A grammar of Sandawe : a Khoisan language of Tanzania

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Chapter 2

Phonology

The following sections present a description of the phonology of Sandawe. First, vowels and consonants are discussed in sections 2.1 and 2.2. Section 2.3 discusses the syllable structure of Sandawe, including labialization. Section 2.4 discusses tone.

2.1. Vowels

The Sandawe vowel system is based on five vowel qualities: **a**, **e**, **i**, **o**, and **u**. In table 1, the vowel phonemes of Sandawe are shown. A distinction is made between short and long oral vowels, and voiceless vowels.

Table 1: Sandawe vowel phonemes

	vowel qualities				
short (oral)	i	e	a	o	u
long (oral)	ii	ee	aa	oo	uu
voiceless	i̥				u̥

The following near minimal pairs contrast the different vowel qualities.

i vs. **e**

| \|hímé | sing |
| \|hèmé | sweep |

| ǹ | bone |
| ŋ!ê | day |

a vs. **e**

| tàá | untie |
| téé | count |

| màkéntá | kite |
| mèkéntó | spoon for cooking (mash) |

a vs. **o**

‖’àá	follow
‖’óó	to rain
sákhà	yoke, pole of a water-carrier
ǃáákhɔ̀	raised, open place

u vs. **o**

tû	come out
tó	finish
dùrṳ̀	slope; family/clan possessions
dóró	zebra

The (near) minimal pairs in the following examples show contrastive length for voiced vowels.

tsí	I
tshìí	gums; mushroom, sp.
ŋǃé	become light
ŋǃèé	laugh
ǃákí	bifurcation
ǃáákí	fresh milk
‖’ô	sleep
‖’ɔ̀ó	carry loads, collect
ɬúpà	grass
ɬùúbá	lung

Vowels that precede a nasal consonant in the coda may have a longer duration than short oral vowels in open syllables. This effect is clearest in monosyllables before pause. However, there is no opposition between long and short vowels before nasals.

‖’ô	[‖’ô]	to sleep
‖’óó	[‖’óː]	to rain
‖’ôŋ	[‖’ôːŋ]	throat

Therefore, vowels before nasal coda consonants are treated as short oral vowels.

The phonological status of voiceless vowels is problematic, as discussed below. Voiceless vowels have only two vowel qualities: **i** and **u**.[5] Since there is no voice in their pronunciation, distinguishing the two acoustically can be difficult. The decisive feature seems to be the absence or presence of lip-rounding.

In the majority of cases, voiceless vowels occur in word-final position.

kòŋkóṛ̥	cock
kàkúrὺ̥	calabash
búsὶ̥	kind of gazelle
tímὺ̥	swallow
hík'ὶ̥	go (SG)
tɬ'áráŋgὺ̥	dust
kàmákὺ̥	cheek
nárágὺ̥	hunger

Grammatical morphemes and clitics in word-final position may have a final voiceless vowel as well:

–kὺ̥, –súkὺ̥	CAUS1, CAUS2 (causative verbal suffix)
–ts'ὶ̥	MID2 (middle)
–sὺ̥	fSG (nominal gender marker)
=sὶ̥	1SG (realis subject clitic)
–`sὶ̥	1SG:NR (non-realis subject clitic)
=sὺ̥	3fSG:NR (non-realis subject clitic)

All word-final voiceless vowels have a low tone. The tone of voiceless vowels cannot be heard when lexemes are used in isolation, but it surfaces when suffixes or clitics are added. The vowel is realized as a voiced vowel with a low tone in these cases, which is illustrated below.

hík'ὶ̥=sà   [hík'ìsà]
go:SG=3fSG
She went

kàkúrὺ̥=ná   síyé=nè=ì   [kàkúrùná síyénì̀ì]
calabash=Q   take:SG=Y/NQ=2SG
Did you take the calabash?

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[5] Voiceless vowels after a glottal stop in coda position are not included here, as they are considered realizations of the glottal stop release. The quality of these phonetic elements is the same as the vowel quality preceding the glottal stop (see section 2.3).

A few lexemes show word-internal voiceless vowels, e.g. reduplicated stems which end in a voiceless vowel, and some noun and verb stems. Note that word-internal voiceless vowels always follow a continuant. The following are examples of reduplicated forms and an exhaustive list of stems that contain word-internal voiceless vowels:

ts'àxṵ̀–ts'àxṵ̀–sé	beat lightly
kásɨ̥̀kásɨ̥̀	temple
lémṵ̀lémṵ̀	way of dancing (ideophone)
farɨ̥̀kwà	Farkwa (place name)
gɨ̀rɨ̥̀bé	run
hàǹ̥sé	praise
k'óŋgórṵ́mà	bird, sp.
làn̥tà	Lalta (place name)
thásɨ̥́nó	liver
!hàsɨ̥̀mé	fetch water with a small calabash
‖hásɨ̥́ná	tree, sp.
bàìsɨ̥̀kéɗ̀	bicycle (<Sw. *baisikeli*)

The tone of word-internal voiceless vowels cannot be heard and the test which determines the tone of final voiceless vowels cannot be used here. The phonetic realization of tone after the voiceless vowel may help to determine the underlying tone for voiceless vowels. In all reduplicated stems the high tone after the voiceless vowel is realized on a lower pitch level than the previous high tone (e.g. lémṵ᥂lémṵ̀). This is predictable if a low tone is posited for the voiceless vowel (lémṵ̀lémṵ̀.).[6]

The tone of word-internal voiceless vowels in other nouns and verbs, which are very few in number, can be high or low. In the following lexemes a high tone is posited: **thásɨ̥́nó** and **‖hásɨ̥́ná**. The reason for positing a high tone here is the phonetic realization of the final tone in these lexemes: in **thásɨ̥́nó** and **‖hásɨ̥́ná** the final high tone is realized on the same pitch as the previous high tone, which cannot be explained if the voiceless vowel had a low tone. When followed by a low-toned syllable, the phonetic realization of the following tone does not provide a clue to the tone of the voiceless vowel. By arbitrary convention, the tone of these voiceless vowels is posited as identical to the pitch level of the preceding vowel, e.g. **k'óŋgórṵ́mà**, **gɨ̀rɨ̥̀bé**, **làn̥tà**.

The two voiceless vowels can be contrasted to each other and to their voiced counterparts. The contrast between voiceless ɨ̥ and ṵ̥ is shown by the

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[6] Note however, that the reduplication of verb stems is also characterized by downstep between the two parts (see section 6.2.1). So for reduplicated verb stems there is no need to posit a low tone for the voiceless vowel.

subject/modality clitics =sį̥ (1SG realis), =`sį̥ (1SG non-realis) versus =sʉ̥̀ (3fSG non-realis).[7] In the table below, the voiceless vowels are contrasted to their voiced counterparts. The following lexemes contain voiceless vowels both after continuants (r, s, and m) and non-continuants (i.e. obstruents like k', k, and g):

bòbórí̥	small gourd
kòŋkórį̥	cock
híkí	how?
híkʔį̥	go (SG)
–ts'í	MID1
–ts'į̥	MID2
kùrúkùrù	ankle
kàkúrį̥	calabash
|'úmú	waist
tímʉ̥̀	swallow
tɬ'úŋgù	cloud
tɬ'áráŋgʉ̥̀	dust
nárágʉ̥̀	hunger
n|ûmsù	wife [8]
–sʉ̥̀	fSG (nominal gender marker)

The preceding examples show that voiceless and voiced vowels are contrastive. However, word-final į̥ always has a low tone and word-final i always has a high tone. There are no words with a low-toned voiced vowel i. Thus, these word-final voiceless and voiced vowels are in complementary distribution when tone is taken into account. The occurrence of the word-final voiceless vowel į̥ is therefore treated as the phonetic realization of a low-toned voiced vowel.

Complementary distribution cannot be claimed for the voiced oral vowel u. Although the word-final voiceless ʉ̥ also has an underlying low tone, the low tone is not restricted to the voiceless vowel, e.g. thèndégù 'legs of bed'.

