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A grammar of Gaahmg, a Nilo-Saharan language of Sudan

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Citation

Stirtz, T. M. (2012, February 7). *A grammar of Gaahmg, a Nilo-Saharan language of Sudan*. LOT dissertation series. LOT, Utrecht. Retrieved from <https://hdl.handle.net/1887/18452>

Version: Not Applicable (or Unknown)

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2 Phonology

2.1 Consonants

Gaahmg has 21 consonant phonemes as shown in table 1. There is contrastive length for fricatives, nasals, lateral, and rotic phonemes, but not for other consonant phonemes.

Table 1: Consonant Phonemes

	Labial	Dental	Alveolar	Palatal	Velar
Vl. Plosives	p	t̪	t	c	k
Vd. Plosives	b	d̪	d	ɟ	g
Fricatives	f, f:		s, s:		
Nasals	m, m:		n, n:	ɲ, ɲ:	ŋ, ŋ:
Laterals			l, l:		
Rotics			r, r:		
Approximants	w	ɸ ¹		y ²	

2.1.1 Consonant articulation

Gaahmg dental and alveolar plosives are contrastive. Dental plosives are made with the tongue tip touching the back of the upper teeth. The articulation of the alveolar plosive tends to vary from person to person between alveolar and retroflex. The plosive is produced with the tongue tip or the underside of the tongue tip touching the alveolar ridge or slightly behind the alveolar ridge. The phoneme [ɾ] is a flap, but when lengthened [ɾ:] is realized as a trill.

The phoneme /ɸ/ deserves special attention. It is best described as a dental approximant since the tongue does not necessarily touch the teeth, although it can protrude out of the open mouth between the teeth. The articulation is most similar to that of the IPA [ɸ] but has less friction.

2.1.2 Consonant contrasts

2.1.2.1 Phonetically similar contrasts

The consonants are considered to be phonemic based on the minimal and near minimal pairs of (1) in which phonetically similar consonants are contrasted. Root-final velar consonants are written in parentheses to indicate that they do not surface.

¹ The interdental fricative symbol {ɸ} is used to represent the dental approximant phoneme.

² The symbol {y} is used instead of the IPA symbol {j}.

(1) **Consonant contrasts**

p - b	pāḍá(g)	‘rope material’	báḍà	‘gourd bowl’
p - f	páré(g)	‘leather bag’	fárjá(g)	‘bird type’
p - w	páásèè	‘basket type’	wáásāā	‘stone type’
b - m	bòḍl	‘ground crack’	mòḍl	<i>village name</i>
b - w	bāár	‘tribe member’	wāár	‘insect type’
m - w	mīḍ	‘stone’	wīḍ-ḍ	‘breast’
m - n	māāng	‘disagreement’	nāāḍ	‘day’
f - w	fīḍ	‘feather’	wīḍ-ḍ	‘breast’
t - ḍ	tḍḍr	‘larynx’	ḍḍḍr	‘animal fence’
t - t	téèr	‘carving tool’	téèl	‘anchor’
t - s	tálḍ(g)	‘tax’	sálḍ(g)	‘army ant’
ḍ - d	ḍḍḍr	‘animal fence’	dḍḍr	‘hammer’
ḍ - n	ḍórsó	‘tumor’	nḍrnáó	‘saliva’
ḍ - l	ḍéèl	‘lake’	léél	‘grass (GEN.)’
ḍ - r	ḍùù-ḍ	‘year’	rùù-ḍ	‘perennial stream’
ḍ - ð	ḍḍḍ	‘eye’	mḍḍḍ	‘tree type’
	cḍḍāḍ	‘illness type’	mḍḍān	‘youth leader’
t - d	téèl	‘anchor’	dèèl	‘collar bone’
t - s	téèl	‘anchor’	séèḍ	‘ruler’
d - n	dáólḥ	‘tree type’	nḍḍ	‘demon’
d - l	dèèl	‘collar bone’	léél	‘grass (GEN.)’
d - r	dḍwḍ	‘bean type’	rḍḍwḍ	‘net’
d - ð	dḍd	‘stork’	jááḍ	‘old clothing’
s - ð	āwḍḍḍ	‘bird type’	lḍḍḍ	‘planting drill’
n - l	nḍḍ	‘demon’	lḍḍḍ	‘tree type’
n - r	nāān-ḍ	‘day’	rāāḍ	‘quarrel’
n - j	nāān-ḍ	‘day’	jāāḍ	‘crocodile’
n - ŋ	nāms	‘food, eating’	ŋālg	‘neck’
l - r	ḍéèl	‘lake’	ḍḍḍr	‘leech’
c - j	cāā	‘cooking stone’	jāā	‘boy, son, person’
c - y	cāā	‘bath’	yāāḍ	‘sister’
j - j	jāā	‘boy, son, person’	jāā	‘girl, daughter’
j - y	jááḍ	‘ragged clothes’	yāāḍ	‘sister’
j - y	jāāḍ	‘crocodile’	yāām	‘bride’
j - ŋ	jāáfār	‘mustache’	ŋāásāā	‘tree type’
k - g	káál	‘house fence’	gāāl	‘falcon’
k - w	káár	‘stew’	wāár	‘insect type’
g - ŋ	gārḍḍ	‘dung’	ŋārjá(g)	‘leach’
g - w	gāā	‘pumpkin type’	wāā	‘water’

2.1.2.2 Consonant length contrasts

There is little, if any, phonetically contrastive length of plosives in any environment. The same is true for the approximants /w/, /ð/ and /y/. Although plosives and approximants have little if any contrastive length, fricatives and other sonorants are contrastive for length in intervocalic position of a few nouns, such as those in (2).

(2) Intervocalic consonant length contrasts

f - ff	áfáɖ	‘blood’	cáffá(g)	‘side (of body)’
s - ss	básár	‘dried food’	bāssà-ɖ	‘large intestine’
m - mm	sāmáj	‘sorghum storehouse’	ṭámmál	‘chair’
ɲ - ɲ	də̀ɲṛ-g	‘unable to speak (ADJ.PL)’	ɲēɲṛās	‘full (ADJ.PL)’
ŋ - ɲɲ	ṣíŋ-íɖ	‘louse’	ṣíŋṛ	‘lyre’
r - rr	kāráábbá	‘troublesome (ADJ)’	pārrās	‘full (ADJ)’
	[kāráábbá]			
l - ll	wíli(g)	‘stone name’	ṭíllí(g)	‘tree, flower’

2.1.3 Consonant rules

Final consonants pose a challenge in Gaahmg. In (3), root-final consonants in three different verb forms sometimes surface in three different ways. Root-final consonants are word-final in the incomplete (INCP), intervocalic in the past continuous (CONT.P), and in a third environment in the deictic complete (COMP.D).

(3) Final consonants in various environments (Presented in surface form)

	3sN	3sN	3sN	
	INCP	CONT.P	COMP.D	
(a)	àṣ	àw-án	àb-ágā	‘sit’
(b)	káé	káy-án	káj-ágā	‘bring’
(c)	cīi	cī-ón	cīg-ógō	‘wear’
(d)	cūɖ	cūɖ-ón	cūɖ-úgū	‘climb’
(e)	lḏf	lḏf-án	lḏf-ḏgṣ	‘do magic’
(f)	lās	lās-án	lās-ágā	‘roll-up’
(g)	ɲām	ɲām-án	ɲām-ágā	‘break’
(h)	gṣn	gṣn-án	gṣn-ḏgṣ	‘grab’
(i)	gūɲ	gūɲ-ón	gūɲ-úgū	‘agree’
(j)	māl	māl-án	māl-ágā	‘gather’
(k)	wēr	wēr-án	wēr-ágā	‘watch’
(l)	ɲáṣ	ɲáw-án	ɲáw-ágā	‘request’
(m)	kóé	kóy-án	kóy-ógō	‘cook’
(n)	fěḏ	fěḏ-án	fěḏ-ágā	‘release’
(o)	pāā	pā-án	pā-ḏágā	‘guard’

The root-final consonants of (3a-b) surface in three different ways, and the final consonants of (c, l, m) surface in two different ways. A root with final vowel is given for comparison in (o).

In (3a-c), the root-final consonants surface differently in the two environments of the past continuous and deictic completive. To account for these differences, we propose that the root-final consonant in the deictic completive becomes underlying geminate through suffixation. The deictic completive suffix is analyzed as *-CAggA*, where *C* is a consonant with the same features as the root-final consonant³ and *A* is a back vowel taking the [ATR] and [round] features of the root. The suffix causes the root-final consonant to be underlying doubled, but a degemination process causes the geminates to surface with little, if any, phonetically contrastive length. The past continuous form has the suffix *-Aɲ*, where *A* is an unrounded back vowel and takes the [ATR] value of the root. Thus, the root-final consonant weakens in the past continuous form with intervocalic environment, but not in the deictic completive form where it is underlying geminate through suffixation.

In (3a-c, l-m), the root-final consonants also surface differently in the word-final environment of the incomplete compared with the environment of the deictic completive. We analyze the root-final consonants in these verbs to weaken to vowels word-finally.

The verb forms of (3) are re-presented in (4) with the proposed underlying form on the left and underlying geminates represented in the deictic completives. The surface form is given in brackets to show where it differs from the underlying form.

(4) **Final consonants in various environments re-presented**

	UR	3sN	3sN	3sN		
		INCP	CONT.P	COMP.D		
(a)	/ab/ L	àɔ̃	àw-án	àb-bāggā	[àbāgā]	‘sit’
(b)	/kaɣ/ H	káé	káy-án	káɣ-jāggā	[kájággā]	‘bring’
(c)	/cig/ M	cīi	cī-ón	cīg-góggō	[cīgógō]	‘wear’
(d)	/cuɖ/ M	cūɖ	cūɖ-ón	cūɖ-ɖúggū	[cūɖúgū]	‘climb’
(e)	/lɔf/ L	lɔ̃f	lɔ̃f-án	lɔ̃f-fōggō	[lɔ̃fōgō]	‘do magic’
(f)	/las/ M	lās	lās-án	lās-sāggā	[lāságā]	‘roll-up’
(g)	/ɲam/ M	ɲām	ɲām-án	ɲām-māggā	[ɲāmágā]	‘break’
(h)	/gɔn/ L	gɔ̃n	gɔ̃n-án	gɔ̃n-nōggō	[gɔ̃nōgō]	‘grab’
(i)	/gɯɲ/ L	gūɲ	gūɲ-ón	gūɲ-ɲūggū	[gūɲūgū]	‘agree’
(j)	/mal/ M	māl	māl-án	māl-lāggā	[mālágā]	‘gather’
(k)	/wer/ M	wēr	wēr-án	wēr-rāggā	[wērágā]	‘watch’
(l)	/ɲaw/ H	ɲáɔ̃	ɲáw-án	ɲáw-wāggā	[ɲáwágā]	‘request’
(m)	/kɔy/ H	kóé	kóy-án	kóy-yōggō	[kóyógō]	‘cook’

³ However, *C* becomes *ɖ* when attached to a root-final vowel as in *pā-ɖāggā* ‘guard’.

