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**A grammar of Gaahmg, a Nilo-Saharan language of Sudan**  
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### 3 Morphophonology

Several morphophonological alternations applying throughout the language are presented in this chapter and labelled with an M. Alternations which apply only to certain morphemes are presented in the relevant sections, and not here. Phonological consonant rules, which were presented in 2.1.3 and the monosyllabic vowel lengthening which was presented in 2.3.3, are relisted here for ease of reference.

- {P1} Bilabial and palatal weakening (from 2.1.3)
- (a) /b/, /ʒ/ are weakened intervocally 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.
- {P2} Velar plosive elision (from 2.1.3)  
/g/ is elided both inter-vocally and word-finally when following a vowel.
- {P3} Plosive weakening (from 2.1.3)  
Plosives are weakened to approximants when they immediately precede word-final obstruents and follow vowels.
- {P4} Monosyllabic vowel lengthening (from 2.3.3)  
Vowels are realized as long in monosyllabic, opened-syllable nouns and verbs.

Whereas the phonological rules apply to all relevant environments in a word, the morphophonological rules only apply to relevant environments that exist because of morphemes combining. All rules in this section apply in several bound morphemes, often including both suffixes and clitics in both nouns and verbs. However, morphophonological rules are not applied to two noun clitics (COP, ACM), and are not applied to several verb clitics. Nevertheless, all the rules apply to all stem suffixes. In 4.2, morphophonological rules not applied to certain clitics are further discussed.

In the relevant sections throughout this thesis, when the rules of this section are referred to, they are indicated by number between braces such as {M3}. Thus, the common morphophonological rules of this section are easily distinguished from less common processes applied to one or two morphemes. The latter are more like exceptions in the language than rules. Each of the following rules is explained afterwards with examples.

### 3.1 Morphological consonant and vowel elision

{M1} Verb stem suffix vowel elision

When vowels are joined through morphology to verb stems with a vowel-final suffix, the final vowel of the stem is elided.

When the agentive passive clitic = $\bar{E}$  is attached to the stem  $\text{ʃ}\acute{e}r\text{-}s\bar{a}$  ‘forget-COMP’, the completive suffix vowel is elided ( $\text{ʃ}\acute{e}r\text{-}s = \bar{e}$ ). In the past continuous relative clause verbs of 10.9, the definite clitic = $\bar{E}$  does not elide the continuous suffix vowel -*a* of  $\eta\bar{a}n\text{-}\bar{a}$ . = $\acute{e}$  ‘file-CONT.P.RC=RDM’ and is one exception to the rule.

{M2} Suffixes becoming juxtaposed syllables

When vowels are joined through morphology to roots with final vowels, no vowels are elided and the bound morpheme appears as a syllable on its own, juxtaposed to the root.

When the vowel-initial past continuous suffix - $\bar{A}n$  is attached to the vowel-final verb root /pa/ ‘guard’, the suffix becomes a second syllable, juxtaposed to the root ( $p\bar{a}\text{-}\acute{a}n$ ). When the copular clitic = $\bar{V}n$  is attached to the root  $t\acute{s}\acute{s}$  ‘cow’, the clitic vowel *V* takes on all the features of the final vowel and begins a second syllable ( $t\acute{s}\acute{s}\text{-}\bar{v}n$ ). When the agentive passive clitic = $\bar{E}$  is attached to the root  $b\bar{a}\bar{a}$  ‘throw.INCP’, the suffix vowel becomes a new syllable ( $b\bar{a}\text{-}\bar{e}$ ).

### 3.2 Morphological [ATR] harmony

In 2.2.2.2, it was observed that the [-ATR] vowels (*e, ə, a*) and the [+ATR] vowels (*i, u, ə*) function as distinct sets in roots, the vowels of one set never occurring in the same root with vowels of the other set. The [ATR] harmony also functions across morpheme boundaries, spreading either to the right or to the left without limit in words to all vowels unspecified for [ATR]. [+ATR] quality is dominant. In all morphemes, only [+ATR] quality is specified underlying, and spreads from root to bound morpheme or from bound morpheme to root. Vowels that are not specified for [ATR], or do not have an [ATR] association through spreading, are realized as [-ATR] by default. Examples follow in the next two sections.