Word-internal voiceless vowels remain partly unexplained. Their existence is remarkable, because most voiceless vowels occur in word-final position and become voiced when another morpheme or clitic is attached. One can assume that word-internal voiceless vowels in reduplicated stems have a special status: the

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[7] The first person singular realis clitic =sį̥ has no underlying tone. Its non-realis counterpart has an underlying low tone. See section 5.1 for more information.

[8] The string sù in this lexeme is a frozen gender marker.

voicelessness from the final vowel is preserved on the reduplicated internal vowel. The other word-internal voiceless vowels are found after continuants in a few lexemes that all contain three or more syllables. There are no near minimal pairs that contrast internal voiceless to voiced vowels. Maybe the vowel has been devoiced (and hence shortened) in order to conform better to the predominant pattern of disyllabic roots and stems in Sandawe (see sections 3.1 and 6.1).

2.2. Consonants

The consonants of Sandawe are presented in tables 2 and 3. Table 2 presents the pulmonic and glottalic consonants (ejectives); table 3 demonstrates the velaric consonants (clicks).

Table 2: Pulmonic and glottalic consonants, according to manner and place of articulation

		bilabial	alveolar	palatal	velar	glottal
STOPS	vl. asp.	ph	th		kh	
	vl.	p	t		k	ʔ
	voiced	b	d		g	
	nasal	m	n		ŋ	
FRICATIVES	vl.	f	s		x	h
	lateral		ɬ			
AFFRICATES	vl. asp.			tsh		
	vl.			ts		
	voiced			dz		
	vl. lateral		tɬ			
	voiced lateral		dʒ			
EJECTIVES	vl.				k'	
	vl. affricate		ts'			
	vl. lateral		tɬ'			
LIQUIDS			l, r			
APPROXIMANTS				y	w	

Table 3: Velaric consonants (clicks), according to click type and accompaniment

	dental	*alveolar*	*lateral*
voiceless aspirated	ǀh	ǃh	ǁh
voiceless	ǀ	ǃ	ǁ
voiceless glottalized	ǀ'	ǃ'	ǁ'
nasal	ŋǀ	ŋǃ	ŋǁ
voiced	ᶢǀ	ᶢǃ	ᶢǁ

The following consonants have labialized counterparts, as discussed in section 2.3:

-    **th**, **t**, **n**, **s**, **ɬ**, **tsh**, **ts**, **dz**, **ts'**, **tɬ'**, **kh**, **k**, **g**, **x**, and **k'**;
-    **ǀh**, **ǀ**, **ǀ'**, **ŋǀ**, **ǃh**, **ǃ**, **ǃ'**, **ŋǃ**, **ǁh**, **ǁ**, **ǁ'**, and **ŋǁ**.

2.2.1. Pulmonic and glottalic consonants

This section presents a further description of the pulmonic and glottalic consonants. Examples are provided and (near) minimal pairs show the main phonological oppositions.

With the exception of laterals, stops and affricates distinguish between voiceless unaspirated and voiceless aspirated phonemes (**p**, **t**, **k**, **ts** versus **ph**, **th**, **kh**, **tsh**). The following lexemes show the opposition between the voiceless aspirated, voiceless unaspirated and voiced consonants (**b**, **d**, **g**, **dz**) in near minimal pairs.

phê	tomorrow
pèé	put (SG)
bèébà	be nearby
thékélé	hyena
tétérà	seed(s)
dégérà	tree, sp.
khéʔé	listen
kéké	ear
gélé	baobab
tsí	I
tshìí	gums; mushroom, sp.
dzìgídà	heart

The contrast between unaspirated and aspirated consonants can be seen as a fortis-lenis distinction. Sandawe speakers consider the voiceless aspirated consonant as

"normal" and "strong", its voiceless counterpart as "weak". The "weak" voiceless consonants may be perceived auditorily as almost voiced.

In loanwords from Swahili, there is no contrast between aspirated and unaspirated consonants.[9] Standard mainland Tanzanian Swahili does not have a phonemic contrast between aspirated and unaspirated consonants, it only has the series of unaspirated consonants. Words containing a voiceless stop/affricate in Swahili are incorporated in Sandawe with a voiceless aspirated stop/affricate, the "normal" consonant according to native speakers. This is illustrated by the examples below.

phèsáà   money (<Swahili *pesa*)
tshúphà   bottle (<Swahili *chupa*)

The affricates **tsh**, **ts**, and **dz** all have two phonetic realizations, one more fronted [tsh, ts, dz] and one more central [tʃh, tʃ, dʒ]. These realizations may be used as free variants within the ideolect of a single speaker. However, it is stressed by elder speakers that the more fronted variant is the "original" one, as pronounced by speakers of Mangastaa and surroundings, the geographical centre of the Sandawe-speaking area. These three afrricates are relatively rare, for example when compared to the ejective **ts'** (see below).

There are three nasal consonants: **m**, **n**, and **ŋ**. The nasals **m** and **n** are contrasted in the examples below. The nasal **n** is less frequent than **m**, especially in word-initial position. The nasal **ŋ** does not occur word-initially.

méé   big
nèé   stay (PL)

mìníkí   know, understand
níʔį̀   go (PL)

In coda position, there is no opposition between the three nasal consonants. The nasal in the coda is a homorganic consonant, whose place of articulation is determined by the following:

   m before labial consonants, e.g. ʔìmbô 'say'.

   n before (post-)alveolar consonants, e.g. ʔìnthó 'muscle', mântshà 'eat'.

   ŋ before velar consonants and in word-final position before pause, e.g. kóŋgóràʔą̀ 'axe', !hêŋ 'tongue'.[10]

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[9] 'Swahili' is consistently used here to refer to standard mainland Tanzanian Swahili that Sandawe speakers are in contact with.

[10] The consonant **ŋ** in coda position should not be confused with the nasal component ŋ, which is used in digraphs to transcribe nasal clicks, i.e. ŋ|, ŋ!, and ŋ‖.

Across morpheme or word boundaries, a nasal coda consonant can be followed by a glottal stop or a vowel. When the nasal is followed by a glottal stop across morpheme boundaries, the nasal is realized as nasalization of the preceding vowel (see sections 6.3 on clipping before direct object pronouns, and 6.4.1 on the plural marker −ʔwá):

   thímé + ʔwá   >   thíN−ʔwá   >   thį́ʔį̃wá   cook (PL object)

When the nasal is followed by a glottal stop across word boundaries, it is pronounced [ŋ]:

ʔàfà−ŋ   ʔàlèé   [ʔàfàŋʔàlèé]
acacia-DEF (POSS.)branch
A branch of the acacia

When a vowel follows the nasal consonant, the nasal is pronounced [ŋ] and the velar stop g appears as an onset-filler (see section 2.3 on syllable structure):

gìtɬ’ê−ŋg=à   ŋ‖ókhò
cloth-DEF=3   wash
He washed the garment.

Note that the nasal ŋ is the sole segment in two grammatical markers: the definiteness marker −̀ŋ (section 3.5) and the linking clitics −ŋ (section 7.1).

There are two exceptions to the homorganic status of the nasal in the coda position: the nasal m (a plural marker for factitive verb stems) does not change its place of articulation before the factitive stem marker −sé:

   dzàà−m−sé   make touch (PL stem)

Further, the nasal m occurs in the lexical item |wèêm ‘tree, sp.’ which is additionally exceptional both in syllable structure and tone pattern (rising-falling).

The set of fricatives contains five consonants, all of which are voiceless: f, s, x, h, and the lateral voiceless fricative ɬ. The fricative f is very rare and restricted to occurences before e, a, and u:

fàré	lie
fàr̀kwà	Farkwa (place name)
ʔàfà	acacia, sp.
làfà	fruit-bearing tree, sp.
k’úk’ùfé	sprout
ʔáfúrè	ox (cf. Alagwa and Burunge **'afuuraa**)

The fricative **s** is very common and occurs before all vowel qualities.

sàʔútà	ostrich
sémbéthù	stick used to hold the cooking pot
sìbìrí	cooking pot with a small opening
sógóró	large stick
sùrú	wall

The following examples illustrate occurrences of **x**.

xâ	be bad
xéé	stick used to hold the cooking pot
tɬ'àxé	beat, hit, strike
xòʔá	tree, sp.
gótɬ'óxǫ̀	jump to mind
‖hàxú	bee, sp.