	UR	3sN	3sN	3sN		
		INCP	CONT.P	COMP.D		
(n)	/fěð/ H	fěð	fěð-án	fěð-ðággā	[fěðágā]	‘release’
(o)	/pa/ M	pāā	pā-án	pāð-ðággā	[pāðágā]	‘guard’

The root-final plosives /b/, /ʒ/ and /g/ of (4a-c) surface in the deictic completive, but are weakened word-finally in the incomplete form, and intervocalically in the past continuous form. Similarly, the approximants /w/ and /y/ of (l-m) are weakened word-finally in the incomplete form. The bilabial and palatal plosives of (a-b) weaken to corresponding approximants intervocalically (/b/ becomes [w] in *āw-ān*, /ʒ/ becomes [y] in *kāy-ān*). Thus we have the rule of {P1a}, where P represents a phonological rule. The plosives /b/, /ʒ/ of (a-b) and approximants /w/ and /y/ of (l-m) weaken to corresponding vowels word-finally (/b/, /w/ become [ɔ] or [u], and /ʒ/, /y/ become [ɛ] or [i], depending on the [ATR] quality of the preceding vowel). Thus we have the rule of {P1b}. The dental plosive /d/ of (d) does not weaken intervocalically or word-finally, and the alveolar plosive /d/ is not attested root-finally in verbs.

{P1} Bilabial and palatal weakening

- (a) /b/, /ʒ/ are weakened intervocalically to approximants.
- (b) /b/, /ʒ/, /w/, /y/ are weakened word-finally to vowels with the same [ATR] quality as the preceding vowel.
- (c) /w/, /y/ before word-final sonorants are weakened to vowels with the same [ATR] quality as the preceding vowel.

As will be evident from the distribution of word-final consonant clusters in 2.1.4.2, all word-final consonant sequences are sonorant-obstruent in surface form. Therefore, as stated in {P1c}, /w/, /y/ are weakened before word-final sonorants. In this way, word-final sonorant-sonorant consonant sequences are avoided. For example, the *ɔ* of *càðr* ‘rabbit’ and the *ɛ* of *gðēn* ‘metal worker’ could underlying be *w* and *y* respectively, but are weakened to vowels in the surface form.

The velar plosive /g/ of (4c) is weakened to elision as stated in {P2}.

{P2} Velar plosive elision

- /g/ is elided both inter-vocalically and word-finally when following a vowel.

Since all word-final consonant sequences are sonorant-obstruent in surface form as will be discussed in 2.1.4.2, the contrast between plosives and approximants is neutralized in the first of the two consonant positions. Therefore, there is also the rule of {P3}.

{P3} Plosive weakening

Plosives are weakened to approximants when they immediately precede word-final obstruents and follow vowels.

For example, the *w* in *dāwɔ* ‘fertile soil’ and *y* in *kāyɔ* ‘cup, spoon’ could underlyingly be *b* and *ɟ* respectively, but weaken to sonorants in the surface form. Rules {P1-P3} apply throughout the language in roots and when bound morphemes are attached.

2.1.3.1 Underlying and surface representations of plosives

In this section, we discuss the neutralization of plosives in various environments. The chart of (5) summarizes the plosive changes mentioned in this section, which are illustrated with examples in the following sections. The environments are as follows: word-initial B, intervocalic V, either consonant in a consonant sequence - C₁C₂-, word-final before an obstruent $\underline{C}C_{[-son]}^\#$, word-final E. A dash indicates the underlying phoneme has not been attested to surface in the environment. An empty slot indicates the phoneme cannot be confirmed to surface in the environment.

(5) **Plosive realizations in various environments**

UR	B	V	-C ₁ C ₂ -	$\underline{C}C_{[-son]}^\#$	E
p	→	p			
t̚	→	t̚			
t	→	t			
c	→	c			
k	→	k			
b	→	b	w	-	w
ɓ	→	ɓ	ɓ	ɓ	ɓ, u
d	→	d	d	d	-
ɗ	→	ɗ	ɗ	ɗ	ɗ
g	→	g	Ø	g	-
b:	→	b			ɓ̥
ɓ:	→	ɓ			ɓ̥
d:	→	d			-
ɗ:	→	ɗ			ɗ̥
g:	→	g			g̥

Voiced and voiceless plosives

Voiced and voiceless plosives surface word-initially. Voiceless plosives do not surface in any other environment. There is neutralization between voiced and voiceless plosives in consonant sequences, as plosives are always voiced in this environment—either in word-medial or word-final consonant sequences.

Voiced plosives and approximants

As the bilabial and palatal weakening rule of {P1} indicates, there is neutralization between the plosives /b/, /ʒ/ and approximants /w/, /y/ intervocalically {P1a}. There is neutralization between the plosives /b/, /ʒ/ and vowels /ɔ, u/, /ε, i/ word-finally {P1b}. The velar plosive /g/ is elided intervocalically and word-finally {P2}, but otherwise surfaces. As the plosive weakening rule of {P3} indicates, there is neutralization between plosives and corresponding approximants for the first consonant of a word-final consonant sequence. The dental and alveolar plosives /ɖ/, /d/ surface the same as their underlying forms in all other environments.

Geminate plosives /b:/, /ʒ:/, and /g:/

There is no phonetic contrast of length for any plosive in any environment. As will be discussed in section 2.1.3.2, the underlying geminate plosives /b:/, /ʒ:/, and /g:/ are realized as single, devoiced unreleased plosives word-finally, and are realized with little or no lengthening intervocalically. Since the non-geminate plosives /b/, /ʒ/, and /g/ surface as weakened in the same environments that their geminate equivalents surface as single plosives, they are never in contrast.

Geminate plosives /ɖ:/ and /d:/

The plosives /ɖ/ and /d/ are not weakened intervocalically or word-finally, but also never surface with contrastive length. Intervocalically, the underlying geminate equivalents /ɖ:/ and /d:/ surface with little or no length. Word finally, the dental geminate /ɖ:/ surfaces the same as for the other geminate plosives—as a single devoiced unreleased plosive, but is released elsewhere. The alveolar geminate plosive /d:/ is not attested word-finally.

Voiceless plosives and voiced geminate plosives

Voiceless plosives are not attested anywhere except word-initially and are in complementary distribution with voiced geminate plosives which cannot be confirmed word-initially. Thus, voiceless plosives could possibly be analyzed as underlying geminate plosives in word-initial position. In this analysis, there would be no underlying voicing contrast in plosives, but only a length contrast⁴.

In this thesis, word-initial plosives are written as voiceless plosives since they surface as such. Underlying geminate plosives in word-final and intervocalic

⁴ Or, since consonant clusters are not attested word-initially, an alternative analysis would be that geminate plosives are fortis ('strong') consonants and non-geminate plosives are lenis ('weak') consonants.

position are written as voiced geminate plosives, and the reader should assume that all such voiced geminate plosives surface with little or no contrastive length.

2.1.3.2 Plosive distribution

Voiceless plosives surface at the beginnings of words, but not in other environments.

(6) Voiceless plosive distribution

	Beginning	
p	púr	‘flower’
t̥	t̥ēē-d̥	‘road, path’
t	tēēnd̥	‘riddle’
c	cééṣ	‘lame person’
k	kābbār [kābār]	‘wing, armpit’

Voiced plosives surface at the beginnings of words and in consonant sequences. The phonemes /j/ and /g/ occur as the first or second segment of consonant sequences, /d/ and /d̥/ only occur as the second segment of sequences, and /b/ is not attested in any consonant sequence.

(7) Voiced plosive distribution

	Beginning	Consonant sequence	
b	bāāḍ	‘father’	----
d̥	d̥iṣ	‘rat’	móf̥d̥ēē
d	d̥ṣólāfāā	‘wolf’	kág̥dār
ʃ	ʃiḍ	‘husband’	bāʃwáár
			d̥óg̥g̥d̥l̥jā [d̥óg̥d̥l̥jā]
g	gēmūūr	‘dove’	bāg̥d̥ārs
			ʃórgāāl
			‘snake type’
			‘food type’
			‘bird type’
			‘ankle’
			‘lizard type’
			‘bird type’

When the plosives [b], [ʃ] and [g] surface in intervocalic and word-final position, they are underlyingly geminate even though they surface with little or no contrastive length. If they were not geminate, they would be weakened to approximants and vowels in these environments. They are realized as single, devoiced unreleased plosives word-finally, and are realized with little or no length intervocalically.

(8) Geminate voiced plosive distribution

	Intervocalic	Final	
bb	lābbù(g) [lābù]	‘navel’	ʃílābb [ʃílāb̥]
ʃ	cīʃí [cīʃí]	‘diarrhea’	bimíríʃ [bimíríʃ̥]
gg	dāggár [dāgár]	‘tortoise’	gāágg [gāág̥]
d̥	fāád̥ār	‘nostril’	d̥àid̥ [d̥àid̥̥]
			‘water spring’
			‘bird type’
			‘bird type’
			‘scorpion’

	Intervocalic		Final	
d	cēdán ⁵	‘illness type’	dɔd [dɔd̥]	‘bird type’

The voiced plosives /d/ and /d/ never surface with contrastive length and are not weakened intervocalically or word-finally. Therefore there is no evidence for the voiced plosives /d/ and /d/ to be geminate underlyingly, except for the dental plosive in root-final position of certain verb forms through morphology. As seen in the verb *cūd-ḏúggū* [cūdúgū] ‘climb-COMP.D’ of (4), the geminate plosive *ḏ*: surfaces in verb forms with little or no contrastive length.

For the remaining data of this thesis, underlying geminate plosives are written without a phonetic realization, but can be assumed to surface with little or no contrastive length.

2.1.3.3 Underlying and surface representations of other consonants

Fricatives and sonorants surface word-initially, intervocalically, word-finally, and in consonant sequences, with the exception of the dental approximant /ð/, which does not surface word-initially, and the approximants /w/ and /y/ which do not surface word-finally. As the rule of {P1c} indicates, the contrast between the approximants /w/, /y/ and vowels /ɔ, u/, /ɛ, i/ is neutralized before a word-final sonorant. This is because only sonorant-obstruent consonant sequences are allowed to surface word-finally, as will be discussed in section 2.1.4.2. As was shown in section 2.1.2.2, length is contrastive for fricatives, nasals, lateral, and rotic phonemes intervocalically in a handful of nouns. These surface forms are summarized in the chart of (9) and examples are given in the following section.