{M3} [+ATR] spreading

[+ATR] quality spreads to the left or to the right across morpheme boundaries, only limited by word boundaries, to vowels unspecified for [ATR].

### 3.2.1 Rightward [ATR] spreading

The [+ATR] quality spreads rightward from noun roots onto plural suffixes. In (1), nouns representing each of the six vowels attach the plural suffix *-EEgg*, where E is a vowel specified as [-back]. In (d-f), the [+ATR] quality assigned to the noun root spreads rightward onto the suffix unspecified for [ATR]. In (a-c), no such spreading occurs since roots and suffixes are unspecified for [ATR] and take [-ATR] quality by default.

#### (1) Rightward [ATR] spreading to plural suffix *-EEgg*

	Vowel	Noun SG	Noun PL	
(a)	ε	cɛ̀ɛ̀r	cɛ̀ɛ̀r-ɛ̀ɛ̀gg	‘singer’
(b)	a	ɖàà̀r	ɖàà̀r-ɛ̀ɛ̀gg	‘eagle’
(c)	ɔ	cɔ̀ɔ̀l	cɔ̀ɔ̀l-ɛ̀ɛ̀gg	‘donkey’
(d)	i	ʒíí	ʒíí-íígg	‘cricket’
(e)	ə	gùù̀r	gùù̀r-íígg	‘grinding stone’
(f)	u	à̀à̀r	à̀à̀r-íígg	‘sheep’

### 3.2.2 Leftward [ATR] spreading

The [+ATR] quality spreads leftward from the imperative plural suffix onto verb roots. A list of singular imperative and imperative plural forms representing each of the six vowels is given in (2). The singular imperative generally has no suffix and is often the same form as the root. The imperative plural has the suffix *-ɖA<sup>+</sup>*, where *A<sup>+</sup>* is a back vowel specified as [+ATR] and takes the [round] feature of the root. In (a-c), verb roots unspecified for [ATR] become [+ATR] in the plural imperative form. In (d-f), [+ATR] verb roots remain [+ATR].

#### (2) Leftward [ATR] spreading from imperative plural suffix *-ɖA<sup>+</sup>*

	Vowel	IMP	IMP PL	
(a)	ε	fɛ́ɛ́	fíí-ɖɔ̀	‘clean’
(b)	a	ɖáá	ɖóó-ɖɔ̀	‘put, make’
(c)	ɔ	kóm	kúm-ɖū	‘cut, chop’
(d)	i	díú	díú-ɖū	‘plant’
(e)	ə	pêr	pêr-ɖè	‘attach’
(f)	u	túr	túr-rū	‘see’

### 3.2.3 [+ATR] bound morphemes

Several [+ATR] bound morphemes which spread their quality to the root or stem are represented in (3). For each morpheme, the underlying root and surface form are given along with the section where the morpheme is discussed. [+ATR] quality distinguished the morphemes *-əgg*, *-<sup>+</sup>g*, *-ɖ<sup>+</sup>A*, *=i*, *=i* from other bound morphemes unspecified for [ATR] which are otherwise segmentally equivalent. In

addition, [+ATR] quality is a morpheme in itself added to second person subject verb forms to distinguish them from other person forms. As will be shown in 5.3, the second person singular verb for ‘chopping’ *ó kúm-ān* is [+ATR], whereas the first singular *á kóm-ān* and third singular *ē kóm-ān* are [-ATR].