The fricative **h** is illustrated below. The occurrence of this fricative in word-internal position is rare, the only lexeme in our data is **wàhéèw** 'brother (relative?)'.[11]

hàmá	insult
héèw	this (DEM1, m.)
hí|'á	tie; cover
hògòrí	trade, price
hùmà	win

The set of laterals consists of the fricative **ɬ**, the affricates **tɬ** and **dʒ**, the ejective **tɬ'**, and the approximant **l**. The lateral affricates are rare and are not attested in word-internal position. The following lexemes contrast the lateral consonants in word-initial position before **a**.

ɬàá	goat
tɬâ	bark
dʒàní	arrow
tɬ'àá	take (PL)
láá ʔè	hare

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[11] We do not know the exact meaning of this lexeme. It was explained to us in Swahili as *kaka, siyo mama mmoja wala baba mmoja* 'brother who does not have the same mother, nor father'. The word might refer to 'cousin', although it should then be distinguished from ʔáɬèé 'cousin'.

The ejectives are **ts'**, **tɬ'**, and **k'**. In the examples below **ts'** is contrasted to the affricates **tsh** and **ts**. The ejective is common, both word-initially and word-internally.

ts'ê	hair
tshèé	be absent
tsèé	head

The lateral ejective **tɬ'** has been contrasted to the other lateral consonants above. The consonant occurs word-initially and word-internally before all vowel qualities, except, word-internally, before **i**.

tɬ'óxó	dig holes to plant
tɬ'ɩthé	slaughter
phútɬ'úmà	peace
k'àtɬ'é	be stupid

The liquids **l** and **r** are contrasted below. Word-initial **r** is rare when compared to **l**.

| rátà | tree, sp. |
| làfà | fruit-bearing tree, sp. |

| rôŋ | voice |
| lòŋgósɩ̀ | genet |

| báárɩ̀ | rainy season |
| bàlímáá | female in-law |

| pàràré | sketch on ground; cure by sweeping a feather |
| kɩ̀pálálá | sweat |

| gòrò | pillar |
| bògòló | honey bag |

The approximants **w** and **y** are rare. Word-initially, **w** is most common before **a** and **e**, **wo** and **wi** are attested once, and **wu** is not attested. Word-internally, **wa**, **we**, and **wo** are attested.

wàré	friend
wàʔé	babble
wèré	walk
wówóŋ	mosquito (ideo.?)
wɩ̀khɩ̀	week (<Sw. *wiki*)

kéléwà	milk container
sàwà?ʌ̀té	yawn
!'àwé	fall (SG)
‖ùúwé	shoot with an arrow
sàndàwé	Sandawe
púw–ó	pestling (NMN)

In very few examples, **w** occurs in the coda position of the syllable (see section 2.3).

| wàhéèw | brother (see footnote 11) |
| ǀ'èéw | buffalo |

Word-initially, **y** only occurs before **a**. It is attested in the following lexemes:

yà?àmé	get used to
yà?àbé, yá?ábóó	to work, work (n.)
yàyá	elder sibling

Word-internally, the approximant occurs before **a**, **e**, and **o**.

dò?ó?ǫ́yà	flamingo
ǀhǐíyà	Kirk's dikdik
tshíyà	all

| síyé | take (SG) |
| ?íyé | stay (PL) |

| bóyó | seed |
| sàyò | converse[12] |

Finally, the approximant **y** can appear in the coda of a syllable (see section 2.3). It is very rare in lexemes (e.g. **wámbôy** 'uncle' and **kwáày** 'shoulder'), but more common as the realization of a grammatical marker –**i**:

mànà–á–ì   [mànàáỳ]
know-3O-3:NR
He will know it

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[12] In an alternative pronunciation, the approximant is left out. See section 2.3 on syllable structure.

In some cases, particularly in morphophonology, the approximants function as glides which fill the onset of phonemically onsetless syllables. The glide will be written when morpheme boundaries are not marked.

hí=à,   híyà
SUB:CNJ=3
If/when he

ŋ!ê–àà,   ŋ!êyàà
day-SFOC
Day (subject focus)

The glottal stop has full phonemic status. The following pairs contrast the glottal stop to **h** and **k** in initial position.

ʔìmé	rumble, groan
hìmé	smell
ʔô	here
kô	just
ʔàɬèé	branch
hàȵsé	praise

A word-initial glottal stop could be analyzed as an automatic consequence of the articulation of an initial vowel. However, the initial glottal stop is never omitted in speech, for example when it separates two identical vowels. Therefore, the word-initial glottal stop is treated as a phoneme.

ts'ŏŋ hí–sà   ʔàɬèé=sà   mântshá=ìʔȵ hèsú tshìná–nà=sà   ʔàmínȵ̀
hippo SUB:CNJ-3fSG cactus=3fSG eat=SUB   she   (POSS.)anus-DIR=3fSG believe
When a hippo eats a cactus, it trusts its anus. (Saying).[13]

hí–sà   ʔàɬèé=sà   * [hísà:ɬèésà]
tshìná–nà=sà ʔàmínȵ̀   * [tshìnánàsà:mínȵ̀]

Note that, whereas words always start with a consonant, several clitics start with a vowel, e.g. the following subject/modality markers: =ì (2SG realis; 3 non-realis), =à (3 realis), =ò (1PL realis), and =è (2PL realis). The 3PL realis clitic has two variants: =àʔà̪ and =ʔà (see section 5.1.1).

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[13] Explanation: Do not try to imitate something you do not have the capacity for.

The word-internal glottal stop may appear in the onset or the coda of the syllable. When it occurs in the onset, it usually separates two identical vowels, except for verb roots with a final **έ**.

ɬàʔálὺ	cheese
yàʔàmé	get used to
dòʔóʔóyà	flamingo
bàʔé	grow, be big
‖’òʔé	gnaw
thùʔé	reply

A glottal stop in the coda position of a syllable is infrequent, but it is found both in lexemes and in grammatical markers. The glottal stop is followed by a voiceless vowel, which has the same quality as the preceding vowel.

mâʔą̀	be tired
sàwàʔą̀té	yawn
kúʔų́nà	gourd

In the verbs below, the glottal stop is part of the plural verb marker **–ʔwá**, which is attached to (clipped) verb stems (see section 6.4.1):

bô–ʔɔ̀wá–	say (PL)
khǎ–ʔą́wá–	hit (PL)

2.2.2. Clicks

Table 3 has demonstrated the consonants that are produced with a velaric airstream mechanism, i.e. clicks. Three click types are distinguished: dental (**|**), alveolar (**!**) and lateral (**‖**). Each click type has five accompaniments: voiceless aspirated, voiceless, voiceless glottalized, nasal, and voiced. This gives a total of fifteen click phonemes in Sandawe. In lexical items, clicks are as common in Sandawe as pulmonic and glottalic consonants. In function words and grammatical markers clicks are absent.

There is considerable variation in the literature in the use of click type labels and the orthographic representation of click types. Ladefoged and Maddieson (1996:248) give an overview of classifications of click types by several authors. Their discussion shows that a lot of variation is found for the alveolar click type (**!**). The variation is explained among others by different timepoints used in measuring the place of articulation: "The maximum occlusion during a click is more extensive than the occlusion that exists just before the release; judgements on the place of

articulation will vary according to whether place is based on the maximum occlusion or a later timepoint" (id:249). In this way, the description of the click type transcribed as ǃ can be found as alveolar or post-alveolar (contact just before release), but also as palatal (measurement during maximum occlusion).

Moreover, "auditorily similar click types can be produced by different speakers using somewhat different articulations" (id:249). Ladefoged and Maddieson particularly note variation in the production of the alveolar click type in Sandawe and Hadza (id:253).