(9) Fricative and sonorant realizations in various environments

UR		B	V	-C ₁ C ₂ -	CC _[-son] #	CC _[+son] #	E
f	→	f	f	f	-		f
s	→	s	s	s	-		s
m	→	m	m	m	m		m
n	→	n	n	n	n		n
ɲ	→	ɲ	ɲ	ɲ	ɲ		ɲ
l	→	l	l	l	l		l
r	→	r	r	r	r		r
w	→	w	w	w	w	ɔ, u	ɔ, u
ð	→	-	ð	ð	ð		ð
y	→	y	y	y	y	ɛ, i	ɛ, i

⁵ Or cēḏán

UR		B	V	-C ₁ C ₂ -	<u>CC</u> _[-son] #	<u>CC</u> _[+son] #	E
f:	→		f:				
s:	→		s:				
m:	→		m:				
n:	→		n:				
ɲ:	→		ɲ:				
ŋ:	→		ŋ:				
l:	→		l:				
r:	→		r:				

2.1.3.4 Fricative and sonorant distribution

Fricatives and sonorants are attested in five word positions with few exceptions: /y/ and /ð/ are not attested as the second of a consonant sequence, /ð/ is not attested at the beginnings of words, and /y/ and /w/ do not surface word-finally. The sonorants *w* and *y* in *lɛwɖá* ‘animal (gen.)’ and *kàymà* ‘lucky stone’ can also be interpreted as the vowels *ɔ* and *ɛ*. In section 2.3.5, it is discussed how there is no strong evidence for these phonemes being analyzed as vowels or glides in this environment.

(10) Fricative and sonorant distribution

f	B	fɛgg	‘water’	s	B	sīnd	‘guest’
	C ₁	mɔfɖɛɛ	‘snake type’		C ₁	rɔslūúmàà	‘praying mantis’
	C ₂	sáárfāā	‘rat’		C ₂	dérsá	‘sweat’
	V	áfáɖ	‘blood’		V	kāsá	‘boy’
	E	gàf	‘give INCP’		E	kās	‘chair’
m	B	málò	‘beeswax’	n	B	nōrnóó	‘saliva’
	C ₁	sīmɖəgg	‘salve (N.PL)’		C ₁	ənsò	‘plate’
	C ₂	gərmù-ɖ	‘insect type’		C ₂	nōrnóó	‘saliva’
	V	lāmāɲ	‘knot’		V	gəbbəniɖ	‘tribal name’
	E	áám	‘bone’		E	séèn	‘ruler’
ɲ	B	ɲāàɲ	‘crocodile’	ŋ	B	ŋárəmàà	‘spirit type’
	C ₁	tùggùùɲfāà	‘tree type’		C ₁	bòðŋmà	‘insect type’
	C ₂	bērɲáð	‘tomato’		C ₂	tílŋó(g)	‘seed, chain’
	V	kāɲāàɖ	‘bowl’		V	áŋé(g)	‘elephant’
	E	lúɲ	‘boomerang’		E	ɖàɲ	‘courtyard’
r	B	rəðwə	‘net’	l	B	lɔfɔ	‘magic’
	C ₁	əɲə-ɖ	‘insect type’		C ₁	wîlmāā	‘ant type’
	C ₂	tɛgrɛlfāà	‘bird type’		C ₂	kúūrúúgg	‘rodent’
	V	kūūrī	‘circle’		V	búlíɲ	‘worm’
	E	ɖáár	‘throne’		E	bāàl	‘instrument’

Fricative and sonorant distribution (continued)

w	B	wéé(s)	‘house’	y	B	yāām	‘bride’
	C ₁	lēwḑá	‘animal’		C ₁	kāymà	‘lucky stone’
	C ₂	bàɣwáár	‘bird type’		C ₂	-----	
	V	rə̀ə̀wə̀	‘net’		V	íyáá	‘oil, fat’
	E	-----			E	-----	
ð	B	-----					
	C ₁	gə̀ə̀ðg ⁶	‘thief’				
	C ₂	-----					
	V	áðá	‘dog’				
	E	ṭààð	‘door’				

2.1.4 Consonant distribution in consonant sequences**2.1.4.1 Consonant sequences across syllable boundaries**

There are few restrictions on non-geminate consonant sequences across syllable boundaries (-C₁.C₂-). The coda of a previous syllable (C₁) may be an obstruent or sonorant, nasal or oral, voiced or voiceless. The same is true of the onset of the following syllable (C₂). Additionally, consonants may be both obstruent or both sonorant, both nasal or both oral, and both may be voiced. Further, the consonants may have opposite corresponding values (C₁ = obstruent, C₂ = sonorant; C₁ = nasal, C₂ = oral; C₁ = voiceless, C₂ = voiced; opposite orders of each values as well). However, only fricatives can be voiceless in consonant sequences, and there are no attested voiceless-voiceless sequences except in compound words such as *fě́ɛ́ɛ́-fā́* ‘person name (person.name-place)’.

All attested consonant sequences across syllable boundaries are listed in (11), which is divided into sequences with and without nasal consonants. The sonorants *w* and *y* in *kāwḑá* ‘ear wax’ and *kāymà* ‘lucky stone’ can also be interpreted as the vowels *ɔ* and *ɛ*.

(11) Sequences with nasal consonants

nḑ	tēḑás	‘bird type’	ɲḑ	sáràḑḑā	‘tree type’
nd	kándāl	‘tree type’	ɲɣ	ɣṭṭṭl	‘bird name’
ns	ṭĩns-əgg	‘asking’	ɲf	tùggùṭṭfàà	‘tree type’
nf	ráánfàà	‘covering (n)’	ɲm	bòðṭmà	‘insect type’
ms	ámsá-ḑ	‘dryness’	lm	kóðlmàà	‘tree type’
rn	ṭārná(g)	‘leach’	lɲ	bòlṭṭ(g)	‘medical tool’
rm	gə̀rmū̀-ḑ	‘tree type’	rɲ	kə̀rṭṭl	‘grass type’
ɾɲ	gàɾṭṭè	‘dung’	ym	kāymà	‘lucky stone’

⁶ With some speakers, the underlying approximant /ð/ of *gə̀ə̀ðg* ‘thief’ only surfaces in the plural form *gə̀ə̀ðḑə̀gg*; with other speakers, it also surfaces in the singular form.

Other sequences

sl	rəslūúmàà	‘preying mantis’	lɔ̄	cēlɔ̄dā	‘charcoal’
fɔ̄	mófɔ̄ēē	‘snake type’	lɔ̄	bámàlɔ̄jā	‘morning star’
rɔ̄	óɔ̄dāà	‘army’	lg	ɔ̄lɔ̄gɔ̄	‘drum’
rs	ɔ̄sɔ̄sɔ̄	‘tumor’	lf	kálfɔ̄	‘jaw’
rl	kúūrlúúgg	‘rodent’	rɔ̄	káurɔ̄	‘tree type’
jw	bàjwáár	‘bird type’	rg	túrgə(g)	‘nature’
gd	bāgdàrs	‘lizard type’	rf	sáárfāā	‘rat’
gd	kágdàr	‘food type’	wɔ̄	kāwɔ̄dā	‘ear wax’
gr	tēgrēlfāā	‘bird type’	yɔ̄	tāyɔ̄dā(g)	‘strainer’

2.1.4.2 Consonant sequences word-finally

In word-final non-geminate consonant clusters ($C_1C_2\#$), C_1 is always sonorant and C_2 is always obstruent. Only the obstruents ɔ̄ , ɔ̄ , g , and s are attested in the C_2 position. There is partial word-final nasal assimilation in that only homorganic nasals surface before the obstruents ɔ̄ and g . However, heterorganic nasals surface before the obstruents ɔ̄ and s .

(12) Sequences with nasal consonants	Other sequences
ms nāms ‘food, eating’	rɔ̄ bəɔ̄rɔ̄ ‘lion’
nɔ̄ fānɔ̄ ‘cheek’	rs jèèrs ‘hippopotamus’
ng úng ⁷ [úŋg] ‘tear’	lɔ̄ lɔ̄lɔ̄ ‘facial blemish’
ns wíləns ‘hunting’	lɔ̄ fālɔ̄ ‘tree type’
jɔ̄ rɔ̄jɔ̄ ‘mud’	ɔ̄g gəɔ̄ɔ̄g [gəɔ̄g _o] ‘thief’
jɔ̄ bəjɔ̄ ‘upper hip’	wɔ̄ dāwɔ̄ ‘fertile soil’
ɔ̄jɔ̄ ləjɔ̄ ‘tree type’	yɔ̄ kāyɔ̄ ‘cup, spoon’

The sonorants w and y in dāwɔ̄ ‘fertile soil’ and kāyɔ̄ ‘cup, spoon’ can also be interpreted as the vowels ɔ̄ and ɛ̄ . In section 2.3.5, it is discussed how there is no strong evidence for these phonemes being analyzed as vowels or glides in this environment.

Since no sonorant-sonorant consonant sequences are attested word-finally in (12), we assume that these sequences are not allowed. The bilabial and palatal weakening rule of {P1c} in 2.1.3 is based on this constraint. Since no word-final sonorant-sonorant consonant sequences are allowed, /w/ and /y/ before word-final sonorants must be weakened to vowels with the same [ATR] quality as the preceding vowel. The ɔ̄ of cāɔ̄r ‘rabbit’ and the ɛ̄ of gəɔ̄n ‘metal worker’ could underlying be w and y respectively, but weaken to vowels in the surface form.

⁷The underlying nasal n of úng ‘tear’ surfaces as ŋ in the singular form úŋg but surfaces as n in the plural form únígg .

The plosive weakening rule of {P3} in 2.1.3 is based on the same constraint. Since no word-final sonorant-sonorant consonant sequences are allowed, plosives must be weakened to approximants when they immediately precede root-final obstruents and follow vowels. The *w* in *dāwɔ* ‘fertile soil’ and *y* in *kāyɔ* ‘cup, spoon’ could underlyingly be *b* and *ɟ* respectively, but weaken to sonorants in the surface form.

2.2 Vowels

Gaahmg has six vowel phonemes as shown in table 2. The vowel /ə/ [ɐ] is phonetically low, made in the same place in the mouth as [a], but with advanced tongue root. The phonemes /ɛ/ and /ɔ/ vary somewhat in phonetic value, becoming closer to the values [e] and [o] respectively in long vowels. To a lesser extent, the phonemes /i/ and /u/ also vary in phonetic value, realized closer to [i] and [u] respectively in short vowels. Vowel length is common and can be analyzed as a vowel sequence in the same syllable or as a lengthened version of a short vowel.

Table 2: Vowel Phonemes

	[-round]		[+round]
	[-back]	[+back]	
[+ATR]	i	ə	u
[-ATR]	ɛ	a	ɔ

The two [ATR] sets of phonemes determine the vowel harmony in the language. Only vowels with the same [ATR] value occur together in the same root. Across morpheme boundaries in the same word, [+ATR] quality spreads to all vowels unspecified for [ATR], either from root to bound morpheme or from bound morpheme to root, whereas [-ATR] quality never spreads. In 3.2, [ATR] quality across morpheme boundaries is further discussed.

