

Issues in the Tonology of Gã

A Senior Honors Thesis

Presented in Partial Fulfillment of the Requirements for graduation
with distinction in Linguistics in the undergraduate colleges
of The Ohio State University

by

Mary Paster

The Ohio State University
March 2000

Project Adviser: Professor David Odden, Department of Linguistics

Acknowledgements

Data for this study were collected in Columbus, Ohio during the period January 1998-June 1999 from Edward Amoo, a native speaker of Gã, to whom I am grateful for his patience. I would also like to thank John Akrobettoe, also a native speaker of Gã, who provided additional assistance. The research was funded by the Department of Linguistics at The Ohio State University, by an Arts and Sciences Undergraduate Research Scholarship, and by award money from the Denman Undergraduate Research Forum.

Chapter 1. Background

Gã, a Kwa language, is the primary language spoken in Accra (pop. 867,000), the capital of Ghana. The goal of this work is to provide a description of the phonology of Gã within an autosegmental framework, with a focus on tonal processes. This study is significant not only because Gã is spoken in West Africa, where few languages have been thoroughly documented with respect to tone, but also because Gã displays a number of interesting phonological properties.

1.1.1. Previous work on Gã

Previous work on Gã includes Dakubu (1973) and (1986), Kotey (1969), Okunor (1969), Trutenau (1972), Wentum (1997), and Zimmerman (1858). Early work on Gã did not include a systematic analysis of tone, often mentioning tone only in passing (e.g. Zimmerman (1858)), if at all. Okunor (1969) was the first in-depth analysis of tone in Gã. This study clarified some important tonal issues in Gã despite the fact that there would not be a theory capable of explaining these facts for ten years after its publication (see section 1.1.2 of the present paper for a discussion of autosegmental phonology). For example, Okunor appears to have been the first to recognize downstepped high tone as a type of high tone rather than as a mid tone. Further, he recognized the relationship between this type of downstep and the normal downdrift that occurs when two high tones are separated by a low tone (see section 1.2.2 of the present paper). On page 9, he writes that a downstepped high tone "... is basically a high tone but differs from a simple high tone in being a step lower than the preceding high tone just as it would be automatically if it were separated from the preceding high tone by one or more low tones." The book is organized into verb tenses, and includes partial verb paradigms for the eight tonal/prosodic verb stem types identified. Dakubu (1973) is a particularly useful Gã-English dictionary with tone carefully marked. This was the first true Gã-English dictionary, as earlier sources consisted simply of lists of English words translated into Gã. Dakubu's dictionary also includes grammatical information on many of its entries, indicating how a particular word or affix is used. Wentum (1997) provides an interesting analysis of lexical tone as well as an extensive and well-organized list of verb roots sorted by prosodic/tonal category. Dakubu (1986) discusses tone rules corresponding to the rules of falling tone simplification, the HL rule, and plateauing, and gives a brief analysis of floating tones in Gã.

1.1.2. Theoretical background

Work on tone languages has contributed significantly to phonological theory. Phonologists, whose interest is in the distribution of sounds (also called segments) in a language and the changes these segments undergo with respect to each other due to context, have known for many years that tone is an important property of some languages, where the pitch at which syllables in a word are pronounced makes a difference in the meaning of the word. However, it was only with the advent of autosegmental phonology that a theoretical basis was postulated which made sense of the variety of tonal systems found in the languages of the world (see Goldsmith 1976, Clements and Ford 1979).

Autosegmental theory was originally formulated to account primarily for the behavior of tones and was later generalized to explain all phonological features, which are the primitives which distinguish one segment from another (including the place in the mouth where a segment is articulated, whether or not the segment is voiced, and the shape of the lips, to name a few). Previous phonological theories such as characterized in Chomsky and Halle 1968 assumed a one-to-one correlation between speech segments and features, so that each segment had exactly one value for a given feature. Autosegmental theory denies this assumption, claiming instead that adjacent segments may share features, that a single segment may have two specifications of the same type of feature, and even that a feature may exist without a segment. In terms of tone, an autosegmental approach accounts for the fact that tone languages can have vowels with more than one tone (1a), which explains the existence of contour tones; multiple vowels that share a single tone (1b); and unpronounced 'floating' tones that are not linked at all (1c).

- (1) a. Falling tone
hô
 /\
 HL
- b. Multiple linking
yóó
 V
 H
- c. Floating tone
gá' gá
 | |
 H(L)H

Originally, autosegmental phonology was supported only by a few languages. Since that time, some sophisticated work has been done on tone languages, and each different language has contributed to phonologists' concept of how autosegmental features work and how they interact. Therefore, it is of great importance to the field of

phonology to test the theory against the widest possible range of languages, since each new language has the potential to present data which will require major modifications of the theory, or perhaps the total abandonment of the theory.

1.2. Phonological and morphological structure

1.2.1. Phonemes

1.2.1.1. Vowels

Gã has a seven-vowel system (2). Vowels may be nasal (indicated by underlining) and/or long.

(2)	i	u
	e	o
	ɛ	ɔ
	a	

There is no contrast between tense and lax nasal vowels [ẽ] and [ɛ̃], or [õ] and [ɔ̃]. The nasal mid vowels are all realized as the lax variants, [ɛ̃] and [ɔ̃], respectively. The nasalized lax mid vowels behave phonologically as lax vowels. (3) shows examples of forms which have undergone a process assimilating the definite suffix -ɛ¹ to a preceding lax vowel.

(3)	gbé	‘pot’	gbé- ¹ ɛ ²	‘the pot’
	shí ¹ tó	‘pepper’	shí ¹ tó- ¹ ɔ̃	‘the pepper’
	la	‘fire’	lá- ¹ á	‘the fire’

In (4), we see that tense vowels do not trigger assimilation.

(4)	mí	‘drum’	mí- ¹ ɛ̃	‘the drum’
	músu	‘stomach’	músu- ¹ ɛ̃	‘the stomach’
	fíne	‘wing’	fíne- ¹ ɛ̃	‘the wing’
	too	‘sheep’	toó- ¹ ɛ̃	‘the sheep’

Nasalized mid vowels pattern with the lax vowels in triggering the assimilation (5), indicating that these are, in fact, lax vowels.

¹ The suffix has another variant, [-lɛ], whose vowel does not assimilate; presumably, this is the underlying form of the suffix, and /l/ is optionally deleted prior to the application of vowel assimilation. Also, as is evident in the forms in (3), the definite suffix induces tone changes in some nouns. This is because the suffix contributes a H tone, which docks to the final vowel of the noun stem.

² There is no change in the suffix vowel after [ɛ̃], but I assume that the suffix vowel does actually take on the feature specifications of the preceding [ɛ̃], just as it does with the other lax vowels. However, there can be no evidence from assimilation for this assumption.

- (5) sɛ̃ ‘throat’ sɛ̃-ɛ̃ ‘the throat’
 omɔ̃ ‘rice’ omɔ̃-ɛ̃ ‘the rice’

1.2.1.2. Consonants

Consonants are as follows:

(6)

	lab	cor	vel	labio-velar (complex)
stop	p/b	t/d	k/g	kp/gb
fric	f	s, sh		
affric		ch/j		
glide	w		y	
liquid		l, r		
nasal	m	n	ŋ	ŋm

1.2.2. Tones

The tone-bearing unit (TBU) in Gã is assumed to be the mora³. Since all vowels and syllabic consonants (which can include nasals and liquids) are moraic, these are the segments which effectively bear tones. For the sake of simplicity, many of the diagrams in this work will show tones linked directly to segments (or to V's, representing vowels); this should be taken as shorthand for a tone linked to a mora which, in turn, is linked to the root node of the segment.

Level tones remain at the same pitch throughout the duration of the vowel. In Gã, level tones are either low (indicated by L; unmarked in transcriptions, as in [la] ‘fire’), high (indicated by H; marked by an acute accent over the sound, as in [lá] ‘blood’), or H preceded by a downstep, which lowers the pitch of the H tone (marked by an exclamation mark preceding the downstepped tone, as in [e-ká'né] ‘he counted’). Contour tones are falling (as in [e-hê] ‘he bought’) or rising (as in [e-droó] ‘he helped’). The contour tones represent the association of two tones to one or more TBU's in the same syllable, so that a falling tone is a composite made up of a H tone and a L tone (7a). A falling tone starts with a high pitch and goes lower. A rising tone, made up of the sequence LH, starts with a low pitch and goes higher (7b). A final type of contour tone is the rise-fall (as in [e-loô]

³ As argued by Paster (2000), there are two serious objections to the alternative, that the syllable is the TBU. First, there are two different types of falling tones differentiated by their behavior phrase-medially: monomoraic falling tones lose their L and surface as level-H (see section 2.3.4), while bimoraic falling tones surface as HL before L and H'H before H (see section 2.1.2). If we write tone rules to account for these phenomena assuming the syllable as TBU, then the only way to differentiate the two types of fall is to claim that the bimoraic falls are actually bisyllabic. However, as will be shown in section 2.3.2, CV₁V₁ roots undergo a vowel shortening process that indicates that these roots are monosyllabic; the process applies to CVV HL roots such as /pij/, which fall into the bisyllabic class under the syllable-as-TBU account. In addition to this contradiction, the syllable account also requires that the rule of prevocalic vowel shortening (to be described in section 2.3.2) do two things: delete the first mora of a long vowel before another vowel, and delete the first tone of the syllable to which that mora was linked. Under the mora account, this rule simply deletes the first mora along with the tone that is directly associated to it.

‘he collected’), the manifestation of the tone sequence LHL on a sequence of adjacent vowels (7c).

- (7) a. $\begin{array}{c} \text{hê} \\ \diagup \quad \diagdown \\ \text{H} \quad \text{L} \end{array}$
- b. $\begin{array}{c} \text{droó} \\ || \\ \text{L} \quad \text{H} \end{array}$
- c. $\begin{array}{c} \text{loô} \\ || \quad \diagdown \\ \text{L} \quad \text{H} \quad \text{L} \end{array}$

In general, contour tones are dispreferred. The rise-fall pattern is rare, while the language makes use of mechanisms to avoid or simplify rising and falling tones. Falling tones, for example, are simplified to level H phrase-medially (see section 2.3.4). An interesting property of rising tones is that they never are manifested on a single short vowel. When a rising tone is associated to what is expected to be a short vowel (one with a single mora), the vowel lengthens to accommodate the rising tone (see section 2.1.5 for more discussion of this phenomenon). In addition, contour tones in Gã are limited to certain contexts. Falling and rising tones only appear at the end of a word. There appear to be no words with a falling tone at the beginning of a long vowel or in the first syllable of a multi-syllabic word⁴.

Downstepped H tones are phonological H tones which are slightly lower in pitch than a preceding H tone. A downstep has the effect of lowering the pitch range of all following tones, so that a downstepped H tone is (phonetically) approximately midway between a H tone and a L tone. It is assumed that this non-automatic downstepping is the result of a more general phenomenon of automatic downstep, also referred to as downdrift, where a L tone lowers the pitch register before a H tone. For instance, in the phrase [mí-walí] ‘my spoon,’ the H tone on the third syllable is lower than the H tone on the first syllable because of the intervening L tone on the second syllable. Downdrift affects L tones as well as H tones, so that in a sequence of L tones, the pitch lowers across the utterance.

Non-automatic downstepping results from a ‘floating’ L tone between two H tones, as in (8).

- (8) $\begin{array}{c} \text{gá} \quad \text{!} \quad \text{gá} \\ | \quad \quad | \\ \text{H} \quad (\text{L}) \quad \text{H} \end{array}$

⁴ This could be due to the way in which tones link to TBU’s, if tones are not underlyingly linked to TBU’s: if association proceeds one-to-one, left-to-right, then any ‘leftover’ tones will be associated to the final mora, so that contour tones may only appear on the final mora.

The floating tone exists in the tonal representation of the word or phrase, but does not manifest itself by being associated to a mora; rather, it is evidenced indirectly through its pitch lowering effect on following H tones.

As mentioned above, tone assignment may be lexical or assigned by rules. Lexical tones are not predictable; their assignment is simply memorized by the speaker. Rule-governed assignment follows predictable patterns, and may be used to distinguish verb tenses in the language. The lexical tones are H as in [wó] ‘lift’, L as in [wo] ‘wear’, HL (or falling) as in [hê] ‘buy’, and LH (or rising) as in [droó] ‘help’. The underlying tones change predictably with verb tense, and verbs of the same prosodic type generally pattern together for these changes, as will be discussed in section 1.2.4.

1.2.3. Syllable structure

Examples of possible syllable structures are given below.

(9)	V	[e.ha.o]	‘he worried’
	VV	[ee.cha]	‘he is digging’
	CV	[wɔ.ma]	‘we built’
	CVV	[e.gbɔɔ]	‘he hunted’
	CyV	[nyɛ]	‘you (pl.)’
	CVN	[maŋ] ⁵	‘town’

The effects of syllable structure restrictions on polymorphemic V+V sequences will be addressed in section 2.3.2.

1.2.4. Verb morphology

Verbs generally consist of a subject prefix and a verb root, with various segmental and tonal prefixes and suffixes differentiating tense/aspect.

1.2.4.1. Verb tenses

The following verb tenses are observed: simple past (10a), generic negative⁶ (10b), perfective (10c), negative perfective (10d), progressive (10e), habitual (10f), future (10g), negative future (10h), subordinate (10i), imperative (10j), negative imperative (10k), and participial (10l). The basic shape of each tense is listed; in some cases, the particular form of subject prefixes (SP’s) is tense-specific. The derivation of these forms through association of floating tones, etc., will be examined in detail in chapter 3.

⁵ Dakubu (1973) records this as CVN; however, in the present study, the status of the final segment in forms like this as a nasal consonant vs. nasalized vowel was unclear.

⁶ The ‘generic negative’ is so named because this form is used as the negative of the simple past, habitual, and progressive.

- (10) a. Simple past (SP-L-root)
mí-cha 'I dug'
e-cha 'he dug'
ákú cha 'Aku dug'
- b. Generic negative (SP-H-root-HHL-VV)
mí-¹chá-ââ 'I did not dig'
é-¹chá-ââ 'he did not dig'
ákú é-¹chá-ââ 'Aku did not dig'
- c. Perfective (SP-H-L-root)
mí-cha 'I have dug'
é-cha 'he has dug'
ákú é-cha 'Aku has dug'
- d. Negative perfective (SP-H-root-H-kɔ)
mí-¹chá-kɔ 'I have not dug'
é-¹chá-kɔ 'he has not dug'
ákú é-¹chá-kɔ 'Aku has not dug'
- e. Progressive (SP-n-root)
mí-n-¹chá 'I am digging'
e-e-cha 'he is digging'
ákú n-cha 'Aku is digging'
- f. Habitual⁷ (SP-L-root-ɔ)
mí-cha-a 'I dig (habitually)'
e-cha-a 'he digs (habitually)'
ákú cha-a 'Aku digs (habitually)'
- g. Future (SP-baá-root)
má-¹chá 'I will dig'
e-baá-¹chá 'he will dig'
ákú baá-¹chá 'Aku will dig'
- h. Negative future (SP-H-root-H-¹ŋ)
mí-¹chá-¹ŋ 'I won't dig'
é-¹chá-¹ŋ 'he won't dig'
ákú é-¹chá-¹ŋ 'Aku won't dig'
- i. Subordinate (SP-H-root)
má-¹chá 'that I dig'
é-¹chá 'that he dig'
ákú á-¹chá 'that Aku dig'
- j. Imperative (root-H; nyɛ-root-a; nyɛ-há-a
wó-root-a)
cháá 'dig!'
nyɛ-cha-a 'dig (pl.)!'
nyɛ-há-a wó-cha-a 'let's dig'
- k. Negative imperative (kaá-root; nyɛ-ká-root-a; nyɛ-ka-há-a ní wó-root-a)
kaá-¹chá 'don't dig!'
nyɛ-¹ká cha-a 'don't dig (pl.)!'
nyɛ-ka-há-a ní wó-cha-a 'let's not dig'
- l. Participial (root-mɔ)
hao-mɔ 'worrying'
fútu-mɔ 'mixing'
hé-¹mó 'buying'

1.2.4.2. Verb roots

The following types of verb roots are observed:

⁷ Note that the habitual suffix in (8f) is actually /-ɔ/, and assimilates to the preceding /a/, as will be discussed in section 1.2.4.5.