The present description follows Ladefoged and Maddieson (1996) in using *alveolar* as a non-specific label for the click type ǃ in Sandawe. For this study no detailed phonetic investigation has been made in order to show variation in the production of the alveolar click type among speakers. The allophonic variant of the alveolar click type in which "the tongue tip makes contact with the bottom of the mouth after the release of the front click closure" (id:253), has occasionally been noted during fieldwork sessions. It is treated as a free variant of the alveolar click type, and therefore it is not distinguished in the transcription.

The two sets of examples below contrast the different click types and the accompaniments, respectively. The contrast between the three click types is illustrated by glottalized clicks:

ǀ'èé	look at, inspect	(dental)
ǃ'èé	earth, clay	(alveolar)
ǁ'èé	to skin	(lateral)

The contrast between the five click accompaniments is exemplified by alveolar clicks.

ǃhâŋ	place where millet is beaten	(voiceless aspirated)
ǃâ	moonlight	(voiceless)
ǃ'àwé	fall	(voiceless glottalized)
ŋǃá	grasp, catch	(nasal)
ʄâʔà̰	sound of something soft falling and hitting the ground (ideo.)	(voiced)

Word-initial clicks are common, but word-internal clicks are relatively rare. Examples with a word-internal click often have a word-initial click as well, but word-initial pulmonic and glottalic consonants also occur. Examples in the latter set frequently contain a word-initial **h**.

ǃúnǃè	kidney
ǁ'òǁ'á	baboon
ǀhùnǀá	ant heap, k.o.

| hìn|ó   tree, sp.

ʔăn‖húmà   tree, sp.
máá|ʼà   louse
séŋ‖á   tree, sp.
kʼá!ʼà   grind, soften
hɪ́ŋ‖á   urinate
hó‖ʼóŋ   fill
hɪ́‖ʼɪ́ŋ   heat
há!à   call

Voiced clicks are very rare. Only two lexemes in our data contain voiced dental clicks.[14] Note that both have word-initial as well as word-internal clicks.

ʄɪ̄|óó   bird, sp.
ʄ\|ísà   slope

Eight lexemes in our data contain a voiced alveolar click. Five of these contain a word-internal **kh**, as shown below:

ǃ̬ékhé   tree, sp.
ǃ̬àkhíná   carry sth. under one's arm
ǃ̬áákhò   raised, open place
ǃ̬àŋkhárà   hard field
ǃ̬òkhómí   antelope, sp.

The rest of the examples contains at least one ideophone:

ǃ̬âʔa̰   sound of smth. soft falling and hitting the ground (ideo.)
ǃ̬ûŋ   explode (ideo.?)
ǃ̬ònǃ̬òwásɪ̰   bird, sp.

Two lexemes in our data have voiced lateral clicks, both word-initially and word-internally.

‖̬á‖̬à   meat of the high back, around the shoulders
‖̬ó‖̬è   big male of greater kudu

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[14] Elderkin (1994) also presents only two examples that contain a voiced lateral click: ʄɪ̄ːǀó: 'bird, sp.; pytilia' and ʄé: 'slope'. Probably, ʄ\|ísà in our data is a complex form, which may be derived from a root ʄi or ʄe.

The voiced lateral click seems to be the rarest among consonants in Sandawe. The two lexemes above were provided by one consultant when asked for any words that contain [ǁ]. Other consultants could not provide any examples, nor did they know the meaning of the two lexemes when they were presented to them. An old word list, which is probably copied from Ten Raa's informant Pius Duma, had two lexemes. The words, which are retranscribed below in the current writing system, correspond more or less to our examples:

ǁàǁhà	*mfupa juu ya kidari* (bone above the chest)
ǁògè (or ǁòǁè)	*dume kubwa la mnyama, hasa lenye pembe kubwa*
	(large male animal, especially one with big horns/antler)

Vowels before glottalized and voiced clicks are automatically nasalized, both word-internally and across word boundaries.

[ká̰!'à]	grind
[hó̰!'òŋ]	forehead
[ɲ̥ǀísà]	slope
[ǁó̰ǁè]	big male of greater kudu

[ǁhôntàsà̰ ǀ'èé]	ǁhôn–tà=sà	ǀ'èé
	cave-in=3fSG	look_at
	She looked inside the cave.	

De Voogt (1992) and Elderkin (1992) also claim that the nasalization of vowels before glottalized clicks is automatic. De Voogt presents an articulatory description of glottalized clicks in Hadza and Sandawe in which he assumes a delayed glottal closure (as opposed to the voiceless click). Nasalization of preceding vowels then results from an open velic which keeps the pharyngeal air pressure low as long as the glottis is open. Voiced clicks are not treated because they were not recorded during his research. Elderkin (1992:113) states that he "always heard this nasality before the glottalised click when it follows a vowel; I have never noted it before any other of the oral clicks, including the aspirated click".

This type of predictable nasalization before glottalized and voiced clicks is not further marked in transcriptions, hence /ká!'à, hó!'òŋ, ɲǀísà, ǁóǁè/.

2.3. Syllable structure

Sandawe has open and closed syllables. Open syllables contain an initial consonant in the onset and a vowel in the nucleus which may be short, long or voiceless: CV, CVV, or CV̥. Closed syllables, which are less frequent, contain an additional

consonant in the coda: CVC, or CVVC. The following description presents a short overview of elements in the onset, nucleus and coda.

Syllables always have a consonant in the onset position. Although some morphemes and clitics may consist of a vowel only, this never results in onsetless syllables. When the vowel is attached to its host it either merges with the preceding vowel in the nucleus, or, in the case of **i**, it may fill the coda position as a glide **y**. When the vowel follows a syllable with a nasal coda consonant, it forms a new syllable. In this case, the onset-filler **g** appears between the nasal **ŋ** and the vowel **aa**:

tsèê–ŋg–àà	ɦík̚ʔ̰,	tsèê–ŋ–àà	> tsèêŋ.gàà
head-DEF-SFOC	go:SG	CVV-C-VV	CVVC.CVV
The head went			

The consonant in the onset position can be simple or complex. Simple onset consonants are all pulmonic, glottalic and velaric consonants, except **ŋ** (see section 2.2.1). Labialized consonants are complex consonants. In our description of these consonants we leave the question open whether they are single segments (C^w) or consonant clusters (Cw). A digraph is used throughout the transcriptions.

Labialization is the only type of secondary articulation for consonants in Sandawe. The rounding of the lips takes place simultaneously with the primary articulation. Over half of the consonants has a labialized counterpart:

-   the (post-)alveolar consonants **th**, **t**, **n**, **s**, **ɬ**, **tsh**, **ts**, **dz**, **ts'**, and **tɬ'**;
-   the velar consonants **kh**, **k**, **g**, **x**, and **k'**;
-   the velaric consonants **|h**, **|**, **|'**, **ŋ|**, **!h**, **!**, **!'**, **ŋ!**, **‖h**, **‖**, **‖'**, and **ŋ‖**.

The consonants without a labialized counterpart fall into several groups. In terms of place of articulation, labial and glottal consonants do not occur with additional rounding. Regarding manner of articulation (or efflux for the clicks), the following consonant types cannot be labialized: voiced stops (with the exception of **g**), nasals, lateral affricates, liquids and approximants, and voiced clicks.[15]

Labialized consonants occur in word-initial and word-internal position, but most of them appear word-initially. The following lexemes contrast labialized consonants to their unrounded counterparts:

k'wé	kill
k'é	cry
‖wâ	name
‖â	plant (v.)

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[15] The incorporation of Swahili loanwords in Sandawe strengthens the claim for the absence of certain labialized consonants: Swahili *pwani* has become **pháánì–nà** 'on the coast' in Sandawe.

There are some additional interesting facts about labialized consonants:

- co-occurrence restrictions for labialized consonants and vowels
- variation between labialized consonants and consonant-vowel sequences
- the formation of labialized consonants as the outcome of a diachronic, morphophonological process.

First, the occurrence of labialized consonants is restricted to syllables which contain an (unrounded) vowel: **i**, **e**, or **a**. The vowel qualities **o** and **u** cannot co-occur with labialized consonants.[16] The examples illustrate the co-occurrence of labialized consonants with short and long oral vowels **i**, **e**, and **a**.