2.2.1 Vowel contrasts

2.2.1.1 Phonetically similar contrasts

The six vowels are considered to be phonemic based on the minimal and near minimal pairs of (13). The following symbols refer to the specified positions taken by vowels: B is word-initial, M is word-medial, and E is word-final.

(13) **Vowel contrasts**

i - ɛ	B	īgg	‘milk’	ēēɔ	‘eye’
	M	cíl	‘spine’	cél	‘dream’
	E	mīi	‘goat’	ɲēē	‘drawing, colour’

Vowel contrasts (continued)

ε - a	B	ēēɲ	‘back’	áám	‘bone’
	M	ḍēēr	‘leach’	ḍáár	‘throne’
	E	ɲēē	‘drawing, colour’	ɲāā	‘girl, daughter’
a - ɔ	B	áál	‘calf fence/pen’	óól	‘head’
	M	ḍáár	‘throne’	ḍóór	‘animal fence’
	E	máà	‘house’	móó	‘gunfire’
ɔ - u	B	óól	‘head’	úū-ḍ	‘wasp’
	M	kóól	‘snake type’	kùùl	‘Kulag clan member’
	E	móó	‘gunfire’	mūū	‘forehead, face’
ə - i	B	āyúú	‘local tooth brush’	íyóó	‘oil, fat’
	M	gààl	‘shield’	jííl	‘cricket’
	E	wóó	‘shade, help’	mīī	‘goat’
ə - ε	B	āāḍ	‘tree type’	ēēḍ	‘water-carrying net’
	M	ḍāār	‘snake type’	ḍēēr	‘leach’
	E	wóó	‘shade, help’	rēē	‘cotton, thread’
ə - a	B	ààl	‘hyena’	áál	‘calf fence/pen’
	M	ḍāār	‘snake type’	ḍààr	‘eagle’
	E	wóó	‘shade, help’	wāā	‘pond’
ə - ɔ	B	ààl	‘hyena’	óól	‘head’
	M	ḍāār	‘snake type’	ḍóór	‘animal fence’
	E	wóó	‘shade, help’	móó	‘gunfire’
ə - u	B	āāḍ	‘tree type’	úū-ḍ	‘wasp’
	M	ɲāām	‘chin’	múùm	<i>village name</i>
	E	wóó	‘shade, help’	mūū	‘forehead, face’

2.2.1.2 Vowel length contrasts

Short and long vowels occur contrastively in word-initial, word-medial, and word-final positions. However, the short vowel *ε* is only attested in word-initial position in pronouns such as *ēggà* ‘they (3pN)’ and *ēgg* ‘their (3pPs, 3pPp)’.

(14) **Vowel length contrasts**

i - ii	B	îlɿ	‘beeswax’	īgg	‘milk’
	M	cīl	‘instrument’	ḥīl	‘tree type’
	E	kūūrī	‘circle’	cùùrì	‘sheave’
ε - εε	M	sēn	‘skin illness’	sēēn	‘ruler’
	E	móósē	<i>village name</i>	māāsēē	‘root type’
ə - əə	B	ámīī	‘ant type’	ààmāā	‘liver’
	M	sām	‘medicine’	sóóm	‘hunter’
	E	kúsá	‘grass type’	būūsàà	‘stone name’

Vowel length contrasts (continued)

a - aa	B	āāā-d	‘lake’	āārēē	‘grass type’
	M	sāṣ	‘shoe’	sāāḍ	‘grass-cutter’
	E	cēldá	‘charcoal’	āldáá	‘earth, dust’
u - uu	B	úld	‘grinding stone’	úū-d	‘wasp’
	M	lún	‘boomerang’	lúún	‘water pot’
	E	gṣyù	‘grass type’	ṣyúú	‘local tooth brush’
o - oo	B	ṣṣn	‘meat’	ṣṣl	‘head’
	M	kṣr	‘word, speech’	kṣṣl	‘snake name’
	E	málḍ	‘beeswax’	mélṣṣ	‘sugar cane’

2.2.2 Vowel distribution**2.2.2.1 Distribution in word positions**

As shown by the contrasts in (14), six short and six long vowels are attested in word-initial, word-medial, and word-final position. In monosyllabic nouns, phonetically short vowels are not common word-medially; only four are attested word-initially—*il* ‘horn’, *úld* ‘grinding stone’, *ṣṣn* ‘meat’, *āld* ‘fox’, and *ṣṣ* ‘wife’; and do not surface word-finally. However, phonetically long vowels are common in monosyllabic nouns: they are most frequent word-medially, then word-finally, and a few occur word-initially. Although vowel length is phonemic, there is neutralization of vowel length word-finally in monosyllabic nouns and verbs. As will be discussed in 2.3.3, vowels are only realized as long in that position. In polysyllabic nouns, short vowels are common in all three word positions, and long vowels are rare word-initially and word-finally.

2.2.2.2 Distribution in noun roots

The distribution of vowels in disyllabic noun roots is given in (15). The [-ATR] vowels (*ɛ*, *ɔ*, and *a*) and the [+ATR] vowels (*i*, *u*, and *ə*) function as distinct sets in roots; the vowels of the [-ATR] set never occur with vowels of the [+ATR] set in the same root.⁸ Within each set, all possible vowel combinations are attested in roots except *i-u*. The word *jìgg-úúl* ‘afternoon’ is a compound and literally means ‘evening-up’.

⁸ The following nouns are believed to be compounds because of mixed sets of [ATR] vowels: *fùulmāā* ‘insect type always in houses (*māā* ‘house’)', *gāālmṣí* ‘tree type (lit. eagle’s claws)’, *wílṣmāā* ‘ant type (*māā* ‘mother’)', *tùggùùṣfāā* ‘tree type (*fāā* ‘release’)', *rṣlūúmāā* ‘bird type (lit. apostle of house)’, *tírímāā* ‘bird type (*tírí(g)* ‘tree type’)', *túúlṣfāā* ‘grass type (*fāā* ‘release’)', *tāāsāmī* ‘sorhgum type (*tāāsā* ‘ducked’, *mī* ‘chicken’)', *nāāḍi* ‘those (*ḍi* ‘also’)'.

(15) **Vowel distribution in disyllabic nouns roots**

[-ATR]			[+ATR]		
ɛ - ɛ	wɛ̀lɛ̃n	‘sour taste’	i - i	fɪ̃dɪ̃n	‘perfume’
ɛ - a	cɛ̀dán	‘illness type’	i - ə	ʃɪ̃lɛ̀bb	‘water spring’
ɛ - ɔ	mɛ̀lɔ̃	‘sugar cane’	i - u	ʃɪ̃gg-úúl	‘afternoon’
a - ɛ	kààdɛ̀l	‘bull’	ə - i	mɛ̀nɪ̃l	‘rainbow, spirit’
a - a	ʃálám	‘malnutrition’	ə - ə	gɛ̀mɔ̃l	‘forest’
a - ɔ	páɣɔ̃	‘star’	ə - u	gɛ̀mũ̀r	‘dove’
ɔ - ɛ	bórɛ̀-ɖ	‘eye matter’	u - i	búlɪ̃ɣ	‘worm’
ɔ - a	mòrāā	‘governor’	u - ə	bũ̀sɔ̃dɛ̀	‘stone type’
ɔ - ɔ	fɔ̀dɔ̃r	‘nose’	u - u	bũ̀ɣúr	‘youth’

2.2.2.3 Distribution in vowel sequences

Vowel sequences may occur in the same syllable (CV₁V₂, CV₁V₂C, or CV₁V₂CC). Only vowels of the same [ATR] set are paired in sequences, as shown in the list of (16). All possible vowel sequences are attesting in roots except *ɛa*.

(16) **Vowel sequences**

[-ATR]			[+ATR]		
ɛa	--		iə	ɖɪ̃ɔ̃rmə̀	‘centipede’
ɛɔ	ɖɛ̀ɔ̃l ⁹	‘jackal’	iu	díũ-sũ ¹⁰	‘planted (v)’
aɛ	bàɛ̀l	‘perfume’	əi	ʔɛ̀l	‘tree type’
aɔ	càɔ̃r	‘rabbit’	əu	gɛ̀ũlɖɔ̃dɛ̀	‘fish’
ɔɛ	gɔ̃ɛ̃n	‘metal worker’	ui	bũ̀l	‘moisture’
ɔa	gɔ̃à-ɖ	‘excrement’	uə	bũ̀ə	‘tree type’

Vowel sequences may not exceed two vowels, and long vowels do not occur in underlying vowel sequences. However, long vowels do occur in surface form vowel sequences such as in *ɣũ̀ũ̀* ‘leopard’, where the underlying final-approximant *y* surfaces as a vowel, in accordance with {P1b} in 2.1.3.

2.3 Syllable structure

2.3.1 Syllable types

The syllable structure may be represented as (C)N(C)(C), where the vowel nucleus

⁹ In *ɖɛ̀ɔ̃l*, *bàɛ̀l* and other examples of (16), the vowels *ɔ*, *ɛ*, and *i* in V₂ position could be analyzed as the glides *w* or *y* if it were not for the fact that sonorant-sonorant sequences are not allowed in word-final consonant clusters.

¹⁰ The root verb is */dɪ̃w/* ‘plant’, but in the completive *díũ-sũ*, *w* becomes *u*, evidenced by the fact that the [+round] quality of *u* is spread to the suffix vowel, which would otherwise be *ə*.

N is the only obligatory constituent of the syllable. The CC codas are only found word-finally and onset-less syllables only word-initially. The nucleus N may be short, long, or a vowel sequence, where long vowels can be analysed as vowel sequences of two short vowels or as lengthened versions of short vowels. The most common syllable types are CN and CNC. The syllable type CNCC commonly occurs in monosyllabic words and word-finally in disyllabic words. Less common syllable types, which only occur word-initially, are N and NC. The syllable type NCC only occurs in monosyllabic words.

In the list of syllable types in table 3, all words are monomorphemic except those with hyphens. The syllable type NCC is not attested with a long vowel except across morpheme boundaries as in *éél-g* ‘stomach’, and the syllable type CNCC is not attested with a vowel sequence except across morpheme boundaries as in *gə̀ür-d* ‘stomach’.

Table 3: Syllable types (N = syllable nucleus)

	Short		Long		Vowel Sequence	
N	ú	‘you 2sN’	ùù	‘air’	ā̄ ¹¹	‘tree type’
NC	îl	‘horn’	áám	‘bone’	ààl ¹²	‘brother’
NCC	āld	‘fox’	éél-g	‘stomach’	óíld	‘cold’
CN	wā	‘no’	wāā	‘pond’	būā	‘tree type’
CNC	fól	‘hole’	dēēr	‘leach’	bàèl	‘perfume’
CNCC	cúld	‘birth sack’	jèèrs	‘hippo’	gə̀ür-d	‘stomach’

As will be seen in 2.4.3, tone assignment in some disyllabic nouns depends on syllable weight. For this reason, each syllable type is classified according to one of three different weights: light, mid or heavy.