(11)	CV L	e-fo	‘he tied’
	CV H	e-lá	‘he sang’
	CV toneless ⁸	e-ba	‘he came’
	CV HL	e-hê	‘he bought’
	CV LH ⁹	e-droó	‘he helped’
	CV ₁ V ₁ L	e-doo	‘he roasted’
	CV ₁ V ₂ toneless	e-hao	‘he worried’
	CVV H	e-yóó	‘he recognized’
	CV ₁ V ₂ LH	e-foá	‘he hugged’
	CV ₁ V ₁ HL ¹⁰	e-pí ¹ ₁	‘he suffered’
	CV ₁ V ₂ HL	e-bó ¹ _á	‘he gathered’
	CV ₁ V ₁ LHL	e-feê	‘he did’
	CV ₁ V ₂ LHL	e-hiê	‘he hand-carried’
	CV ₁ CV ₁ toneless	e-kata	‘he lifted two-handed’
	CV ₁ CV ₂ toneless	e-chukɔ	‘he roasted’
	CV ₁ CV ₁ H	e-télé	‘he carried on head’
	CV ₁ CV ₂ H	e-kádí	‘he made a mark’
	CV ₁ CV ₁ LH	e-kojó	‘he judged’
	CV ₁ CV ₂ LH	e-majé	‘he sent’
	CV ₁ CV ₁ HL	e-chá ¹ _{lá}	‘he mended’
	CV ₁ CV ₂ HL	e-bó ¹ _{té}	‘he entered’
	CVVCV HL	e-dí ¹ _í dá	‘he staggered’
	CCVCV HL	e-flí ¹ _í kí	‘he flew’

The following gaps and asymmetries are observed: only three underlying CV LH verbs were found; the verb /hao/ ‘worry’ appears to be the only verb of type CVV toneless as well as the only CVV root with a diphthong, and verbs of type CVV always end in a non-front vowel, usually [o] or [ɔ]; /yóó/ ‘recognize’ is the only verb of type CVV H that has been found; there are very few CVV LH verbs; /pí¹₁/ ‘suffer’ is the only example of a CVV HL verb with like vowels that has been found; only two examples of CVV LHL verbs with two different vowels have been found; and /dí¹_í dá/ ‘stagger’ and /flí¹_í kí/ ‘fly’ are the only verbs of their respective types to have been found. There apparently also are no verbs of type CV LHL, CVCV L, or CVCV LHL. It also appears that there are no H¹H roots; there could be no contrast between these and HL roots in citation form.

1.2.4.3. Subject prefixes

The pronoun subject prefixes are /mí¹-/, /o-/, /e-/, /wɔ-/, /nyɛ-/, and /amɛ-/ (12).

⁸ As will be shown, toneless roots behave differently from both H-toned and L-toned roots. Toneless syllables surface as L by default.

⁹ Due to the rising tone, the underlying short vowel lengthens (see section 2.1.5).

¹⁰ The verbs listed as HL in (11) surface as H¹H in citation form because of the HL rule (see section 2.1.1).

- (12) mí-dú-úú ‘I did not cultivate’
 o-dú-úú ‘you did not cultivate’
 e-dú-úú ‘he did not cultivate’
 wɔ-dú-úú ‘we did not cultivate’
 nyɛ-dú-úú ‘you (pl.) did not cultivate’
 amɛ-dú-úú ‘they did not cultivate’

The subject prefixes undergo tonal and/or segmental changes in some tenses. The tone of subject prefixes changes predictably in several tenses, which will be shown to be the result of floating tone markers (section 1.2.4.6). A phenomenon of subject prefix deletion will provide evidence that except for /mí-/ , which is H-toned, all of the subject prefixes are underlyingly toneless and surface as L by default.

1.2.4.4. Other segmental prefixes

Other segmental verb prefixes are specific to tense/aspect. For example, one prefix, /n-/ , marks the progressive tense (13). As shown, the prefix assimilates to the place of articulation of the following consonant.

- (13) mí-n-dú ‘I am cultivating’
 wɔ-n-dú ‘we are cultivating’
 nyɛ-n-dú ‘you (pl.) are cultivating’
 amɛ-n-dú ‘they are cultivating’
 ako n-dú ‘Ako is cultivating’

When the subject prefix is /o-/ ‘you’ or /e-/ ‘he,’ the nasal consonant does not surface; instead, the vowel of the subject prefix is lengthened, as shown in (14).

- (14) o-o-dú ‘you are cultivating’ e-e-dú ‘he is cultivating’

Because the vowel in [mí] is nasalized and the progressive prefix assimilates to the place of the following consonant, it is difficult to perceive whether the progressive prefix surfaces as a nasal consonant or nasalized vowel in the first person singular forms (transcribed here as a consonant, as in [mí-n-dú] above), since there is not a strong acoustic boundary between the vowel and root-initial consonant.

The subordinate is marked by the prefix /á-/ , as shown in (15).

- (15) ákú á-sɔle ‘that Aku pray’ ako á-sɔle ‘that Ako pray’

When following the subject prefix /mí-/ , the subordinate prefix triggers deletion of the /i/ , resulting in forms such as in (16).

- (16) má-¹chá ‘that I dig’
 má-lá ‘that I sing’
 má-sóle ‘that I pray’

When following any of the other subject prefixes, /á-/ deletes, as shown in (17), possibly as the result of a dispreference in the language for vowel clusters. The H tone of the /á-/ prefix remains and associates to the subject prefixes.

- (17) ó-lá ‘that you sing’
 é-lá ‘that he sing’
 wó-lá ‘that we sing’
 nyé-lá ‘that you (pl.) sing’
 amé-lá ‘that they sing’

Another prefix, /bǎ-/¹¹, appears in the future tense (18).

- (18) e-baá-lá ‘he will sing’ ákú baá-lá ‘Aku will sing’

The first person singular future forms (19) behave differently.

- (19) má-¹chá ‘I will dig’
 má-lá ‘I will sing’
 má-sóle ‘I will pray’

These first person singular forms in the future tense are identical to those in the subordinate, and it may be the case that these forms are actually taken from the subordinate. Otherwise, the series of rules needed to generate the future forms is rather complex. First, the H tone of the subject prefix induces plateauing (see section 2.1.2) on the /bǎ-/ prefix, giving [mǐ-¹bá]. Next, the /ǐ/ and associated H tone of the subject prefix are deleted, giving [m-¹bá]. Finally, the sequence [mb] is simplified to [m], giving [m¹á]. This series of rule application would result in a floating L tone before the subject prefix; it is unclear whether this is the case.

The negative imperative and negative hortative forms (20) are marked by the prefix /ka-/.

- (20) kaá-lá ‘don’t sing!’
 nyé-¹ká lá-a ‘don’t sing (pl.)!’
 nyé-ka-há-a ní wó-lá-a ‘let’s not sing’

The prefix surfaces with a rising tone and a long vowel in the singular form and with a H tone in the plural form. This is due to a floating H tone negative imperative marker (see section 1.2.4.6) which associates to /ka-/.

¹¹ The vowel in this prefix is assumed to be underlyingly short and to lengthen by a process of rising tone lengthening, to be discussed in section 2.1.5.

1.2.4.5. Verb suffixes

In addition to prefixes, several verb tenses also have suffixes. The future negative, for example, has the suffix /-¹ŋ/, as shown in (21).

(21)	mí-lá- ¹ ŋ	‘I will not sing’	e-lá- ¹ ŋ	‘he will not sing’
	mí- ¹ chá- ¹ ŋ	‘I will not dig’	é- ¹ chá- ¹ ŋ	‘he will not dig’
	mí- ¹ kójó- ¹ ŋ	‘I will not judge’	é- ¹ kójó- ¹ ŋ	‘he will not judge’
	mí- ¹ chómó- ¹ ŋ	‘I will not twist’	e- ¹ chómó- ¹ ŋ	‘he will not twist’

Some imperative forms have the suffix /-m₂/, as shown in (22).

(22)	e-yóó	‘he recognized’	yóó-m ₂	‘recognize!’
	e-fóté	‘he poured’	fóté-m ₂	‘pour!’
	e-ká ¹ né	‘he counted’	ká ¹ né-m ₂	‘count!’
	e-ká ¹ i	‘he remembered’	ká ¹ i-m ₂	‘remember!’
	e-gbla	‘he dragged’	gblá-m ₂	‘drag!’
	e-hao	‘he worried’	háó-m ₂	‘worry!’
	e-hê	‘he bought’	hé-m ₂	‘buy!’
	e-droó	‘he helped’	droó-m ₂	‘help!’

Of the root types that take this suffix in their imperative forms, some have optional variants without the suffix, as in (23). Of those roots for which this variant was observed, all are of type CVV, and none have more than one tone. The CVV roots all get level H tone.

(23)	yóó	‘recognize!’
	tóó	‘float!’
	túú	‘approach!’
	káá	‘take a vow!’

When the root is short, the /-m₂/ suffix does not surface (24), but these short roots still have a H tone suffix, which interacts with their root tones in a variety of ways. The class of ‘short’ verb roots for the purpose of the /-m₂/ suffix includes all CV verbs except those having a rising or falling tone¹².

(24)	e-jo	‘he danced’	joó	‘dance!’
	e-ba	‘he came’	bá	‘come!’
	e-chú	‘he sent’	chú	‘send!’

¹² The stem /gbla/ in (22) seems to be an exception, since it appears to have only a single short vowel and therefore would be predicted to behave like the CV roots, yet the inclusion of the suffix indicates that it is of the ‘long’ root type. In section 2.3.3, I argue that roots of surface type CCV are underlyingly CVCV.

In one exceptional case, the root /hɑ/ ‘give,’ a short root does optionally take the suffix (25).

- (25) hɑɑ-mó fɔ́'ó ~ hɑɑ' fɔ́'ó ‘give the oil!’

The plural imperative and its negative have the suffix /-a/, as shown in (26).

- (26) nyɛ-fɔ́tɛ-a ‘pour (pl.)!’ nyɛ-ká-fɔ́tɛ-a ‘don’t pour (pl.)!’
nyɛ-yóó-a ‘recognize (pl.)!’ nyɛ-ká-yóó-a ‘don’t recognize (pl.)!’

The same suffix appears in the hortative and its negative (27).

- (27) nyɛ-hɑ-a wɔ́-fɔ́tɛ-a ‘let’s pour’
nyɛ-ka-hɑ-a wɔ́-fɔ́tɛ-a ‘let’s not pour’
nyɛ-hɑ-a wɔ́-yóó-a ‘let’s recognize’
nyɛ-ka-hɑ-a wɔ́-yóó-a ‘let’s not recognize’

It should be noted that the /-a/ suffix appears both on the main verb and on the verb /hɑ/ (literally, ‘give’) in the hortative.

The generic negative has a suffix consisting of a bimoraic vowel which assimilates to the final vowel of the root as in (28).

- (28) e-dú-úû ‘he did not cultivate’
e-lá-áá ‘he did not sing’
e-kpé-éê ‘he did not chew’

The structure of [e-kpé-éê] is shown in (29). Note that the delinking of the H on the subject prefix is due to a polarity process to be described in section 2.1.4.

- (29)

The final vowel of a generic negative form is always tri-moraic. When the final vowel of the root is long, the vowel is shortened before the suffix. This neutralizes the length contrast in root-final vowels, as shown in (30).

- (30) e-tú ‘he jumped’ e-tuu ‘he approached’
é-!tú-úû ‘he did not jump’ é-!tú-úû ‘he did not approach’

This phenomenon will be examined more closely in section 2.3.2.

The habitual is marked by the suffix /-ɔ/ (31).

- (31) e-nu-ɔ 'he drinks (hab.)'
 e-mɛ-ɔ 'he waits (hab.)'
 e-hulú-ɔ 'he jumps (hab.)'

The /-ɔ/ suffix assimilates to root-final /-a/, as in (32).

- (32) e-ma-a 'he strikes (hab.)'
 e-shwatá-a 'he pulls forcibly (hab.)'
 e-bóa-a 'he gathers (hab.)'

The suffix /-kɔ/ marks the negative perfective, as shown in (33).

- (33) e-chósé-kɔ 'he has not trained'
 e-yóó-kɔ 'he has not recognized'
 e-bó'á-kɔ 'he has not gathered'

Participial forms include the suffix /-mɔ/, as in (34).

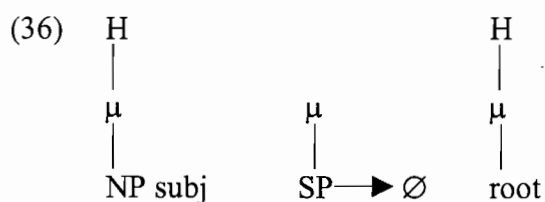
- (34) e-kpá hao-mɔ 'he stopped worrying'
 e-kpá fútu-mɔ 'he stopped mixing'
 e-kpá sole-mɔ 'he stopped praying'

1.2.4.6. Floating tone tense/aspect markers

Some verb tenses, in addition to or instead of the segmental suffixes or prefixes described in section 1.2.4, have prefixed floating tones which may dock to the segmental prefixes. As will be demonstrated in section 2.1.3, the subject prefixes are underlyingly toneless, except for the H-toned /mí-/ . Evidence for the toneless prefixes comes from a process of subject prefix deletion, which applies to a non-H-toned subject prefix after an NP subject. In tenses with a floating L tone prefix, the tone is left behind after subject prefix deletion, resulting in downstep of a following H-toned root, as in (35).

- (35) H L H
 | | |
 μ μ μ
 | | |
 NP subj SP → ∅ root

In tenses with no floating tone prefixes, however, the deletion of subject prefixes leaves behind no tone, indicating that there is no underlying L tone on the prefixes (36).



The simple past has a prefixed floating L tone which surfaces on the subject prefix. As shown in (37), the association of the floating L to the subject prefixes causes all of the subject prefixes, including the underlyingly H-toned first person singular prefix, to surface with a L tone in the simple past.

(37)

mī-dú	‘I cultivated’
e-dú	‘he cultivated’
o-dú	‘you cultivated’
wɔ-dú	‘we cultivated’
amɛ-dú	‘they cultivated’
nyɛ-dú	‘you (pl.) cultivated’

(38) shows how the prefix tones are derived.

(38)

H-toned prefix	Toneless prefix
mī † H L (simple past marker)	e L (simple past marker)

The perfective (39) has a floating H tone which associates to the subject prefixes so that the prefixes surface with H tone.

(39)

mī-jo	‘I have danced’
é-jo	‘he has danced’
ó-jo	‘you have danced’
wó-jo	‘we have danced’
amɛ-jo	‘they have danced’
nyɛ-jo	‘you (pl.) dance’

The negative imperative (40) is marked by a H tone that associates to the prefix /ka-/. The prefix is underlyingly L-toned, but with the association of the H tone, surfaces either with a rising tone or with a downstepped H tone (with the underlying L tone delinking, causing the downstep).

(40)

kaá-lá	‘don’t sing!’	nyɛ- [!] ká lá-a	‘don’t sing (pl.)!’
--------	---------------	---------------------------	---------------------

(41) shows how the prefix tones are derived.

- (41) **Singular** **Plural**
- L H (neg. imper. marker) H L H (neg. imper. marker)
- | | | |
- μ μ ← ∅ μ μ
- (rising tone lengthening; 2.1.5) (plateauing rule; 2.1.2)
- kaá nvé-! ká

cf. negative hortative forms (42), which do not have a floating tone. These surface as L, indicating that the /ka-/ prefix is not underlyingly H-toned.

- (42) ny_E-ka-há-a wɔ-lá-a 'let's not sing'
ny_E-ka-há-a ní wɔ́-fo-a 'let's not cut'

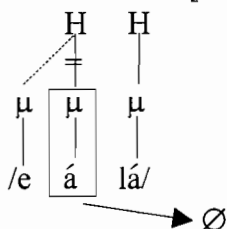
The other negative tenses have a H tone prefix that associates to the subject prefix but is delinked when followed by a root with initial H tone by a polarity process (see section 2.1.4).

In the subordinate (43), all of the subject prefixes surface with a H tone.

- (43) má-lá 'that I sing'
 é-lá 'that he sing'
 ó-lá 'that you sing'
 wó-lá 'that we sing'
 amé-lá 'that they sing'
 nyé-lá 'that you (pl.) sing'

These data could be explained by a floating H tone, but this is not necessary since, as explained in the preceding section, it could also be assumed that the H tone in this tense is underlyingly associated to the prefix /á-/ , which surfaces in forms with a noun phrase (NP) subject (e.g. [áku á-lá] ‘that Aku sing’) and in the first person singular (as in [má-lá] above), but which is deleted after the other subject prefixes, leaving only a floating H tone, as in (44).

- (44) Derivation of [é-lá]



The perfective and habitual have floating L tones which do not associate but remain floating between subject prefixes and verb roots in the surface form. These floating tones are manifested as a downstep between H-toned subject prefixes and H-

toned roots, and cause blockage of some phonological processes in these tenses. A closer examination of the effects of floating tones will be presented in section 2.2.