!hwík’į̀	insect, sp.
ts'wìŋkírį̀	snail
tʰwìí	bird
mágwélà	lower leg
ɬwéʔę́	come out quickly
twèé	night
gwàbé	be thirsty
ǀ'wăŋ	millet
dzwàá	stick

Second, variation has been noted for some lexemes which contain labialized consonants. In careful speech the syllable which consists of a labialized consonant and a vowel undergoes a process of breaking. This results in two new syllables: one which contains the non-labialized consonant and a rounded vowel, followed by a second one which contains the original vowel of the first syllable. An automatic glide **w** connects the two vowels:

ŋǀwàá, ŋǀòwáá	elephant

The numeral 'three' has two free variants. One has a labialized consonant, which is followed by **a**; the other has an unrounded consonant which is followed by the rounded vowel **o**.

swàmkíxì̧, sòmkíxì̧	three

Finally, in two examples labialized consonants are apparently the result of former morphophonological changes.

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[16] Another co-occurrence restriction is that labialized velar consonants (**kʰw**, **kw**, **gw**, **xw**, and **k'w**) are never followed by **i**.

máxà ŋ‖wéé	male child, son
n|wéé	do, create

These words, which display frozen morphology, can be compared to morphologically simple forms. The rounded vowels in the simple forms are realized as rounding of the preceding consonant in the complex forms: $CV_{[rounded]}+V >$ $CwVV$. The vowel ee in máxà ŋ‖wéé is a frozen gender marker (–é), which was added to the noun root ŋ‖òó 'child'. The verb root ŋ\|wéé 'do, create' can be compared to the clipped form ŋ\|ú–, which is the basis for plural verb stem formation (see section 6.4.1). The verb root ŋ\|wéé seems to contain a frozen (object?) suffix, which is realized as a long vowel ee. The rounded vowel u is realized as rounding of the click ŋ\|. Note that the long vowels in the forms cannot be explained.

The nucleus of the syllable is filled by a short, long, or voiceless vowel. There are no diphthongs in Sandawe. When a morpheme with a vowel-initial syllable is attached to an open syllable (CV(V)-V), the structure of the nucleus can be preserved in three ways:

- the vowel becomes part of the nucleus of the same syllable. The vowel quality of the preceding word is lost; e.g. màxé=à [màxáà] 'he is smart'
- the vowel forms a new syllable, which has an initial glide; e.g. wèré=à [wèréyà] 'he walks'
- if the vowel is i, it can occupy the coda position of the syllable as the approximant y; thímé–ì–s̀ʉ [thíméỳsʉ̀] 'cook, f.'.

The following consonants can occur in the coda position of the syllable: w, y, a homorganic nasal, m, and ʔ.

The coda consonant w has only been attested in the examples below. In the first two examples w is a suppletive masculine gender marker, which is only used with demonstratives and ɬáá 'be good, fine'.

hèéẁ	this (DEM1, m) (cf. hèé–sʉ̀ 'this' DEM1, f.)
ɬááẁ	(he is) good (cf. ɬáá–sʉ̀ '(she is) good')
wàhéèw	brother
|'èéw	buffalo
ʔèmáw	antelope, sp.
‖'ěw	soil, k.o.; vegetation, k.o.
kêwtò	wild pig

The coda consonant w also occurs in an alternative pronunciation of sàyò 'converse'. The glide y is absent and the final vowel o is realized as a coda consonant: [sàw].

The coda consonant **y** is more frequent, because it is a common realization of the nominal agent suffix –**ì**. and the subject/modality clitics =**ì** (2SG realis and 3 non-realis). It also occurs in the nouns **wámbôy** 'uncle' and **kwáày** 'shoulder'.

fàré–ỳ, fàré–ỳ–sỳ̀	liar (m., f.)
màndà–á=ì [màndàáỳ̀]	he will know it
wámbôy	uncle, father's brother
kwáày	shoulder

A nasal in the coda position is either an instance of a homorganic nasal consonant, e.g. **ríŋgó** 'go around', or the (invariable) nasal **m** as the plural factitive stem marker, e.g. **hù|'ù–m–sé** 'taste from a dipped finger' (see section 6.2.3 for more examples). In mono-morphemic lexical items, there is no distinctive length of the vowel before the nasal coda consonant: CVN. When the nasal is part of a grammatical morpheme, it may be attached to short or long vowels: CV-N or CVV-N.

The glottal stop **ʔ** in the coda position occurs both in lexical items and grammatical markers (see section 2.2.1). The glottal stop is automatically followed by a voiceless vowel, which has the same quality as the preceding vowel, e.g. **ɬàʔàté** 'die', **ɬwêʔè̥** 'come out suddenly (SG)', **khûʔù̥** 'be dumped, be thrown up'. There are only two lexical items in which the glottal stop follows a long vowel: **!'àáʔḁ̀** 'move closer to', and **!àáʔḁ́sò** 'moon'.

Sandawe has no complex codas at the phonetic level. In one instance, namely plural verb stems with a nasal, a nasal consonant and a glottal stop would both appear in the coda, but this is resolved in the phonetic realization. Disyllabic verb roots which end in **mé** or **né** undergo clipping (reduction of the final syllable) before the plural object marker –**ʔwá**, e.g. **ɬòmé** 'cultivate' > **ɬǒN**–; where **N** is a homorganic nasal element (for more information on clipping, see section 6.3). When the plural marker is attached, the glottal stop appears in the coda position of the preceding syllable. The vowel which precedes the glottal stop is nasalized (as the realization of the nasal element): **ɬǒ̥ʔó̥wá**. For more information see sections 6.3 and 6.4 on clipping and verbal plurality marking, respectively.

2.4. Tone

The description of tone in Sandawe first identifies the tonemes in (nominal and verbal) roots and presents an overview of their distribution. Then issues in the tone of grammatical elements are treated. Finally, tone in phrases and clauses is discussed.

Tone is constant in noun and verb roots, except for a few derivational suffixes that change the tone pattern of the root (e.g. the deverbal marker –**ó**, section 3.4.2). The tone system is based on two level tones, high (´) and low (`), and the rising

contour tone (ˇ). The phonemic status of the falling contour tone (ˆ) is problematic, see below. Contour tones are very common at the phonetic level, but they have a restricted distribution. It is demonstrated that contour tones are often allotones of level tones, or are compound tones which are made up of two level tones. Lexical tone marking in the transcriptions stays close to the phonetic realization, with exceptions indicated below. In the description, the syllable will be taken as the basic tone bearing unit.

The following pairs contrast high and low tones in word-initial and word-final position, respectively:

hámà	sweep moisture
hàmá	insult
ǀʼínà	breast
ǀʼíná	sand

The rising contour tone has a more restricted distribution. The rising tone is only phonemically distinct on long vowels and on syllables with a nasal coda consonant. It is most common in monosyllables, where it can be contrasted to the high level tone.

tshàá	tear
tsháá	cooking pot
‖òó	track, path
‖ʼóó	to rain
ts'ǒŋ	rhinoceros
ts'óŋ	tree, sp.

The lexical item ‖ʼěw 'kind of soil; kind of vegetation' is the only example of a syllable with a coda consonant **w** which has a rising tone.

A different kind of rising tone is a compound tone, which is formed in contracted, bound forms. When disyllabic verb roots are clipped, the original tone pattern is preserved on the resulting single syllable. If the tone pattern on the disyllabic word was low-high, the tone on the clipped, monosyllabic verb is rising. This rising tone is realized on a short vowel: e.g. ǀhàwé > ǀhǎ– 'draw (bow)'.

The phonemic status of the falling contour tone is problematic. The tone occurs in the following environments:

- as a variant of an initial low tone in roots with an all low tone pattern
- in monosyllabic roots with a CV(N) structure
- as a compound tone, which is formed when a high and a low tone are merged.

