>

<sup>35</sup>This morpheme is derived from /-sî/, which expresses possession, and /-è/, which is a third person masculine singular PGN morpheme (Elderkin 1989:88).

Table 4.7. Suffixation of morphemes with a high falling tone

	<i>Stem ending</i>	<i>Example</i>	<i>/-gê/ declarative</i>	<i>/-sê/ 3m.sg. possessive</i>
1	high tone	gélé H-H Gele	gélé-gê H-H-HL Gele-decl.	gélé-sê H-H-HL Gele-3m.sg.poss.
2	rising tone	t <sup>h</sup> ě: LH tree	t <sup>h</sup> ě:-gê LH-HL tree-decl.	t <sup>h</sup> ě:-sê LH-HL tree-3m.sg.poss.
3	short high falling tone	<sup>n</sup> !ê HL day	<sup>n</sup> !ê-gè HL-HL day-decl.	<sup>n</sup> !ê-sè HL-HL day-3m.sg.poss.
4	long high falling tone	tʃ <sup>h</sup> î: HL honey	tʃ <sup>h</sup> î-gè HL-HL honey-decl.	tʃ <sup>h</sup> î:-sè HL-HL honey-3m.sg.poss.
5	mid tone	!áʔlō H-L-H swallow	!áʔlō-gè H-L-H-HL swallow-decl.	!áʔlō-sè H-L-H-HL swallow-3m.sg.poss.
6	low falling tone in L melody word	hùmbù L-L cow	hùmbù-gê L-L-HL cow-decl.	hùmbù-sê L-L-HL cow-3m.sg.poss.
7	voiceless vowel	tɿ'ík'ᵊ H-L morning	tɿ'ík'ᵊ-gè H-L-HL morning-decl.	tɿ'ík'ᵊ-sè H-L-HL morning-3m.sg.poss.
8	glottal stop	tónóʔ H-H-L small ax	tónóʔ-gè H-H-L-HL small ax-decl.	tónóʔ-sè. H-H-L-HL small ax-3m.sg.poss

Like the low toned morphemes discussed in the previous section, a morpheme with a high falling tone has three possible tonal realizations: high falling, mid falling, and low falling. Its behavior is identical with that of the low tone morpheme, with one exception. Namely, a suffix with an underlying high falling tone is realized with a surface high falling tone when it is attached to a stem containing only low tones, as in row 6 of the table. Such a stem is thus the only means of distinguishing between a suffix with a low tone and one with a high falling tone.

#### 4.3.4 Suprasegmental suffixes

Two types of suprasegmental suffixes have been identified in Sandawe. Firstly, there a suffix type which consists only of a floating tone. Secondly, there is a suffix type which consists of a floating tone, length, and nasalization. The tonal behavior of each of these suffixes will now be considered.

Suffixes consisting only of a floating tone can be seen in the following two examples:

- (2) | ípō  
 | í-` -pó  
 H-L-H  
 come-neg.-2sg.  
 You didn't come

- (3) | ípò  
 | í-` -pò  
 H-L-L  
 come-irr.-2sg.  
 You will come

The floating tones in these examples are derived from the segmental suffixes /-tʃ<sup>h</sup>ì/ (negative) and /-ì/ (irrealis) respectively. The segmental elements of these suffixes are evident in other person forms. The /-tʃ<sup>h</sup>/ segment of the negative suffix can be seen in all person forms other than the second person singular,<sup>36</sup> whereas the irrealis suffix /-ì/ can be seen in the third person masculine form only.

That the floating tones in the examples above are low tones can be seen by noting the tone of the following syllable. In example (2), the mid tone of the final syllable is analyzed as high tone which has been downstepped by the preceding low tone. In example (3), the low tone of the final syllable is realized as a falling low tone because of the preceding low tone.

A second suprasegmental suffix type, which consists of tone, length, and nasalization, can be seen in Sandawe. Two such suffixes are particularly common: the connective morpheme /-ḱ̄/ and the specificity morpheme /-ḱ̄̄/. The tonal behavior of these suffixes is illustrated in table 4.8:

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<sup>36</sup>Some speakers of the eastern dialect of Sandawe also retain the segment in the second person singular form, resulting in the pronunciation /| ítʃ<sup>h</sup>ḱ̄pō/ for 'you didn't come'.

Table 4.8. Suffixation of suprasegmental morphemes

		<i>Example</i>	<i>/-ḥ̣/ connective</i>	<i>/-ḥ̣/ specificity</i>
1	high tone	gélé H-H Gele	gélé: H-H-H Gele-&	gélê: H-H-L Gele-sp.
2	rising tone	t <sup>h</sup> ě: LH tree	t <sup>h</sup> ě: LH-H tree-&	t <sup>h</sup> ě: LH-L tree-sp.
3	short high falling tone	<sup>n</sup> !ê HL day	<sup>n</sup> !ê: HL-H day-&	<sup>n</sup> !ê: HL-L day-sp.
4	long high falling tone	tʃ <sup>h</sup> î: HL honey	tʃ <sup>h</sup> î: HL-H honey-&	tʃ <sup>h</sup> î: HL-L honey-sp.
5	mid tone	!áʔlō H-L-H swallow	!áʔlō: H-L-H-H swallow-&	!áʔlō: H-L-H-L swallow-sp.
6	low falling tone in L melody word	hùmbù L-L cow	hùmbù: L-L-H cow-&	hùmbù: L-L-L cow-sp.
7	voiceless vowel	tɬ'ík'ɨ H-L morning	tɬ'ík'ɨ: H-L-H morning-&	tɬ'ík'î: H-L-H-L morning-sp.
8	glottal stop	tónóʔ H-H-L small ax	tónóʔ̄: H-H-L-H small ax-&	tónóʔ̄: H-H-L-L small ax-sp.

In rows 1, 5, 6, 7, and 8, the surface tone patterns resulting from the suffixation of the suprasegmental morphemes were judged by our main Sandawe speaker to be the same as those found in monomorphemic words with the corresponding tone patterns. However, when looked at in the Speech Analyzer program, the final vowels in words suffixed with the suprasegmental morphemes were always longer than their monomorphemic counterparts. Furthermore, final vowels in words suffixed with the high toned connective morpheme */-ḥ̣/* consistently exhibited slightly longer vowels than the same words suffixed with the low toned specificity morpheme */-ḥ̣/*. An instrumental analysis also reveals that the word-final tone patterns of forms suffixed with */-ḥ̣/* fall slightly further than the corresponding falling tone patterns in monomorphemic words. (The transcription in the table above reflects the judgments of our speaker, rather than the results of instrumental analysis.)

The tone pattern resulting from suffixing a word-final rising tone with the high toned connective morpheme (row 2) rises in the same way as the basic rising tone and then stays at a high pitch for slightly longer. Suffixing the low toned specificity morpheme to a word-final rising tone results in a tone pattern which rises and then falls. The extra length perceived by our native speaker for these two patterns is shown in the table by the symbol */·/*.

Attaching the low toned specificity morpheme to a word ending in a short high falling tone (row 3) results in a long high falling tone which was judged by our native speaker to be identical with that of the long high falling tone found in monomorphemic words. A long high falling tone is also produced when a word ending in a short high falling tone is suffixed with the high toned connective morpheme, but this tone is slightly different from the long high falling tone of monomorphemic words in that it falls slightly further. The same pattern can be observed in words ending in a long high falling tone. That is, suffixing the high toned suprasegmental morpheme results in no perceived change in tone pattern, whereas suffixing the low toned suprasegmental morpheme results in a tone that falls slightly further.

Two stem-final possibilities not included in the table are a long vowel with a high tone pattern (as in /! 'wá:/ 'pigeon') and a long vowel with a mid tone pattern (as in /mámā:/ 'health'). Suffixing /-ḥ/ to these stems results in a long high level tone and a long mid level tone respectively, which are both slightly longer than the corresponding tones found in monomorphemic words. Suffixing /-ḥ̄/ to these stems results in a long high falling tone and a long mid falling tone, respectively. The first of these tones differs from the lexical long high falling tone in that it stays at a high level for longer before it falls, and also in that it is slightly longer in overall length. The long mid falling tone has no lexical counterpart.

As is illustrated by the examples in row 7 of the table, a voiceless vowel becomes voiced, and thus tone bearing, when it is suffixed with a morpheme consisting of nasalization and tone. The examples in row 8 show how a phonetically conditioned vowel surfaces after a word-final glottal stop to bear the nasalization and tone of such a suffix.

#### 4.3.5 Reduplications and borrowings

We have not made a thorough study of either reduplicated forms or borrowed words in Sandawe, but a few observations can be recorded here. Four main tonal types of reduplicated forms can be seen in our data in table 4.9:

Table 4.9. Reduplications

	<i>Sandawe example</i>	<i>English gloss</i>
1	tííí:tííí:	to drizzle
2	bét <sup>h</sup> ábé:t <sup>h</sup> â	plant (type)
3	kìlíkìlī	squirrel
4	màlà <sup>h</sup> màlá:	smooth

The first example shows the reduplication of a form, /tííí:/, which has the H tone melody, resulting in another form with the same melody. This contrasts with the second example, in which the second part of the reduplicated form has a lengthened first vowel and a falling tone pattern on the second vowel. The third example can be analyzed as deriving from the juxtaposition of L-H and L-H, which creates the environment for the high tone of the fourth syllable to be downstepped to a mid tone. However, it is not clear why the tone of the third syllable is also mid. The last example does not display the L tone melody, as might be expected from the tone pattern of the first part of the reduplication, but the melody LH. This

shows some similarity with a rule that applies to certain constituents after a constituent with the L tone melody, as will be seen in sections 4.4.1 and 4.4.2.

The assignment of tone to Swahili borrowings in Sandawe shows a tendency for translating the stressed penultimate syllable in Swahili into a high toned syllable in Sandawe. The preceding and following tones are assigned low tone. Thus a word such as *kijiji* 'village', in which the second syllable is stressed, becomes /kìdʒíɖʒí/ L-H-L. The final vowel in some borrowings is devoiced. This can be seen in /gâri/ H-L, which comes from *gari* 'car'.

## 4.4 Phrase and sentence-level tonal phenomena

This section is divided into three subsections. The first deals with tonal phenomena involved in the structure of different kinds of noun phrases and the second considers the circumstances under which verbs may have different tonal realizations. The final section briefly discusses some intonational phenomena.

### 4.4.1 Noun phrases

The first type of NP to be considered here is the genitive.<sup>37</sup> The relationship between the two parts of the genitive is signified solely by tone. This is illustrated in table 4.10:

Table 4.10. Genitive NPs

	<i>Modifier</i>	<i>Head</i>	<i>Genitive construction</i>	
1	gélé H-H Gele	mátó H-H gourd	gélé	màtò H-H Gele's gourd
2	kǒ:ŋgó: LH-H Gkoongo o	bǒ:k'ò LH-HL spoon	kǒ:ŋgó:	bò:k'ò LH-HL Gkoongo's spoon
3	tʃí H I	ǰǎ: LH goat	tʃí	ǰǎ: LH my goat
4	hàpú LH you	k'ámé LH beer	hàpú	k'àmè LH your beer
5	hèwé L-H he	hùmbù L-L cow	hèwé	hùmbù L-L his cow

Combinations of nouns with different tone melodies behave in the same way as the examples in the table with the exception of certain combinations which will be discussed below.