1.2.4.7. Tone suffixes

Some tenses have suffixed floating tone markers that associate to verb roots. The negative perfective, negative future, and imperative have H tone suffixes that associate to the final vowel of roots. (45) shows that L-toned roots have a downstepped H tone in the negative perfective due to the H tone suffix.

- | | | | | |
|------|-------|-------------|------------------------|---------------------|
| (45) | e-cha | ‘he dug’ | é- [!] chá-kɔ | ‘he has not dug’ |
| | e-jo | ‘he danced’ | é- [!] jó-kɔ | ‘he has not danced’ |

The derivation of these forms is shown below (the association of H and delinking of L will be explained by a plateauing rule to be described in section 2.1.2).

- (46)
- | | | |
|---------------------|---|-------------------|
| é- [!] chá | - | kɔ |
| | | |
| H | L | H (tone suffix) L |

The same effect is found in the negative future (47).

- | | | | | |
|------|-------|-------------|-------------------------------------|------------------|
| (47) | e-cha | ‘he dug’ | é- [!] chá- [!] ŋ | ‘he won’t dig’ |
| | e-jo | ‘he danced’ | é- [!] jó- [!] ŋ | ‘he won’t dance’ |

The association of H tone suffixes to roots is shown in (48).

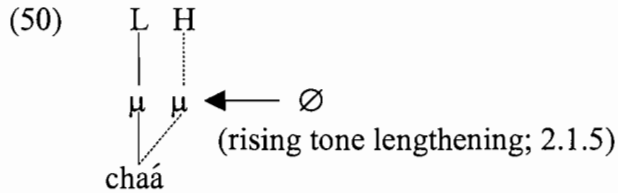
- (48)
- | | | |
|---------------------|------|--------------------------|
| SP | root | |
| | | |
| H (negative marker) | L | H (floating tone suffix) |
- (plateauing rule; 2.1.2)

Recall from the discussion of suffixes that there is a H tone suffix in the imperative. The H suffix of the imperative behaves differently from the H suffixes of the negative perfective and negative future because there is no subject prefix in the imperative. The plateauing rule (to be discussed in section 2.1.2) that causes the delinking of the underlying tone of L-toned roots in the latter two tenses is triggered by their H-toned subject prefixes, and so does not apply in the imperative. Thus, L-toned roots retain their L tone, and surface with a rising tone, as shown in (49)¹³.

- | | | | | |
|------|-------|--------------|------|---------|
| (49) | e-cha | ‘he dug’ | chaá | ‘dig!’ |
| | e-ba | ‘he slashed’ | baá | ‘slash’ |
| | e-me | ‘he waited’ | meé | ‘wait!’ |

¹³ The roots in these examples, with underlyingly short vowels, undergo lengthening (discussed in section 2.1.5) in order to avoid manifesting a rising tone on a short vowel.

The derivation of imperatives is shown in (50).



As will be demonstrated later, the tone suffixes provide evidence for an underlying three-way tonal contrast (H-L-Ø).

Tone suffixes in the language are summarized below.

(51)	Generic neg. (simple past, habitual, progressive)	H (HHL; HL on suffix only)
	Negative future	H
	Negative perfective	H
	Imperative (singular only)	H

1.2.5. Noun morphology

Noun morphology to be discussed includes noun roots, possessive prefixes (underlyingly the same as the verbal subject prefixes), the plural suffix, and the definite suffix.

1.2.5.1. Noun roots

Nouns appear to obey all of the tone and syllable restrictions that apply to verbs. However, in addition to the prosodic types enumerated for verbs, nouns maintain a contrast between HL and H¹H (52), while there appear to be no H¹H verbs underlyingly.

(52)	mǎbǎ	‘pity’	gǎ ¹ gǎ	‘bee’
	fǒte	‘termite’	yí ¹ chú	‘head’
	kpúlu	‘cup’	gbí ¹ ké	‘child’
	zénjle	‘roof’	gó ¹ wá	‘guava’

1.2.5.2. Possessive pronouns

The pronominal possessive pronouns are identical to the verbal subject prefixes:

(53)	mí-tǔ	‘my gun’
	o-tǔ	‘your gun’
	e-tǔ	‘his gun’
	wǎ-tǔ	‘our gun’
	nyɛ-tǔ	‘your (pl.) gun’
	amɛ-tǔ	‘their gun’

The first person singular prefix is H-toned; the rest of the prefixes surface as L and are assumed to be toneless.

1.2.5.3. Noun suffixes

Nouns may include a suffix to indicate the plural or definite forms. The plural suffix is /-i/ (54).

(54)	chwíi	‘heart’	chwí- ¹ i ¹⁴	‘hearts’
	nāne	‘leg’	nāne-i	‘legs’
	gbε	‘path’	gbε-i	‘paths’
	julɔ	‘thief’	julɔ-i	‘thieves’
	kaklá	‘knife’	kaklá- ¹ i	‘knives’
	kpúlu	‘cup’	kpúlu-i	‘cups’
	afoflo	‘flower’	afoflo-i	‘flowers’

As will be discussed in section 2.3.2, noun root final long vowels are shortened before the plural suffix.

The definite is formed with the suffix /-¹lé/¹⁵ (55).

(55)	lemá	‘axe’	lemá- ¹ lé	‘the axe’
	tú	‘gun’	tú- ¹ lé	‘the gun’

The definite suffix includes a floating H tone which associates to the final mora of the noun, observable when the noun has a final L tone (56).

(56)	cho	‘tree’	chó- ¹ lé	‘the tree’
	yoo	‘woman’	yoó- ¹ lé	‘the woman’

As shown in (57), the suffix appears at the end of an entire noun phrase, so that the floating H tone associates to L-final adjectives following a noun.

(57)	cho agbo	‘big tree’	cho agbó- ¹ lé	‘the big tree’
	tú ényɔ	‘two guns’	tú ényɔ- ¹ lé	‘the two guns’

An optional rule deletes /l/ from /-lé/.

¹⁴ The final vowel of this root is shortened before the plural suffix due to a rule of prevocalic shortening (see section 2.3.2) which deletes the first mora (along with its tone) of a bimoraic vowel before a vowel or moraic nasal suffix.

¹⁵ I assume that the underlying tone of the definite suffix is floating H + L, where the H docks to the final mora of the root, while the L is underlyingly associated to the suffix. The suffix always surfaces with downstepped H tone due to the HL rule (see section 2.1.1), which changes pre-pausal HL to H¹H.

(58)	cho	‘tree’	chó- ¹ é	‘the tree’
	<u>nuu</u>	‘man’	<u>nuu</u> - ¹ é	‘the man’
	leé	‘tail’	leé- ¹ é	‘the tail’
	wóbí ¹ i	‘bee’	wóbí ¹ i- ¹ é	‘the bee’

This rule must precede the assimilation of /ε/ to an immediately preceding lax vowel (59), since assimilation does not occur across /l/ (cf. [lemá-¹lé]).

(59)	áá ¹ sáá	‘guinea fowl’	áá ¹ sáá- ¹ á	‘the guinea fowl’
	nyɔɔ	‘month’	nyɔɔ- ¹ ɔ	‘the month’
	jwé ¹ é	‘grass’	jwé ¹ é- ¹ é	‘the grass’

Chapter 2. Phonological rules of the language

2.1 Core phenomena

2.1.1. HL rule

The sequence HL changes to H¹H pre-pausally, as illustrated in (60).

(60)	HL rule (verbs)
	$ \begin{array}{c} \mu \quad \mu \quad \# \\ \quad \quad \diagdown \\ H \quad L \quad H \quad \leftarrow \quad \emptyset \end{array} $

Rules of this type are not documented for other African tone languages, and the representation of the rule seems a bit unnatural since it involves the insertion of H tone and then spreading to the L-toned mora and delinking of L. This could be viewed as two separate rules, but there is no independent evidence for a boundary H tone at the end of each utterance. It is unclear why a language would insert a H tone at the end of a phrase only when a final L tone is preceded by a H tone, yet minimal pairs such as [é-cha] ‘he has dug’ and [é-¹chá] ‘that he dig’ indicate that the process is an important part of the phonology. One possible explanation for the historical development of this rule relates to Dagbani, a Gur language of Ghana. In Dagbani (Hyman (1988)), glottal stop is inserted in declaratives after short, prepausal stem vowels where the prepausal word is not nominal. The environments for insertion of the final glottal stop are similar to those required for the application of the HL rule since, as will be shown, the HL rule applies only to short syllables before pause, not to most suffixes, and never to nouns. It is possible that a previous stage of the Gã language had glottal stop insertion in these contexts. This might have caused final L tone after H to sound higher than a normal L tone, since the final vowel would be cut off by the glottal stop so that the L tone would not have time to reach its lowest, target f0 value¹⁶.

¹⁶ Thanks to Larry Hyman for suggesting this connection.

Dakubu (1986) analyzes this as two separate rules, so that H is inserted phrase-finally after HL through a rule of Final H Insertion, and then the final H spreads and the L delinks through a process of H-Anticipation (similar to the plateauing rule described below). However, as will be shown, the environments for the application of the HL rule vs. plateauing are slightly different (e.g., plateauing applies to verb suffixes while the HL rule does not). Presumably, in Dakubu's analysis, the Final H Insertion rule does not apply after suffixes, so that H-Anticipation cannot apply there either.

The HL rule applies between a H-toned prefix and L-toned verb root, as in the future tense examples¹⁷ in (61).

- | | | | | |
|------|------|-------------|------------------------|-----------------|
| (61) | e-jo | 'he danced' | e-baá- [!] jó | 'he will dance' |
| | e-kɔ | 'he bit' | e-baá- [!] kɔ | 'he will bite' |
| | e-nu | 'he drank' | e-baá- [!] nú | 'he will drink' |

The derivation of these forms is shown in (62).

- (62)
- | | | | | | |
|---|---|-----|---|-----------------|-----|
| e | - | baá | - | [!] jó | |
| | | | | | |
| | | LH | | LH | ← ∅ |

Another case where this process occurs is in the citation form of HL verbs. In (63), the verbs in citation form undergo the HL rule.

- | | | | | |
|------|----------------------|--------------|-----------------------|-------------|
| (63) | e-ká [!] né | 'he counted' | e-chá [!] lá | 'he mended' |
|------|----------------------|--------------|-----------------------|-------------|

In (64), the process is blocked by the addition of an object because the process only applies to a pre-pausal vowel.

- | | | | |
|------|---------|-----------------------|----------------------|
| (64) | e-káne | gbɛmɛ- [!] i | 'he counted people' |
| | e-chála | mámá- [!] i | 'he mended clothing' |

This process fails to apply in the simple past ([ákú cha] 'Aku dug') and the perfective ([mí-chɔ] 'I have trapped') between subject and verb. These apparent exceptions result from floating tones in these tenses, whose effects will be explained in section 2.2.3. The verbal suffixes of the negative perfective ([e-lá-kɔ] 'he has not sung') and the habitual ([e-fó-ɔ] 'he weeps') also are exceptions to the rule, which might indicate that the rule cannot apply to verbal suffixes; it does, however, apply to the participial suffix /-mɔ/ (cf. [cha-mɔ] 'digging' vs. [lá-[!]mɔ] 'singing'). And as was shown in section 1.2.5.3, noun suffixes do undergo the rule.

The HL rule does not apply to nouns. When a CV L object follows a verb with final H tone, the object still surfaces as L (65).

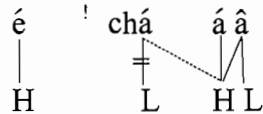
¹⁷ The past tense forms will be given to justify the underlying tone patterns of verb roots since underlying root tones are most transparently revealed in this tense.

- (71) e-hulú 'he jumped' e-baá-'hulú 'he will jump'
 e-majé 'he sent' e-baá-'majé 'he will send'

In the negative of the simple past (generic negative), plateauing applies between the H-toned subject prefix, a L-toned CV root, and the negative suffix which has an initial H tone, causing the sequence HLH to surface as H'HH, as in (72).

- (72) e-cha 'he dug' é-'chá-ââ 'he did not dig'

Plateauing in [é-'chá-ââ] is illustrated in (73) below.

- (73) 

Plateauing occurs regularly throughout the language. However, although it was shown above that plateauing can occur from the initial H of a noun onto the final L of a preceding verb, plateauing does not apply within nouns when conditioned by H tone from an adjacent verb (74).

- (74) obíshi kpé 'a rat chewed' mǐ-bé kaklá 'I did not have a knife'
 kpólo kpákpá 'good cup' mǐ-ŋmawó 'my rib'
 nāmǐ é-cha-kǒ 'who hasn't dug' é-'mǐ kwakwé 'he has caught a mouse'

HLH sequences within a noun root or phrase also do not alternate.

- (75) álugú tugwí 'strawberry' nēkasé' mǒhí 'school'
 dókǒ dókǒ 'duck'

2.1.3. Subject prefix deletion

When preceded by an NP subject, the third person singular prefix /e-/ deletes when it is not H-toned (76).

- (76) SP deletion
 NP e → ∅ root
 (L)

For instance, in the simple past, the prefix never surfaces after an NP subject (77).

(77)	e-cha	'he dug'	ákú cha	'Aku dug'
	e-lá	'he sang'	ákú 'lá	'Aku sang'
	e-hê	'he bought'	ákú 'hê	'Aku bought'
	e-hulú	'he jumped'	ákú hulú	'Aku jumped'

In the perfective, however, where subject prefixes are always H-toned, the third person subject prefix always surfaces after an NP subject (78).

(78)	é-cha	'he has dug'	ákú é-cha	'Aku has dug'
	é-'lá	'he has sung'	ákú é-'lá	'Aku has sung'

In the simple past forms in (77), the L tone of the subject prefix remains as a floating tone when the subject prefix is deleted. This accounts for the downstep in [ákú 'lá] and for the failure of the HL rule in [ákú cha] (79).

(79)	Origin of downstep in [ákú 'lá]	Failure of HL rule in [ákú cha]
	$\begin{array}{c} \text{ákú} \quad (e \rightarrow \emptyset) \quad \text{lá} \\ \swarrow \quad \quad \downarrow \\ \text{H} \quad \text{L} \quad \text{H} \end{array}$	$\begin{array}{c} \text{ákú} \quad (e \rightarrow \emptyset) \quad \text{cha} \\ \swarrow \quad \quad \downarrow \\ \text{H} \quad \text{L} \quad \text{L} \end{array}$

We know that the L tone is not underlyingly associated to the SP, but is added to simple past forms as a floating L (see section 2.2.3 for a full explanation of the effects of floating tones). In fact, in no tense is it the case that deletion of the SP leaves behind a floating L tone unless that tense has a floating L prefix. In every other tense where the SP is deleted, if there is downstep between an NP subject and verb root, there is also a downstep in the first person form between the H-toned first person SP and initial-H verb roots. Thus, SP's (except the first person singular) are underlyingly toneless, not L.

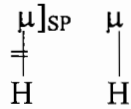
To illustrate this, we will consider the habitual. In this tense, the third-person singular prefix is dropped after an NP, as in [ákú 'lá-a] 'Aku sings (hab.)'. There is a downstep before H-toned roots, but if we consider only this form, it is unclear whether the downstep is due to an underlying L on the subject prefix or a tense-specific L tone marker. The form [mí-'lá-a] 'I sing (hab.)' shows that the L tone must be a tense marker, because there is no deleted SP in this form that could have contributed the L. In all tenses where there is no floating tone prefix, the SP deletion process does not leave behind any tone, indicating that the SP's are toneless underlyingly (80).

(80)	e-lá-kɔ	'he has not sung'	ákú lá-kɔ	'Aku has not sung'
	e-dú-kɔ	'he has not cultivated'	ákú dú-kɔ	'Aku has not cultivated'
	e-e-lá	'he is singing'	ákú n-lá	'Aku is singing'
	e-e-dú	'he is cultivating'	ákú n-dú	'Aku is cultivating'
	e-lá-ââ	'he did not sing'	ákú lá-ââ	'Aku did not sing'
	e-dú-úú	'he did not cultivate'	ákú dú-úú	'Aku did not cultivate'
	e-lá-'ŋ	'he will not sing'	ákú lá-'ŋ	'Aku will not sing'
	e-dú-'ŋ	'he will not cultivate'	ákú dú-'ŋ	'Aku will not cultivate'

2.1.4. Polarity

The negative tenses have a floating H tone which associates to the subject prefix. The H tone is deleted by a polarity rule (81) when preceding a verb root with initial H tone (see Kenstowicz, Nikiema, and Ourso 1988 for a description of similar phenomena in Moore and Lama).

- (81) Polarity in the negative tenses



An example of the phenomenon is found in the simple negative (82). Here, the subject prefix is H-toned when followed by a L-initial root (the roots get a downstepped H tone due to the tense-specific H tone suffix, whose effects will be explored in section 2.2.1).