Table 4: Syllable weight of syllable types

Light	Mid	Heavy
V	VC	VVC
CV	VCC	VVCC
	CVC	CVVC
	CVCC	CVVCC
	VV	
	CVV	

¹¹ As discussed in 2.3.6, the word-final vowel *ɔ* in *ā̄ɔ* ‘tree type’ *ɔ* could be interpreted as the glide *w* if it were not for the fact that the definite clitic =*n* for stem-final vowels attaches to this noun (*ā̄ɔ*=*n*) instead of the definite clitic for stem-final consonants =*Á*.

¹² In *ààl*, *bàèl*, the vowels *ɔ*, *ɛ* could be analyzed as the glides *w* or *y* if it were not for the fact that sonorant-sonorant sequences are not allowed in word-final consonant clusters.

Open syllables with short vowels (V and CV) have light weight, closed syllables with short vowels (VC, VCC, CVC, CVCC) and open syllables with long vowels or vowel sequences (VV and CVV) have mid weight, and closed syllables with long vowels or vowel sequences (VVC, VVCC, CVVC, CVVCC) have heavy weight. Although tone assignment in some nouns depends on syllable weight, there are no meaningful restrictions on distribution of syllables in words based on syllable weight.

2.3.2 Syllable structure of polysyllabic words

There are 12 disyllabic syllable structures as shown in (17), including light-light, light-mid, light-heavy, mid-light, mid-mid, and mid-heavy syllable structures. There are no heavy syllables in word-initial position. Consonant clusters do not exceed 2 consonants—either word finally (*-CCC#) or across syllable boundaries (*-CC.C-).

(17) Disyllabic short vowel syllable structures

light-light	V.CV	ũfũ	‘tree type’
light-mid	V.CVC	ásər	‘army’
light-heavy	V.CVCC	órɔ́nd	‘fermented milk’
mid-light	VC.CV	ənsə	‘cooking plate’
mid-mid	VC.CVC	ámsáɖ	‘dryness’
mid-heavy	VC.CVCC	əndərs	‘insect type’
light-light	CV.CV	kúsə	‘grass type’
light-mid	CV.CVC	ɬáləm	‘malnutrition’
light-heavy	CV.CVCC	ɖufurɖ	‘dust’
mid-light	CVC.CV	cēlɖá	‘charcoal’
mid-mid	CVC.CVC	kágɖər	‘food type’
mid-heavy	CVC.CVCC	bāgɖərs	‘lizard’

Long vowels are common in both first and second syllables of disyllabic words as seen from (18).

(18) Disyllabic long vowel syllable structures

VV.CV	ààsà	‘basket type’
V.CVV	íyáə	‘oil, fat’
VV.CVV	áàrēē	‘grass type’
VV.CVC	ə̃m̃ə̃ŋ	‘yawning’
V.CVVC	āwēēs	‘bird type’
VVC.CV	āāmsá	‘dry, tired (ADJ)’
VC.CVV	àlɖáá	‘earth, dust’
VC.CVVC	ə̃ndə́ər	‘tree type’
CVV.CV	ɬééɬá	‘leaf, liver sickness’

Disyllabic long vowel syllable structures

CV.CVV	gǝmǝǝ	‘ant type’
CVV.CVV	mǎāsēē	‘root type’
CVV.CVC	péérǎm	‘flag’
CV.CVVC	márǝǝs	‘spider’
CVV.CVVC	tǝifǝǝ	‘bird type’
CVV.CVCC	bǎālǎṇḁ	‘stripe’
CV.CVVCC	búlūǝrs	‘bird type’
CVVC.CV	bǝǝṇmǎ	‘insect type’
CVC.CVV	mǎfǝēē	‘snake type’
CVVC.CVV	ǝílǝǝ	‘tree type’
CVC.CVVC	ǝǝrgǎāl	‘bird type’

Vowel sequences may not exceed two vowels, and long vowels do not occur in underlying vowel sequences. Vowel sequences are rare in polysyllabic lexemes. The only three attested are listed in (19). In all of these, they occur in an initial CVVC syllable type.

(19) Polysyllabic vowel sequence structures

CVVC.CVV	gǝlǝǝǝ	‘fish’
CVVC.CV	ǝǝǝrmǎ	‘centipede’
	kǝlǝǝǝ	‘tree type’

Three-syllable words are not common—about 5% of monomorphemic nouns. Only the syllable types CN, CNC, and occasionally N occur in three-syllable words. The syllable types CN and CNC may occur in any position of the word.

(20) Three-syllable short vowel syllable structures

CV.CV.CV	tǎsǎmé(g)	‘grass’
CV.CV.CVC	kǎṇǎrǎṇ	‘jackal’
CV.CVC.CV	sǎrǎṇǎ	‘tree type’
CVC.CV.CV	tǎṇǎlǎ(g)	‘elbow’
CVC.CV.CVC	sǎṇǎlǎṇ	‘tree type’

Long vowels may occur in any syllable of three-syllable words. No more than three syllables in a root have been attested.

(21) Three-syllable long vowel syllable structures

V.CV.CVV	ūṇúrǎǝ	‘pumpkin’
CVV.CV.CV	mǎǝṇǎmǎ	‘vegetable type’
CV.CV.CVV	kūsūmǎí	‘knee’
CV.CVV.CVV	kūǝúǝíí	‘bird type’

The verb root also has the syllable structure (C)N(C)(C), where the vowel nucleus is

the only obligatory constituent of the syllable and can be short, long, or a vowel sequence. However, at least 90% of verb roots consist of the syllable CVC with short vowel. The other syllable types are rare.

(22) **Root verb syllable types**

VC	/ab/ L	‘sit’
CV	/ba/ M	‘throw’
CVC	/be/ L	‘beat’
CVVC	/maar/ M	‘buy’
	/kœj/ L	‘welcome’
CVCC	/gams/ MH	‘find’
CVCVC	/kœɲɔr/ L	‘snore’

2.3.3 Monosyllabic vowel lengthening

The surface syllable structure of Gaahmg requires that all monosyllabic, open-syllable nouns and verbs have long vowels as stated in the rule of {P4}.

{P4} Monosyllabic vowel lengthening

Vowels are realized as long in monosyllabic, opened-syllable nouns and verbs.

Normally, the underlying root vowel of monosyllabic, open-syllable nouns is long. But in nouns such as *tɔɔ* / *tɔ-gg* ‘cow’ which have a short root vowel, the vowel is realized as long in the singular form. In the plural form with final consonant, the vowel remains short.

In verbs such as *nág-gā* / *nág-dā* ‘sleep.SBJV1sN/.1pN’ with root-final velar plosive, the velar plosive is elided in word-final position of incomplete forms {P2}, as will be discussed in 9.6. The resulting monosyllabic open-syllable verb with underlying short vowel surfaces with a long vowel *nāā* ‘sleep.INCP’.

The lengthening rule of {P4} requires that the minimal surface word for nouns and verbs have at least mid syllable weight. The process does not apply to other parts of speech such as the negative *wá* ‘no, not’ or the adverb *tu* ‘towards, upward’. These adverbs, which are separate words, are discussed in chapter 13.

2.3.4 Nasal clusters and prenasalization

Nasal-obstruent sequences such as in *àndàrs* ‘insect type’ and *tĩns-əgg* ‘asking’ are common in the language. They are interpreted as consonant sequences instead of prenasalized obstruents for the following reasons: several unambiguous consonant sequences are attested in 2.1.4.1 including nasal-obstruent sequences, there are no

words beginning with a nasal-obstruent sequence that must count as one unit, there are no three-consonant sequences across syllable boundaries in which a nasal-obstruent sequence must count as one unit, and all word-final nasal-obstruent sequences fit into the proposed syllable type CVCC.

2.3.5 Ambiguous vowel sequences

Vowel sequences before word-medial or word-final consonant sequences such as in the words of (23) are interpreted as vowel sequences in the surface form. The vowels in V_2 position of the sequences cannot be analyzed as glides, since three consonants in a sequence are not allowed.

(23) $V_1V_2C.C-$ or $V_1V_2CC\#$

$\text{d}ĩĩrm\grave{a}$	‘centipede’
$k\grave{a}ũrj\grave{a}$	‘tree type’
$\grave{a}\grave{a}r-g$	‘priest, chief’
$\acute{s}ĩl\grave{d}$	‘cold (n)’
$g\grave{d}ũr-d$	‘stomach’

Vowel sequences before root-final sonorants such as in the words of (24) are interpreted as vowel sequences in the surface form. As shown in the distribution of word-final consonant sequences of (12), only sonorant-obstruent sequences are allowed, as in $b\grave{a}r\grave{d}$ ‘lion’; word-final sonorant-sonorant consonant sequences ($*c\grave{a}wr$ ‘rabbit’, $*g\grave{z}yn$ ‘metal worker’) are not allowed. However, unambiguous vowel sequences such as in $\text{d}ĩĩrm\grave{a}$ ‘centipede’ and $bũ\grave{a}$ ‘tree type’ of (16) are attested. Thus, the vowels in V_2 position of the sequences in (24) are analyzed as vowels.

(24) $V_1V_2C_{[+son]}\#$

$c\grave{a}\grave{a}r$	‘rabbit’
$g\grave{d}ēn$	‘metal worker’
$t\grave{a}ĩl$	‘tree type’

Vowel sequences before root-final obstruents such as in the words of (25) are ambiguous. The vowels in V_2 position of the sequences can be analyzed as glides in the surface form since all other sonorants ($m, n, \text{ɲ}, l, r, \text{ð}$) are unambiguously attested in word-final sonorant-obstruent constructions as shown in (12). They can also be analyzed as vowels in the surface form since all relevant vowel sequences ($a\text{ɔ}, \text{e}\text{ɔ}, a\text{ɛ}, \text{ɛ}\text{ɛ}, \text{ə}u, iu, \text{ə}i, ui$) are unambiguously attested in (16). Although there is no strong evidence for one interpretation over the other, such words are listed with vowel sequences in this thesis¹³.

¹³ In (12), the glides are written instead of vowels in order to show the full range of sonorant possibilities in word-final sonorant-obstruent position. Otherwise, vowels are written for this

- (25) $V_1V_2C_{[son]} \#$
 ḍāḍḍ ‘fertile soil’
 káḗḍ ‘serving spoon’
 ḍḗḍ ‘scorpion’

Vowel sequences before root-medial consonants such as in the words of (26) are also ambiguous. The vowels in V_2 position of the sequences can be analyzed as glides in the surface form since all other sonorants are unambiguously attested in word-medial, syllable-final position as shown in (11). They can also be analyzed as vowels in the surface form since all relevant vowel sequences are unambiguously attested in (16). Although there is no strong evidence for one interpretation over the other, such words are listed with vowel sequences in this thesis.