<sup>37</sup>This type of noun phrase is discussed in Elderkin (1989:103), where it is referred to as an *associative construction*.

We refer to the tonal change which signifies the genitive construction as *tone lowering*. The tone pattern of the head noun is realized as a pattern containing all low tones.<sup>38</sup> The only remnant of the underlying tone pattern is found in the word-final tone. A word-final high tone is realized as a low level tone, whereas a word-final low tone is realized as a low falling tone.<sup>39</sup>

In the fifth example in the table, the tone lowering process does not change the underlying tone pattern of the head noun as it already contains only low tones. In such examples, the genitive construction can be ambiguous with the copular construction, which does not involve any tonal changes. Thus the example in row 5 of table 4.10 may mean either 'his cow' or 'he is a cow'. Such ambiguity is only possible when the head noun is a third person masculine singular noun. The second noun in a copular construction is suffixed with a low toned PGN morpheme. This distinguishes the copular construction from the genitive, which has no low toned PGN morpheme on the head; but in the third person masculine singular, the PGN morpheme from the low toned set is zero, and so there is no difference between the copular and the genitive. The following examples illustrate this contrast:

- |     |     |            |
|-----|-----|------------|
| (4) | tʃí | hùmbù      |
|     | H   | L-L        |
|     | I   | cow        |
|     |     | my cow     |
| (5) | tʃí | hùmbù-sì   |
|     | H   | L-L-L      |
|     | I   | cow-1sg.   |
|     |     | I am a cow |

The genitive tone lowering rule is not without exceptions, as can be seen in table 4.11:

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<sup>38</sup>The extent to which the tones in a word are lowered may vary. We have worked with some speakers of the eastern dialect of Sandawe whose lowered tones are clearly not as low as their lexical low tones.

<sup>39</sup>The tonal changes we observe here differ from those recorded by Elderkin (1989:103). He found that a difference in pitch level (*word key*) in the second noun indicated the genitive relationship. The second noun retained its underlying pattern, but it was realized at a lower pitch than that of the previous noun.

Table 4.11. Tone lowering exceptions in genitive NPs

	<i>Modifier</i>	<i>Head</i>	<i>Genitive construction</i>		
1	hùmbù L-L cow	ts'wǎ: LH tail	hùmbù L-L cow's tail	ts'wǎ: LH	
2	kʷàndà L-L hut	tlâ HL door	kʷàndà L-L hut's door	tlâ HL	
3	tʃí hùmbù H L-L my cow	ts'wǎ: LH tail	tʃí H my cow's tail	hùmbù L-L	ts'wǎ: L
4	tʃí H I	mántʃ <sup>h</sup> â H-L food	tʃí H my food	mántʃ <sup>h</sup> â H-HL	
5	ǰísū HL-H sister	tʃ <sup>h</sup> î: HL honey	ǰísū HL-H sister's honey	tʃ <sup>h</sup> î: HL	
6	gélé H-H Gele	ǰísū HL-H sister	gélé H-H Gele's sister	ǰísū HL-H	
7	tʃí H I	másù H-L aunt	tʃí H my aunt	másù H-L	

The two types of exception relate to tone melodies. The first exception is that modifiers which have the L tone melody do not trigger the tone lowering process in the following noun (examples 1 and 2). Example 3 reveals that it is the tone melody of the modifying noun or NP as a whole which is pertinent, and not just the melody of the noun which immediately precedes the head.

The second exception is that head nouns which have the HL tone melody do not undergo the tone lowering process when the modifier they follow has a word-final high tone (example 4).<sup>40</sup> Similarly, if the modifier ends in a mid tone (example 5), the realization of the HL head noun starts at the same pitch as this tone. In the same context, the tone pattern of a head noun which has another melody would start at a slightly lower pitch. Example 6 shows how a noun which has the underlying tone melody HLH, but the surface melody HL, patterns with nouns which have the underlying melody HL. Example 7 shows how the tone pattern of head nouns with the underlying melody HL is not lowered even when the low toned part of the melody is carried by a voiceless vowel. This example also indicates that a multimorphemic noun which only has the HL melody because of a low toned suffix (in this case, the feminine suffix /-sù/) patterns with monomorphemic HL nouns.

<sup>40</sup>We have recorded some examples from speakers of the eastern dialect of Sandawe in which the pitch level of an HL head noun is lowered slightly, but not to the extent necessary for it to be classed as a tone lowering process.

The L and HL exceptions can both be explained as being motivated by the requirement of a contrast in the tone melodies of the modifier and head of a genitive construction. When the modifier has the L tone melody, the lowering of the tone pattern of the head noun would remove an already existing contrast in melody between the modifier and the head and therefore tone lowering does not take place. When the head has a surface HL tone melody and the modifier has a word-final high tone, tone lowering of the head would not change the overall melody of the construction. That is, the underlying modifier-head melodies H-HL and LH-HL display the overall melodies HL and LHL. If the head in such constructions were realized with the L melody, the resulting melodies, H-L and LH-L, would still display the same overall melodies as if the head retained its underlying tone melody. In all other melody combinations, with the exception of those which include a head noun with the L melody, when tone lowering applies to the head noun, there is a resulting change in the overall melody of the construction.

Tone lowering as described here must be distinguished from downstep within words (see section 4.1). Lowering a high tone results in a low tone, whereas downstepping a high tone results in a mid tone. This contrast can be seen clearly in (6):

(6)	ɛ́ísū	màtò
	HL-H	H-H
	sister	gourd
	sister's gourd	

Furthermore, the HL exception for tone lowering, as described above, means that the process cannot be analyzed simply as a floating low toned genitive morpheme found between the modifier and the head of a genitive construction, which causes downstep within the NP.

A second type of NP which exhibits tone lowering is the coordinate NP, as illustrated in (7):<sup>41</sup>

(7)	sómbá:	nî:	ɛǎ: / ɛà:
	H-H-H	H	LH
	fish	and	goat
	fish and goat		

In a coordinate NP, the tone pattern lowering of the second noun is optional. The HL exception to the tone lowering process holds in such constructions, but the L exception does not apply as the environment required for it never occurs. That is, the necessity of suffixing the first noun with the high toned morpheme /-ɛ́:/ means that no first noun can have the tone melody L.

The presence of the coordinating conjunction /nî:/ is optional in the coordinate construction and it has no effect on the tonal behavior described above. The surface tone pattern of this conjunction is always low and level, but the underlying tone pattern is given above as high. This is because if the tone pattern of the conjunction were low at the underlying level, it would be low

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<sup>41</sup>Some data we have collected suggests that the extent of the lowering of a noun's tone pattern in a coordinate construction differs somewhat from that found in a genitive construction. Specifically, a lowered H melody noun occurs at a slightly higher pitch level in a coordinate construction than it does in a genitive construction.

falling at the surface level (see section 4.1). The tone pattern of the conjunction is consistent with that of a high tone which has been lowered and therefore we analyze the tone pattern of the conjunction as a lowered high tone. Further support for this analysis comes from the presence of a high tone in the connective morpheme /-í/. It seems likely that the two morphemes /nǐ:/ and /-í/ are related. Other conjunctions can also be analyzed as undergoing tone pattern lowering, as can be seen in rows 5 and 6 of table 4.14.

The tone pattern of an adjective in a NP may be lowered or may occur with its basic tone pattern. The examples in table 4.12 illustrate the distribution of this variation:

Table 4.12. Tonal variation in noun and adjective combinations

	<i>Noun</i>	<i>Adjective</i>	<i>Combination</i>	
1	<sup>h</sup> àtʃ <sup>h</sup> ú L-H lion	k'áŋkárâ H-H-L black	<sup>h</sup> àtʃ <sup>h</sup> ú L-H black lion	k'áŋkàrà H-H-L
2	<sup>h</sup> àtʃ <sup>h</sup> ú L-H lion	k'áŋkárâ H-H-L black	<sup>h</sup> àtʃ <sup>h</sup> ú: L-H(-L) the black lion	k'áŋkárâ: H-H-L(-L)
3	<sup>h</sup> àtʃ <sup>h</sup> ú L-H lion	k'áŋkárâ H-H-L black	<sup>h</sup> àtʃ <sup>h</sup> ú L-H a lion is black	k'áŋkárâ H-H-L
4	mìndǎ L-L field	ts'ô:ʔtō LH-L-H small	mìndǎ L-L small field	ts'ô:ʔtō LH-L-H

The tone pattern of the adjective is lowered if the noun is not marked as specific, as in the first example. If the noun and adjective are suffixed with the specificity morpheme /-í/, the tone pattern of the adjective is not lowered, as shown in the second example. If the tone pattern of the adjective is not lowered in a construction that is not marked as specific, the construction is understood as a copular (example 3). The last example illustrates how the L tone lowering exception evident in the genitive and coordinate constructions also holds for adjectives. The tone pattern of an adjective following a L melody noun is not lowered in a NP. Note however how the HL exception does not apply, as can be seen in example 1.

#### 4.4.2 Verbs

The tone pattern lowering observed in nouns, as described in the previous section, also applies to verbs in realis sentences, under certain conditions:

Table 4.13. Realis verb tone lowering, including exceptions

	<i>Verb</i>	<i>Realis sentence</i>		
1	t <sup>h</sup> ímé H-H cook	gélé-á: H-H-H Gele-SF Gele cooks	t <sup>h</sup> ìmè H-H cook	
2	<sup>n</sup> !òmá L-H crawl	gélé-á: H-H-H Gele-SF Gele crawls	<sup>n</sup> !òmà L-H crawl	
3	dǔòmó L-H buy	gélé-á: H-H-H Gele-SF Gele buys a fish	sómbá H-H fish	dǔòmò L-H buy
4	dǔòmó L-H buy	gélé-á: H-H-H Gele-SF Gele buys a cow	hùmbù L-L cow	dǔòmó L-H buy
5	! <sup>h</sup> énâ H-L snore	gélé-á: H-H-H Gele-SF Gele snores	! <sup>h</sup> énâ H-L snore	
6	hík'ì H-L go	gélé-á: H-H-H Gele-SF Gele goes	hík'ì H-L go	

Examples 1 through 3 illustrate the tone pattern lowering of verbs with the H and LH melody. The next two examples show how there are parallel restrictions to the L and HL exceptions noted in the previous section. The tone pattern of a verb following a constituent with the L tone melody is not lowered (example 4) and neither is that of a verb with the HL tone melody when it immediately follows a word-final high tone (example 5). A further parallel with the genitive tonal phenomena can be seen in example 6. That is, a verb with a high surface tone pattern but an underlying HL melody behaves like a verb with a surface HL melody.