(3) **[+ATR] bound morphemes and spreading**

Morpheme	Morpheme	UR	SR		Section
N.PL body part	-əgg	/bērɔ̃/	b̥ɪɔ̃-əgg anus-PL	‘anusés’	6.2.3
	- <sup>+</sup> g	/kālāā/	k̥əl̥āā-gg tongue-PL	‘tongues’	6.2.3
	-V <sup>+</sup> gg	/āā-ɔ̃/	əɔ̃-əgg eye.1pPp-PL	‘our eyes’	6.2.3
IMP.PL	-ɔ̃ <sup>+</sup> A	/nām/	n̥ám-ɔ̃ break-IMP.PL	‘Break!’	9.4
CAUS	-ɔ̃ <sup>+</sup> A	/kór/	k̥úr-ɔ̃ ‘read-CAUS’	‘he writes’	9.11
Marked ACC	=ì	/wár/	w̥ár = ì ‘take = 3sAM’	‘he takes him’	5.4, 10.4
DAT	=ɪ̃n	/gàf/	g̥àù-s = ɪ̃n ‘give- COMP=3SD’	‘he gave him’	5.5, 10.5
SBO1	=ì	/ŋān/	ŋ̥ān-s = ì ‘file-COMP = SBO1.3SN’	‘(when) he filed’	10.7
Second person subjects		/kóm/	ó kúm-ān, ú = kúm-ān ‘2sN=chop- CONT.N’	‘you are chopping’	5.3, 9.1

### 3.3 Morphological [round] harmony

{M4} Rightward [+round] spreading

[+round] quality spreads rightward from the root to all suffix vowels not underlyingly specified for the feature [round].

Several bound morphemes in noun and verb morphology are underlyingly specified for [round], but several bound morphemes in noun and verb morphology are not. The roundness only spreads rightward from roots to suffixes or clitics, and never the opposite direction. Roundness does not spread as specified in every word with every speaker, but tends to vary from word to word and from speaker to speaker.

### 3.3.1 Rightward [round] spreading in nouns

Nouns with root-final consonant sequences commonly take the plural suffix *-Agg*, where *A* is a back vowel unspecified for [round] and takes the [round] and [ATR] features of the root. In (4), the plural forms are shown for nouns with each of the six vowels. In (c,f), the [+round] feature of the root spreads to the vowel of the plural suffix, causing *A* to become *ɔ* or *u*. In other examples of (4), the suffix vowel is realized as unrounded. In (d-f), the [+ATR] quality of the verb root spreads rightward onto the suffix, whereas in (a-c), the noun root unspecified for [ATR] does not affect the suffix.

#### (4) Rightward [+round] spreading to noun plural suffix *-Agg*

	Root vowel	Noun SG	Noun PL	
(a)	ɛ	célɔ	célɔ-āgg	‘local broom’
(b)	a	mānɔ	mānɔ-āgg	‘tree type’
(c)	ɔ	kōrɔ	kōrɔ-ōgg	‘bird type’
(d)	i	t̥irɔ	t̥irɔ-ōgg	‘farm’
(e)	ə	lənɔ	lənɔ-əgg	‘tree type’
(f)	u	cúlɔ	cúlɔ-ūgg	‘birth sack’

### 3.3.2 Rightward [round] spreading in verbs

The completive verb has the suffix *-sA*, where *A* is a back vowel unspecified for [round] and takes the [round] and [ATR] features of the root. Similarly, plural subjunctive forms have the suffix *-ɔA* with the same vowel unspecified for [round]. In (5), the completive and plural subjunctive forms are shown for verbs with each of the six vowels. In (c,f), the [+round] feature of the root is spread to the vowel of the completive and plural subjunctive suffixes. In other examples of (5), the suffix vowel is realized as unrounded. In (d-f), the [+ATR] quality of the verb root spreads rightward onto the suffix, whereas in (a-c), the verb root unspecified for [ATR] does not affect the suffix.