- | | | | | |
|------|----------------------------|-------------------|----------------------------|--------------------|
| (82) | e-cha | 'he dug' | e-gbɔɔ | 'he hunted' |
| | é- [!] chá-ââ | 'he did not dig' | é- [!] gbó-óô | 'he did not hunt' |
| | ákú é- [!] chá-ââ | 'Aku did not dig' | ákú é- [!] gbó-óô | 'Aku did not hunt' |

When preceding a root with initial H tone, the SP is low-toned. When there is an NP subject, the SP is then deleted (83).

- | | | | | |
|------|-----------|--------------------|-----------|-------------------------|
| (83) | e-lá | 'he sang' | e-dú | 'he cultivated' |
| | e-lá-ââ | 'he did not sing' | e-dú-úú | 'he did not cultivate' |
| | ákú lá-ââ | 'Aku did not sing' | ákú dú-úú | 'Aku did not cultivate' |

The derivation of these forms is demonstrated in (84).

- (84)
- $$\begin{array}{ccc} \text{ákú} & (e \rightarrow \emptyset) & \text{lá - á â} \\ \swarrow \quad \downarrow & \vdash \text{ (polarity)} & \swarrow \quad \downarrow \quad \downarrow \\ H & H & H \quad L \end{array}$$

Polarity is also evidenced in the negative perfective. (85) shows H-toned prefixes with L-initial roots.

- | | | | | |
|------|----------------------------|-------------------|-----------------------------|----------------------|
| (85) | e-cha | 'he dug' | e-hulú | 'he jumped' |
| | é- [!] chá-kɔ | 'he has not dug' | é- [!] húlú-kɔ | 'he has not jumped' |
| | ákú é- [!] chá-kɔ | 'Aku has not dug' | ákú é- [!] húlú-kɔ | 'Aku has not jumped' |

With H-initial roots, the SP's undergo polarity, surfacing with L tone. When there is an NP subject, the SP is deleted (86).

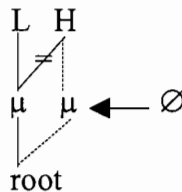
- | | | | | |
|------|-----------|--------------------|------------|--------------------------|
| (86) | e-lá | ‘he sang’ | e-yóó | ‘he recognized’ |
| | e-lá-kɔ | ‘he has not sung’ | e-yóó-kɔ | ‘he has not recognized’ |
| | ákú lá-kɔ | ‘Aku has not sung’ | ákú yóó-kɔ | ‘Aku has not recognized’ |

Cases of polarity in each of the negative tenses will be outlined in chapter 3.

2.1.5. Rising tone lengthening

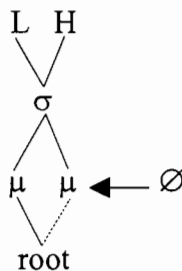
There are no surface short rising tones in the language. Whenever the tone sequence LH is associated to an underlyingly short vowel, the vowel surfaces as long.

- (87) Rising tone lengthening



The rule in (87) does several things: a mora is added, which links to the root node of the vowel. The H tone of the rise then links to the new mora and delinks from the first mora. Because the rule involves this series of ‘steps’, it might be viewed as a bit unnatural. Alternatively, one could argue that the syllable is actually the tone-bearing unit, so that the rule could be formulated as in (88).

- (88) RTL’



Using the syllable as the TBU, the rising tone lengthening rule involves only the insertion of a mora and its linking to the root node of the vowel; the tones do not need to be rearranged.

Rising tone lengthening applies in the imperative, where CV H, CV L, and CV toneless verbs get a floating H suffix. In CV H verbs, the floating H is not manifested, and the imperative forms look like the underlying forms of the roots, as in (89).

- | | | | | |
|------|------|-----------------|----|--------------|
| (89) | e-lá | ‘he sang’ | lá | ‘sing!’ |
| | e-dú | ‘he cultivated’ | dú | ‘cultivate!’ |

In CV toneless verbs, the floating H associates to the verb root, as in (90).

- (90) e-ye 'he ate' yé 'eat!'
 e-ba 'he came' bá 'come!'

In CV L verbs, the floating H associates to the end of the root, giving a rising tone. The vowel is lengthened to accommodate the rising tone, as in (91), reproduced from (49).

- (91) e-cha 'he dug' chaá 'dig!'
 e-ba 'he slashed' baá 'slash'
 e-me 'he waited' meé 'wait!'

It is clear from the examples in (89) and (90) that the tense itself does not require a long final vowel. Therefore, the lengthening in (91) must be the result of rising tone lengthening.

The verb [e-droó] 'he helped' underlyingly has a short vowel, which lengthens in the simple past and the imperative. Forms of this verb are given in (92).

- (92) e-droó 'he helped'
 e-dró-ɔ 'he helps (hab.)'
 e-baá-[!]dró 'he will help'
 é-[!]dró-kɔ 'he has not helped'
 é-[!]dró-óô 'he did not help'
 droó 'help!'

These examples make it clear that the underlying form of this verb root has a short vowel; otherwise, there would be no way to account for vowel shortening in forms such as the future [e-baá-[!]dró] without predicting shortening in other CVV verb roots in this tense, which is unattested. (93) shows future tense forms of roots with underlyingly long vowels, where no shortening takes place.

- (93) e-tɔɔ 'he floated' e-baá-tɔɔ 'he will float'
 e-sɔɔ 'he caught' e-baá-sɔɔ 'he will catch'

Additionally, the imperative prefix /ka-/ undergoes rising tone lengthening in the singular form.

- (94) kaá-[!]chá 'don't dig!'
 nyé-[!]ká cha-a 'don't dig (pl.)!'
 nyé-ka-há-a ní wó-cha-a 'let's not dig'

As shown, the negative plural imperative and negative hortative forms have the /ka-/ prefix surfacing with a short vowel. In the case of the hortative, there is no H tone prefix associating to /ka-/, so rising tone lengthening does not apply. In the case of the plural, the association of a H tone to the L-toned /ka-/ prefix leads to plateauing, so that the

prefix surfaces with a downstepped H tone and therefore does not undergo rising tone lengthening. Plateauing fails to apply to the singular form since there is no H tone preceding /ka-/. When the H tone prefix associates to /ka-/, a rising tone results, and rising tone lengthening causes the vowel of /ka-/ to lengthen.

2.2. Effects and interactions

2.2.1. Effects of tone suffixes

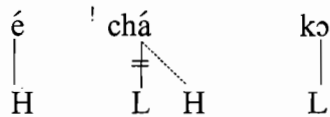
As discussed earlier, some verb tenses are characterized by a H tone suffix, which associates to verb roots.

The negative perfective has a H tone suffix, which associates to the final vowel of a verb root. With a CV L verb root, the underlying L tone of the verb root delinks, but remains evident through downstepping before the root, as in (95).

- (95) e-cha 'he dug'
 mǐ-[!]chá-kɔ 'I have not dug'
 é-[!]chá-kɔ 'he has not dug'
 ákú é-[!]chá-kɔ 'Aku has not dug'

The illustration in (96) shows the association of the floating H tone to the verb root, and the delinking of the underlying root tone due to plateauing.

- (96) CV L root in negative perfective with H tone suffix



The behavior of H-toned verb roots in this tense makes it clear that the floating L tone in (95), which is manifested as a downstep, is the result of delinking the lexical L of the verb root itself. The floating L cannot be inserted systematically as part of the construction of this tense, since if it were, we would incorrectly predict downstepping in the forms in (97).

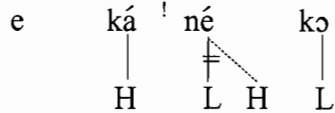
- (97) mǐ-chú-kɔ 'I have not sent' ákú chú-kɔ 'Aku has not sent'

The floating H tone causes HL verb roots to surface with H[!]H tone, as demonstrated in (98). As shown, these verbs surface with H[!]H tone in citation form which could either be due to the H tone suffix or to the HL rule. In the third example in both columns, the roots surface with H[!]H tone, and neither of the tonal rules, the HL rule or plateauing (described in section 2.1), can account for the alternation here, since the crucial environment is not satisfied for application of either of the rules.

- (98) /e-káne/ → e-ká'né 'he counted' /e-chála/ → e-chá'lá 'he mended'
 e-káne ako 'he counted Ako' e-chála ataadé 'he mended a dress'
 e-ká'né-kɔ 'he has not counted' e-chá'lá-kɔ 'he has not mended'

The illustration in (99) shows the association of the floating H tone suffix to the second syllable of the underlyingly HL verb root. The L of the root delinks, remaining as a downstep between the two syllables of the root.

- (99) CVCV HL root in negative perfective



2.2.2. Reanalysis of the 'irregular' verb roots

Kotey (1969) and Okunor (1969) point out several 'irregular' CV L verbs which, in certain tenses, behave like H-toned verbs (100).

- (100) e-bo toí 'he listened'
 e-ba 'he came'
 e-be 'it was cooked'
 e-yɛ 'he ate'
 e-ho 'he passed by'
 e-lɛ 'he knew'
 e-nu 'he heard'
 e-wa 'it was hard'
 e-wɔ 'he slept'
 e-wo 'he wore'

These, I will argue, are not actually CV L verbs; rather, they are CV verbs which are underlyingly toneless. They are pronounced as L-toned by default in tenses such as the simple past, but behave like H-toned roots in tenses with floating tone suffixes. A similar case of a three-way tone distinction (H-L-Ø) is found in Margi (see Pulleyblank (1986)). In Margi, as in Gã, the three-way underlying contrast corresponds to a two-way surface contrast, with toneless syllables assigned L tone by default (in Margi, however, toneless syllables always take the tone of the preceding syllable, so that the default L assignment only applies to toneless syllables in phrase-initial position).

In the generic negative (101), which has a floating H tone suffix, the toneless verbs behave like H-toned verbs, rather than like L-toned verbs. With the L-toned roots, the subject prefix surfaces with a H tone, and there is a downstep before the root. H-toned and toneless roots, on the other hand, have L-toned subject prefixes and no downstep before the root.

(101)	L-toned root	é- [!] mĕ-ĕĕ	‘he did not wait’
	H-toned root	e-fó-óô	‘he did not weep’
	toneless root	e-bá-ââ	‘he did not come’

The diagram in (102) shows why the toneless and L-toned roots behave differently in this tense. The H tone simply spreads from the suffix to the toneless root, giving a H tone on the root and a toneless subject prefix due to polarity. With the L-toned root, the H from the suffix spreads to the root, causing the underlying L on the root to delink. The delinked L tone remains as a downstep in the surface form, and the subject prefix is H-toned because the floating L tone blocks polarity.

(102)	Toneless root in generic negative	L-toned root in generic negative

The form [e-lê] ‘he did not know’ does not follow the pattern of the other irregulars in the generic negative, since in the past tense, the root /le/ would be expected to surface as *[e-lé-êê]. In other tenses, though, this root behaves like the other eleven roots listed above.

In the imperative (103), L-toned roots differ from toneless and H-toned roots not only in their tone pattern but also in vowel length. The L-toned roots have a rising tone and a long final vowel.

(103)	L-toned root	chaá	‘dig!’
	H-toned root	lá	‘sing!’
	toneless root	wó	‘sleep!’

The diagram in (104) shows how the imperative forms of toneless and L-toned verbs are derived, with the L-toned root undergoing rising tone lengthening.

(104)	Toneless roots in imperative	L-toned roots in imperative

Underlyingly H-toned roots behave like the toneless roots in all of these instances because when H tone suffixes are added to H-toned roots, the result can only be a level H tone. It will be assumed that in such cases, the floating H tone is deleted by the Twin Sister Convention, where when two identical tones are linked to a single TBU, one is deleted.

CVCV verbs which are L-toned in citation form behave like H-toned roots in the tenses with floating H tone suffixes as well, indicating that the roots are also toneless. In the generic negative, recall that when the tense-specific floating H tone suffix associates

to a root with initial L tone, the L delinks, remaining as a downstep between a H-toned subject and the verb root (105).

- | | | | | |
|-------|--------------------------|--------------------|-------------------------|-------------------|
| (105) | e-hulú | ‘he jumped’ | e-cha | ‘he dug’ |
| | mí- [!] hulú-úû | ‘I did not jump’ | mí- [!] chá-ââ | ‘I did not dig’ |
| | ákú [!] hulú-úû | ‘Aku did not jump’ | ákú [!] chá-ââ | ‘Aku did not dig’ |

The surface-L CVCV roots, however, are missing the downstep in the generic negative (106).

- | | | | | |
|-------|-------------|------------------------|-------------|----------------------|
| (106) | e-bóle | ‘he surrounded’ | e-hala | ‘he chose’ |
| | e-bólé-êê | ‘he did not surround’ | e-hálá-ââ | ‘he did not choose’ |
| | mí-bólé-êê | ‘I did not surround’ | mí-hálá-ââ | ‘I did not choose’ |
| | ákú bólé-êê | ‘Aku did not surround’ | ákú hálá-ââ | ‘Aku did not choose’ |

The derivation of [e-bólé-êê] is shown in (107). Since the root is toneless, the H tone of the suffix spreads all the way to the beginning of the root. This then triggers polarity, so that the /e-/ prefix surfaces as L.

- | | | |
|-------|--------------|------------|
| (107) | e | bólé - é ê |
| | ⊢ (polarity) | ⋮ |
| | H | H L |

In fact, the same generalization holds for these verb roots in all of the tenses with floating H suffixes; an underlying L tone on these roots would result in unattested forms such as *[mí-[!]bólé-êê], with a downstep before the root. This indicates that the CVCV roots which are L-toned in citation are underlyingly toneless.

2.2.3. Effects of floating tones

As was shown in section 1.2.4.6, the simple past (108) has a prefixed floating L tone which associates to the subject prefix.

- | | | | | |
|-------|-------|----------|--------|---------|
| (108) | e-cha | ‘he dug’ | mí-cha | ‘I dug’ |
|-------|-------|----------|--------|---------|

As shown in (109), the floating L tone of the simple past associates to the subject prefix, and in the case of the H-toned first-person singular prefix on the left, the underlying H tone of the subject prefix delinks; toneless prefixes, as on the right, surface with a L tone which is phonetically indistinguishable from the default L tone that surfaces on underlyingly toneless syllables (see section 2.1.3 for evidence for the L/toneless distinction in subject prefixes).

- (109) $\begin{array}{c} \text{mí} \\ \text{---} \\ \text{H} \quad \text{L} \end{array}$ $\begin{array}{c} \text{e} \\ \text{---} \\ \text{L} \end{array}$

A floating H tone prefix appears in the subordinate, as in (110) (reproduced from (43)). There is no change from the underlying tone of the first-person singular prefix; all of the subject prefixes surface with a final H tone in this tense.

- | | | |
|-------|--------|-----------------------|
| (110) | má-lá | ‘that I sing’ |
| | é-lá | ‘that he sing’ |
| | ó-lá | ‘that you sing’ |
| | wó-lá | ‘that we sing’ |
| | nyé-lá | ‘that you (pl.) sing’ |
| | amé-lá | ‘that they sing’ |

The illustration in (111) shows the effect of the prefixed floating H tone on H-toned and toneless subject prefixes in the subordinate. In both cases, the subject prefix surfaces as H-toned.

- (111) $\begin{array}{c} \text{má} \\ \text{---} \\ \text{H} \quad \text{H} \end{array}$ $\begin{array}{c} \text{é} \\ \text{---} \\ \text{H} \end{array}$

In the case of the H-toned subject prefix, there is no evidence supporting the representation in (111) as opposed to one in which the underlying H tone of the subject prefix is the one which surfaces, with the floating H tone of the perfective remaining floating. Either would result in a H tone on the prefix; this is not crucial to the analysis.

A floating H tone prefix also appears in perfective forms in (112). Here, a prefixed floating H tone associates to the subject prefix.

- | | | |
|-------|-----------|---------------------|
| (112) | mí-chò | ‘I have trapped’ |
| | amé-chò | ‘they have trapped’ |
| | ako é-chò | ‘Ako has trapped’ |

The illustration in (113) shows association of the prefixed floating H tone to H-toned and toneless subject prefixes in the perfective. As in the subordinate, the underlying tone of the subject prefix delinks.

- (113) $\begin{array}{c} \text{mí}^{18} \\ \text{---} \\ \text{H} \quad \text{H} \end{array}$ $\begin{array}{c} \text{é} \\ \text{---} \\ \text{H} \end{array}$

¹⁸ I assume that at a later stage, one of the H tones is deleted by the Twin Sister Convention.