In roots with an all low tone pattern, the root-initial low tone may be realized as a falling tone. The occurrence of this type of falling tone is most frequent in citation forms of disyllabic roots with an initial CVC structure and trisyllabic roots with an internal voiceless vowel.

dzândzà ~ dzàndzà	back
hûmbù ~ hùmbù	cow
gwârtà ~ gwàrtà	he-goat [17]
fàr̥kwà ~ fàr̥kwà	Farkwa (place name)
lâl̥tà ~ làl̥tà	Lalta (place name)

Note that the falling tone does not occur when the subject focus marker −aa is suffixed to these roots. The tone of the focus marker is usually a copy of the final tone of the preceding root, but for roots with an all low tone pattern, the tone of the marker is rising (instead of low):

dzàndzà−àá	back (+focus)
hùmbù−àá	cow (+focus)

The falling tone also occurs in monosyllabic CV and CVN roots.

ts'â	water
ŋ!ûŋ	mouth

The falling tone in monosyllabic roots is in complementary distribution with the low tone, as the low tone does not occur in any monosyllabic roots (see below). Unlike the falling tone in disyllabic and trisyllabic roots, it is invariable in monosyllables. Therefore, the falling tone in monosyllabic roots can be analyzed as the realization of an underlying low tone.

ts'â	/ts'à/	water
ŋ!ûŋ	/ŋ!ùŋ/	mouth
ŋ!ê	/ŋ!è/	day
thâ	/thà/	run (SG)
‖'ô	/‖'ò/	sleep (PL)

Note that when the subject focus marker is suffixed to monosyllabic roots with a falling tone, its tone is low. The tone of the root remains a falling tone, e.g. ŋ!êyàà 'day (+focus)'; ŋ!ûŋgàà 'mouth (+focus)'.

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[17] The form has an exceptional CVC-CV structure with r in the coda position. It is related to West-Rift Southern Cushitic *gwereta (Kießling and Mous 2003:128). Compare also Iraqw **gurta** and Burunge **gwereti**.

Finally, the falling tone occurs when a high and a low tone merge. This compound tone is formed in lexical items when the definiteness marker –ˋŋ is suffixed to a word with a final high pitch. When the preceding tone is a rising tone, a rising-falling pattern results.

ts'êŋ	< ts'é–ˋŋ	the hair
g̀ìtɬ'êŋ	< g̀ìtɬ'é–ˋŋ	the cloth
!hwéèŋ	< !hwéé–ˋŋ	the hole
m̀ìsíkóòŋ	< m̀ìsíkóó–ˋŋ	the beehive
dzwàâŋ	< dzwàá–ˋŋ	the stick
wàg̀ìnèêŋ	< wàg̀ìnèé–ˋŋ	the guest (m.)

Note that in the system of tone marking which is used, surface tone is marked. Therefore, a falling tone can be either the realization of an underlying low tone in monosyllables (**ts'â** 'water' < /**ts'à**/) or the compound falling tone (**ts'êŋ** 'the hair' < **ts'é–ˋŋ**).

The following tables present an overview of the distribution of tone in nominal and verbal roots according to the number of syllables and provides examples:

Table 4: Distribution of tone in monosyllabic roots

Tone	CV		CVV		CVC	
Low (L)	*		*		*	
Falling (F)	‖'ô	to sleep	*		‖hôŋ	cave
High (H)	ŋ‖ó	to fear	‖'óó	to rain	ts'óŋ	tree, sp.
Rising (R)	*		‖'òó	to harvest	‖'ăŋ	well; warthog

- There are no monosyllabic roots with a surface low tone. Monosyllabic roots with a falling tone can be analyzed as having an underlying low tone pattern.
- CV roots can only have a falling or a high tone. Note however that CV roots with a high tone are very rare and all examples are verb roots. The falling tone on CV roots is common.
- There are no CVV roots with a falling tone.
- **ts'óŋ** is the only example of a CVC root with a high tone.
- The lexical item |**wèêm** 'tree, sp.' has an exceptional syllable structure and a rising-falling tone pattern (LHL) which has further only been noted for the demonstrative **hèéŵ** 'this (DEM1, m.)' and morphologically complex forms that contain compound tones (e.g. **màn̄àá̀** 'he will know it').

In polysyllabic roots, the falling tone is a variant of the low tone in initial position, as described earlier. The falling tone is therefore not included in the following tables.

Table 5: Distribution of tone in disyllabic roots

Tone pattern		
L-L	ʔàfà	accacia, sp.
	mànà	know
	mìndà	field
	gwàrtà	he-goat
L-H	yàyá	elder sibling
	ŋ|àtí	come (PL)
	sìngáá	eyebrow
	!'àkáŋ	tooth
L-R	!èkòó	bulrush millet
	kòlǒŋ	hoe
H-L	ɬúpà	grass
	|'únɨ̀	ripen
	dzáágò	hunting net
	báárɨ̀	rainy season
	ŋ|áthɨ̀ŋ	nose
H-H	kókó	chicken
	táné	pull
	ʔúɬíí	salt
	ʔááná	maize
	sómbá	fish
	ŋ|ówáŋ	star
H-R	ts'íròó	tree top
R-L	!wèéyà	African teak
	mèénà	to love
	ŋ!àáxɨ̀ŋ	bridge of the nose
R-H	ts'òóts'í	hunger
	tɬ'ăngáá	lizard
R-R	*	

- There are no roots with a pattern of consecutive rising tones.
- **ts'íròó** 'tree top' is the only disyllabic root with a high-rising tone pattern.
- There are no CVV syllables with a low tone.
- The all low tone pattern is rare.

- Noun roots have more closed syllables and syllables containing long vowels than verb roots. Therefore tone patterns for verb roots with a rising tone, e.g. **mèénà** 'love', are very rare.
- The word **nǎŋ⁺gwé** 'cat' has an exceptional downstepped high tone. This may be the result of a merged low and high tone (assuming a frozen gender marker): ***nǎŋgù–é**; alternatively it may be the realization of an underlying rising tone on the final vowel, which has been shortened ***nǎŋgwèé** > **nǎŋgwě / nǎŋ⁺gwé**.[18]

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[18] Cf. Alagwa and Burunge ***munyaangwee** 'wild cat' (Kießling and Mous 2003:211).

Table 6: Distribution of tone in trisyllabic roots

Tone pattern		
L-L-L	mòkòlà	greet
	kòsègà	think
	wàròŋgò	ancestral spirit
L-L-H	tɬ'àk'ìmé	shoe
	kìràŋgí	roasting rack
L-H-H	ǃòkhómí	big antelope; sp.
	‖àk'áts'á	ask
	mòpókáá	potato
L-H-L	ɬàɬáŋgè	chameleon
	kòònáwà	damage
H-H-H	sógóró	large stick
	báŋk'ásá	wooden door
	góxómbéé	shaft of arrow
H-L-H	hánàkí	sit (PL)
	k'úk'ùfé	sprout
H-H-L	tétérà	seed
	tɬ'ók'óndò	mud
	kóŋgórà̰ʔà̰	axe
H-L-L	khókhòtà	invite
	ɬóxòmà	sauce
L-L-R	bègèràá	large gourd
	ǃòròrǒŋ	frog
R-H-H	nǒŋgóló	insect
	xòóxórí	crow
H-R-L	ʔálàámṵ̀	upper arm
	láʔàámṵ̀	castrated ram

The distribution of tone patterns in trisyllabic roots shows that all combinations of low and high tones are possible. The rising tone only occurs in a few patterns and examples are rare.

As noted above, tone marking of lexical items stays close to the phonetic realization. The following cases present some exceptions:

- a low tone after one or more high tones is automatically realized as a falling contour tone, e.g. káákà [káákâ] 'dog'. (There is no contrast between falling tones and low tones after a high tone.)
- a high tone after a word-initial click is sometimes perceived as a rising tone, e.g. ŋ|ówáŋ [ŋ|ǒwáŋ] 'star'. (There is no contrast between rising tones and high tones after a click in open syllables with a short vowel.)
- a rising tone after a high tone may be realized as a downstepped high (level) tone, especially in fast speech, e.g. ʔáláámʉ̀ [ʔá�ꜜláámʉ̀] 'upper arm'.