- (26) V_1V_2C-
 kàèḡà ‘lucky stone’
 kḗḍḍá ‘ear wax’
 fḗḍḍá ‘planting seed’

2.3.6 Ambiguous final vowels

Word-final vowel sequences such as in *māāḍ* ‘gazelle’ are underlying vowel-plosive or vowel-approximant constructions which surface as vowel-vowel sequences. The bilabial and palatal weakening rule of {P1b} states that the underlying plosives /b/, /ɟ/ and approximants /w/, /y/ are weakened word-finally to vowels with the same [ATR] quality as the preceding vowel. Unambiguous word-final vowel sequences such as in *būḍ* ‘tree type’ support this analysis, as does the fact that different allomorphs of the accompaniment and definite clitics attach to stem-final vowels rather than to stem-final consonants.

In (27), singular nouns and their accompaniment and definite forms are given. Accompaniment singular nouns take the clitic = $\tilde{E}$ for surface-final consonant stems as in (a) and the clitic = $n\tilde{E}$ for surface-final vowel stems as in (b-d). The language treats (b-p) as having vowel-final stems and attaches the clitic = $n\tilde{E}$. Similarly, the definite clitic = A for surface-final consonant stems attaches in (a), but definite clitics having final n for surface-final vowel stems attach in (b-p).

There are no noun suffixes with initial consonant which attach to both underlying-final consonants and underlying-final vowels. Therefore, the root-final plosives /b/, /ɟ/, and /g/ never surface as plosives as they do in verbs (/cág/, cáá ‘bathe.INCP.3sN’, cág-gággā ‘bathe-COMP.D’). In nouns, there is no way to verify whether the root-final segments are underlyingly /w/ or /b/, /ɟ/ or /y/. However, although the definite

position.

(27) **V₁V₂# in noun forms**

	UR	N SG	ACM	DEF	
(a)	/kaam/ L	kààm	kààm = ē	kààm = ā	‘nyala’
(b)	/waayaa/ H	wááyáá	wááyáá = nē	wááyáá = n	‘bird type’
(c)	/aŋe(g)/ H	áŋé	áŋé = nē	áŋé = n	‘elephant’
(d)	/buə/ ML	būð	būð = nī	būð = n	‘tree type’
(e)	/kaw/ HL	káð	káð = nē	káw = àn	‘hyena, root’
(f)	/maaw/ ML	māāð	māāð = nē	māāw = àn	‘gazelle’
(g)	/bew/ ML	bēð	bēð = nē	bēw = àn	‘tree type’
(h)	/ceew/ HM	cééð	cééð = nē	cééw = àn	‘lame person’
(i)	/tay/ ML	tāè	tāè = nē	tāy = àn	‘giraffe’
(j)	/kaay/ M	kāāē	kāāē = nē	kāāy = àn	‘witch doctor’
(k)	/muy/ M	mūī	mūī = nī	mūy = ðn	‘wildebeest’
(l)	/puuy/ ML	pūūī	pūūī = nī	pūūy = ðn	‘leopard’
(m)	/buu/ L	bùù	bùù = nī	bùù. = ùn	‘chicken coop roof’
(n)	/rɛɛ/ M	rēē	rēē = nē	rēē. = ēn	‘cotton’
(o)	/tɔɔ/ H	tóó	tóó = nē	tóó. = ón	‘cow’
(p)	/jũ/ ML	jĩ	jĩ = nī	jĩ. = ìn	‘turkey’

clitic distinguishes surface-final vowel stems from surface-final consonant stems, it also distinguishes underlying-final approximant (or plosive) stems from underlying-final vowel stems. The definite clitic = *An* attaches to stems with underlying-final approximants in (e-l), and the definite clitic = *Vn* with copied vowel from the stem attaches to stems with underlying-final vowels in (m-p). Thus, the singular nouns of (e-l) have underlying-final approximants or plosives, but surface-final vowels.

2.4 Tone

There are three underlying level tones in Gaahmg illustrated by the words of table 5.

Table 5: Contrastive H, M, and L tones

H	śór	‘tree bark’
M	ǎǎr	‘anger’
L	ààr	‘sheep’

Rising and falling tone is analyzed as a sequence of two level tones. The level tones combine and result in nine tone melodies which are all contrastive in the same monosyllabic syllable type—three level, three falling, and three rising. The same, as well as additional tone melodies, are contrastive in disyllabic syllable patterns.

Unlike some African tone languages, tone is not affected by consonants, tone is stable—it does not shift from one syllable to another, and tone does not down-step or down-drift. The functional load of tone is very high, both in the distinction of words and in the expression of grammatical functions.

The tone bearing unit is the syllable. In roots with fewer tones than the number of syllables, such as in three-syllable nouns with two tones, tone is assigned right-to-left, regardless of syllable weight. However, when there are more tones than syllables, such as in disyllabic roots with three-tone melodies, two tones are assigned to the heaviest syllable, and the remaining tone is assigned to the other syllable.

In roots, no more than one tone may be assigned on light syllables and generally no more than two tones may be assigned on mid or heavy syllables. However, as will be seen in 7.6.2, two tones (HM) are assigned to the accompaniment clitic =*Ē* which is a light syllable. And as will be seen in 9.8.6, three tones (MHM) are assigned to the continuous past suffix –*Ā̃n* which is a mid syllable. Nevertheless, no more than three tones are ever allowed on any one syllable.

2.4.1 Tonal contrasts in the same syllable structure

The words in (28) have contrastive tone melodies for the specified syllable structures. Three level, three falling, and three rising tone melodies are attested in the CVVC syllable type. There is also one attested monosyllabic root with three tones (*dū̃l* ‘instrument’). The same tone melodies and additional tone melodies are attested in disyllabic syllable patterns, although not all in the same syllable pattern. The singular suffix –*ɔ̃* of *nī-ɔ̃* ‘tooth’ and of several other nouns in (28) does not add tone, as will be discussed in section 6.3.1. The contrasts support the claim of there being minimally three underlying tones in the language.

(28) Tonal contrasts in the same syllable structures

	CVVC		CVCVVC		CVCVC
H	póór ‘boat’		wéráá-ɔ̃ ‘clan member’		básár ‘dried food’
M	bāāl ‘cave’		kālāā-ɔ̃ ‘tongue’		ṭēḍēl ‘bird type’
L	dēēl ‘collar bone’		sēṇāā-ɔ̃ ‘instrument’		ḍìrìm ‘tree type’
HL	sēēn ‘ruler’	---			fīḍìn ‘perfume’
HM	nī-ɔ̃ ‘tooth’	---			bórē-ɔ̃ ‘eye matter’
ML	bēēl ‘metal’		gēmūūr ‘dove’		mōsōr ‘horse’
LH	ḍōór ‘fence’		mōḍáál ‘hatred’	---	
LM	ḍēēr ‘leach’		bārōōl ‘cistern’		gēmāl ‘forest’
MH	būúl ‘bread’		sēwēēl ‘tree type’		cēyám ‘tobacco’
HLH	---		rúṇúú-ɔ̃ ‘bird type’	---	
HLM	---		mōḍūūl <i>village name</i>	---	
HMH	---		lúlíḍ ‘snake type’	---	
LHL	ḍūūl ‘instrument’		bāsáār ‘lie’		bōḍōl ‘job-less person’

Although there are at least nine contrastive tone melodies in noun roots, verb roots may only have the seven underlying tone melodies of (29). The only verb roots

attested to have HM melody are *bēl-l* ‘name, call’ and *léē* ‘come, arrive’, and the only verbs attested to have ML melody are *d̥s̥s-s* ‘stand’, *būn-ḡ* ‘make big’. The infinitive verb form is analyzed to reveal the underlying root tone.

(29) **Tonal contrasts in infinitive verb forms**

	Root tone	INF	
(a)	H	fír-r	‘smell, pray’
(b)	M	cōr-r	‘help’
(c)	L	ḡur-r	‘bury’
(d)	HL	pâr-r	‘attach’
(e)	HM (rare)	bēl-l	‘name, call’
(f)	ML (rare)	d̥s̥s-s	‘stand’
(g)	MH	k̥s̥ḡ-ḡ	‘strike, ram’

2.4.2 Tone distribution

Level tone

Level tone appears in syllable types regardless of syllable weight. In (30), syllable types are grouped together according to light, mid, or heavy syllable weight. High, Mid, and Low tone occur on each of the six syllable types with both long and short vowels, with the exception of High on the syllable type VV. The singular suffixes

(30) **Level tone distribution in six syllable types with both short and long vowels**

	V- (light)	VC- (mid)	VCC (mid)
H	íyóó ‘oil, fat’	órḡàà ‘army’	úlḡ ‘grinding stone’
M	ūrīī ‘ostrich’	ālḡáá ‘earth’	ālḡ ‘fox’
L	òsáà ‘pillow’	àrḡḡ-ḡ ‘insect’	àrs ‘tree type’
	CV- (light)	CVC (mid)	CVCC (mid)
H	ḡínì ‘world’	cíl ‘spine’	célḡ ‘local broom’
M	kāsá ‘boy’	mēl ‘tree type’	kōrḡ ‘bird type’
L	fērì <i>hill name</i>	ḡàl ‘pot’	fālḡ ‘tree type’
	VV- (mid)	VVC (heavy)	VVCC (heavy)
H	---	áám ‘bone’	éél-g ‘stomach’
M	ōōrī ‘angry person’	ēēḡ ‘net type’	īīg ‘milk’
L	ààsà ‘basket’	ààl ‘hyena’	ààr-g ¹⁴ ‘priest, chief’
	CVV- (mid)	CVVC (heavy)	CVVCC (heavy)
H	wááyáá ‘bird type’	póór ‘boat’	dóólḡ ‘tree type’
M	lēērōō ‘reed’	bāāl ‘cave’	bāār-ḡ ‘abdomen’
L	fāànḡḡ ‘sorghum type’	dēēl ‘collar bone’	jēērs ‘hippopotamus’

¹⁴ There are two singular forms *ààr*, *ààrg* and the plural form is *ààrēēg*.

-*ɖ*, -*g* of *əɾɲə-ɖ* ‘insect’, *éél-g* ‘stomach’ and of other roots of (30) do not add tone, as will be discussed in section 6.3.1.

Falling and rising tone

Falling and rising tone only appear in roots on syllable types with mid and heavy weight. As shown in (31), falling and rising tone does not occur on the open syllable types V and CV with light weight. It has not been attested on VVCC syllables. Falling and rising tone is common on CVVC, CVVCC, CVC and CVV syllables, and rare in VC, VCC, VV, VVC and CVCC syllables. Other than in the word *ɖùùl* ‘instrument’, three tones on the same syllable in monomorphemic roots is not attested.