Just as in the subordinate, in the case of /mí/, there is no evidence supporting the representation in (113) as opposed to one in which the underlying H tone of the subject prefix is the one which surfaces, with the floating H tone of the perfective remaining floating. Since this is not crucial to the analysis, I have elected to assume the representation in (113) because I have characterized the prefixed floating H tone of the perfective as one which associates to the subject prefix. As has been shown, some floating L tone prefixes associate to subject prefixes, while others remain floating and are manifested as a downstep before a H-toned root.

In fact, the perfective tense can be shown to have a second floating tone marker. Note that all of the examples in (112) have the surface tone sequence HL. As demonstrated in section 2.1.1, the HL rule should always change the underlying sequence HL to H¹H, except in the special cases noted. Thus, the forms in (112) represent tense-specific blocking of the HL rule in the perfective. The examples in (114) contrast the expected pattern in the subordinate forms on the left, where the HL rule changes the tone of L-toned roots to a downstepped H, with the perfective forms on the right, where the HL rule is blocked.

- | | | | | |
|-------|---------------------|-----------------|-------|-----------------|
| (114) | é- ¹ chá | ‘that he dig’ | é-cha | ‘he has dug’ |
| | é- ¹ jó | ‘that he dance’ | é-jo | ‘he has danced’ |

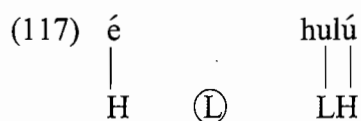
As illustrated in (115), the blockage of the HL rule in the perfective is explainable assuming a second floating tone marker, a L tone, in the perfective. As shown, the prefixed floating H tone of the perfective associates to the subject prefix, while the prefixed floating L tone remains floating, giving the tone sequence HLL, which does not trigger the HL rule.

- (115)
- | | | |
|---|---|----|
| é | | jó |
| ⋮ | Ⓛ | ⋮ |
| H | | L |

As shown in (116), plateauing (described in section 2.1.2) is also blocked in the perfective. Here, the forms on the left show the expected pattern in the subordinate, where the underlyingly LH roots surface with ¹HH tone because of the plateauing rule. In the perfective forms on the right, plateauing is blocked, and the roots surface with LH tone despite being preceded by a H-toned syllable, an environment which normally triggers plateauing.

- | | | | | |
|-------|----------------------|----------------|--------|-----------------|
| (116) | é- ¹ húlú | ‘that he jump’ | é-hulú | ‘he has jumped’ |
| | é- ¹ májé | ‘that he send’ | é-majé | ‘he has sent’ |

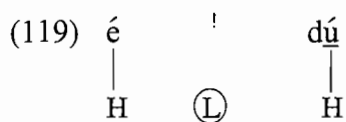
The illustration in (117) shows that the floating L tone of the perfective actually gives the underlying tone sequence HLLH, which, as we have seen, does not trigger plateauing. This explains the blockage of plateauing in the perfective.



A final piece of evidence for a floating L tone in the perfective occurs with H-toned verb roots in this tense. (118) shows H-toned roots in the subordinate on the left, with no change in the root tone. In the perfective forms on the right, there is a downstep between the subject prefix and root, attributable to the floating L tone.

- (118) é-lá 'that he sing' é-^hlá 'he has sung'
é-dú 'that he cultivate' é-^hdú 'he has cultivated'

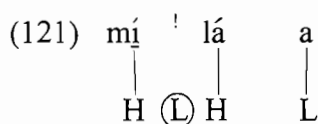
The illustration in (119) shows the floating L tone between the H-toned subject prefix and root in the perfective; this results in the downstep between the subject prefix and root.



In the habitual, there is a similar floating L tone marker before the verb root. As is the case with the floating L tone in the perfective, this floating tone does not associate to the first person singular prefix. This is demonstrated in the first person singular forms in (120), where there is a downstep between a H-toned subject prefix and root in, e.g., [mí-¹lá-a].

- (120) e-lá-a 'he sings (hab.)' e-gbélé-ɔ 'he opens (hab.)'
 ákú-¹lá-a 'Aku sings (hab.)' ákú-¹gbélé-ɔ 'Aku opens (hab.)'
 mí-¹lá-a 'I sing (hab.)' mí-¹gbélé-ɔ 'I open (hab.)'

The illustration in (121) shows how the floating L tone marker in the habitual causes the downstep in [mí-^Llá-a].



2.2.4. Ordering

In the polarity (negative) tenses, when followed by a verb root with initial H tone (122), the H tone on the subject prefix is deleted. Polarity must therefore apply before subject prefix deletion (section 2.1.3), since the subject prefixes rendered toneless by polarity are deleted here.

- | | | | | |
|-------|-----------|--------------------|-----------|-------------------------|
| (122) | e-lá | ‘he sang’ | e-dú | ‘he cultivated’ |
| | e-lá-áâ | ‘he did not sing’ | e-dú-úû | ‘he did not cultivate’ |
| | ákú lá-áâ | ‘Aku did not sing’ | ákú dú-úû | ‘Aku did not cultivate’ |

If SP deletion were to apply first, these SP’s would not be deleted, since they would be associated to the H tone prefix of the negative tenses. Polarity would then apply, deleting the H from the SP, giving forms such as *[ákú e-dú-úû], which are unattested.

As demonstrated below, falling tone simplification is ordered before the HL rule.

- | | | | | |
|-------|---------------------|-------------|----------------------|--------------|
| (123) | e-hê | ‘he bought’ | e-kwê | ‘he watched’ |
| | hé- ¹ mó | ‘buying’ | kwê- ¹ mó | ‘watching’ |

Forms such as [cha-mó] ‘digging’ indicate that the /-mó/ suffix is not underlyingly H-toned. If the HL rule applied to the forms in (123) before falling tone simplification, then the HL would not apply to the suffix, since the final L of the underlyingly falling-toned root would block the HL rule. Falling tone simplification would then yield the incorrect form *[hé-mó]. Instead, the falling tone must be simplified to H; then, the final H of the root induces the HL rule on the suffix.

The forms below indicate that plateauing must be ordered before rising tone lengthening.

- | | | |
|-------|---------------------------|-----------------|
| (124) | m-á- ¹ dró | ‘I will help’ |
| | e-baá- ¹ dró | ‘he will help’ |
| | ákú baá- ¹ dró | ‘Aku will help’ |

If rising tone lengthening applied first, then we would expect these forms to surface with long vowels, as in *[e-baá-¹dróó]. Instead, plateauing applies first, so that when rising tone lengthening applies, there is no longer a rising tone on the root, and the lengthening is therefore not induced.

2.3. Peripheral phenomena

2.3.1. Assimilation

2.3.1.1. Vowel place assimilation

Some vowel suffixes assimilate to an immediately preceding [-tense] vowel ([ɛ], [ɔ], or [a]), as shown below.

- (125) Vowel place assimilation
- | | | | |
|--------------|------|-------|---------|
| μ] | ROOT | | + μ |
| | | | |
| root (vowel) | | | (vowel) |
| | | | |
| [-tense] | | | |

Vowel place assimilation occurs in the habitual, causing the suffix /-ɔ/ to assimilate to root-final /a/ (but not to [ɛ]). The examples in (126) show the suffix where it does not undergo assimilation.

(126)	e-hê	'he bought'	e-hé-ɔ	'he buys (hab.)'
	e-hao	'he worried'	e-hao-ɔ	'he worries (hab.)'
	e-ká'né	'he counted'	e-káne-ɔ	'he counts (hab.)'
	e-sóle	'he prayed'	e-sóle-ɔ	'he prays (hab.)'
	e-hulú	'he jumped'	e-hulú-ɔ	'he jumps (hab.)'
	e-bó'í	'he started'	e-bó'í-ɔ	'he starts (hab.)'
	e-bɛɛ	'he swept'	e-bɛ-ɔ	'he sweeps (hab.)'

The examples in (127) show assimilation of the habitual suffix to root-final /a/.

(127)	e-cha	'he dug'	e-cha-a	'he digs (hab.)'
	e-lá	'he sang'	e-lá-a	'he sings (hab.)'
	e-foá	'he hugged'	e-foá-a	'he hugs (hab.)'

As was shown in (59) (reproduced below), the definite suffix /-ɛ/ assimilates to /-a/ and /-ɔ/.

(128)	áá' sáá	'guinea fowl'	áá' sáá-á	'the guinea fowl'
	nyɔɔ	'month'	nyɔɔ-ɔ	'the month'
	jwɛ'ɛ	'grass'	jwɛ'ɛ-ɛ	'the grass'

cf. forms with [+tense] final vowels, where assimilation does not occur.

(129)	cho	'tree'	chó-ɛ	'the tree'
	nuu	'man'	nuú-ɛ	'the man'
	leé	'tail'	leé-ɛ	'the tail'
	wóbí'í	'bee'	wóbí'í-ɛ	'the bee'

2.3.1.2. Nasalization

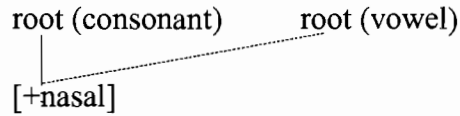
As illustrated in (130), nasalization (marked by underlining) is contrastive in vowels.

(130)	e-ba	'he came'	e-b <u>a</u>	'he slashed'
	e-ká	'he dried'	e-k <u>aa</u>	'he took a vow'

Following a nasal consonant or nasalized vowel, however, vowels are nasalized. Progressive nasalization is productive in the language, so that underlyingly oral vowels become nasal following a nasal segment. This is illustrated in the form [nyɛ-há-a wó-fóté-a] 'let's pour', where the suffix /-a/, underlyingly oral, is nasalized following the nasal

vowel [a] but oral following the oral vowel [e]. The representation of this rule is shown below.

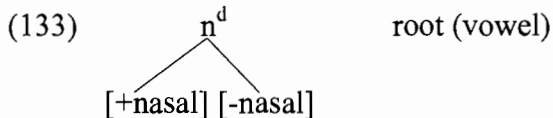
(131) Nasalization



As shown in (132), there are some exceptions to this generalization. Following some nasal consonants, the vowel is oral.

(132)	e-ká'né	'he counted'	n̄ane	'leg'
	e-ǰé'né	'he untied'	n̄en̄e	'hand'
	e-shá'né	'he slipped'	fine	'wing'

These cases almost invariably involve [n][e] sequences, and following the nasal, there is a brief stop, suggesting an underlying prenasalized stop or perhaps one which existed in an earlier form of the language and has since been reduced. As shown below, if these nasals are assumed to be [+nasal] and [-nasal] in succession, this accounts for the blockage of nasalization after these consonants.

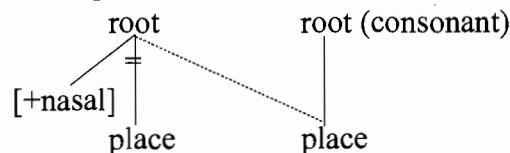


An alternative analysis would be to say that the blocking is due to the fact that there is no nasalized [e] in the language. However, in forms such as [n̄en̄e], the final vowel is actually the [-tense] variant, and therefore should be able to nasalize. This form is the only clear example of a [-tense] oral vowel after a nasal, however:

2.3.1.3. Nasal place assimilation

Nasals generally have the same place of articulation as a following consonant. This is true of monomorphemic forms, and is also a productive rule (134).

(134) Nasal place assimilation



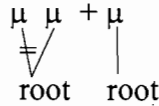
A nasal prefix assimilates to a following obstruent in the progressive tense (135). The underlying form of the prefix is assumed to be /n-/.

- | | | | | |
|-------|------------|----------------------|------------|---------------------|
| (135) | amɛ-ŋ-wɔ | ‘they are sleeping’ | amɛ-ŋ-kasé | ‘they are learning’ |
| | amɛ-m-mɛ | ‘they are waiting’ | amɛ-m-bɛɛ | ‘they are sweeping’ |
| | amɛ-ŋm-kpɔ | ‘they are peeling’ | amɛ-ŋm-gbe | ‘they are killing’ |
| | amɛ-n-tá | ‘they are narrating’ | amɛ-n-jo | ‘they are dancing’ |

2.3.2. V+V effects

The two-mora limit on syllables causes shortening of three-mora sequences in some cases. This rule applies only to immediately adjacent vowels (or vowel+liquid); i.e., there can be no intervening consonant.

- (136) Prevocalic long vowel shortening¹⁹



The future negative suffix causes shortening of a preceding long vowel, as shown in (137).

- | | | | | |
|-------|--------|-------------|-----------|--------------------|
| (137) | e-gbɔɔ | ‘he hunted’ | é-gbɔ́-’ɲ | ‘he will not hunt’ |
|-------|--------|-------------|-----------|--------------------|

The form [é-gbɔ́-’ɲ] above illustrates the fact that shortening deletes tones associated to the mora being deleted. Otherwise, the underlying L of the root would be expected to remain as a downstep, as in *[é-’gbɔ́-’ɲ], which is unattested.

In the plural imperative verbs with the suffix /-a/, there is neutralization in the length of the final vowel. The examples in (138) illustrate this.

- | | | | | |
|-------|-------|-----------------|--------|-------------------------|
| (138) | e-ba | ‘he slashed’ | e-ba-a | ‘he slashes (hab.)’ |
| | e-kaa | ‘he took a vow’ | e-ka-a | ‘he takes a vow (hab.)’ |

These examples suggest that there is a two-vowel length limit within a syllable. In roots with long vowels, the intermediate form (e.g. [nyé-kaa-a]) undergoes vowel shortening.

Vowel shortening applies to long vowels before the plural suffix /-i/ (139); no minimal pairs have been discovered, however, which could demonstrate the neutralization of vowel length before the plural suffix.

- | | | | | |
|-------|---------|---------------|-----------|---------------------|
| (139) | loo | ‘fish (sg.)’ | lo-i | ‘fish (pl.)’ |
| | too | ‘goat/sheep’ | to-i | ‘goats/sheep (pl.)’ |
| | áá’ sáá | ‘guinea fowl’ | áá’ sá-’í | ‘guinea fowl (pl.)’ |
| | wɔbí’í | ‘bee’ | wɔbí-’í | ‘bees’ |
| | nyɔɔ | ‘month’ | nyɔ-i | ‘months’ |

¹⁹ Note that the rule also deletes any tone associated to the mora being deleted. This may be due to a constraint on the number of tones allowed in a syllable. If we assume that the vowel shortening rule allows the second and third morae to syllabify together, then all of their combined tones plus those of the first mora may simply be too many tones for a single syllable. This is an issue for further study.

Neutralization takes place in the habitual with the suffix /-ɔ/. The examples in (140) shows how the vowels in /chɔ́/ ‘pour’ and /chɔ́ɔ̃/ ‘teach’ are of the same length in the habitual. Note that the initial L tone of /chɔ́ɔ̃/ is deleted as part of the resyllabification process.

- | | | | | |
|-------|----------|-------------|------------|---------------------|
| (140) | e-chɔ́ | ‘he poured’ | e-chɔ́-ɔ | ‘he pours (hab.)’ |
| | e-chɔ́ɔ̃ | ‘he taught’ | e-chɔ́ɔ̃-ɔ | ‘he teaches (hab.)’ |

Based on these data, we might consider an alternative analysis where the LHL root has a short vowel underlyingly, so that the citation form involves rising tone lengthening. However, these roots surface as long in the future tense, despite the fact that they undergo plateauing and therefore do not have rising tone in this tense (141).

- | | | | | |
|-------|---------|----------------|---------------------------|-------------------|
| (141) | e-bɛ̃ɛ̃ | ‘he swept’ | e-baá- ¹ bɛ̃ɛ̃ | ‘he will sweep’ |
| | e-saã | ‘he mended’ | e-baá- ¹ saã | ‘he will mend’ |
| | e-fɛ̃ɛ̃ | ‘he did’ | e-baá- ¹ fɛ̃ɛ̃ | ‘he will do’ |
| | e-loô | ‘he collected’ | e-baá- ¹ loô | ‘he will collect’ |

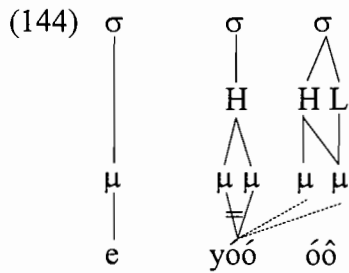
We know that CVV LHL roots (like /chɔ́ɔ̃/) are monosyllabic because they undergo the vowel shortening process. On the other hand, verb roots of the form CVV where the two vowels are different actually have two syllables. As demonstrated in (142), the bisyllabic CVV roots do not undergo shortening.