2.4.1. Tone on voiceless vowels

Tone on voiceless vowels cannot be heard and is not fully contrastive. The tone, which can be high or low, depends on the type of voiceless vowel and on its position in the word.

The phonemic voiceless vowels i̥ and ʉ̥ should be distinguished from voiceless vowels that occur automatically following a glottal stop. The vowels i̥ and ʉ̥ most frequently occur in word-final position. All word-final voiceless vowels have a low tone, e.g. híkʼı̥ 'go (SG)'; kàmákʉ̥ 'cheek'. The tone cannot be heard when lexemes are used in isolation, but it surfaces when suffixes or clitics are added and the vowels become voiced (see section 2.1).

Word-internally, the phonetic realization of tone after the voiceless vowel can be used in a few words to determine the underlying tone for voiceless vowels. For example in kásı̥kásı̥ 'temple', the high tone following the word-internal voiceless vowel is realized on a lower pitch than the initial high tone. This is predictable because of automatic downstep when the voiceless vowel has a low tone. The lexemes t͡hásı̥nó 'liver' and ‖hásı̥ná 'tree, sp.' have a high toned voiceless vowel. The final high tone of these words is realized on the same pitch as the previous high tone, which cannot be explained if the voiceless vowel has a low tone.

In other lexemes, the phonetic realization of the final tone cannot predict the tone of the voiceless vowel. By arbitrary convention, the tone of these voiceless vowels is posited as high or low, depending on the pitch level of the preceding vowel, e.g. gʉ̀rı̥bé, kʼóŋgórʉ́mà (see section 2.1 for more examples).

Voiceless vowels after a glottal stop are realizations of the glottal stop release. They occur with the glottal stop in the coda position of the syllable. The quality of these vowels is the same as the vowel quality preceding the glottal stop. By convention, the tone of these voiceless vowels is posited as high or low, depending on the pitch level of the preceding vowel:

kúʔú̥nà	calabash
káʔą̥́	that (complementizer)
dòʔóʔǫ́yà	flamingo
sàwàʔą̥té	yawn
dìʔį̥sèé	old man

Note that the voiceless vowel in the verb stem **níʔį̥** 'go (PL)' is preceded by a glottal stop, but the tone differs from the preceding tone. In this case the voiceless vowel is not considered part of the glottal stop, but as a word-final voiceless vowel ̥ì. The low tone surfaces in morphophonology, for example when the linking clitic **–́ŋ** is added: **níʔ ì–ŋ**.

2.4.2. Tone on coda consonants

The only coda consonants that can bear a (low) tone are **y** and **w**. In both cases, the consonants are realizations of a tone-bearing vowel (**ì** and **ù**). The consonant **–ỳ** occurs either as a nominalizing suffix, or as a subject/modality clitic (3 non-realis and 2SG realis):

fàré–ỳ	< fàré–ì	liar
mànàáỳ	< mànà–á=ì	he will know it; you know it

The consonant **–ẁ** occurs in **hèéẁ** ('this, m.') and **ɬááẁ** ('good, m.'). Although there is no productive masculine suffix **–ù**, the tone bearing vowel is assumed in analogy to the other forms in the two paradigms, which have a productive gender/number marker:

hèéẁ	this (m.)
hèé–sù̥	this (f.)
hèé–sò	these (PL)

ɬááẁ	good (m.)
ɬáá–sù̥	good (f.)
ɬáá–sò	good (PL)

2.4.3. Tone on grammatical markers and clitics

Most grammatical morphemes and clitics in Sandawe have tone. They are attached after their host and tone is added to the tone pattern of the root or stem, together

forming the tone pattern of the phonological word. The majority of nominal suffixes, postpositions and subject/modality clitics have a low tone; most verbal markers (verbal stem markers and object suffixes) carry a high tone. The suffix **–sê** (marking places and place names, see section 3.4.5) and the infinitive suffix **–ʔôŋ** (see section 3.4.2) have a falling tone which can in both cases be analyzed as a compound tone.

The clauses below illustrate how tone is realized across morpheme boundaries. In the second line of each example, the grammatical markers and clitics are separated from their hosts and displayed with their own tone.

au   gìŋɡíyò   gáwàtàyêŋ   ts'àánà   xéésùnè
au   gìŋɡíyò   gáwà–tà–yé–ˋŋ   ts'àá–nà   xéé–sùŋ=nè
or   Gingiyo   mountain-in-m-DEF   (POSS.)home-DIR bring-1PL:NR=Y/NQ
Or will we get him to the house of Gingiyo, from the mountain?

hèwé   kèlèmbâŋgà   ŋ‖èésúˈké
hèwé   kèlèmbá–ˋŋ=à   ŋ‖èé–súkɥ̀–é
he   (POSS.)skin-DEF=3   enter-CAUS2-3O
He put on his skin. (Source: Animal story "Hare and Civet cat")

‖âŋgésɪ̪̀   tsí   ‖'wèéʔìnsɪ̪̀
‖âŋ–é=sɪ̪̀   tsí   ‖'wèé–ʔìŋ=sɪ̪̀
see-3O=1SG   I   (POSS.)eye-INSTR=1SG
I have seen it with my own eyes.

Occasionally a downstepped high tone is formed, due to vowel coalescence. This occurs for example when the object suffix **–é** follows the causative stem marker **–kɥ̀**, which is realized as **kwˋ** or **kˋ** before a vowel:

ŋ‖úŋˈkʷésɪ̪̀
ŋ‖úŋ–kɥ̀–é=sɪ̪̀
stand_upright-CAUS1-3O=1SG
I put it up.

A few grammatical markers and clitics display special characteristics with respect to tone. For some, tone is dependent on the tone of the preceding element, while others affect the tone (pattern) of the root.

The subject focus marker **–aa** and the topic marker **–ki** are underlyingly toneless. The pitch on which these morphemes are realized is identical to the pitch height of the preceding element: low after a preceding low or falling tone; high after a preceding high or rising tone.

gáwàkìyàà
gáwà–ki–aa
mountain-TOP-SFOC
And as for the mountain,

gìtɬ'êŋgàà
gìtɬ'é–`ŋ–aa
cloth-DEF-SFOC
the cloth (+focus)

khòówáá
khòó–aa
household-SFOC
household (+focus)

hèwékí
hèwé–kí
he-TOP
As for him,

Note however that the subject focus marker is realized on a rising pitch when all preceding tones in the word are low:

hùmbùwàá
hùmbù–aa
cow-SFOC
cows (+focus)

The nominal suffix –kì?ŋ, which marks language names, has low tone. However, when preceded by a root which has all low tones, kí has a high tone:

sàndàwé–kì?ŋ	Sandawe
tswèésò–kì?ŋ	Nyaturu
thàthùrʉ̀–kí?ŋ	Datooga
?ìràmbà–kí?ŋ	Nyiramba

The tone of some morphemes affects the tone (pattern) of the root. First, suffixes with a preceding floating tone can affect the last tone of the root or stem. Examples are the definiteness marker –`ŋ and the 1SG realis subject clitic –`sɪ̀ . The floating low tone is realized on the preceding syllable, which results in a falling contour after a high tone, or a rising-falling contour after a rising tone. There is no effect when the floating low tone is preceded by a low or a falling tone.

ɡ̀ìtɬ'êŋ
ɡ̀ìtɬ'é–`ŋ
cloth-DEF
the cloth

ŋ‖èêsì̥
ŋ‖èé–`sì̥
arrive-1SG:NR
I will arrive

Second, the factitive stem marker **–sé** changes the tone pattern of the preceding verb root: a factitive stem has all low tones before the factitive marker.

dzààsé	cause to be contiguous	<	**dzáá**	be contiguous
gòtɬ'òxì̥sé	remember	<	**gótɬ'óxì̥**	jump to mind

Finally, the deverbal marker **–ó** changes the tone pattern of the root. The deverbal noun has all high tones.

hónó	(act of) collecting	<	**hòná**	collect (honey)
phúmphúsó	(act of) offering	<	**phùmphùsé**	offer

2.4.4. Tone and pitch in the phonological word and larger domains

The current section presents a short overview of (the realization of) tone in phonological words and larger domains. Downdrift, downstep, and upstep are discussed, which operate locally and not at clause or utterance level. The presence or absence of these pitch phenomena define phonological phrases, which show a close relation with syntax and information structure. For an elaborate analysis of the use of pitch in Sandawe, see Elderkin (1989). Dobashi (2003; 2004) uses his data to provide a syntactic analysis of tone in Sandawe. Eaton (2002) investigates tone as one of the means of marking information structure in Sandawe.