A number of further exceptions to the tone lowering process need to be mentioned here. These restrictions do not have equivalents in the genitive construction:

Table 4.14. Further exceptions to realis verb tone lowering

	Verb(s)		Realis sentence			
1	t <sup>h</sup> ímé		gélé	t <sup>h</sup> ímé-â		
	H-H		H-H	H-H-L		
	cook		Gele	cook-3m.sg.PC		
			Gele cooks			
2	t <sup>h</sup> ímé	l <sup>h</sup> èmé	gélé-á:	t <sup>h</sup> ímé:	l <sup>h</sup> èmè	
	H-H	L-H	H-H-H	H-H-H	L-H	
	cook	sweep	Gele-SF	cook-&	sweep	
			Gele cooks and sweeps			
3	t <sup>h</sup> ímé	l <sup>h</sup> èmé	sómbá-sâ	t <sup>h</sup> ímé-â	k <sup>h</sup> õ:-sâ	l <sup>h</sup> èmè
	H-H	L-H	H-H-L	H-H-L	LH-L	L-H
	cook	sweep	fish-3f.sg.PC	cook-narr.&	house-3f.sg.PC	sweep
			she cooks the fish and sweeps the house			
4	t <sup>h</sup> ímé	hík'ì	gélé-á:	t <sup>h</sup> ímé-jó:	pà:	hík'ì
	H-H	H-L	H-H-H	H-H-H	H	H-L
	cook	go	Gele-SF	cook-dur.	NC <sup>42</sup> -3m.sg.	go
			Gele carried on cooking and then went			
5	t <sup>h</sup> ímé		sà:	t <sup>h</sup> ímé		
	H-H		H	H-H		
	cook		NC-3f.sg.	cook		
			and then she cooked			
6	t <sup>h</sup> ímé		sà:	t <sup>h</sup> ìmè		
	H-H		H	H-H		
	cook		SC-3f.sg.	cook		
			and then she should cook			

Example 1 illustrates how tone pattern lowering is suspended when the verb is suffixed with a PC. Examples 2, 3, and 4 show how the same is true of verbs which are suffixed with the connective morpheme /-á:/, the narrative connective morpheme /-â:/, or the durative morpheme /-jó:/. In example 5, the verb has its basic tone pattern because it is found a clause containing a narrative conjunction and no SF marker or realis PC. In contrast, the tone pattern of a verb in the same context is lowered if the conjunction is subjunctive rather than narrative (example 6).

One further tonal phenomenon which can be observed in verbs is determined by focus. Focused constituents in the sentences in table 4.15 are underlined in the English gloss and ungrammatical sentences are marked with the symbol '\*'. The first column shows the morphemic composition of the verbs without tone markings and the second and third columns show the surface and underlying tone patterns:

<sup>42</sup>The abbreviations NC and SC stand for narrative conjunction and subjunctive conjunction, respectively. These conjunctions are marked for the person, gender, and number of the subject of the clause they introduce. The narrative conjunction introduces an indicative clause, whereas the subjunctive conjunction introduces a subjunctive clause.

Table 4.15. Irrealis verb tone pattern lowering and its relationship to focus

	Verb	Irrealis sentence	
		Non-lowered	Lowered
1	t <sup>h</sup> ime-i-su cook-irr.-3f.sg. she will cook	xòʔâ t <sup>h</sup> ímêsu L-HL H-H-L-L Kho'a <u>will</u> cook / Kho'a will <u>cook</u>	xòʔâ t <sup>h</sup> ímèsu L-HL H-H-L-L <u>Kho'a</u> will cook
2	t <sup>h</sup> ime-i-su-ts'e cook-irr.-3f.sg.-neg. she won't cook	xòʔâ t <sup>h</sup> ímêsuts'e L-HL H-H-L-L-H Kho'a <u>won't</u> cook / Kho'a won't <u>cook</u>	xòʔâ t <sup>h</sup> ímêsuts'e L-HL H-H-L-L-H <u>Kho'a</u> won't cook
3	t <sup>h</sup> ime-i-su cook-irr.-3f.sg. she will cook	t <sup>h</sup> ímêsu xòʔâ H-H-L-L L-HL Kho'a <u>will</u> cook / Kho'a will <u>cook</u>	*t <sup>h</sup> ímèsu xòʔâ H-H-L-L L-HL *Kho'a will cook
4	t <sup>h</sup> ime-tʃ <sup>h</sup> i-su cook-neg.-3f.sg. she didn't cook	xòʔâ t <sup>h</sup> ímétʃ <sup>h</sup> u L-HL H-H-L-H Kho'a didn't cook	*xòʔâ t <sup>h</sup> ímétʃ <sup>h</sup> u L-HL H-H-L-H *Kho'a didn't cook

Verb tone pattern lowering can be seen in examples 1 and 2. The lowering process is not controlled by the tone melody, either of the preceding constituent or of the verb itself, but rather by the information structure of the utterance. If the verb or its polarity is focused, it tends to occur with its non-lowered tone pattern, as in the first sentences of examples 1 and 2. When tone lowering occurs, as in the second sentences of these two examples, the focus is instead on the immediately preceding constituent, or on the sentence as a whole.<sup>43</sup> If the verb is sentence-initial, it must occur with its non-lowered tone pattern (example 3) and therefore the use of the lowered tone pattern sentence-initially results in an ungrammatical sentence. This type of lowering only occurs in irrealis sentences which contain a low toned PGN morpheme. As shown in example 4, tone lowering is not an option in sentences which contain the high toned PGN morpheme, irrespective of the focus or the sentence position of the verb.

#### 4.4.3 Intonation

A sentence which is structurally a declarative can be realized on a higher pitch level and is thus understood as an interrogative:

- (8) †nâmu-ā: ʔuté-sà                      lî  
 H-L-H            H-L-L                                      H  
 Nam-SF            yesterday-3f.sg.PC                      came  
 Nam came yesterday?

As also observed by Elderkin (1989:131), the tone contour of the sentence is the same both as a declarative and as an interrogative, but this contour is raised to a higher pitch in the latter.<sup>44</sup> This is shown in example (8) by the symbol '†'.

<sup>43</sup>For further illustration and discussion of tonal means of focusing in Sandawe, see Eaton (2003).

<sup>44</sup>Elderkin also recorded examples of the raising of the pitch level of a particular word to give it emphasis in an utterance (1989:134). We have not observed this phenomenon.

A second intonational phenomenon which can be recorded here is the operation of downstep between words. This is shown in the example below by the symbol ‘+’:

- (9)      ʔúté-à                      +gélé      |<sup>h</sup>imè  
             H-L-L                              H-H      H-H  
             yesterday-3m.sg.PC      Gele      sing  
             Gele sang yesterday

The high tone which begins the second word is found on a slightly lower pitch level than the high tones in the preceding word. This lowering is due to the low tone at the end of the first word. This process can be referred to as downstep between words. It is important to note that the lowering of a high tone in this way is very slight, whereas the downstep of a high tone within a word involves a greater change in pitch. Example (9) can be contrasted with sentence (10), in which downstep between words does not occur:

- (10)      gélé-á:                      ʔútê      |<sup>h</sup>imè  
             H-H-H                              H-L      H-H  
             Gele-SF                              yesterday      sing  
             Gele sang yesterday

Here the high tone which begins the second word is found on the same pitch level as the high tone at the end of the preceding word.

The next two examples illustrate how downstep between words does not occur if the word following the low tone is suffixed with a SF marker or a PC:

- (11)      ʔútê                      gélé-á:                      |<sup>h</sup>imè  
             H-L                              H-H-H                              H-H  
             yesterday                      Gele-SF                              sing  
             Gele sang yesterday

- (12)      gáwá                      ʔúté-à                              |<sup>h</sup>imè  
             H-L                              H-L-L                              H-H  
             Gawa                      yesterday-3m.sg.PC                              sing  
             Gawa sang yesterday

The suffixing of a constituent with a SF marker or a PC is a means of marking prominence. Since downstep does not occur between words in the contexts shown above, a constituent which has informational prominence therefore also has auditory prominence as any high tones it contains are as high or higher than other high tones in the same sentence. This has a parallel in irrealis clauses. Recall that as shown in table 4.15, a focused verb containing the low toned PGN morpheme tends to occur with a non-lowered tone pattern.

A final intonational phenomenon which can be mentioned here concerns the lowering of the tone pattern of vocative phrases, temporal adverbs, and disjuncts. The lowering of the tone

pattern of a vocative NP is obligatory, but temporal adverbs, such as /ʔútê/ 'yesterday' and disjuncts such as /dímə/ 'perhaps', sometimes occur with their lexical tone patterns and sometimes with their lowered tone patterns. We have as yet been unable to determine whether there is a functional distinction between the two tonal variations.

## 5 Basic syllable structure and interpretation

### 5.1 CV

Table 5.1 gives some examples of monosyllabic nouns and verbs which display the syllabic structure CV:

Table 5.1. Words with CV syllabic structure

<i>Nouns</i>		<i>Verbs</i>	
kû	rope	ně:	to stay (pl. subj.)
dô:	rim, edge, lip	p <sup>h</sup> ũ:	to spit out
rô:	voice, sound	t <sup>h</sup> â	to run (sg. subj.)
n!ê	day	tô	to finish (trans.)
ǰă:	goat	tû	to emerge from

The vowel in a monosyllabic word with the syllabic structure CV can be a short oral vowel, a long oral vowel, or a nasal vowel, but not a voiceless vowel. There are 161 monosyllabic nouns and verbs in the data set and 111 (68.9%) of these words have the syllabic structure CV.

Table 5.2 gives some polysyllabic examples of both nouns and verbs containing only CV syllables:

Table 5.2. Words with CV.CV.(CV).(CV) syllabic structure

<i>Nouns</i>		<i>Verbs</i>	
ʔá.t <sup>h</sup> â	tree (type)	hò.k'ó:	to deprive
hó.nó:	bone marrow	ts'é.lé:	to melt, dissolve (intrans.)
dè.rɿ	chin	nú.k'ɿ	to be tight
gè.ré.k <sup>h</sup> â	ridge	hé.té.kâ	to marry; to take (pl. obj.)
dʒì.gí.dâ	heart	bǒ:.gó.lâ	to clear field after burning
há.rá.bú.t <sup>h</sup> â	medicine (local)	kì.pà.là.là	to sweat

As table 5.2 shows, all vowel types, including the voiceless vowels, may occur in polysyllabic words containing CV syllables. The percentage of the disyllabic words in the monomorphemic data set which display the structure CVCV is 68.5% (422 out of 616).