- | | | | | |
|-------|-------|--------------|------------|----------------|
| (142) | e-hao | ‘he worried’ | nyɛ̃-hao-a | ‘worry! (pl.)’ |
|-------|-------|--------------|------------|----------------|

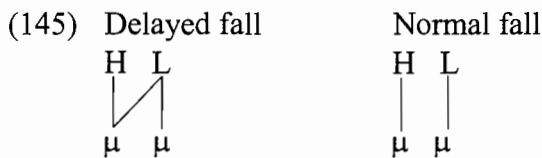
In the generic negative, two V-slots are added to the end of the verb root. Neutralization also occurs in this tense, but the resulting verb always ends in a vowel which is longer than a long vowel (i.e., three timing units instead of two), as in (143).

- | | | | | |
|-------|---------|-----------------|---------------------------|------------------------|
| (143) | e-yóó | ‘he recognized’ | e-yó-óô | ‘he did not recognize’ |
| | e-fó | ‘he wept’ | e-fó-óô | ‘he did not weep’ |
| | e-gbɔɔ | ‘he hunted’ | é- ¹ gbɔ́-óô | ‘he did not hunt’ |
| | e-chɔ́ | ‘he trapped’ | é- ¹ chɔ́-óô | ‘he did not trap’ |
| | e-bɛ̃ɛ̃ | ‘he swept’ | é- ¹ bɛ̃-é̃ɛ̃ | ‘he did not sweep’ |
| | e-kpɛ | ‘he sewed’ | é- ¹ kpɛ̃-é̃ɛ̃ | ‘he did not sew’ |

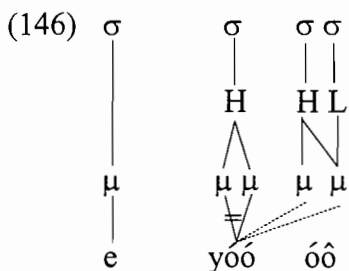
These data may be analyzed as in (144). If the final sequence of vowels is assumed to be bisyllabic, then the two-mora syllable limit is not violated.



There is another reason that breaking the final vowel sequence into more than one syllable is desirable, although the representation would have to be different from that in (144). As shown in that example, the H tone suffix is linked to both suffix vowels, so that the final falling tone is delayed in comparison to a bimoraic falling tone where each tone is linked to a single mora (145).



Hyman (1988), however, argues that there is a universal constraint against multiply linked tones within contour syllables, and that there is no language in which such a representation is necessary; putative examples of, for example, the delayed fall pattern can always be analyzed as bisyllabic. If this is true, then the representation of [e-yó-óô] must actually look like the one in (146), where the suffix is bisyllabic and therefore does not violate the constraint against multiple linking within the syllable.



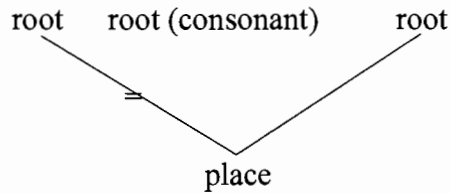
The syllabification of the generic negative suffix may not be resolvable. Unfortunately, no suffix has been found that can attach after the generic negative suffix, so we do not know whether the suffix would shorten before a vowel, which would indicate whether it had one syllable or two.

2.3.3. Vowel deletion

In verb roots of type CVCV where both vowels are the same and the second consonant is a nasal or liquid, the first vowel is optionally dropped. If it is assumed that both [l] and [n] are unspecified with respect to place, then the rule in (147) is sufficient to

account for the available data, since in all documented cases of deletion, the intervening consonant is either [l] or [n]. If cases are found involving deletion before other consonants (e.g. [m]), then the rule will need to make reference to separate place nodes for consonants and vowels. This remains an empirical question.

(147) Vowel deletion (optional)



Examples of the deletion process are shown in (148).

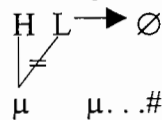
- (148) e-gbala ~ e-gbla 'he dragged' e-fɔlɔ ~ e-flɔ 'he cut (pl.)'
 e-ɲmá'ná ~ e-ɲmá'á 'he scratched' e-kpá'lá ~ e-kpl'á 'he herded'

Some evidence for the underlying form of these roots as CVCV rather than CIV comes from the behavior of the root /drɔ̃/, which never surfaces as CVCV. If the alternation in the roots in (148) were the result of vowel insertion, then we might expect an optional form *[dorɔ̃], or perhaps *[doró], which are unattested.

2.3.4. Falling tone simplification

As discussed earlier, falling tones are simplified to level H phrase-medially. The rule of falling tone simplification is represented in (149).

(149) Falling tone simplification



This rule applies, for example, when a CV HL verb root is followed by an object or suffix, as in (150).

- (150) e-hê 'he bought' e-kwê 'he watched'
 e-hé fɔ 'he bought oil' e-kwé ákú 'he watched Aku'
 e-hé-kɔ 'he has not bought' e-kwé-kɔ 'he has not watched'
 hé-mɔ̃ 'buy!' kwé-mɔ̃ 'watch!'

HL sequences on long vowels, however, do not undergo falling tone simplification. As shown below, these always surface as either HL or H^lH.


- (151) e-píì 'he suffered' (HL rule)
 e-píì jù 'he suffered Monday' (plateauing)
 e-píì sho 'he suffered Wednesday' (no change)

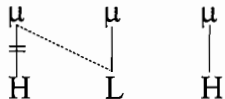
The data in (152) provide evidence for the delayed falling tone of the generic negative suffix described in section 2.3.2. The fall is perceptibly late, and the data below clearly show that the final mora of the suffix must have HL tone, not L, since these forms pattern with short falling tones in undergoing falling tone simplification.

- (152) e-lá-áâ 'he did not sing'
 e-lá-áâ lá'lá 'he did not sing a song'
 é-'gbé-éê 'he did not kill'
 é-'gbé-éé ako 'he did not kill Ako'

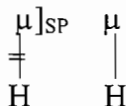
2.4. Summary of rules

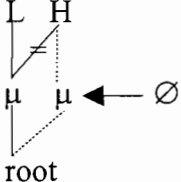
The following rules have been proposed to account for tonal phenomena and some segmental phonological effects in Gã:

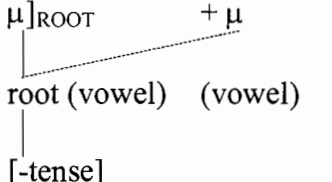
- (153) a. HL rule


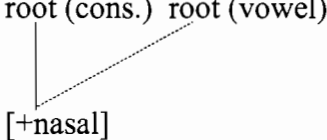
 b. Plateauing


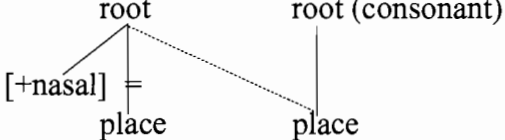
 c. SP deletion
 NP e → ∅ root
 |
 (L)

 d. Polarity


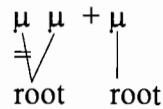
 e. Rising tone lengthening


 f. Vowel place assimilation


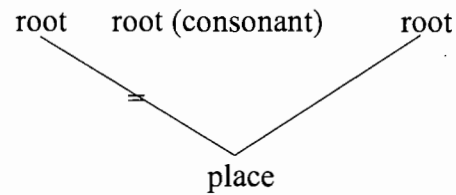
 g. Nasalization
 root (cons.) root (vowel)


 h. Nasal place assimilation


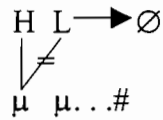
i. Prevocalic vowel shortening j.



Vowel deletion (optional)



k. Falling tone simplification



Chapter 3. The verb tenses

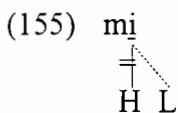
Data from each of the verb tenses will be presented in order to demonstrate how the phonological processes in chapter 2 operate and interact in the language.

3.1. Simple past

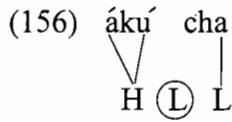
The simple past consists of a subject prefix, floating L tone prefix, and verb root, as shown with CV L roots in (154).

(154)	mī-cha	'I dug'	mī-kɔ	'I bit'
	e-cha	'he dug'	e-kɔ	'he bit'
	áku cha	'Aku dug'	áku kɔ	'Aku bit'
	mī-ma	'I built'	mī-fu	'I buried'
	e-ma	'he built'	e-fu	'he buried'
	áku ma	'Aku built'	áku fu	'Aku buried'

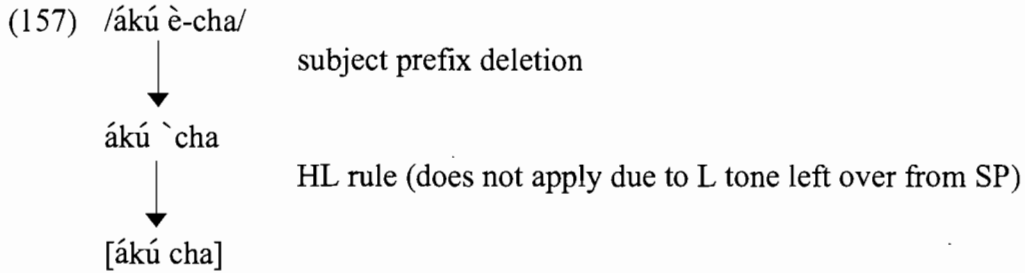
As shown, the first person singular surfaces as L-toned in this tense despite being underlyingly H-toned, as was demonstrated earlier. This is because the floating tone prefix associates to the subject prefix, as in (155).



Also in this tense, subject prefix deletion takes place, since the subject prefixes are non-H. This results in forms such as [áku cha] above. Note that in this form, the HL rule does not apply despite the fact that the environment for its application seems to be satisfied; the root surfaces as L prepausally, following the H tone of the NP subject. As shown in (156), the HL rule is blocked by the floating L prefix, which gives the tone sequence HLL, not HL. From this we know that the subject prefix deletion process did not delete the floating L tone prefix, but left the tone behind.



(157) summarizes the derivation of [áku' cha].



CV toneless roots are indistinguishable from CV L roots in this tense.

(158)	mì-ho	'I passed by'	mì-lɛ	'I knew'
	e-ho	'he passed by'	e-lɛ	'he knew'
	áku ho	'Aku passed by'	áku lɛ	'Aku knew'

CVV L roots also do not change in the simple past, as shown in (159).

(159)	mì-joo	'I sharpened'	mì-tɔɔ	'I floated'
	e-joo	'he sharpened'	e-tɔɔ	'he floated'
	áku joo	'Aku sharpened'	áku tɔɔ	'Aku floated'
	mì-sɔɔ	'I caught'		
	e-sɔɔ	'he caught'		
	áku sɔɔ	'Aku caught'		

The CVV toneless root behaves like CVV L roots.

(160)	mì-hao	'I worried'
	e-hao	'he worried'
	áku hao	'Aku worried'

CVCV toneless roots are shown in (161).

(161)	mì-sole	'I prayed'	mì-chɔmɔ	'I twisted'
	e-sole	'he prayed'	e-chɔmɔ	'he twisted'
	áku sole	'Aku prayed'	áku chɔmɔ	'Aku twisted'
	mì-hala	'I collected'	mì-chukɔ	'I roasted'
	e-hala	'he collected'	e-chukɔ	'he roasted'
	áku hala	'Aku collected'	áku chukɔ	'Aku roasted'

With CVV LH roots (162), plateauing might be expected to change the root-initial L to a downstepped H after an NP subject with final H tone. But again, the floating L tone prefix blocks this tone process in the simple past tense.

- (162) *mᵢ-fuá* ‘I hugged’
 e-fuá ‘he hugged’
 ákú fuá ‘Aku hugged’

(163) shows that the floating L tone gives the tone sequence HLLH, which is not a sequence that undergoes plateauing.

- (163) *ákú* *fuá*
 $\begin{array}{c} \diagdown \quad \diagup \\ \text{H} \quad \textcircled{\text{L}} \quad \text{LH} \end{array}$

Also due to the floating L, CV LH roots do not undergo plateauing, but instead keep their rising tone, which induces rising tone lengthening.

- (164) *mᵢ-droó* ‘I helped’
 e-droó ‘he helped’
 ákú droó ‘Aku helped’

CVCV LH roots (165) also do not undergo plateauing, due to the presence of the floating L.

- | | | | | |
|-------|-------------------|-------------------|-----------------|--------------|
| (165) | <i>mᵢ-chwalá</i> | ‘I beat (rice)’ | <i>mᵢ-hulú</i> | ‘I jumped’ |
| | <i>e-chwalá</i> | ‘he beat (rice)’ | <i>e-hulú</i> | ‘he jumped’ |
| | <i>ákú chwalá</i> | ‘Aku beat (rice)’ | <i>ákú hulú</i> | ‘Aku jumped’ |
| | <i>mᵢ-balá</i> | ‘I wrapped’ | <i>mᵢ-kujú</i> | ‘I judged’ |
| | <i>e-balá</i> | ‘he wrapped’ | <i>e-kujú</i> | ‘he judged’ |
| | <i>ákú balá</i> | ‘Aku wrapped’ | <i>ákú kujú</i> | ‘Aku judged’ |

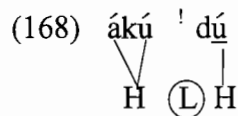
The same generalization holds for CVV LHL roots (166).

- | | | | | |
|-------|-----------------|--------------|----------------|-------------|
| (166) | <i>mᵢ-choô</i> | ‘I taught’ | <i>mᵢ-kεê</i> | ‘I said’ |
| | <i>e-choô</i> | ‘he taught’ | <i>e-kεê</i> | ‘he said’ |
| | <i>ákú choô</i> | ‘Aku taught’ | <i>ákú kεê</i> | ‘Aku said’ |
| | <i>mᵢ-yweê</i> | ‘I spoke’ | <i>mᵢ-hoô</i> | ‘I sold’ |
| | <i>e-yweê</i> | ‘he spoke’ | <i>e-hoô</i> | ‘they sold’ |
| | <i>ákú yweê</i> | ‘Aku spoke’ | <i>ákú hoô</i> | ‘Aku sold’ |

Roots with initial H tone (e.g. the CV H roots shown in (167)) are downstepped following an NP subject with final H tone.

(167)	mī-dǔ	'I cultivated'	mī-kpé	'I chewed'
	e-dǔ	'he cultivated'	e-kpé	'he chewed'
	ákú ¹ dǔ	'Aku cultivated'	ákú ¹ kpé	'Aku chewed'
	mī-kpá	'I rubbed'	mī-lá	'I sang'
	e-kpá	'he rubbed'	e-lá	'he sang'
	ákú ¹ kpá	'Aku rubbed'	ákú ¹ lá	'Aku sang'

As shown in (168), the downstep in these forms is a result of the floating L tone simple past marker.



CVCV HH roots also show downstepping in this tense.

(169)	mī-chósé	'I trained'	mī-gbélé	'I opened'
	e-chósé	'he trained'	e-gbélé	'he opened'
	ákú ¹ chósé	'Aku trained'	ákú ¹ gbélé	'Aku opened'
	mī-télé	'I carried (on the head)'	mī-kádí	'I made a mark on'
	e-télé	'he carried (on the head)'	e-kádí	'he made a mark on'
	ákú ¹ télé	'Aku carried (on the head)'	ákú ¹ kádí	'Aku made a mark on'

CVCV HL stems behave in the same way.

(170)	mī-bó ¹ té	'I entered'	mī-ká ¹ né	'I counted'
	e-bó ¹ té	'he entered'	e-ká ¹ né	'he counted'
	ákú ¹ bó ¹ té	'Aku entered'	ákú ¹ ká ¹ né	'Aku counted'
	mī-ló ¹ mó	'I cursed'	mī-kó ¹ tá	'I folded'
	e-ló ¹ mó	'he cursed'	e-kó ¹ tá	'he folded'
	ákú ¹ ló ¹ mó	'Aku cursed'	ákú ¹ kó ¹ tá	'Aku folded'

CVV HL roots are shown below.

(171)	mī-ló ¹ ó	'I collected'	mī-bó ¹ í	'I started'
	e-ló ¹ ó	'he collected'	e-bó ¹ í	'he started'
	ákú ¹ ló ¹ ó	'Aku collected'	ákú ¹ bó ¹ í	'Aku started'
	mī-ká ¹ é	'I remembered'	mī-bó ¹ á	'I gathered'
	e-ká ¹ é	'he remembered'	e-bó ¹ á	'he gathered'
	ákú ¹ ká ¹ é	'Aku remembered'	ákú ¹ bó ¹ á	'Aku gathered'

In general, the simple past forms are the most similar to what is assumed to be the underlying form of each root. With the exception of CVV and CVCV HL roots (which undergo the HL rule), initial-H roots (which are preceded by a downstep in this tense),

and roots with rising tone (which undergo rising tone lengthening), roots are unchanged in the simple past.