(31) Falling/rising tone distribution in various syllable types

	V- (light)	VC (mid)	VCC (mid)
HL	---	îl ‘horn’	îļ ‘beeswax’
	CV- (light)	CVC- (mid)	CVCC (mid)
HL	---	kâlfɔ̃ ‘jaw’	---
ML	---	jêr ‘sorghum type’	rəɲɖ ‘mud’
LH	---	ɖəlgə̃ ‘drum’	---
LM	---	gɔ̃n ‘responsibility’	---
MH	---	dɔ̃d ‘stork’	---
	VV- (mid)	VVC (heavy)	VVCC (heavy)
HL	âârēē ‘grass type’	âəs ¹⁵ ‘dried food’	---
HM	---	ûū-ɖ ‘wasp’	---
	CVV- (mid)	CVVC (heavy)	CVVCC (heavy)
HL	mâa ‘house’	sēēn ‘ruler’	gùùrɖ ‘energy’
HM	múū ‘mosquito’	jîi-ɖ ‘tooth’	káān-ɖ ‘fly’
ML	tūi ‘cassava’	bēēl ‘metal’	kāānɖ ‘carrying stick’
LH	---	ɖə́ɔ̃r ‘fence’	gàágg ‘bird’
LM	---	ɖēēr ‘leach’	gə̀ùr-ɖ ‘stomach’
MH	míi ‘chicken’	būúl ‘bread’	---
LHL	---	ɖùùl ‘instrument’	---

2.4.3 Tone assignment

In three-syllable words

Tone is stable in that it does not shift or spread from one syllable to another. Thus, it is not possible to determine the tone bearing unit (TBU) by observing shifting or spreading. Rather, tone assignment is used as support of the syllable being the TBU.

¹⁵ Can also be interpreted as having a glide *aws*

All attested three-syllable monomorphemic words are presented in (32). Tone assignment is as expected for one and three-tone melodies for the syllable being the TBU. These have one tone per syllable, with the exception of *kàṇàràṇ* ‘jackal’. Two-tone melodies are assigned right-to-left in that the final tone of the melody surfaces on the final syllable, and the first tone of the melody surfaces on the first two syllables.

(32) **Tone assignment in three-syllable monomorphemic words**

Melodies with one or two tones			Melodies with three tones		
M	ṇḗṇṇērās	‘fully (ADJ.PL)’	HLM	máónìṁṁ	‘vegetable type’
L	kàmàlògg	‘woman’		bámàlḗ	‘morning star’
	sàṇḍàlàn	‘living alone’		ḍóggḍḗ	‘ankle’
HL	móggólèè	‘maize’	MHM	kūḍúúrī	‘bird type’
	túnḍúli(g)	‘elbow’		cēggéllū	‘root name’
ML	būḍirīṇ	‘sunset’	MHL	ūṇúrḍḍ	‘pumpkin type’
LH	bìṁirīṇ	‘bird type’		kāggólīg	‘cock’
LM	càṇàlḍā	‘upper arm’	LHL	kàṇàràṇ	‘jackal’
	gèbbànīḍ	<i>area name</i>			
	mùggùrī	‘hatred’			
	kūsūmī	‘knee’			
	tāsāmé(g)	‘grass type’			
	fḗṇḍlḍé	‘leave for child rearing’			

In disyllabic words

Nearly all disyllabic roots with one or two-tone melodies are assigned tone as expected with one tone per syllable. However, there are five attested exceptions, all of which involve the ML tone melody. The word *ārāḍ* ‘lake’ of (33) and four words listed below it are exceptions.

All attested disyllabic monomorphemic words with three-tone melodies are also shown in (33). In these words, the syllable with the heaviest syllable weight is assigned two tones and the other syllable is assigned one. If there is the same weight in both syllables, two tones are usually assigned to the first syllable, but in two out of six of such words, tone is assigned to the second syllable (*kḍḍḍr* ‘weakness’ and *bērḗḍ* ‘tomato’). In (33), syllable weight is listed before each word with three tones, where l = light, m = mid, and h = heavy, and the letters for the first and second syllables are divided by a period. It is the underlying syllable structure that determines the syllable weight rather than the surface form. For example, since *mūggūḍ* ‘burning wood’ has an underlying final /y/ or /j/, the second syllable is underlying CVVC instead of CVCV.

(33) **Tone assignment in two-syllable monomorphemic words**

Melodies with one or two tones			Weight	Melodies with three tones	
H	fádóól	‘farmland’	HLH	l.h	rúnúú-ḍ ‘bird type’
M	bārōól	‘cistern’	HLM	m.m	áārēē ‘grass type’
L	sèŋàà-ḍ	‘instrument’		m.l	kâlfā ‘jaw’
HL	fīḍīn	‘perfume’		m.l	kúūrī ‘sheave’
ML	mōsōr	‘horse’		l.h	máōūūl <i>village name</i>
	āāā-ḍ	‘lake’	HMH	h.h	kúūrlúúgg ‘rat type’
	gōmūūr	‘dove’		l.h	lúlííḍ ‘snake type’
	gōrmūū-ḍ	‘tree type’		l.m	málǎǎ ‘nose mucus’
	kāŋāāḍ	‘bowel type’	MHM	m.m	bállēē ‘tree type’
	kāmēēr	‘village’	MHL	m.h	mūggúūì ‘burning wood’
LH	mòḍáál	‘hatred’	LHM	m.l	ḍǎlgā ‘drum’
LM	gēmīil	‘tree type’	LHL	l.m	bàōāl ‘business’
MH	sēwēél	‘tree type’		m.m	kòḍfōr ‘weakness (N.SG)’
				l.h	jōfōr ‘desire’
				m.m	bērŋáḍ ‘tomato’
				l.m	òsāā ‘wooden pillow’
				l.h	gāḍāāè ‘basket’
				l.h	kāōāām ‘work’
				l.h	kūsúūr ‘authority’
				m.m	cīrsò(g) ‘tool cleaner’

2.4.4 Lexical tone

Lexical tone described in this section has to do with roots (single non-bound morphemes) which are distinguished only by tone. Grammatical tone described in 2.4.5 has to do with bound morphemes distinguished only by tone that make a grammatical distinction, or morphemes that consist only of tones.

Gaahmg frequently uses tone for distinguishing lexical meanings, as shown in the lists of minimal pairs in (34-36).

(34) **Noun minimal pairs**

H - M	sóóm	‘hunter’	sōōm	‘medicine’
	óór	‘tree bark’	ōōr	‘anger’
	cáá	‘wild cat’	cāā	‘bath’
	kááé	‘night’	kāāē	‘witch doctor’
H - L	ḍáár	‘throne’	ḍàār	‘eagle’
	óór	‘tree bark’	òòr	‘sheep’
H - HL	káár	‘stew’	kāār	‘male goat’
	cīl	‘spine’	cīl	‘instrument’

Noun minimal pairs (continued)

H - ML	kóðél	‘natural painting’	kóðèl	‘baboon’
	ṭírí(g)	‘tree type’	ṭírì(g)	‘death, dying’
M - L	ǎǎr	‘anger’	àǎr	‘sheep’
M - HM	mūū	‘forehead, face’	múū	‘mosquito’
M - ML	bāāl	‘cave’	bāal	‘instrument’
	cāā	‘bath’	cāa	‘cooking stone’
	kāpāā-d	‘back of head’	kāpāād	‘bowel for hot food’
M - MH	mīī	‘goat’	mīí	‘chicken’
L - ML	ḍèèl	‘storage shelf’	ḍèl	‘lake’
	jìì	‘tree type’	jìi	‘turkey’
L - MH	jèèm	‘thing, something’	jèém	‘sorghum sieve’
L - LM	bòggò	‘tree type’	bòggō	‘cream’
	bàròòl	‘snake type’	bàrōl	‘cistern’
HM - ML	kāān-d	‘fly’	kāānd	‘water-carrying stick’

(35) Verb minimal pairs in infinitive form

H-L	cág-g	‘bathe, wash’	càg-g	‘finish’
	pál-l	‘cut’	pàl-l	‘fall’
M-L	bēl-l	‘possess’	bèl-l	‘hit, beat’
M-HM	bēl-l	‘possess’	bēl-l	‘name, call’
L-HM	bèl-l	‘hit, beat’	bēl-l	‘name, call’

(36) Differing word category minimal pairs

H - M	káén	‘finished (ADJ)’	kāēn	‘yesterday (ADV)’
H - HL	káén	‘finished (ADJ)’	kāèn	‘thin (V)’
H - ML	fúúí	‘tree type’	fūūi	‘male (ADJ)’
H - LHL	kóófǒr	‘thin, weak (ADJ)’	kòòfǒr	‘weakness’
M - HL	kāēn	‘yesterday (ADV)’	kāèn	‘thin (V)’
M - ML	cīīnd-ǎgg	‘finishing (N.SG)’	cīīnd-àgg	‘playing (N.PL)’
H - MH	báár	‘weak (ADJ)’	bāár	‘tribe member’
M - MHM	bāāl	‘cave’	bāal	‘striped (ADJ)’
L - LHL	ḍùùl	‘difficult (ADJ)’	ḍùul	‘instrument’
HL - ML	jíílì	‘knowledgeable (ADJ)’	jīlì	‘ignorance’
ML - LH	gāàl	‘falcon’	gàál	‘far (ADJ)’
ML - HML	būūr	‘pot for wine’	búúr	‘remained (ADJ)’

As seen from (37), tone distinguishes subject and infinitive pronouns, as well as possessive pronouns of kinship terms and body parts. Tone also distinguishes the conjunction ǎ ‘and’ with Low tone from the second singular pronouns ǎ ‘you’ and ǎ ‘your’. Pronouns are discussed in the sections indicated in (37) and the conjunction

ə ‘and’ is discussed in 15.2.

(37) **Pronoun minimal pairs**

5.3	9.2	5.2.3	5.2.2	
Subject	Infinitive	Possessive kinship	Possessive body parts	
á	ā	á	ā	1s
ó	ō	ó	ō	2s
ē	ē	é	ē	3s

Tone also distinguishes singular and plural demonstrative adjectives as shown in (38) where singular demonstratives have initial High tone and plural demonstratives have initial Low tone.

(38) **Demonstratives (see 8.1.3)**

DEM ADJ SG		DEM ADJ PL	
née	‘this’	nèè	‘these’ near speaker
náá(n)	‘that’	nàà(n)	‘those’ near addressee
nááḁi	‘that’	nààḁi	‘those’ away from both

Tone also distinguishes the animate accompaniment preposition è ‘with’ from the inanimate accompaniment prepositions ē ‘with’ and the general preposition é (GP).

(39) **Preposition minimal pairs**

è	‘with’	Animate accompaniment preposition	11.1
ē	‘with’	Inanimate accompaniment preposition	11.2
é	GP	General preposition	11.3

In (40), examples of nouns with three tonal allomorphs of a plural suffix are given. The suffix of (a) has no underlying tone, allowing the plural form to surface with Low tone, the same as in the root. Whereas, the suffix of (b) has underlying Mid tone and the suffix of (c) has underlying High tone. As will be shown in section 6.3.1, there are seven other noun plural suffixes with two or three tonal allomorphs, most of which are not semantically or phonologically predictable with the root.