Leaving aside loanwords (see section 2.1.3), only one type of segmental sequence which might be analyzed as a consonant cluster is allowed word-initially in Sandawe. The second segment of such a sequence is always [w]. Table 5.3 gives some examples of this:

Table 5.3. Possible consonant clusters in word-initial position

<i>Pulmonic and glottalic consonants</i>			<i>Velaric consonants</i>		
/t/	t <sup>w</sup> árâ	to carry	/l/	l <sup>w</sup> ě:	eye
/t <sup>h</sup> /	t <sup>h</sup> wĩ:	bird	/l <sup>h</sup> /	l <sup>h</sup> wě:	dirt
/dʒ/	dʒ <sup>w</sup> ǎ:	stick	/l' /	l'wě	narrow opening
/tʃ/	tʃ <sup>w</sup> ǎ:má:	dwarf mongoose	<sup>ɸ</sup> l/	<sup>n</sup> l <sup>w</sup> é:	thorn; to make
/tʃ <sup>h</sup> /	tʃ <sup>h</sup> wǎ:	bee larvae	/! /	!wǎ:	opportunity
/tɬ/	tɬ <sup>w</sup> é:	to dry up	/! <sup>h</sup> /	! <sup>h</sup> wé:	hole
/g/	g <sup>w</sup> éʔ	to hurt (intrans.)	/! ' /	!'wá:	pigeon
/k/	k <sup>w</sup> élé:	to enter quickly	<sup>ɸ</sup> ! /	<sup>n</sup> ! <sup>w</sup> â	river
/k <sup>h</sup> /	k <sup>h</sup> wà	to return	/ll/	ll <sup>w</sup> é:	to hide
/ts' /	ts' <sup>w</sup> ǎ:	tail	/ll <sup>h</sup> /	ll <sup>h</sup> wǎ:	fruit (type)
/tɬ' /	tɬ' <sup>w</sup> é:	witchcraft	/ll' /	ll'wě:	to try
/k' /	k' <sup>w</sup> ê:	neck	<sup>ɸ</sup> ll/	<sup>n</sup> ll <sup>w</sup> ě:	to break
/s/	s <sup>w</sup> ê	now			
/ɬ/	ɬ <sup>w</sup> áts' ī	scabies			
/x/	x <sup>w</sup> áɬâ	to brew beer			

Eleven-point-two percent (87 out of 777) of the monosyllabic and disyllabic words in the data set have a word-initial consonant cluster of this kind. Since no other type of word-initial consonant cluster is found in native Sandawe words, we interpret consonant and [w] sequences as labio-velarized phonemes transcribed with a superscript [<sup>w</sup>]. C<sup>w</sup>V is therefore analyzed as a subtype of the CV syllable.

Not all consonants may be labio-velarized. The data set has no examples of the following labio-velarized consonants:

*\*/b<sup>w</sup>, p<sup>w</sup>, p<sup>h</sup>w, d<sup>w</sup>, dʒ<sup>w</sup>, ʔ<sup>w</sup>, m<sup>w</sup>, n<sup>w</sup>, f<sup>w</sup>, h<sup>w</sup>, j<sup>w</sup>, l<sup>w</sup>, r<sup>w</sup>/*

We can therefore state that labio-velarization is possible with all stops and fricatives, except for the labials (/b, p, p<sup>h</sup>, m, f/),<sup>45</sup> the glottals (/ʔ, h/)<sup>46</sup>, and /n, d, dʒ/.<sup>47</sup> These last three phonemes may represent accidental rather than systematic gaps since they do not occur very frequently in the data set. Excluding the voiced clicks, which occur very infrequently, we have recorded labio-velarized versions of all the clicks. As first noted by Elderkin (1989:40), we have observed that the back vowels /u/ and /o/ are not found after labio-velarized consonants.

The data set contains fifteen examples of word-medial labio-velarized phonemes. Some of these appear to be loanwords, such as /dàk<sup>w</sup>ě:/, 'donkey', which is from Southern Cushitic

<sup>45</sup>Elderkin (2003:3) reports that the labio-velarization of labial consonants can be seen in recent loanwords, but not in native Sandawe words.

<sup>46</sup>In multimorphemic examples, such as /mé-ʔwá:/ 'big-pl.', a glottal stop may be followed by [w], but this is analyzed as a CVC syllable followed by CV. There are no monomorphemic examples containing a glottal stop followed by [w].

<sup>47</sup>Tucker and Bryan (1977:306) state that [w] may follow all consonants, except those in labial, palatal, or glottal categories.

(Ehret, 1974: 71). If the data set is extended to include multimorphemic examples, we find further examples of word-medial labio-velarized phonemes in reduplicated forms, such as /ll'wě:ll'wé:ts'í/ 'to try', and also after the suffixation of vowel-initial morphemes (see table 6.8 in the next section).

## 5.2 V

Only 2.9% (eighteen out of 616) of the disyllabic words in the data set contain vowel clusters. Some examples are shown in table 5.4:

Table 5.4. Examples of vowel clusters

l'èú	buffalo	ʔíó:	mother
pùé	to pound grain	ll'âé:	new
núá	corn porridge	!wě:â	tree (type)

When multimorphemic words are considered, we find more examples of vowel clusters due to the suffixation of vowel-initial morphemes to vowel-final stems (see section 6.1 below).

We account for vowel clusters in Sandawe by positing a V syllable. The vowel in such a syllable may be short or long. It should be noted that a V syllable may only occur following a CV syllable and thus there are no vowel-initial words.

## 5.3 CVC

Word-medially, the sequence of a nasal consonant followed by a homorganic oral consonant is common:

Table 5.5. Examples of homorganic nasal and oral consonant clusters

/m/		/n/		[ŋ]	
ʔìmbô	word	ʔànt <sup>h</sup> á	honey gourd	[gòŋgò]	fighting game
tá:mbá	tree (type)	k <sup>h</sup> ú:nts'â	incline	[sé:ŋkó:]	small ax
<sup>n</sup> l'ùmp <sup>h</sup> á	to smoke cigarette	l'ǎ:ntá:	aim	[ts'á:ŋk'ê]	guinea fowl

Seventeen percent (105 out of 616) of the disyllabic words in the data set contain consonant clusters of this kind. Elderkin (1989:57–74) gives a diachronic analysis of nasal plus stop sequences in Sandawe and argues that words containing such sequences have been borrowed from Bantu languages containing prenasalized consonants and Southern Cushitic languages containing sequences of nasal plus plosive. We analyze the clusters illustrated in table 5.5 as caused by the juxtaposition of a CVC syllable (in which the second consonant must be a nasal stop) and a CV syllable. A CVC syllable of this type does not occur word-finally.

We have been unable to determine whether Sandawe distinguishes between a nasal vowel followed by a consonant and a oral vowel followed by [ŋ] or [ɲ] plus an oral consonant.<sup>48</sup> We therefore transcribe all root-medial sequences of these kinds with oral vowels followed by a nasal consonant and then an oral consonant. A nasal vowel is therefore only found root-finally.<sup>49</sup>

In addition to homorganic nasal and stop clusters, Sandawe also contains some words which have heterorganic clusters. A comparison with earlier records of Sandawe vocabulary reveals that these clusters can be interpreted as the result of vowel elision. For example, our multimorphemic data set contains the form /xòmsé/ ‘to sip’. This word is given in Dempwolff (1916:43) as /xomese/ ‘to slurp beer’. A further example is the pronunciation /s<sup>w</sup>ámkíxí/, which we have recorded for ‘three’, for which Dempwolff has /somíkex/ (1916:51). It is also possible to see evidence of an elided vowel in the tone pattern of a current pronunciation. /<sup>n</sup>lúmsū/ ‘wife’, for example, has a mid tone following a consonant cluster, which suggests that this tone is high at the underlying level, but has been downstepped by a floating low tone remaining after the vowel elision which resulted in the consonant cluster.

A CVʔ syllable can occur in monosyllabic words and in both positions in disyllabic words:

Table 5.6. Words with a CVʔ syllable

<i>Monosyllabics</i>		<i>Disyllabics</i>	
k <sup>h</sup> úʔ	to spill	gírɪʔ	to stop (intrans.), wait
dʒĩ:ʔ	bird (type)	tónoʔ	small ax
		jâʔbé	to work

When words ending in a glottal stop are nasalized because of suffixation, the nasalization is carried by a low toned vowel which surfaces after the glottal stop and matches the quality of the vowel preceding it.<sup>50</sup> This can be illustrated by the verb /k<sup>h</sup>úʔ/ ‘to spill’, which is realized as [k<sup>h</sup>úʔū̃] when it is suffixed with the connective morpheme /-í/. An argument could therefore be made for analyzing the additional vowel as a voiceless vowel which should be included in the underlying phonemic representation. However, two factors argue against this position. Firstly, as already noted, the quality of the additional vowel is predictable and phonetically rather than lexically determined. Secondly, including the additional vowels in the phonemic representation would entail extending the vowel inventory of Sandawe to allow for three additional voiceless vowels, /e̥, o̥, ḁ/, which only occur after a glottal stop. Therefore, we do not include the additional vowels in the phonemic representation and instead account for the data by positing a CVC syllable in which the second consonant is a glottal stop.

<sup>48</sup>Elderkin (1989:62) reports a similar difficulty regarding this issue.

<sup>49</sup>Three exceptions to the position we have adopted are the words /!ú: !è/, ‘kidney’, /<sup>g</sup>||ĩ: <sup>g</sup>||ó:/, ‘bird (type)’, and /<sup>g</sup>||ó: <sup>g</sup>||è/, ‘greater kudu (male)’. In these three words, the vowel preceding the click is clearly nasalized throughout its duration.

<sup>50</sup>Elderkin (1989:39) notes, “after ʔ, the release takes the quality of the vowel preceding [sic] it, but it can also be affected by the quality of the following consonant, especially w.” We have also observed this phenomenon. It should be noted that the release is not always clearly audible.

It can be noted that other consonants in Sandawe do occur in what appears to be a word-final position:

Table 5.7. Phonetic representation of words with apparently final consonants

[nân]	side dish, relish	[hík']	to go (sg. subj.)
[núk']	to be tight	[nâm]	tree (type)

In the western dialect of Sandawe, these words are pronounced with final consonants, as shown in the transcription given. However, evidence of several kinds can be put forward to show that such 'word-final' consonants are in fact followed by voiceless vowels at the underlying level, as illustrated in table 5.8:

Table 5.8. Phonemic representation of words with apparently final consonants

nân <sub>i</sub>	side dish, relish	hík' <sub>i</sub>	to go (sg. subj.)
núk'ᵛ	to be tight	nâmᵛ	tree (type)

First, there are dialectal differences in the pronunciation of words such as those given above. For example, in the western Sandawe dialect, we find the form [nâm] 'tree (type)'. This word can be pronounced in the eastern dialect as [nâmᵛ], with a voiceless vowel, or as [nâmu], with a final voiced vowel.

Second, when an apparently consonant-final word is suffixed by a suprasegmental morpheme which includes nasalization, the resulting form has a word-final vowel. An example of this is [nânî:], which is suffixed with the specificity morpheme /-ᶦ/ and means 'the (specific) side dish, relish'. It can be contrasted with [nân] 'side dish'.

Finally, the application of tone rules can reveal the underlying presence of word-final vowels, as was seen in sections 4.4.1 and 4.4.2. A word such as /núk'ᵛ/, 'to be tight', which has a surface H melody, patterns with HL melody words in tonal phenomena because of the presence of the underlying low toned word-final vowel.

Unlike the phenomenon described above with respect to glottal stops, the quality of the word-final vowels discussed here is not predictable (see section 3.1.2). Therefore, we do write these vowels in the phonemic representation.

A few Sandawe words contain word-medial consonant clusters which have not been discussed so far. For some of these words, records of earlier pronunciations suggest that the cluster was created by the elision of a vowel. For example, /mùst<sup>h</sup>ě:/, 'pestle' is given by Kagaya (1993:95) as /musit<sup>h</sup>e:/. Consonant clusters in other words, such as /tùrté/ 'to visit', and /kùtùmté/ 'to kneel', may well also be the result of vowel elision.