3.2. Generic negative

The generic negative is composed of a subject prefix, floating H tone prefix, root, HHL tone suffix, and bimoraic vowel suffix. The forms in (172) are CV L roots in the generic negative.

(172)	mí- [!] chá-ââ	‘I did not dig’	mí- [!] kɔ́-ɔ̀ɔ̀	‘I did not bite’
	é- [!] chá-ââ	‘he did not dig’	é- [!] kɔ́-ɔ̀ɔ̀	‘he did not bite’
	áku é- [!] chá-ââ	‘Aku did not dig’	áku é- [!] kɔ́-ɔ̀ɔ̀	‘Aku did not bite’
	mí- [!] má-ââ	‘I did not build’	mí- [!] fú-úú	‘I did not bury’
	é- [!] má-ââ	‘he did not build’	é- [!] fú-úú	‘he did not bury’
	áku é- [!] má-ââ	‘Aku did not build’	áku é- [!] fú-úú	‘Aku did not bury’

In these forms, the floating H tone prefix is manifested on the subject prefix. The association of the floating tone must take place before non-H SP deletion; otherwise, we would have expected deletion, as in *[áku [!]chá-ââ]. Plateauing applies in this tense, so that the initial H of the vowel suffix spreads leftward to the vowel of the root, causing the L of the root to delink, as in (173). This results in a downstep before the root.

(173)	é	[!] chá	á	â
		≠		
	H	L	H	L

CVV L roots behave similarly to the CV L roots in this tense. One notable difference is that roots with a final long vowel undergo prevocalic shortening, so that the root /gbɔ̀/ as in [e-gbɔ̀] ‘he hunted’ surfaces with a short vowel before the VV suffix. Here, the root undergoes plateauing before prevocalic shortening, so that the underlying L of the root delinks before the vowel is shortened, and therefore is not deleted but remains as a downstep.

(174)	e-gbɔ̀	‘he hunted’	e-sɔ̀	‘he caught’
	mí- [!] gbɔ́-ɔ̀ɔ̀	‘I did not hunt’	mí- [!] sɔ́-ɔ̀ɔ̀	‘I did not catch’
	é- [!] gbɔ́-ɔ̀ɔ̀	‘he did not hunt’	é- [!] sɔ́-ɔ̀ɔ̀	‘he did not catch’
	áku é- [!] gbɔ́-ɔ̀ɔ̀	‘Aku did not hunt’	áku é- [!] sɔ́-ɔ̀ɔ̀	‘Aku did not catch’

The CVV root with a diphthong does not undergo vowel shortening. Since this root is toneless, it surfaces with H tone due to the H tone suffix in this tense. The SP undergoes polarity and is deleted after an NP subject.

- (175) mǐ-háó-óô 'I did not worry'
 e-háó-óô 'he did not worry'
 ákú háó-óô 'Aku did not worry'

The CVV LH root, /fuá/, undergoes plateauing (176).

- (176) mǐ-[!]fúá-áâ 'I did not hug'
 é-[!]fúá-áâ 'he did not hug'
 ákú é-[!]fúá-áâ 'Aku did not hug'

CVV LHL roots (177) undergo falling tone simplification, so that there is no L tone or downstep before the suffix as would be expected if the final L tone of the root remained in the surface form.

- | | | | | |
|-------|---------------------------|---------------------|----------------------------|---------------------|
| (177) | e-bɛɛ | 'he swept' | e-ywɛɛ | 'he spoke' |
| | mǐ- [!] bɛ-ɛɛ | 'I did not sweep' | mǐ- [!] ywɛ-ɛɛ | 'I did not speak' |
| | é- [!] bɛ-ɛɛ | 'he did not sweep' | é- [!] ywɛ-ɛɛ | 'he did not speak' |
| | ákú é- [!] bɛ-ɛɛ | 'Aku did not sweep' | ákú é- [!] ywɛ-ɛɛ | 'Aku did not speak' |
| | e-hóô | 'he sold' | e-hóô | 'he cooked' |
| | mǐ- [!] hó-óô | 'I did not sell' | mǐ- [!] hó-óô | 'I did not cook' |
| | é- [!] hó-óô | 'he did not sell' | é- [!] hó-óô | 'he did not cook' |
| | ako é- [!] hó-óô | 'Ako did not sell' | ákú é- [!] hó-óô | 'Aku did not cook' |

The derivation of, e.g., [é-[!]bɛ-ɛɛ] is shown below.

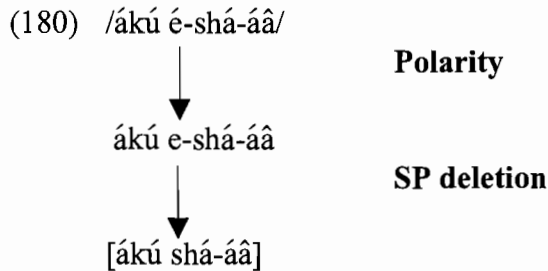
- (178) $\begin{array}{c} \acute{e} \\ | \\ \text{H (neg. tense marker)} \end{array} \quad \begin{array}{c} - \\ \text{(plateauing)} \end{array} \quad \begin{array}{c} \text{!} \\ \text{bɛ} \\ \text{H L} \end{array} \quad \begin{array}{c} - \\ \text{(falling tone simplification)} \end{array} \quad \begin{array}{c} \acute{e} \quad \acute{e} \\ \diagup \quad \diagdown \\ \text{H} \quad \text{L} \end{array}$

With CV H roots, polarity applies to the prefix, deleting the H tone that has associated to the subject prefix, so that the prefixes surface as L. In the case of the SP /mǐ-/, which has an underlying H, the prefix tone remains H since only the tense-specific floating H tone prefix is deleted by polarity²⁰.

- | | | | | |
|-------|------------|-----------------------------|------------|--------------------|
| (179) | mǐ-dú-úú | 'I did not cultivate' | mǐ-lá-áâ | 'I did not sing' |
| | e-dú-úú | 'he did not cultivate' | e-lá-áâ | 'he did not sing' |
| | ákú dú-úú | 'Aku did not cultivate' | ákú lá-áâ | 'Aku did not sing' |
| | mǐ-shá-áâ | 'I did not take forcibly' | mǐ-kpé-éê | 'I did not chew' |
| | e-shá-áâ | 'he did not take forcibly' | e-kpé-éê | 'he did not chew' |
| | ákú shá-áâ | 'Aku did not take forcibly' | ákú kpé-éê | 'Aku did not chew' |

²⁰ In the case of the first person singular prefix, there are two H tones in the input (underlying H and the H negative marker) and H in the output. I assume that the Twin Sister Convention deletes the negative marker rather than the underlying H. Therefore, polarity does not apply to this prefix, because polarity only refers to the H negative marker.

These data indicate that polarity applies before subject prefix deletion. If deletion applied first, then the prefixes would still have the tense-specific H tone at that point and would therefore not undergo deletion in any context. Instead, polarity applies first, making the underlyingly toneless subject prefixes toneless once again when followed by a H-toned root. Then, subject prefix deletion applies, deleting a toneless prefix after an NP subject. This is illustrated below.



CV HL roots pattern with CV H roots; falling tone simplification applies here as it did in the CVV LHL roots.

(181)	e-hê	‘he bought’	e-kwê	‘he looked at’
	mí-hé-êê	‘I did not buy’	mí-kwé-êê	‘I did not look at’
	e-hé-êê	‘he did not buy’	e-kwé-êê	‘he did not look at’
	ákú hé-êê	‘Aku did not buy’	ákú kwé-êê	‘Aku did not look at’

CVV H roots undergo no tonal alternation but do undergo prevocalic shortening.

(182)	e-yóó	‘he recognized’
	mí-yó-óô	‘I did not recognize’
	e-yó-óô	‘he did not recognize’
	ákú yó-óô	‘Aku did not recognize’

CVV HL roots where the two vowels are different do not undergo prevocalic shortening.

(183)	e-bó'á	‘he gathered’
	mí-bó'á-ââ	‘I did not gather’
	e-bó'á-ââ	‘he did not gather’
	ákú bó'á-ââ	‘Aku did not gather’

CVCV H roots trigger polarity, so that SP's surface as L or undergo SP deletion.

(184)	e-gbélé	‘he opened’	e-chósé	‘he trained’
	mí-gbélé-éê	‘I did not open’	mí-chósé-éê	‘I did not train’
	e-gbélé-éê	‘he did not open’	e-chósé-éê	‘he did not train’
	áku gbéle-éê	‘Aku did not open’	áku chósé-éê	‘Aku did not train’
	e-fóté	‘he poured’	e-gbólé	‘he massaged’
	mí-fóté-éê	‘I did not pour’	mí-gbólé-éê	‘I did not massage’
	e-fóté-éê	‘he did not pour’	e-gbólé-éê	‘he did not massage’
	áku fóté-éê	‘Aku did not pour’	áku gbólé-éê	‘Aku did not massage’

CVCV HL roots undergo plateauing between the final syllable of the root and the suffix, surfacing as H^HH.

(185)	e-fú ¹ tú	‘he mixed’	e-ká ¹ né	‘he counted’
	mí-fú ¹ tú-úû	‘I did not mix’	mí-ká ¹ né-éê	‘I did not count’
	e-fú ¹ tú-úû	‘he did not mix’	e-ká ¹ né-éê	‘he did not count’
	áku fú ¹ tú-úû	‘Aku did not mix’	áku ká ¹ né-éê	‘Aku did not count’
	e-chá ¹ lá	‘he mended’	e-kó ¹ tá	‘he folded’
	mí-chá ¹ lá-ââ	‘I did not mend’	mí-kó ¹ tá-ââ	‘I did not fold’
	e-chá ¹ lá-ââ	‘he did not mend’	e-kó ¹ tá-ââ	‘he did not fold’
	áku chá ¹ lá-ââ	‘I did not mend’	áku kó ¹ tá-ââ	‘Aku did not fold’

CVCV toneless roots pattern with the initial-H roots. The H of the suffix spreads into the root, and since there is no L tone on the root, there is no downstep. The H triggers polarity, so that SP’s (except the first person singular) surface as L (or are deleted, following an NP).

(186)	e-bóle	‘he surrounded’	e-chóm̩	‘he twisted’
	mí-bólé-éê	‘I did not surround’	mí-chóm̩-óô	‘I did not twist’
	e-bólé-éê	‘he did not surround’	e-chóm̩-óô	‘he did not twist’
	áku bóle-éê	‘Aku did not surround’	áku chóm̩-óô	‘Aku did not twist’
	e-sóle	‘he prayed’		
	mí-sólé-éê	‘I did not pray’		
	e-sólé-éê	‘he did not pray’		
	áku sólé-éê	‘Aku did not pray’		

The derivation of CVCV toneless verbs in the generic negative is shown below.

(187)	e	-	bólé	-	é ê
	⊢ (polarity)				
	H (neg. tense marker)				H L

CV toneless roots also pattern with the initial-H roots in this tense.

(188)	mí-hó-óô	'I did not pass by'	mí-lé-éê	'I did not know'
	e-hó-óô	'he did not pass by'	e-lé-éê	'he did not know'
	ákú hó-óô	'Aku did not pass by'	ákú lé-éê	'Aku did not know'

3.3. Perfective

The perfective consists of a subject prefix, floating H tone prefix, floating L tone prefix, and root. CV L stems undergo no alternation (189).

(189)	mí-chɔ	'I have trapped'	mí-fa	'I have pulled up'
	é-chɔ	'he has trapped'	é-fa	'he has pulled up'
	ákú é-chɔ	'Aku has trapped'	ákú é-fa	'Aku has pulled up'
	mí-fo	'I have cut'	mí-kpɛ	'I have sewn'
	é-fo	'he has cut'	é-kpɛ	'he has sewn'
	ákú é-fo	'Aku has cut'	ákú é-kpɛ	'Aku has sewn'

The HL rule does not apply to these forms, so that the tone sequence HL surfaces. This is due to the floating L tone prefix, which actually gives the underlying sequence HLL, which does not trigger the HL rule. This is shown in (190).

(190)	é	-	chɔ
	H		L
	Ⓛ		
	(perfective prefixes)		

CV toneless roots follow the same pattern.

(191)	mí-lɛ	'I have known'	mí-ho	'I have passed by'
	é-lɛ	'he has known'	é-ho	'he has passed by'
	ákú é-lɛ	'Aku has known'	ákú é-ho	'Aku has passed by'

CVV L verbs do not alternate.

(192)	mí-gbɔɔ	'I have hunted'	mí-tuu	'I have approached'
	é-gbɔɔ	'he has hunted'	é-tuu	'he has approached'
	ákú é-gbɔɔ	'Aku has hunted'	ákú é-tuu	'Aku has approached'
	mí-tɔɔ	'I have floated'		
	é-tɔɔ	'he has floated'		
	ákú é-tɔɔ	'Aku has floated'		

The CVV toneless root behaves like CVV L roots.

- (193) mǐ-hao 'I have worried'
 é-hao 'he has worried'
 ákú é-hao 'Aku has worried'

CVCV toneless roots (194) also are unchanged from their underlying form.

- | | | | | |
|-------|-------------|----------------------|------------|---------------------|
| (194) | mǐ-chǔmǔ | 'I have twisted' | mǐ-sǒle | 'I have prayed' |
| | é-chǔmǔ | 'he has twisted' | é-sǒle | 'he has prayed' |
| | ákú é-chǔmǔ | 'Aku has twisted' | ákú é-sǒle | 'Aku has prayed' |
| | mǐ-bǒle | 'I have surrounded' | mǐ-hala | 'I have collected' |
| | é-bǒle | 'he has surrounded' | é-hala | 'he has collected' |
| | ákú é-bǒle | 'Aku has surrounded' | ákú é-hala | 'Aku has collected' |
| | mǐ-gbala | 'I have dragged' | mǐ-fǒlǒ | 'I have cut (pl.)' |
| | é-gbala | 'he has dragged' | é-fǒlǒ | 'he has cut (pl.)' |
| | ákú é-gbala | 'Aku has dragged' | ákú é-fǒlǒ | 'Aku has cut (pl.)' |

CVV LHL stems do not alternate.

- | | | | | |
|-------|-----------|-----------------|------------|---------------------|
| (195) | mǐ-bɛɛ | 'I have swept' | mǐ-chɔɔ | 'I have taught' |
| | é-bɛɛ | 'he has swept' | é-chɔɔ | 'he has taught' |
| | ákú é-bɛɛ | 'Aku has swept' | ákú é-chɔɔ | 'Aku has taught' |
| | mǐ-feɛ | 'I have done' | mǐ-loɔ | 'I have collected' |
| | é-feɛ | 'he has done' | é-loɔ | 'he has collected' |
| | ákú é-feɛ | 'Aku has done' | ákú é-loɔ | 'Aku has collected' |

Plateauing into the first vowel of the CVV LHL root is blocked by the floating L tone before the root, which gives the tone sequence HLLH, not a trigger of plateauing.

- (196) é - bɛɛ
 | | |
 H(L) LHL
 (perfective markers)

CVV and CV LH roots also do not undergo plateauing for this same reason.

- | | | | | |
|-------|-----------|------------------|------------|------------------|
| (197) | mǐ-fuá | 'I have hugged' | mǐ-droó | 'I have helped' |
| | é-fuá | 'he has hugged' | é-droó | 'he has helped' |
| | ákú é-fuá | 'Aku has hugged' | ákú é-droó | 'Aku has helped' |

CVCV LH roots surface as LH as well.

(198)	mí-balá	‘I have wrapped’	mí-hulú	‘I have jumped’
	é-balá	‘he has wrapped’	é-hulú	‘he has jumped’
	ákú é-balá	‘Aku has wrapped’	ákú é-hulú	‘Aku has jumped’
	mí-kasé	‘I have learned’	mí-shishí	‘I have deceived’
	é-kasé	‘he has learned’	é-shishí	‘he has deceived’
	ákú é-kasé	‘Aku has learned’	ákú é-shishí	‘Aku has deceived’

A downstep appears before CV H roots due to the floating L tone.

(199)	mí- ¹ bé	‘I have quarrelled’	mí- ¹ dú	‘I have cultivated’
	é- ¹ bé	‘he has quarrelled’	é- ¹ dú	‘he has cultivated’
	ákú é- ¹ bé	‘Aku has quarrelled’	ákú é- ¹ dú	‘Aku has cultivated’
	mí- ¹ lá	‘I have sung’	mí- ¹ há	‘I have given’
	é- ¹ lá	‘he has sung’	é- ¹ há	‘he has given’
	ákú é- ¹ lá	‘Aku has sung’	ákú é- ¹ há	‘Aku has given’

The origin of the downstep is shown below.

(200)	é - ¹	bé
	H (L) H	

(perfective markers)

The downstep also appears before CVV H roots.