(40) **Tonal allomorphs of noun plural suffixes (see 6.3.1)**

	Suffix Tone	Noun SG	Noun PL	
(a)	-Agg	lèŋḁ	lèŋḁ-əgg	‘tree type’
(b)	-Āgg	bəŋɿ	bəŋɿ-əgg	‘pulp’
(c)	-Ágg	mīḁ	mīḁ-əgg	‘stone’

2.4.5 Grammatical tone

Gaahmg also frequently uses tone to distinguish grammatical function; there are grammatical distinctions made only by tone in nouns and verbs. Grammatical tone distinguishes bound morphemes with different grammar, or is a morpheme in itself, either added to or replacing underlying stem tone.

Tone distinguishes bound morphemes, such as the copular and definite clitics of (41). The copular singular clitic = $\bar{A}$ which takes the [ATR] value of the root has underlying Mid tone, the copular plural clitic = $\dot{A}$ has underlying Low tone, and the definite clitic = $\acute{A}$ has underlying High tone.

(41) **Copular = $\bar{A}$, = $\dot{A}$ and definite = $\acute{A}$ suffixes**

		7.2	7.3	
	Noun	Noun COP	Noun DEF	
SG	ḡōm	ḡōm = $\bar{\delta}$	ḡōm = $\acute{\delta}$	‘Arab’
PL	ḡōm-g	ḡōm-g = $\dot{\delta}$	ḡōm-g = $\acute{\delta}$	‘Arabs’

Similarly, the past and non-past continuous forms differ only by tone as shown by the verbs of (42). The past continuous suffix = $\bar{A}n$ has underlying MH tone, whereas the non-past continuous suffix = $\acute{A}n$ has underlying High tone.

(42) **Past = $\bar{A}n$ and non-past = $\acute{A}n$ continuous verb forms**

	9.8.6	9.8.7	
Root tone	CONT.P.3sN	CONT.N.3sN	
H	kóm- $\bar{a}n$	kóm- $\acute{a}n$	‘cut, chop’
L	gàf- $\bar{a}n$	gàf- $\acute{a}n$	‘give’
MH	kǎḡ- $\bar{a}n$	kǎḡ- $\acute{a}n$	‘strike’

Several verb clitics listed in (43-44) are also distinguished only by tone. The third singular object pronoun allomorph = E with no underlying tone attaches to first singular verbs as in (a) and a different allomorph = $\bar{E}$ with HM tone attaches to third singular verbs as in (b). The relative clause definite clitic = $\acute{E}$ with High tone attaches to singular person verb forms as in (c), and the clitic = $\bar{E}$ with Low tone attaches to plural person verb forms as in (d). The subordinate (SBO1) clitic = $\bar{E}$ with Mid tone attaches to first singular verbs as in (e).

(43) **Verb clitics distinguished by tone**

- | | | | | | |
|-----|--------|----------|---------------|-------------------|----------------------|
| (a) | 10.4.2 | 1sN/3sA | = E | pál = $\bar{e}$ | ‘cut.INCP.1sN = 3sA’ |
| (b) | 10.4.2 | 3sN/3sA | = $\bar{E}$ | pál = $\bar{e}$ | ‘cut.INCP.3sN = 3sA’ |
| (c) | 10.9 | RDM.SG | = $\acute{E}$ | pál = $\acute{e}$ | ‘cut.INCP.3sN=RDM’ |
| (d) | 10.9 | RDM.PL | = $\bar{E}$ | pál = $\bar{e}$ | ‘cut.INCP.3pN=RDM’ |
| (e) | 10.7 | SBO1.1sN | = $\bar{E}$ | pál = $\bar{e}$ | ‘cut.INCP.1sN=SBO1’ |

The third singular marked object pronoun allomorph $=i$ with no underlying tone attaches to first singular verbs as in (a) and a different allomorph $=\dot{i}$ with Low tone attaches to third singular verbs as in (b). The imperfect third singular clitic $=\dot{i}$ with High tone attaches to incomplete verbs as in (c), and the subordinate ‘when’ (SBO1) clitic $=\dot{\imath}$ with LM tone attaches to third singular verbs as in (d).

(44) **Verb clitics distinguished by tone**

- | | | | | | |
|-----|--------|----------|-----------------|----------------------------|---------------------|
| (a) | 10.4.2 | 1sN/3sN | $=i$ | $p\acute{o}l=i$ | ‘cut.INCP.1sN=3sAM’ |
| (b) | 10.4.2 | 3sN/3sN | $=\dot{i}$ | $p\acute{o}l=\dot{i}$ | ‘cut.INCP.3sN=3sAM’ |
| (c) | 10.6 | IPF.3sN | $=\acute{i}$ | $p\acute{o}l=\acute{i}$ | ‘cut.INCP=IPF.3sN’ |
| (d) | 10.7 | SBO1.3sN | $=\dot{\imath}$ | $p\acute{o}l=\dot{\imath}$ | ‘cut.INCP.3sN=SBO1’ |

Where tone is a morpheme in itself, it can be added to segmental forms or can replace the underlying tone of segmental forms. Tone is added to distinguish subject persons of verb forms and to distinguish future and non-future subject pronouns. Tone replacement is used for genitive case, plural person possession of body part nouns, antipassives, causatives, and verbal nouns.

In verbs, tone marks subject person agreement by being added to the stem-final syllable. As shown in (45), tone distinguishes third singular and third plural subject verb forms from other person forms. The verb root of (45) has underlying High tone and the completive suffix $-sA$ has no underlying tone. In such verbs, high tone is assigned to the stem-final syllable of third singular forms, Low tone is assigned to the stem-final syllable of third plural forms, and Mid tone is assigned to the stem-final syllable of first and second person forms.

(45) **Paradigm of completive verb $k\acute{o}m-sA$ ‘chop-COMP’ with subject pronouns (see 9.5)**

$\acute{a}$	$k\acute{o}m-s\acute{o}$	1s	$\acute{a}gg$	$k\acute{o}m-s\acute{o}$	1p
$\acute{u}$	$=k\acute{u}m-s\acute{u}$ ¹⁶	2s		$\acute{u}g=k\acute{u}m-s\acute{u}$	2p
$\acute{e}$	$k\acute{o}m-s\acute{o}$	3s	$\acute{e}, \acute{e}gg$	$k\acute{o}m-s\acute{o}$	3p

Tone is also added to subject pronouns to indicate future tense of the following verb form. In first and second person subject pronouns, Mid tone is assigned along with High tone on the final syllable, resulting in falling tone.

¹⁶ As discussed in 5.3, the second person morpheme specifies [+ATR] quality on verbs forms. The [+ATR] quality spreads leftward to the second person pronoun clitics $\acute{o}=, \acute{o}gg=$.

(46) **Future and non-future pronouns (see 9.8.4)**

Subject non-future	Subject future	
á	â	1s
ó	ô	2s
āggá	āggâ	1p
ōggó	ōggô	2p

Genitive case is marked by tone replacement. Nouns with Mid and MH root tone melody have HL melody in genitive forms. Nouns with all other root tone melody have ML tone melody in genitive forms.

(47) **Genitive singular and plural nouns with various root tone melodies (see 6.5)**

Root tone	GEN tone	Noun SG DEF	Noun SG DEF GEN	Noun PL	Noun PL GEN	
H	ML	t̥sɔ̌ = n	t̥sɔ̌ = n	t̥sɔ̌-gg	t̥sɔ̌-gg	‘cow’
M	HL	mĩĩ = n	mũĩ = n	mĩĩ-gg	mũĩ-gg	‘goat’
L	ML	ɖĩĩ = n	ɖĩĩ = n	ɖĩĩ-gg	ɖĩĩ-gg	‘rat’

A Low-Mid tone pattern is required by the plural person possessive morpheme of all body part nouns. Although the underlying tone melody of *b̥s̥s̥rà* / *b̥s̥s̥rà-gg* ‘shoulder’ in the paradigm of (48) is Mid-Low, the plural forms possessed by plural persons surface as Low-Mid.

(48) **Possessive paradigm for inalienable body part *b̥s̥s̥rà* / *b̥s̥s̥rà-gg* ‘shoulder’ (see 6.4)**

	Singular person pronouns			Plural person pronouns		
Noun SG	ā	b̥s̥s̥rà	1sP	---		1pP
	ō	b̥s̥s̥rà	2sP	---		2pP
	ē	b̥s̥s̥rà	3sP	---		3pP
Noun PL	ā	b̥s̥s̥rà-gg	1sP	āgg	b̥s̥s̥rà-gg	1pP
	ō	b̥s̥s̥rà-gg	2sP	ūgg	b̥s̥s̥rà-gg	2pP
	ē	b̥s̥s̥rà-gg	3sP	ēgg	b̥s̥s̥rà-gg	3pP

In antipassive forms, root tone melodies are replaced by other tone melodies: High changes to HM, Mid changes to MH, and Low changes to LH.

(49) **Antipassive suffix *-An* on third singular completive verbs (see 9.10.2)**

Root tone	3sN	ANTIP tone	3sN	
H	f̥ĩr-sɔ̌	HM	f̥ĩr-ōn-sɔ̌	‘smell’
M	c̥ōr-sɔ̌	MH	c̥ōr-ōn-sɔ̌	‘help’
L	ɖ̥ũr-sũ	LH	ɖ̥ũr-ũn-sú	‘bury’

In causative forms, root tone melodies are also replaced by other tone melodies, as shown in (50).

(50) **Third singular causative completive verbs (see 9.11.2)**

Root	COMP	CAUS	COMP	
tone	3sN	tone	CAUS 3sN	
H	f̃r-só	HM	f̃r-só	‘smell’
M	cōr-só	HM	cūr-sú	‘help’
L	ḍūr-sū	ML	ḍūr-sū	‘bury’
MH	kǎs-só	HM	kās-só	‘strike’

Finally, in verbal nouns, root tone melodies are replaced by other tone melodies, as shown in (51).

(51) **Verbal noun plural suffixes =*Agg*, =*gg* (see 10.10)**

Root	INF	VN	VN SG	VN PL	
tone		tone			
H	pál-l	M	pāl	pāl = āgg, pāl = g	‘cut’
L	f̃ɛl-l	ML	f̃ɛl	f̃ɛl = āgg, f̃ɛl = g	‘tell’
HL	p̃ir-r	ML	p̃ir	p̃ir = àgg, p̃ir = g	‘deceive’
HM	b̃ɛl-l	M	b̃ɛl	b̃ɛl = āgg	‘name’
MH	kǎð-ð	M	kān	kǎð-āgg	‘strike’