#### (5) Rightward [+round] spreading to completive *-sA* and plural subjunctive *-ɔA*

	Root vowel	COMP	SBJV PL	
(a)	ɛ	bèè-sà	bèè-ɔà	‘tell, say’
(b)	a	cág-sā	cág-ɔā	‘bathe, wash’
(c)	ɔ	kóm-sō	kóm-ɔō	‘cut, chop’
(d)	i	cíg-sō	cíg-ɔō	‘wear’
(e)	ə	ɟə̀ə-sə	ɟə̀ə-ɔə	‘finish’
(f)	u	rùm-sū	rùm-ɔū	‘clear path’

### 3.4 Morphological tone rules

The following tone rules apply across morpheme boundaries in both noun and verb morphology. They are morphological in that they operate across morpheme boundaries rather than being linked to certain morphemes.

#### 3.4.1 Morphological tone spreading

- {M5} Rightward tone spreading to unassigned bound morpheme vowel  
When a bound morpheme with vowel does not have underlying tone, tone spreads rightward from the root or stem to the bound morpheme.

The High tone of the noun root *kás* ‘sorghum’ spreads to the plural suffix *-Agg* without tone (*kás-ǎgg*). The Mid tone of the incomplete verb stem *cǎr* ‘help.1sN’ spreads to the third singular object clitic =*E* without tone (*cǎr=ǎ* ‘help.1sN=3sA’). In a few nouns and verbs, tone spreads to bound morphemes with underlying tone.

- {M6} Second of two root or stem-final tones reassigned to bound morpheme vowel  
When a bound morpheme with vowel does not have underlying tone, and when there are two tones assigned to the root or stem-final syllable, the second tone is delinked and reassigned to the bound morpheme vowel.

The Low tone of the noun *ílf* ‘beeswax’ with HL root tone melody delinks and is reassigned to the suffix *-Agg* without tone (*ílf-ǎgg*). The Low tone of the verbal noun *pír* ‘lie’ with ML tone melody is delinked and reassigned to the plural clitic =*Agg* without tone (*pír=ǎgg*).

In a few verbs, the second of two tones assigned to the root-final syllable is not delinked but only spreads. The Low tone of the subjunctive verb *pír* ‘lie’ with HL tone melody is not delinked but only spreads to the subjunctive plural suffix *-ǎA* with no underlying tone (*pír-rǎ* ‘to.lie.1sN’).

In a few nouns and verbs, the second tone reassigns to bound morphemes with underlying tone. In the third singular continuous past form, the Low tone of the HL tone melody delinks and reassigns to the continuous past suffix *-ǎn* with MH tone (*pír-ǎn* ‘lie.3sN’). The initial Mid tone of the continuous suffix assimilates to the preceding Low {M9}.

#### 3.4.2 Mid tone lowering and Low tone raising

There are two significant processes in stems and words—a Mid tone lowering process and a Low tone raising process. In roots or stems with HM tone assigned to

the final syllable, the Mid tone assimilates to a Low tone of a bound morpheme. The rule is symbolized in {M7} where the dash mark represents a morpheme boundary of either an affix or clitic. The rule applies in both noun and verb stems.

{M7} Mid tone lowering  
HM-L > HL-L

The plural noun *wáâr-g* ‘insect’ has HM stem tone. The Mid tone becomes Low when the plural copular clitic = $\bar{A}$  with Low tone is attached (*wáâr-g = \bar{a}*).

The infinitive form of the verb *bél* ‘call’ has underlying HM tone. When the third plural morpheme assigns Low tone to the completive suffix attached to this verb, the root Mid tone becomes Low (*bél-dâ*).

In verbs with Low root tone melody, Low tone is raised to Mid when a suffix with Low tone is attached, as symbolized in M8. The process does not occur on verbs with other tone melodies ending in Low tone such as HL or ML tone melodies.

{M8} Verb root L raised to M preceding suffix L  
[only in verbs with Low root tone melody]  
L-L > M-L

The imperative form of the verb *jèr* ‘forget’ has underlying Low tone melody. When the third plural morpheme assigns Low tone to the completive suffix on the same verb, the Low root tone becomes Mid (*jèr-sâ*).