In summary, three types of Sandawe syllables have been proposed in the analysis presented here. CV is the most common type and has no restrictions on its occurrence. The V syllable occurs non-word initially; the CVC syllable occurs word-medially only when C<sub>2</sub> is a nasal, and in

any position when  $C_2$  is a glottal stop. A subtype of CV and CVC syllables is  $C^wV(C)$  syllable which, the data suggests, may be restricted to word-initial position if only monomorphemic native Sandawe words are considered.

Table 5.9 summarizes the syllabic structure of the 777 monosyllabic and disyllabic words in the monomorphemic data set.

Table 5.9. Distribution of syllable types in monosyllabic and disyllabic words

<i>Monosyllabics</i>				<i>Disyllabics</i>			
<i>Structure</i>	<i>Examples</i>	<i>Example</i>	<i>Gloss</i>	<i>Structure</i>	<i>Examples</i>	<i>Example</i>	<i>Gloss</i>
CV	111	kû	rope	CV.CV	422	dóró	zebra
$C^wV$	38	ll <sup>w</sup> â	name	$C^wV.CV$	33	! <sup>h</sup> wénâ	to snore
CVC	11	dʒĩ́íʔ	bird (type)	CV. $C^wV$	12	dàk' wě:	donkey
$C^wVC$	1	g <sup>w</sup> éʔ	to hurt (intrans.)	CV.V	15	ʔíó:	mother
				$C^wV.V$	3	k <sup>w</sup> áî	shoulder
				CV.CVC	9	tónóʔ	small ax
				CVC.CV	107	jǎʔbé	to work
						sómbá	fish
				$C^wVC.CV$	12	k <sup>w</sup> àndà	hut
				CVC. $C^wV$	3	pàng <sup>w</sup> ê	grass (type)
<i>Total</i>	161			<i>Total</i>	616		
<i>Total data set</i>					777		

## 6 Morphophonology

The tonal effects of morphological processes have been considered in section 4.3, together with some of the segmental effects of these processes. Here we look at the remaining segmental effects which can be observed after the suffixation of different types of morphemes. First, we discuss those processes resulting from the suffixation of vowel-initial morphemes and then we move on to consider the effects of the suffixation of consonant-initial morphemes.

### 6.1 Vowel-initial suffixes

If a vowel-initial morpheme is suffixed to a vowel-final stem, vowel assimilation or the insertion of the consonants [j] or [g] at the morpheme boundary may occur. The type of segmental change which occurs depends on the type of the vowels which occur at the morpheme boundary.

If the final vowel of a multisyllabic stem is oral and short, it may be assimilated to the quality of the suffix vowel and the resulting vowel is then long. Table 6.1 illustrates this pattern:

Table 6.1. Short oral vowels in multisyllabic words

<i>Final vowel +</i>	<i>PC</i>	<i>Resulting form (s)</i>	<i>Example</i> <sup>51</sup>	<i>Gloss</i>
i +	i ⇨	i:	tàpàrí: dǵòmò	You (sg.) buy a bowl
i +	e ⇨	ie / e:	tàpàríê / tàpàrê: dǵòmò	You (pl.) buy a bowl
i +	o ⇨	io / o:	tàpàríô / tàpàrô: dǵòmò	We buy a bowl
i +	a ⇨	ia / a:	tàpàríá / tàpàrà: dǵòmò	He buys a bowl
u +	i ⇨	ui / i:	hùmbùï / hùmbï: báló:	You (sg.) herd cows
u +	e ⇨	ue / e:	hùmbùè / hùmbè: báló:	You (pl.) herd cows
u +	o ⇨	uo / o:	hùmbùö / hùmbö: báló:	We herd cows
u +	a ⇨	ua / a:	hùmbùä / hùmbä: báló:	He herds cows
e +	i ⇨	ei / i:	ts'adéi / ts'adí: dǵòmò	You (sg.) buy a hide
e +	e ⇨	e:	ts'adé: dǵòmò	You (pl.) buy a hide
e +	o ⇨	eo / o:	ts'adéô / ts'adô: dǵòmò	We buy a hide
e +	a ⇨	ea / a:	ts'adéá / ts'adá: dǵòmò	He buys a hide
o +	i ⇨	oi / i:	bójóï / bójî: dǵòmò	You (sg.) buy seed
o +	e ⇨	oe / e:	bójóê / bójê: dǵòmò	You (pl.) buy seed
o +	o ⇨	o:	bójô: dǵòmò	We buy seed
o +	a ⇨	oa / a:	bójóá / bójâ: dǵòmò	He buys seed
a +	i ⇨	ai / i:	mìndàï / mìndï: ìòmé	You (sg.) cultivate a field
a +	e ⇨	ae / e:	mìndàè / mìndè: ìòmé	You (pl.) cultivate a field
a +	o ⇨	ao / o:	mìndàö / mìndö: ìòmé	We cultivate a field
a +	a ⇨	a:	mìndà: ìòmé	He cultivates a field

We have observed free variation in the use of the assimilated and unassimilated forms.

In contrast to multisyllabic words, the assimilation of vowels of different qualities does not take place in monosyllabic words, as illustrated in table 6.2:

Table 6.2. Short oral vowels in monosyllabic words

<i>Final vowel +</i>	<i>PC</i>	<i>Resulting form</i>	<i>Example</i>	<i>Gloss</i>
a +	i ⇨	ai	ts'áï hâwè	You (sg.) collect water
a +	e ⇨	ae	ts'áè hâwè	You (pl.) collect water
a +	o ⇨	ao	ts'áo hâwè	We collect water
a +	a ⇨	a:	ts'â: hâwè	He collects water

Similarly, when a stem-final vowel is long, the suffixation of a vowel-initial suffix does not result in the assimilation of vowels of different qualities:

<sup>51</sup>All the examples in the tables in this section have the constituent order OV.

Table 6.3. Long oral vowels

<i>Final vowel +</i>	<i>PC</i>	<i>Resulting form</i>	<i>Example</i>	<i>Gloss</i>
i:	+ i	⇒ i:	ʔũ:íí? dʒòmò	You (sg.) buy salt
i:	+ e	⇒ i:e	ʔũ:íí:ê dʒòmò	You (pl.) buy salt
i:	+ o	⇒ i:o	ʔũ:íí:ô dʒòmò	We buy salt
i:	+ a	⇒ i:a	ʔũ:íí:â dʒòmò	He buy salt
u:	+ i	⇒ u:i	tʃũ:î lá	You (sg.) see an animal
u:	+ e	⇒ u:e	tʃũ:ê lá	You (pl.) see an animal
u:	+ o	⇒ u:o	tʃũ:ô lá	We see an animal
u:	+ a	⇒ u:a	tʃũ:â lá	He sees an animal
e:	+ i	⇒ e:i	ʔàíě:î n   è:	You (sg.) cut a candelabrum tree
e:	+ e	⇒ e:	ʔàíě? n   è:	You (pl.) cut a candelabrum tree
e:	+ o	⇒ e:o	ʔàíě:ô n   è:	We cut a candelabrum tree
e:	+ a	⇒ e:a	ʔàíě:â n   è:	He cuts a candelabrum tree
o:	+ i	⇒ o:i	t <sup>h</sup> ásnó:î dʒòmò	You (sg.) buy liver
o:	+ e	⇒ o:e	t <sup>h</sup> ásnó:ê dʒòmò	You (pl.) buy liver
o:	+ o	⇒ o:	t <sup>h</sup> ásnó? dʒòmò	We buy liver
o:	+ a	⇒ o:a	t <sup>h</sup> ásnó:â dʒòmò	He buys liver
a:	+ i	⇒ a:i	tʃ <sup>h</sup> á:î dʒòmò	You (sg.) buy a pot
a:	+ e	⇒ a:e	tʃ <sup>h</sup> á:ê dʒòmò	You (pl.) buy a pot
a:	+ o	⇒ a:o	tʃ <sup>h</sup> á:ô dʒòmò	We buy a pot
a:	+ a	⇒ a:	tʃ <sup>h</sup> á? dʒòmò	He buys a pot

If the stem-final vowel and the suffix-initial vowel are the same, there is no segmental change at the morpheme boundary, although there may be a tonal change. If the two vowels at the morpheme boundary are of different qualities, these two vowels retain both their quality and their length and are not assimilated. This pattern is the same for both monosyllabic and polysyllabic stems.

In addition to the vowel assimilation options illustrated above, the approximant [j] may optionally occur between the stem and suffix, when a suffix beginning with a non-high vowel is attached to a stem ending in /a/ or /a:/. This is illustrated below with a stem ending in /a:/:

Table 6.4. [j] insertion and oral vowels

<i>Final vowel +</i>	<i>PC</i>	<i>Resulting form (s)</i>	<i>Example</i>	<i>Gloss</i>
a:	+ i	⇒ a:i	ʔàlálá:î k'wè:	You (sg.) kill a scorpion
a:	+ e	⇒ a:je / a:e	ʔàlálá:jê / ʔàlálá:ê k'wè:	You (pl.) kill a scorpion
a:	+ o	⇒ a:jo / a:o	ʔàlálá:jô / ʔàlálá:ô k'wè:	We kill a scorpion
a:	+ a	⇒ a:ja / a:	ʔàlálá:jâ / ʔàlálá? k'wè:	He kills a scorpion

This insertion of [j] occurs particularly frequently in the eastern dialect of Sandawe.