The phonological word consists of a root or stem plus grammatical suffixes and clitics that are attached to it. Within this domain, downdrift (or automatic downstep) applies: high tones after a low or falling tone are automatically realized on a lower pitch than any preceding high tones. For example, the phonetic realization of low and high tones in **hánàkí** 'sit (PL)' results in a High-Low-Mid pitch contour.

Non-automatic downstep in the phonological word is rare, but may occur in polymorphemic words due to vowel coalescence or when a morpheme has a floating low tone, e.g.:

‖’éésúˡkʷésị̹
‖’éé–súkṳ̀–é=sị̹
pay_brideprice-CAUS2-3O=1SG
I made him pay bride price.

‖hèméxˡpósị̹
‖hèmé–xˋ–pó=sị̹
pay-BEN-2SG=1SG
I paid for you.

In verbless negative clauses, the negation marker =ˡts'é (section 5.3.2) is part of the same phonological word as its preceding predicate. The high-toned clitic is realized on a lower pitch than the preceding high tone.

màpín=ˡts'é
maping=NEG2
It's not a *maping* tree.

There are no arguments to posit a floating low tone in front of the morpheme. Therefore, the isolated form of the clitic is transcribed with a downstep symbol (ꜜ).[19]

Downdrift also applies in noun phrases with a noun and modifier(s) (as opposed to possessive constructions, see below). In the following example, the high tones of the noun are realized on a lower pitch than the high pitch of the demonstrative, because of the final low tone on the demonstrative.

hèéẁ   mátó
[DEM1.m   gourd]
This gourd

Downdrift does not apply in between different constituents. At this level, the high tone of a new constituent is realized on the same pitch level as the initial high tone of the preceding word; or, for some syntactic constructions and prominent elements, on a lower or higher pitch level, respectively.

The following example is a presentational verbless sentence, in which the elements are separate constituents.

hèéẁ   mátó
[DEM1.m]   [gourd]
This is a gourd.

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[19] Note that the same marker codes negation on non-realis verbs and special verbs. However, in these cases it always follows a low-toned subject marker, after which tone lowering cannot be heard.

In this sentence, downdrift is absent: the high tones of the noun are realized on the same pitch level as the high pitch in the Low-High-Low contour of the demonstrative. The absence of downdrift thus marks that there are two constituents (cf. the previous example).

The sentence below consists of a noun and an adjectival verb. The initial high tone of the adjectival verb, **thúnkàsê**, is realized on the same pitch level as the initial high tone of the preceding noun. Again, downdrift between constituents is absent.

ʔálàámʉ̀   thúnkà–s–ê
[upper_arm]   [short-BE-3]
The upper arm is short.

In some syntactic constructions, tone is realized on a lower pitch level than the preceding word or constituent. First, possessive constructions are characterized by tone lowering only:

hèsó   ꜜmántshà
they   POSS.food
Their food

mìsíkóó   ꜜŋ!ûŋ
beehive   POSS.mouth
The opening of the beehive

When a possessive construction is used in a clause, the following constituent is realized on the pitch level of the (phrase-initial) possessor. Thus, the downstep is local; it marks the relation between the elements of the possessive construction.

dóró   hèwé   ꜜmípándà   mìkhé–ì=ts'é
zebra   [he   POSS.route]   leave-3:NR=NEG2
A zebra won't leave his route.

Second, verbs without subject marking are generally realized on a lower pitch than the preceding constituent. This occurs when the subject is a clitic which is attached to a non-subject constituent, but also when a subject with a subject focus marker precedes the verb.

tsí   ꜜŋǁókó=sʉ̨́   ꜜŋǁókhò–wá–á
I   POSS.child.PL=1SG   SV.wash-PL1-3O
I washed my children.

hèsw–áá   ŋǁókó   ꜜŋǁókhò–wá–á
she-SFOC   child.PL   SV.wash-PL1-3O
She washed the children.

Note that the realization of tone on the verb on a lower pitch level is only clear when there is no low tone preceding or following the downstep.

Again, downstep is local: constituents that follow these verbs are not subject to the lowering. In the following example, the high tone in the postpositional phrase is realized on the same pitch height as the initial high tone in the sentence on tsí:

tsí ꜜŋ‖ókó=sį̂   ꜛŋ‖ókhò–wá–á khòó–tà–nà
I   POSS.child.PL=1SG   SV.wash-PL1-3O   home-in-DIR
I washed my children at home.

The pitch lowering can be contrasted to verbs that have a subject marker attached to them. In the following examples, the initial high tone on the verb is realized on the same pitch level as the preceding constituent (i.e. the high tone on tsí). Note that the position of the realis subject clitic in the first example lends extra prominence to the verb.

tsí ꜜŋ‖ókó   ŋ‖ókhò–wá–á=sį̂
I   POSS.child.PL   wash-PL1-3O=1SG
I *washed* my children.

tsí ꜜŋ‖ókó   ŋ‖ókhò–wá–à–sį̀
I   POSS.child.PL   wash-PL1-3O-1SG:NR
I will wash my children.

Third, pitch lowering can occur in between the verbs of multi-verb constructions. Examine the example below, in which the relation between the operator verb and the main verb is coded both by downstep and the verbal linker.

ʔàà   nèé–ŋ   ꜜníʔì=yóóó
CNJ2.3PL   stay:PL-VL   VV.go:PL=EXCL
And they were going/continued going.

The realization of tone on a higher pitch level is related to the marking of information structure. Focused constituents and the exclamatory marker =yóóó are realized on a higher pitch than high tones of adjacent elements. This is marked by the symbol ꜛ.

ʔútè   ꜛbòbá–áá   thérè   ŋ‖ókhò
yesterday   Boba-SFOC   dish   wash
Yesterday, *Boba* washed dishes.

kóŋgóràʔą̀ méé=ì   síyé hàà thèé méé=ì pìì   xòxòsé=ᵀyóóó
axe   big=2SG take:SG and   tree   big=2SG CNJ2.2SG hammer=EXCL
You take a big axe and a big piece of wood and then you start hammering (for a long time)!

The realization of the exclamatory marker shows expressive prominence: the longer the duration of the vowel and the higher the pitch, the more prominence is expressed by the speaker.

The realization of tone on different pitch levels shows that Sandawe has several tonal registers, following Elderkin (1989) who uses three "word levels" or "keys". The realization of tone of clitics, words and constituents in these registers is determined by syntactic factors and means of marking information structure. For this study, no detailed investigation has been made of these factors, nor absolute pitch measurements that could establish the number of registers and their extremes.

The realization of tone on a higher or lower pitch level than the preceding element is marked in examples and texts by symbols that denote downstep (ꜜ) and, occasionally, upstep (ꜛ).

tɬáná–xê–n–tà–nà=sì̩   kàté=sí̩   ꜜɬákʔì̩
horn-COLL-DEF-in-DIR=1SG   amid=1SG   SV.get_stuck
I got stuck in the antlers.

Downstep is not marked when the preceding or following tone is low, which is very common, especially when a verb is preceded by a (realis, optative, or hortative) subject clitic. In these cases, a gloss in brackets is used to label the construction:

tɬáná–xê–n–tà–nà=sà   kàté=sà   ɬákʔì̩
horn-COLL-DEF-in-DIR=3fSG   amid=3fSG   (SV.)get_stuck
She got stuck in the antlers.

ʔàfà–ŋ   ʔàlèé
acacia-DEF   (POSS.)branch
A branch of the acacia