### 3.4.3 Suffix High and Mid tone lowering

There is also a lowering process of both High and Mid tone of bound morphemes. A contrast between High and Mid tone is neutralized on bound morphemes following root- or stem-final Low tone. The morphological tone lowering process of {M9} symbolizes the fact that High tone on a bound morpheme becomes Mid when following a root or stem with final Low tone. Further, Mid tone on a bound morpheme assimilates to root or stem-final Low tone. The rule applies in all noun and verb stems. However, the rule does not apply to some clitics such as accompaniment, passives, imperfects, and dative pronouns attached to noun or verb stems.

{M9} Bound morpheme High and Mid tone lowering  
L-H > L-M  
L-M > L-L

When the copular clitic = $\bar{A}$  attaches to the noun stem *séèn* ‘ruler’ with final Low



tone, the clitic Mid tone becomes Low ( $s\acute{e}\hat{e}n = \grave{a}$ ). When the definite clitic = $\acute{A}$  attaches to the same noun, the clitic High tone is lowered to Mid ( $s\acute{e}\hat{e}n = \bar{a}$ ). However, the Mid tone of the copular clitic = $\bar{A}n$  does not lower when attached to  $d\grave{i}i$  ‘rat’ ( $d\grave{i}i = \bar{i}n$ ). Similarly, the Mid tone of the accompaniment clitic =  $n\bar{E}$  does not lower when attached to the vowel-final noun stem  $\grave{a}ns\grave{a}$  ‘cooking plate’ ( $\grave{a}ns\grave{a} = n\bar{e}$ ).

The infinitive verb  $d\bar{s}\grave{a}s$  ‘stand’ has Mid-Low tone melody. In the first singular completive form, Mid tone assigned to the stem-final syllable assimilates to the root-final Low tone ( $d\bar{s}\grave{a}s-s\grave{a}$ ). In the third singular form of the same verb, High tone assigned to the stem-final syllable lowers to Mid tone ( $d\bar{s}\grave{a}s-s\bar{a}$ ). However, when the imperfect clitic = $\acute{E}$  with High is added to the third singular completive form, the High clitic tone does not become Mid ( $d\bar{s}\grave{a}s-s = \acute{e}$ ).

#### 3.4.4 Three tones assigned to a single stem syllable

There are various three-tone contours assigned through morphology to a single syllable, which result in surface tones that differ from the underlying tones. The combinations of underlying tones mostly do not surface in a single syllable in roots. Therefore, the changes resulting in the surface form are analyzed as morphophonological processes rather than processes that occur throughout the language.

As symbolized in {M10}, when the three tones High, Low, High are all assigned to a single stem syllable through morphology, the resultant tone for the syllable is High-Mid-High.

{M10} HLH > HMH

The first singular incompletive verb  $p\acute{r}$  ‘lie’ has a HL root tone melody. In the third singular incompletive form when High tone is added to the root tone to mark third person, the three tones High, Low, and High are all assigned to the same syllable and the Low tone surfaces as Mid ( $p\acute{r} \acute{r}$ ).

As symbolized in {M11}, when the three tones Low, High, Low are all assigned to a single stem syllable, the resultant tone for the syllable is Low-Mid-Low. However, the underlying contour surfaces without change in the heavy syllable noun root  $d\grave{u}\acute{u}l$  ‘instrument’, as shown in (31) of section 2.4.2.

{M11} LHL > LML

When the third plural past continuous suffix  $-\bar{A}n$  with MHL tone is added to the verb  $d\bar{s}\grave{a}s$  ‘stand’, and the initial Mid tone of the suffix assimilates to root-final Low tone, the suffix LHL tone then surfaces as LML ( $d\bar{s}\grave{a}s-\bar{a}n$  ‘starting.3pN’).