Stems which end in a voiceless vowel show the following pattern after suffixation with a vowel-initial morpheme:

Table 6.5. Stem-final voiceless vowels and vowel-initial suffixes

<i>Final vowel</i>	<i>PC</i>	<i>Resulting form</i>	<i>Stem</i>	<i>Example</i>	<i>Gloss</i>
ɸ	+ i	⇒ i:	dʒòmósúkɸ	dʒòmósúkî:	You (sg.) sell
ɸ	+ e	⇒ e:	dʒòmósúkɸ	dʒòmósúkê:	You (pl.) sell
ɸ	+ o	⇒ o:	dʒòmósúkɸ	dʒòmósúkô:	We sell
ɸ	+ a	⇒ a:	dʒòmósúkɸ	dʒòmósúkâ:	He sells

The quality of the voiceless vowel is not evident in the suffixed form, which has a long vowel of the quality of the suffix. The same pattern can be seen in stems which end in a glottal stop:

Table 6.6. Stem-final glottal stops and vowel-initial suffixes

<i>Final consonant</i>	<i>PC</i>	<i>Resulting form</i>	<i>Stem</i>	<i>Example</i>	<i>Gloss</i>
ʔ	+ i	⇒ i:	músúʔ	músúʔî:	You (sg.) smile
ʔ	+ e	⇒ e:	músúʔ	músúʔê:	You (pl.) smile
ʔ	+ o	⇒ o:	músúʔ	músúʔô:	We smile
ʔ	+ a	⇒ a:	músúʔ	músúʔâ:	He smiles

Stem-final vowels which are either lexically nasal or nasalized as the result of suffixation, require the insertion of [g] before a vowel-initial morpheme is suffixed. This is illustrated in table 6.7:

Table 6.7. Long nasal vowels with [g] insertion

<i>Final vowel</i>	<i>PC</i>	<i>Resulting form</i>	<i>Example</i>	<i>Gloss</i>
ĩ:	+ i	⇒ ĩ:gi	tʃ <sup>h</sup> ĩ:gì hònà	You (sg.) harvest honey
ĩ:	+ e	⇒ ĩ:ge	tʃ <sup>h</sup> ĩ:gè hònà	You (pl.) harvest honey
ĩ:	+ o	⇒ ĩ:go	tʃ <sup>h</sup> ĩ:gò hònà	We harvest honey
ĩ:	+ a	⇒ ĩ:ga	tʃ <sup>h</sup> ĩ:gà hònà	He harvest honey
ũ:	+ i	⇒ ũ:gi	tɬ'ũ:gì g <sup>w</sup> eʔsè	You (sg.) hurt the hand
ũ:	+ e	⇒ ũ:ge	tɬ'ũ:gè g <sup>w</sup> eʔsè	You (pl.) hurt the hand
ũ:	+ o	⇒ ũ:go	tɬ'ũ:gò g <sup>w</sup> eʔsè	We hurt the hand
ũ:	+ a	⇒ ũ:ga	tɬ'ũ:gà g <sup>w</sup> eʔsè	He hurts the hand
ē:	+ i	⇒ ē:gi	bèrě:gì dʒòmò	You (sg.) buy millet
ē:	+ e	⇒ ē:ge	bèrě:gè dʒòmò	You (pl.) buy millet
ē:	+ o	⇒ ē:go	bèrě:gò dʒòmò	We buy millet
ē:	+ a	⇒ ē:ga	bèrě:gà dʒòmò	He buys millet

ō:	+	i	⇒	ō:gi	kòlǒ:gî dǰòmó	You (sg.) buy a hoe
ō:	+	e	⇒	ō:ge	kòlǒ:gê dǰòmó	You (pl.) buy a hoe
ō:	+	o	⇒	ō:go	kòlǒ:gô dǰòmó	We buy a hoe
ō:	+	a	⇒	ō:ga	kòlǒ:gâ dǰòmó	He buys a hoe
ā:	+	i	⇒	ā:gi	kímá:gî <sup>n</sup>   wè:	You (sg.) make poison
ā:	+	e	⇒	ā:ge	kímá:gê <sup>n</sup>   wè:	You (pl.) make poison
ā:	+	o	⇒	ā:go	kímá:gô <sup>n</sup>   wè:	We make poison
ā:	+	a	⇒	ā:ga	kímá:gâ <sup>n</sup>   wè:	He makes poison

Another morphophonological process concerning vowel-initial suffixes is illustrated in table 6.8 with the multimorphemic nouns /<sup>n</sup> | èmé-sū/, ‘woman’, and /má-su/, ‘aunt (paternal)’:

Table 6.8. Morphophonological labio-velarization

Final morpheme +	PC	Resulting form(s)	Example	Gloss
su	+ i	⇒ s <sup>w</sup> i / sui	<sup>n</sup>   èmé <sup>s</sup> î / <sup>n</sup>   èmé <sup>s</sup> ûî   à	You (sg.) see a woman
su	+ e	⇒ s <sup>w</sup> e / sue	<sup>n</sup>   èmé <sup>s</sup> ê / <sup>n</sup>   èmé <sup>s</sup> ûê   à	You (pl.) see a woman
su	+ o	⇒ so: / suo	<sup>n</sup>   èmé <sup>s</sup> ô: / <sup>n</sup>   èmé <sup>s</sup> ûô   à	We see a woman
su	+ a	⇒ s <sup>w</sup> a / sua	<sup>n</sup>   èmé <sup>s</sup> â / <sup>n</sup>   èmé <sup>s</sup> ûâ   à	He sees a woman
sù	+ i	⇒ s <sup>w</sup> î	más <sup>w</sup> î   à	You (sg.) see an aunt
sù	+ e	⇒ s <sup>w</sup> ê	más <sup>w</sup> ê   à	You (pl.) see an aunt
sù	+ o	⇒ so:	más <sup>w</sup> ô:   à	We see an aunt
sù	+ a	⇒ s <sup>w</sup> â	más <sup>w</sup> â   à	He sees an aunt

The /u/ and /u̥/ vowels of the suffixes in the two nouns may be replaced by the segment [w] before /i/, /e/, or /a/. The sequence \*[s<sup>w</sup>o] is not allowed. Recall that labio-velarized consonants in Sandawe may not be followed by either /o/ or /u/ (see section 5.1). If the vowel of the feminine suffix is voiced, an unassimilated version of the suffixed form is also allowed.

This morphophonological labio-velarization process is most commonly heard in stems ending in the third person feminine PGN morphemes /-sú/ and /-sù/, as in the examples given above. However, it may also be heard when forms with a suffix-final /u/ or /u̥/, such as the interrogative word /há.kù/ ‘where (at)’, are suffixed with vowel-initial morphemes.

Finally, the third person masculine singular object morpheme /-é/ is a vowel-initial suffix which exhibits a different kind of assimilation when it is attached to a verb root. Instead of the root vowel assimilating to the quality of the suffix vowel, the reverse happens:

- (13) hibǎ:sǐ  
hibǎ-é-sǐ  
L-L-H-L  
weed-3m.sg.obj.-1sg.PC  
I have weeded it

- (14) t<sup>h</sup>í:mé:s<sub>i</sub>  
 t<sup>h</sup>í-é-mé-s<sub>i</sub>  
 H-H-H-L  
 cook-3m.obj.-sg.-1sg.PC  
 I have cooked it

When the /-é/ suffix is attached to a verb root ending in /-o:/, the quality of its vowel can be observed:

- (15) báló:wé:s<sub>i</sub>  
 baló:-é-s<sub>i</sub>  
 H-H-H-L  
 herd-3m.sg.obj.-1sg.PC  
 I have herded it

## 6.2 Consonant-initial suffixes

Stems which end in a voiceless vowel may exhibit some segmental changes when suffixed with a consonant-initial morpheme, as shown in table 6.9:

Table 6.9. Stem-final voiceless vowels and consonant-initial suffixes

<i>Stem</i>	<i>+</i>	<i>PC/PGN</i>		<i>Example</i>	<i>Gloss</i>
tɬǎ:s <sub>i</sub>	+	sà	⇒	tɬǎ:s:â	She died
hík'í	+	kò	⇒	hík'kô	Go!
hík'í	+	sà	⇒	hík'sâ	She went
hík'í	+	s <sub>i</sub>	⇒	hík'ís <sub>i</sub>	I went

The first example illustrates how a phonetically long consonant is formed when the consonant preceding the stem-final voiceless vowel and the suffix-initial consonant are both /s/. In the second example, the /k'/ preceding the stem-final voiceless vowel is reduced to a glottal stop before a suffix-initial velar stop. If, as in the third example, the consonant preceding the stem-final voiceless vowel and the suffix-initial consonant are dissimilar, a consonant cluster results. The fourth example illustrates what happens when two CV syllables containing voiceless vowels meet at a morpheme boundary. Under these circumstances, the voiceless vowel of the first syllable becomes voiced.

Other assimilation phenomena concerning a consonant-initial suffix can be seen when the applicative morpheme /-t.s'è/ is followed by an object morpheme:

Table 6.10. Applicative morpheme assimilation

<i>Stem</i>	+	<i>appl.</i>	+	<i>obj.</i>		<i>Example</i>	<i>Gloss</i>
kǎ:	+	ts'è	+	sé	⇒	kǎ:ʔtʃ <sup>h</sup> ē / kǎ:ʔsē	put (pl.obj.) on me put (pl.obj.) on you
kǎ:	+	ts'è	+	pó	⇒	kǎ:ʔpō	(sg.)
kǎ:	+	ts'è	+	é	⇒	kǎ:ts'ē:	put (pl.obj.) on him
kǎ:	+	ts'è	+	ésú	⇒	kǎ:ts'ē:sū	put (pl.obj.) on her
kǎ:	+	ts'è	+	sú:	⇒	kǎ:ʔtʃ <sup>h</sup> ū: / kǎ:ʔsū:	put (pl.obj.) on us put (pl.obj.) on you
kǎ:	+	ts'è	+	sí:	⇒	kǎ:ʔtʃ <sup>h</sup> ī: / kǎ:ʔsī:	(pl.)
kǎ:	+	ts'è	+	ʔí:	⇒	kǎ:ts'ī:	put (pl.obj.) on them

When /-ts'é/ is followed by an object morpheme with an initial /s/, the combination of these morphemes is realized as /ʔtʃ<sup>h</sup>-/ or /ʔs-/. When /-ts'é/ precedes second person singular /-pó/, it is reduced to /ʔ/.<sup>52</sup>

In table 6.11, the morphophonological processes associated with attaching a realis PC to /nǐ:/ 'and' are shown:

Table 6.11. Morphophonological processes associated with /nǐ:/ 'and'

<i>Stem</i>	+	<i>PC</i>		<i>Example</i>	<i>Gloss</i>
nǐ:	+	sǐ	⇒	nǐsǐ:	and I
nǐ:	+	ì	⇒	nǐ:gǐ:	and you (sg.)
nǐ:	+	à	⇒	nǐ:gà:	and he
nǐ:	+	sà	⇒	nǐsà:	and she
nǐ:	+	ò	⇒	nǐ:gò:	and we
nǐ:	+	è	⇒	nǐ:gè:	and you (pl.)
nǐ:	+	ʔà	⇒	nǐgaʔà:	and they
nǐ:	+	ʔà	⇒	nǐʔà:	and they

When the PC starts with a consonant, the nasalization of /nǐ:/ 'and' is carried on the PC instead of the vowel of the conjunction. When the PC starts with a vowel, this nasalization is carried on both vowels in the form, which are separated by an epenthetic [g]. Note that there are two possible forms of the third person plural PC and thus there are two possible forms when the conjunction is attached.

## 7 Orthography

The orthography presented in this section was agreed upon by a committee of Sandawe speakers representing different parts of the Sandawe speaking region. These representatives

<sup>52</sup> It should also be noted that a suffix-initial glottal stop may cause the shortening of the preceding stem-final vowel. This can be seen in /meʔwá:/ 'big-pl.', which is formed from /mé:/ 'big', and /-ʔwá:/, a plural agreement morpheme.

met in Kwa Mtoro, Usandawe in November 2002 and again in June 2004 to discuss the different options for a Sandawe orthography.

Where possible, the same sound-to-grapheme correspondences in Swahili were retained in the Sandawe alphabet. The two exceptions are the Sandawe sounds /dʒ/ and /tʃ<sup>h</sup>/, which are represented by the graphemes *dz* and *tch*, respectively. The choice of *dz*, instead of *j* as in Swahili, as the grapheme for /dʒ/, reflects a dialectal difference in Sandawe. In the western dialect of Sandawe, the pronunciation [dʒ] is standard, but in the eastern dialect, this phoneme is often either fronted to [dʒ] or weakened to [z] (see section 2.1.1). The choice of *dz* as the grapheme for this phoneme therefore represents a compromise between the various possible pronunciations.

For the /tʃ<sup>h</sup>/ phoneme in Sandawe, the representation *ch*, as used in Swahili for this sound, was rejected so that it could instead be used for the aspirated dental click (see below). Therefore, *tch* was selected as the representation for /tʃ<sup>h</sup>/, and *tc* for the unaspirated post-alveolar affricate, which is not found in Swahili.

There are several other phonemes in Sandawe which are not present in Swahili. Since the aspirated voiceless stop series /p<sup>h</sup>, t<sup>h</sup>, k<sup>h</sup>/ is represented by *p*, *t*, and *k*, as in Swahili, the unaspirated voiceless counterparts required different graphemes. The decision was made in favor of using *bp*, *dt*, and *gk* for this series.

The symbol ' was chosen to represent the glottal stop. It was decided that word-initial glottal stops would not be written in the orthography and this therefore removes the need for an uppercase ' symbol.

Following on from the use of ' to represent the glottal stop, the ejective series /ts', tɬ', k'/ is written *ts'*, *tɬ'*, *k'*. The lateral stops /dɬ, tɬ/ are written as *dl* and *tl*. The voiceless lateral fricative /ɬ/ is represented by *lh*. A parallel can be seen between this choice and the use of *kh* for the voiceless velar fricative /x/, as in Swahili.

The voiceless clicks /|, !, ||/ are represented by *c*, *q*, and *x*, as in other Khoisan languages. The voiced clicks /<sup>ɓ</sup>|, <sup>ɓ</sup>!, <sup>ɓ</sup>||/ are represented by *gc*, *gq*, and *gx*. Like the ejective consonants, the glottalized clicks are written using the glottal stop symbol. Thus *c'*, *q'*, and *x'* represent the sounds /|', !', ||'/ . The aspirated clicks /|<sup>h</sup>, !<sup>h</sup>, ||<sup>h</sup>/ are written as *ch*, *qh*, and *xh*. The nasalized clicks are written with the symbol *n* before the symbol for the click. In this way, we write /<sup>ɓ</sup>|, <sup>ɓ</sup>!, <sup>ɓ</sup>||/ as *nc*, *nq*, and *nx*. The ordering of the two symbols in these graphemes reflects how the nasalization of a nasalized click precedes as well as accompanies the articulation of the click.<sup>53</sup> Nasal vowels are written with the tilde symbol ~ placed above the vowel.

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<sup>53</sup>This is in contrast to the aspiration and glottalization which follow the articulation of the click in aspirated and glottalized clicks, respectively. Thus the symbols representing these modifications follow the symbols for the clicks themselves.

Lexical tone is not marked in the Sandawe orthography as the functional load borne by tone is slight. Grammatical tone is also unmarked, except indirectly in the tonal genitive construction. Here a hyphen is inserted between two constituents of the construction in order to mark the genitive relationship, which in most cases is realized as a change in the tone pattern of the second constituent (as discussed in section 4.4.1). For example, *tci-humbu* 'I-cow' means 'my cow' and *gele-gku* 'baobab-rope' or 'rope of the baobab'.

Table 7.1 charts the phoneme-to-grapheme correspondences for Sandawe:

Table 7.1. Sandawe orthography

Phoneme	Grapheme	Phoneme	Grapheme	Phoneme	Grapheme	Phoneme	Grapheme
b	B, b	ts'	Ts', ts'	<sup>g</sup>	Gc, gc	i	I, i
p	Bp, bp	tɬ'	Tl', tl'		C, c	u	U, u
p <sup>h</sup>	P, p	k'	K', k'	<sup>h</sup>	Ch, ch	e	E, e
d	D, d	f	F, f	'	C', c'	o	O, o
t	Dt, dt	s	S, s	<sup>n</sup>	Nc, nc	a	A, a
t <sup>h</sup>	T, t	ɬ	Lh, lh	<sup>g</sup> !	Gq, gq	i:	Ii, ii
dʒ	Dz, dz	x	Kh, kh	!	Q, q	u:	Uu, uu
tʃ	Tc, tc	h	H, h	! <sup>h</sup>	Qh, qh	e:	Ee, ee
tʃ <sup>h</sup>	Tch, tch	m	M, m	!'	Q', q'	o:	Oo, oo
dʒ	Di, di	n	N, n	<sup>n</sup> !	Nq, nq	a:	Aa, aa
tɬ	Tl, tl	w	W, w <sup>54</sup>	<sup>g</sup>	Gx, gx	ĩ	Ĩ, ĩ
g	G, g	r	R, r		X, x	ũ	Ũ, ũ
k	Gk, gk	j	Y, y	<sup>h</sup>	Xh, xh	ē	Ě, ě
k <sup>h</sup>	K, k	l	L, l	'	X', x'	ō	Ŏ, ŏ
ʔ	'			<sup>n</sup>	Nx, nx	ã	Ã, ã

<sup>54</sup>The w grapheme is also used together with another grapheme to represent a labio-velarized phoneme.

## Appendix A: Word-initial consonants

<i>Phoneme</i>	<i>Example</i>	<i>Gloss</i>	<i>Labio-velarized phoneme</i>	<i>Example</i>	<i>Gloss</i>
b	bèrě:	millet			
p	pě:	to put (sg. obj.)			
p <sup>h</sup>	p <sup>h</sup> ê	tomorrow			
d	dă:	to be able to			
t	tă:	to untie	t <sup>w</sup>	t <sup>w</sup> árâ	to carry
t <sup>h</sup>	t <sup>h</sup> â	to run (sg. subj.)	t <sup>hw</sup>	t <sup>hw</sup> ĩ:	bird
g	gòrò	post	g <sup>w</sup>	g <sup>w</sup> é?	to hurt (intrans.)
k	kókó	chicken	k <sup>w</sup>	k <sup>w</sup> élé:	to enter quickly
k <sup>h</sup>	k <sup>h</sup> ó  ô	to go around	k <sup>hw</sup>	k <sup>hw</sup> à	to return
dʒ	dʒík'é	milk	dʒ <sup>w</sup>	dʒ <sup>w</sup> ă:	stick
tʃ	tʃí	I	tʃ <sup>w</sup>	tʃ <sup>w</sup> ă:má:	dwarf mongoose
tʃ <sup>h</sup>	tʃ <sup>h</sup> ĩ:	mushroom (type)	tʃ <sup>hw</sup>	tʃ <sup>hw</sup> ă:	bee larvae
dʒ	dʒàní	arrow			
tʃ	tʃáná	tusk, horn			
tʃ'	tʃ'ábô	roof	tʃ' <sup>w</sup>	tʃ' <sup>w</sup> é:	witchcraft
ts'	ts'ô:	rhinoceros	ts' <sup>w</sup>	ts' <sup>w</sup> ă:	tail
k'	k'ó:	to lick	k' <sup>w</sup>	k' <sup>w</sup> ákâ	to throw
ʔ	ʔé:râ	corn blossom			
m	mántʃ <sup>h</sup> â	food, to eat			
n	náráʔ	shelf for arrows			
f	fàré	to lie			
s	sáná	beeswax	s <sup>w</sup>	s <sup>w</sup> ê	now
ʃ	ʃáʃâ	grave	ʃ <sup>w</sup>	ʃ <sup>w</sup> áts'ĩ	scabies
x	xàʃé	to tease	x <sup>w</sup>	x <sup>w</sup> áʃâ	to brew beer
h	hàpú	you			
r	rô:gó	knife			
j	jàjá	cousin			
l	lá:ʔê	hare			
w	wàràŋgě:	God			
	í	to come (sg. subj.)	<sup>w</sup>	<sup>w</sup> ě:	eye
<sup>h</sup>	<sup>h</sup> î	to delay	<sup>hw</sup>	<sup>hw</sup> ě:	dirt
n	n î:	meat	n  <sup>w</sup>	n  <sup>w</sup> é:	thorn; to make
'	'ĩ:	snake	' <sup>w</sup>	' <sup>w</sup> ě	narrow opening
ʒ	ʒ ĩ:ʒ ó:	bird (type)			
!	!ě:	rib	! <sup>w</sup>	! <sup>w</sup> ă:	opportunity
! <sup>h</sup>	! <sup>h</sup> ê:	tongue	! <sup>hw</sup>	! <sup>hw</sup> é:	hole
n!	n!ě:	to laugh	n! <sup>w</sup>	n! <sup>w</sup> â	river
!'	!'ě:	ant hill dirt	!' <sup>w</sup>	!' <sup>w</sup> á:	pigeon
ʒ!	ʒ!òk <sup>h</sup> ómí	greater kudu			
	ô:	path	<sup>w</sup>	<sup>w</sup> é:	to hide

<sup>h</sup>	<sup>h</sup> ô:	hollow	<sup>h</sup> w	<sup>h</sup> wă:	fruit (type)
<sup>n</sup>	<sup>n</sup>   ô:	child	<sup>n</sup>    <sup>w</sup>	<sup>n</sup>    <sup>w</sup> ě:	to break
'	'ô:	to harvest	' <sup>w</sup>	' <sup>w</sup> ě:	to try
<sup>g</sup>	<sup>g</sup>   ô: <sup>g</sup>   ê	greater kudu (male)			

## Appendix B: Word-medial consonants

<i>Pulmonic and glottalic consonants</i>			<i>Velaric consonants</i>		
<i>Phoneme</i>	<i>Example</i>	<i>Gloss</i>	<i>Phoneme</i>	<i>Example</i>	<i>Gloss</i>
b	bòbà	mushroom		să: â	tree (type)
p	ǀúpâ	grass	<sup>h</sup>		
p <sup>h</sup>	!'úp <sup>h</sup> á	ashes	<sup>n</sup>		
d	ts'ádé	sleeping hide	'	má: 'â	lice
t	hétékâ	to marry; to take (pl. obj.)	<sup>g</sup>	<sup>g</sup>  ǀ: <sup>g</sup>  ó:	bird (type)
t <sup>h</sup>	ts'ǀ:nt <sup>h</sup> ê	unripe, young	!	!ú:! <sup>h</sup> ê	kidney
g	bégérô	plant (type)	! <sup>h</sup>		
k	! <sup>h</sup> éké	craziness	<sup>n</sup> !	k'á <sup>n</sup> !á	to lose
k <sup>h</sup>	bìk <sup>h</sup> e	to leave	!'	hó! 'ô	forehead
dʒ	ʔèrě:ndʒê	plant (type)	<sup>g</sup> !		
tʃ	ʔô:ntʃê	than (comp.)			
tʃ <sup>h</sup>	g <sup>w</sup> ètʃ <sup>h</sup> é:	wild dog	<sup>h</sup>	ʔú   <sup>h</sup> û	to cough
dɫ			<sup>n</sup>	sé <sup>n</sup>   á	tree (type)
tɫ			'	'ò  'á	baboon
tɫ'	! <sup>h</sup> ě:tǀ'â	ant	<sup>g</sup>	<sup>g</sup>   ó: <sup>g</sup>   ê	greater kudu (male)
ts'	xáts'â	steppe			
k'	'ék'â	blood			
ʔ	dɪʔá	egg			
m	mámá	grandmother			
n	hóná	to harvest honey			
f	ʔáfâ	tree (type)			
s	k <sup>w</sup> èsègà	to think			
ǀ	hùbàǀé	to be hazy			
x	màxé	to be crafty			
h	mèhèmbè	single person			
r	ʔárá:	truth			
j	jàjá	cousin			
l	gàlàmə	rope			
w	gáwâ	hill			

## Appendix C: Vowels

<i>Phoneme</i>	<i>Example</i>	<i>Gloss</i>
i	! ' î	lice eggs
i:	t <sup>hw</sup> ĩ:	bird
ĩ	bâriĩ	rainy season
ĩ:	dĩ:	stone
u	kû	rope
u:	tʃũ:	animal
ũ	nâmuũ	tree (type)
ũ:	<sup>n</sup> ! û:	mouth
e	<sup>n</sup> ! ê	day
e:	mé:	big
ē:	! ě:	rib
o	tô	to finish (trans.)
o:	k <sup>h</sup> õ:	house
õ:	dô:	rim, edge, lip
a	t <sup>h</sup> â	to run (sg. subj.)
a:	k <sup>h</sup> ă:	to hit
â:	tʃ <sup>h</sup> â:	fat, oil

## Appendix D: Surface and underlying tonal patterns

	<i>Tone</i>	<i>Monomorphemic</i>	<i>Multimorphemic</i>
1	high, short ´	gélé baobab tree H-H	gélé-kí baobab tree-add. H-H-H
2	high, long ´	!´wá: pigeon H	gélé-á: baobab tree-SF H-H-H
3	mid, short -	kérébū tick H-L-H	t <sup>h</sup> éré-kī pot-add. H-L-H
4	mid, long -	mámā: health HL-H / H-LH / HL-LH	t <sup>h</sup> éré-ā: pot-SF H-L-H
5	low, short `	hùmbù cow L-L	mìndà-tà-sà field-at-3f.sg.PC L-L-L-L
6	low, long `	mè:mbè bachelor L-L	
7	high falling, short ^	t <sup>h</sup> éréê pot H-L	gélé-sâ baobab tree-3f.sg.PC H-H-L
8	high falling, long ^	k´wê: neck HL	
9	mid falling, short ˘		ts´á-kī-sà water-and-3f.sg.PC HL-H-L
10	low falling, short ˘	mìndà field L-L	k <sup>h</sup> wà-sà return-3f.sg.PC L-L
11	low falling, long ˘	dò: mkola tree L	mìndà: /mìndà-à/ field-3m.sg.PC L-L-L
12	rising, long ˘	sí:ndí: puppy LH-H	hùmbù-ă: cow-SF L-L-H

## Appendix E: Tonal melodies

Tone melody	Number of syllables					
	1		2		3	
<i>H</i>	! 'wá: pigeon H	džík'é milk H-H	tí'ák'átó impala H-H-H			
<i>L</i>	dǒ: mkola tree L	hùmbù cow L-L	džìràmbè gecko L-L-L			
<i>HL#1</i>	kû rope HL	gáwâ hill H-L	gólóbâ evening H-H-L			
<i>HL#2</i>		tátà tip, point HL-L	ʔáíénà monitor lizard H-L-L			
<i>LH#1</i>	t <sup>h</sup> wǐ: bird LH	tòró: insect L-H	tí'ábísó stomach L-H-H			
<i>LH#2</i>		bèrě: millet L-LH	kèlèmbá skin L-L-H			
<i>HLH</i>		mámā: health HL-H / H-LH / HL-LH	kérémbū tick H-L-H			
<i>LHL#1</i>		bǒ:k'ô spoon LH-L	džìgídâ heart L-H-L			
<i>LHL#2</i>			mìnǎ:râ tree (type) L-LH-L			
<i>LHLH</i>		nǎ:ŋg <sup>w</sup> ē: cat LH-LH				

## Appendix F: Abbreviations

1,2,3	first, second, third person
&	connective
ˊ	high tone
-	mid tone
ˋ	low tone
ˆ	high falling tone
ˋ	mid falling tone
ˋ	low falling tone
ˊ	rising tone
add.	additive
anat.	anatomical term
appl.	applicative
C	consonant
comp.	comparative
decl.	declarative
dur.	durative
f.	feminine
H	high tone
intrans.	intransitive
irr.	irrealis
L	low tone
m.	masculine
M	mid tone
NC	narrative conjunction
neg.	negative
NP	noun phrase
obj.	object
PC	pronominal clitic
PGN	person-gender-number morpheme
pl.	plural
poss.	possessive
SC	subjunctive conjunction
SF	subject focus
sg.	singular
sp.	specificity
subj.	subject
trans.	transitive
V	vowel

## References

- Dalgish, Gerard M. (1979). Subject identification strategies and free word order: The case of Sandawe. *Studies in African Linguistics* 10.3. 273–310.
- Dempwolff, Otto. (1916). *Die Sandawe. Linguistisches und ethnographisches Material aus Deutsch-Ostafrika*. Hamburg: L. Friedrichsen & Co. Abhandlungen des Hamburgischen Kolonialinstituts, 34. B. Völkerkunde, Kulturgeschichte und Sprachen, 19.
- Drexel, Albert. (1929). Das grammatische Geschlecht im Nama und Sandawe. *Bibliotheca Africana* 3. 51–58.
- Eaton, Helen C. (2001). Word order and focus in the Sandawe irrealis. *Reading Working Papers in Linguistics* 5. 113–135. Georgiades, Michalis; Kerswill, Paul and Varlokosta, Spyridoula (eds.).
- Eaton, Helen C. (2002). The grammar of focus in Sandawe. Unpublished Ph.D. dissertation. University of Reading.
- Eaton, Helen C. (2003). *Focus as a key to the grammar of Sandawe*. Paper presented at the third Languages of Tanzania Project workshop, University of Dar es Salaam, Tanzania. 25–26 January 2003.
- Eaton, Helen C.; Hunziker, Daniel A. and Hunziker, Elisabeth. (2004). A Sandawe dialect survey report. Unpublished Ms.
- Ehret, Christopher. (1974). Ethiopians and East Africans: The problem of contacts. Nairobi: East African Publishing House. Nairobi Historical Studies, 3.
- Ehret, Christopher. (1986). Proposals on Khoisan reconstruction. *Sprache und Geschichte in Afrika* 7.2. 105–130.
- Elderkin, Edward D. (1982). On the classification of Hadza. *Sprache und Geschichte in Afrika* 4. 67–82.
- Elderkin, Edward D. (1986). Diachronic inferences from basic sentence and noun structure in Central Khoisan and Sandawe. *Sprache und Geschichte in Afrika* 7.2. 131–156.
- Elderkin, Edward D. (1989). The significance and origin of the use of pitch in Sandawe. Unpublished D. Phil dissertation. University of York, Heslington, York.
- Elderkin, Edward D. (1991). Clause structure and tone in Sandawe. *York Papers in Linguistics* 15. 93–115.
- Elderkin, Edward D. (1992). Predictable nasality before East African clicks. *Afrikanistische Arbeitspapiere* 29. 111–129.
- Elderkin, Edward D. (1994). Sandawe verbal sentences. Unpublished Ms.
- Elderkin, Edward D. (2003). Grammar sketch. Unpublished Ms.
- Greenberg, Joseph H. (1950). Studies in African linguistic classification 6: The click languages. *Southwestern Journal of Anthropology* 6. 223–237.
- Güldemann, Tom and Vossen, Rainer. (2000). Khoisan. In Heine, Bernd and Nurse, Derek. (eds.), *African languages: An introduction*. Cambridge: Cambridge University Press. 99–122.
- Hagman, Roy S. (1977). *Nama Hottentot grammar*. Bloomington: Research Center for Language and Semiotic Studies, Indiana University.
- Kagaya, Ryohei. (1990). Jiyū gojun gengo de no gojun seigen. Sandawe go no baai. (Restriction on word order of free word order language - the case of the Sandawe

- language.) *Journal of Asian and African Studies* 40. 1–12. Institute for the Study of Languages and Culture of Asia and Africa. Translated by F. Ingham-Nagasawa.
- Kagaya, Ryohei. (1993). *A classified vocabulary of the Sandawe language*. Institute for the Study of Languages and Culture of Asia and Africa. Itubashi, Tokyo: Tokyo Press Co. Ltd. Asian and African Lexicon 26.
- Kagaya, Ryohei. (1994). Sandawe go no shinkou hyougen de no go no grūpu ni tsuite: syukaku setsuji no kousetsu ni kanshite. (A word group in the progressive expression of the Sandawe language. Concerning the suffixation of a subject marker.) *Journal of Asian and African Studies* 46–47. 175–187.
- Nigmann, Ernst. (1909). Versuch eines Wörterbuchs für Kissandau. *Mitteilungen des Seminars für Orientalische Sprachen* 12. Berlin. 127–130.
- Sands, Bonny E. (1995). *Evaluating claims of distant linguistic relationships: The case of Khoisan*. *UCLA Dissertations in Linguistics* 14. UCLA Linguistics Department, Los Angeles.
- Snider, Keith L. (1999). The geometry and features of tone. Dallas: The Summer Institute of Linguistics and The University of Texas at Arlington.
- ten Raa, Eric. (1969). Sandawe prehistory and the vernacular tradition. *Azania* 4. 91–103.
- ten Raa, Eric. (1970). The couth and the uncouth: Ethnic, social, and linguistic divisions among the Sandawe of central Tanzania. *Anthropos* 65.1/2. 127–153.
- ten Raa, Eric. (1986). The Alagwa: A northern intrusion in a Tanzanian Khoi-San culture, as testified through Sandawe oral tradition. In Vossen, Rainer and Keuthmann, Klaus (eds.), *Contemporary studies on Khoisan (Festschrift Oswin R. A. Köhler)*. Vol. 2. Quellen zur Khoisan-Forschung, Band 5. Hamburg: Helmut Buske Verlag. 271–299.
- Tucker, Archie N. and Bryan, Margaret A. (1977). (Woodburn, James - co-author for Hadza). The East African click languages: A phonetic comparison. In Möhlig, Wilhelm J.G.; Rottland, Franz and Heine, Bernd. (eds.), *Zur Sprachgeschichte und Ethnohistorie in Afrika: Neue Beiträge afrikanischer Forschungen*. Berlin: Dietrich Reimer. 300–323.
- van de Kimmenade, Martin. (1936). Les Sandawe (Territoire du Tanganyika Afrique). *Anthropos* 31. 395–416.
- Westphal, Ernst O. J. (1971). The click languages of southern and eastern Africa. In Sebeok, Thomas A. (ed.), *Current trends in linguistics 7: Linguistics in Sub-Saharan Africa*. The Hague: Mouton. 367–420.
- Wright, Richard; Maddieson, Ian; Ladefoged, Peter and Sands, Bonny. (1995). A phonetic study of Sandawe clicks. *UCLA Working Papers in Phonetics* 91. 1–24.