(201)	mí- ¹ yóó	‘I have recognized’
	é- ¹ yóó	‘he has recognized’
	ákú é- ¹ yóó	‘Aku has recognized’

As shown in (202), CVCV H roots also have the downstep.

(202)	mí- ¹ fóté	‘I have poured’	mí- ¹ gbólé	‘I have massaged’
	é- ¹ fóté	‘he has poured’	é- ¹ gbólé	‘he has massaged’
	ákú é- ¹ fóté	‘Aku has poured’	ákú é- ¹ gbólé	‘he has massaged’
	mí- ¹ gbélé	‘I have opened’	mí- ¹ kádí	‘I have made a mark’
	é- ¹ gbélé	‘he has opened’	é- ¹ kádí	‘he has made a mark’
	ákú é- ¹ gbélé	‘Aku has opened’	ákú é- ¹ kádí	‘Aku has made a mark’

The downstep also appears before CVV HL roots, which undergo the HL rule as well.

- | | | | | |
|-------|----------------------------------------|----------------------|---------------------------------------|--------------------|
| (203) | mí- ¹ bɔ́ ¹ í | 'I have started' | mí- ¹ bó ¹ á | 'I have gathered' |
| | é- ¹ bɔ́ ¹ í | 'he has started' | é- ¹ bó ¹ á | 'he has gathered' |
| | áku é- ¹ bɔ́ ¹ í | 'Aku has started' | áku é- ¹ bó ¹ á | 'Aku has gathered' |
| | mí- ¹ ká ¹ í | 'I have remembered' | mí- ¹ pí ¹ í | 'I have suffered' |
| | é- ¹ ká ¹ í | 'he has remembered' | é- ¹ pí ¹ í | 'he has suffered' |
| | áku é- ¹ ká ¹ í | 'Aku has remembered' | áku é- ¹ pí ¹ í | 'Aku has suffered' |

CVCV HL roots follow the same pattern.

- | | | | | |
|-------|-----------------------------------------|-------------------|-----------------------------------------|---------------------|
| (204) | mí- ¹ kpá ¹ lá | 'I have herded' | mí- ¹ ɲmá ¹ ná | 'I have scratched' |
| | é- ¹ kpá ¹ lá | 'he has herded' | é- ¹ ɲmá ¹ ná | 'he has scratched' |
| | áku é- ¹ kpá ¹ lá | 'Aku has herded' | áku é- ¹ ɲmá ¹ ná | 'Aku has scratched' |
| | mí- ¹ bó ¹ lɔ́ | 'I have shouted' | mí- ¹ bó ¹ té | 'I have entered' |
| | é- ¹ bó ¹ lɔ́ | 'he has shouted' | é- ¹ bó ¹ té | 'he has entered' |
| | áku é- ¹ bó ¹ lɔ́ | 'Aku has shouted' | áku é- ¹ bó ¹ té | 'Aku has entered' |

Again, CV HL roots are preceded by a downstep.

- | | | | | |
|-------|------------------------|-----------------------|-------------------------|---------------------|
| (205) | mí- ¹ hê | 'I have bought' | mí- ¹ kwê | 'I have looked at' |
| | é- ¹ hê | 'he has bought' | é- ¹ kwê | 'he has looked at' |
| | áku é- ¹ hê | 'Aku has bought' | áku é- ¹ kwê | 'Aku has looked at' |
| | mí- ¹ bê | 'I have been absent' | | |
| | é- ¹ bê | 'he has been absent' | | |
| | áku é- ¹ bê | 'Aku has been absent' | | |

3.4. Negative perfective

The negative perfective is made up of a subject prefix, floating H tone prefix, root, H tone suffix, and /-kɔ/ suffix. CV L roots (206) surface with a downstepped H tone, since plateauing causes the H tone suffix to associate to the root, delinking the underlying L. In all cases, the suffix /-kɔ/ surfaces as L, failing to undergo the HL rule.

- | | | | | |
|-------|----------------------------|---------------------|---------------------------|----------------------|
| (206) | mí- ¹ chá-kɔ | 'I have not dug' | mí- ¹ má-kɔ | 'I have not built' |
| | é- ¹ chá-kɔ | 'he has not dug' | é- ¹ má-kɔ | 'he has not built' |
| | áku é- ¹ chá-kɔ | 'Aku has not dug' | áku é- ¹ má-kɔ | 'Aku has not built' |
| | mí- ¹ nú-kɔ | 'I have not drunk' | mí- ¹ jó-kɔ | 'I have not danced' |
| | é- ¹ nú-kɔ | 'he has not drunk' | é- ¹ jó-kɔ | 'he has not danced' |
| | áku é- ¹ nú-kɔ | 'Aku has not drunk' | áku é- ¹ jó-kɔ | 'Aku has not danced' |

The derivation of [é-¹chá-kɔ] is shown below. As indicated, the suffix does not undergo the HL rule.

- (207)
- | | | | |
|---|---|-----|----|
| é | ! | chá | kɔ |
| ⋮ | | ⋮ | ⋮ |
| H | | L H | L |

CVV L roots also have a downstep and are derived in the same way as the CV L roots.

- (208)
- | | | | |
|----------------------------|-----------------------------|-----------------------------|----------------------|
| mí- ¹ túú-kɔ | 'I have not approached' | mí- ¹ gbóó-kɔ | 'I have not hunted' |
| é- ¹ túú-kɔ | 'he has not approached' | é- ¹ gbóó-kɔ | 'he has not hunted' |
| ákú é- ¹ túú-kɔ | 'Aku has not approached' | ákú é- ¹ gbóó-kɔ | 'Aku has not hunted' |
| mí- ¹ káá-kɔ | 'I have not taken a vow' | mí- ¹ sóó-kɔ | 'I have not caught' |
| é- ¹ káá-kɔ | 'they have not taken a vow' | é- ¹ sóó-kɔ | 'he has not caught' |
| ákú é- ¹ káá-kɔ | 'Aku has not taken a vow' | ákú é- ¹ sóó-kɔ | 'Aku has not caught' |

CVCV LH roots undergo plateauing into the first syllable of the root.

- (209)
- | | | | |
|-----------------------------|-----------------------|-------------------------------|------------------------|
| mí- ¹ kásé-kɔ | 'I have not learned' | mí- ¹ shíshí-kɔ | 'I have not deceived' |
| é- ¹ kásé-kɔ | 'he has not learned' | é- ¹ shíshí-kɔ | 'he has not deceived' |
| ákú é- ¹ kásé-kɔ | 'Aku has not learned' | ákú é- ¹ shíshí-kɔ | 'Aku has not deceived' |
| mí- ¹ húlú-kɔ | 'I have not jumped' | mí- ¹ bálá-kɔ | 'I have not wrapped' |
| é- ¹ húlú-kɔ | 'you have not jumped' | é- ¹ bálá-kɔ | 'he has not wrapped' |
| ákú é- ¹ húlú-kɔ | 'Aku has not jumped' | ákú é- ¹ bálá-kɔ | 'Aku has not wrapped' |

CV LH and CVV LH roots undergo plateauing in this tense. Plateauing must apply before rising tone lengthening, otherwise, the vowel would be lengthened in the CV LH root. For example, rising tone lengthening would change /drǒ/ to intermediate [droó]. Plateauing would then change the tone of the root, giving the surface form *[¹dróó], which is unattested.

- (210)
- | | | | |
|----------------------------|----------------------|----------------------------|----------------------|
| mí- ¹ dró-kɔ | 'I have not helped' | mí- ¹ fúá-kɔ | 'I have not hugged' |
| é- ¹ dró-kɔ | 'he has not helped' | é- ¹ fúá-kɔ | 'he has not hugged' |
| ákú é- ¹ dró-kɔ | 'Aku has not helped' | ákú é- ¹ fúá-kɔ | 'Aku has not hugged' |

The derivation of [é-¹dró-kɔ] is given below.

- (211)
- | | |
|--------------------------|-------------------------------------------------|
| /é-drǒ-kɔ/ | |
| ↓ | Plateauing |
| é- ¹ dró-kɔ | |
| ↓ | Rising tone lengthening (does not apply) |
| [é- ¹ dró-kɔ] | |

CVV LHL roots undergo plateauing and falling tone simplification, surfacing as ¹HH in this tense.

- | | | | | |
|-------|----------------------------|---------------------|-----------------------------|----------------------------|
| (212) | mí- ¹ béé-kɔ | 'I have not swept' | mí- ¹ chóó-kɔ | 'I have not taught' |
| | é- ¹ béé-kɔ | 'he has not swept' | é- ¹ chóó-kɔ | 'he has not taught' |
| | áku é- ¹ béé-kɔ | 'Aku has not swept' | áku é- ¹ chóó-kɔ | 'Aku has not taught' |
| | mí- ¹ fée-kɔ | 'I have not done' | mí- ¹ híé-kɔ | 'I have not hand-carried' |
| | é- ¹ fée-kɔ | 'he has not done' | é- ¹ híé-kɔ | 'he has not hand-carried' |
| | áku é- ¹ fée-kɔ | 'Aku has not done' | áku é- ¹ híé-kɔ | 'Aku has not hand-carried' |

The derivation of [é-¹béé-kɔ] is shown below.

- (213)
- | | | | |
|---|--------------|------|----|
| é | ¹ | béé | kɔ |
| | | | |
| H | | L HL | L |

CV H roots show no alternation. The floating H tone prefix is deleted due to polarity, and SP's are deleted before an NP subject.

- | | | | | |
|-------|------------|---------------------|-----------|-------------------------|
| (214) | mí-há-kɔ | 'I have not given' | mí-bé-kɔ | 'I have not quarreled' |
| | e-há-kɔ | 'he has not given' | e-bé-kɔ | 'he has not quarreled' |
| | áku há-kɔ | 'Aku has not given' | áku bé-kɔ | 'Aku has not quarreled' |
| | mí-chú-kɔ | 'I have not sent' | mí-lá-kɔ | 'I have not sung' |
| | e-chú-kɔ | 'he has not sent' | e-lá-kɔ | 'he has not sung' |
| | áku chú-kɔ | 'Aku has not sent' | áku lá-kɔ | 'Aku has not sung' |

CVV H roots also do not alternate.

- (215)
- | | |
|------------|--------------------------|
| mí-yóó-kɔ | 'I have not recognized' |
| e-yóó-kɔ | 'he has not recognized' |
| áku yóó-kɔ | 'Aku has not recognized' |

CVCV HH roots follow the same pattern.

- | | | | | |
|-------|--------------|-----------------------|--------------|----------------------------|
| (216) | mí-chósé-kɔ | 'I have not trained' | mí-gbélé-kɔ | 'I have not opened' |
| | e-chósé-kɔ | 'he has not trained' | e-gbélé-kɔ | 'you have not opened' |
| | áku chósé-kɔ | 'Aku has not trained' | áku gbélé-kɔ | 'Aku has not opened' |
| | mí-fóté-kɔ | 'I have not poured' | mí-kádí-kɔ | 'you have not made a mark' |
| | e-fóté-kɔ | 'he has not poured' | e-kádí-kɔ | 'he has not made a mark' |
| | áku fóté-kɔ | 'Aku has not poured' | áku kádí-kɔ | 'Aku has not made a mark' |

CVCV HL roots follow the same pattern. In addition, the second syllable of each stem surfaces with a downstepped H tone due to the H tone suffix (which had no effect on any of the final-H roots shown above). Due to plateauing, the floating H tone suffix associates to the end of the stem, and the final L delinks, remaining as a downstep, as in (217).

- | | | | | |
|-------|--------------|-----------------------|--------------|-------------------------|
| (217) | mí-kpl'á-kɔ | 'I have not herded' | mí-ɲm'á-kɔ | 'I have not scratched' |
| | e-kpl'á-kɔ | 'he has not herded' | e-ɲm'á-kɔ | 'he has not scratched' |
| | ákú kpl'á-kɔ | 'Aku has not herded' | ákú ɲm'á-kɔ | 'Aku has not scratched' |
| | mí-ká'né-kɔ | 'I have not counted' | mí-bó'té-kɔ | 'I have not entered' |
| | e-ká'né-kɔ | 'he has not counted' | e-bó'té-kɔ | 'he has not entered' |
| | ákú ká'né-kɔ | 'Aku has not counted' | ákú bó'té-kɔ | 'Aku has not entered' |

The derivation of these forms is shown below.

- (218)
- | | | | | |
|-----------------------|---|---------------------------|---|----|
| e | - | kpl'á | - | kɔ |
| ⊢ (polarity) | | ⊢ (plateauing) | | |
| H (neg. tense marker) | | H L H (floating H suffix) | | L |

We know that the downstepped H on the second syllable of the root in these forms cannot be due to the HL rule, as it is in the simple past, since the L-toned suffix /-kɔ/ would block this process. Thus, we know that the tone change is due to a floating H suffix. CVV HL roots show the same behavior (219).

- | | | | | |
|-------|-------------|--------------------------|-------------|------------------------|
| (219) | mí-bɔ'í-kɔ | 'I have not started' | mí-pí'í-kɔ | 'I have not suffered' |
| | e-bɔ'í-kɔ | 'he has not started' | e-pí'í-kɔ | 'he has not suffered' |
| | ákú bɔ'í-kɔ | 'Aku has not started' | ákú pí'í-kɔ | 'Aku has not suffered' |
| | mí-ká'é-kɔ | 'I have not remembered' | mí-bó'á-kɔ | 'I have not gathered' |
| | e-ká'é-kɔ | 'he has not remembered' | e-bó'á-kɔ | 'he has not gathered' |
| | ákú ká'é-kɔ | 'Aku has not remembered' | ákú bó'á-kɔ | 'Aku has not gathered' |

CV HL roots follow the same pattern as other initial-H roots, but also undergo falling tone simplification, losing their final L tone in this tense.

- | | | | | |
|-------|-----------|----------------------|------------|-------------------------|
| (220) | e-hê | 'he bought' | e-kwê | 'he looked at' |
| | mí-hé-kɔ | 'I have not bought' | mí-kwé-kɔ | 'I have not looked at' |
| | e-hé-kɔ | 'he has not bought' | e-kwé-kɔ | 'he has not looked at' |
| | ákú hé-kɔ | 'Aku has not bought' | ákú kwé-kɔ | 'Aku has not looked at' |

Their derivation is given below.

- (221)
- | | | | | |
|-----------------------|---|---------------------------------|---|----|
| e | - | hé | - | kɔ |
| ⊢ (polarity) | | ⊢ (falling tone simplification) | | |
| H (neg. tense marker) | | H L | | L |

CVCV toneless roots pattern with the initial-H roots. Since there is no underlying L on the root, the H tone suffix spreads to the first syllable of the root, triggering polarity. SP's surface as L (or are deleted, following an NP subject).

(222)	e-sɔle	‘he prayed’	e-chɔ̃mɔ̃	‘he twisted’
	mí-sólé-kɔ	‘I have not prayed’	mí-chɔ̃mɔ̃-kɔ	‘I have not twisted’
	e-sólé-kɔ	‘he has not prayed’	e-chɔ̃mɔ̃-kɔ	‘he has not twisted’
	ákú sólé-kɔ	‘Aku has not prayed’	ákú chɔ̃mɔ̃-kɔ	‘Aku has not twisted’
	e-hala	‘he collected’	e-chukɔ	‘he roasted’
	mí-hálá-kɔ	‘I have not collected’	mí-chúkɔ-kɔ	‘I have not roasted’
	e-hálá-kɔ	‘he has not collected’	e-chúkɔ-kɔ	‘he has not roasted’
	ákú hálá-kɔ	‘Aku has not collected’	ákú chúkɔ-kɔ	‘Aku has not roasted’

CV toneless roots also pattern with the initial-H roots in this tense.

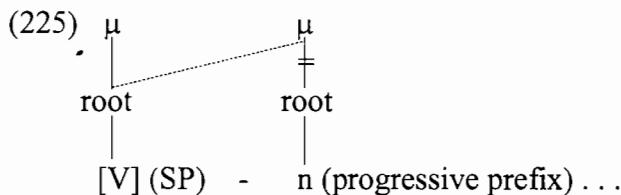
(223)	mí-lé-kɔ	‘I have not known’	mí-hó-kɔ	‘I have not passed by’
	e-lé-kɔ	‘he has not known’	e-hó-kɔ	‘he has not passed by’
	ákú lé-kɔ	‘Aku has not known’	ákú hó-kɔ	‘Aku has not passed by’

3.5. Progressive

The progressive is formed by a subject prefix, /n-/ prefix, and root. In the second and third person singular, the /n-/ prefix is realized as an extra unit of length on the vowel of the SP, as shown in (224). This could be due to a restriction against VN syllables in the language, although some VN syllables may exist. With the first person singular SP, the nasal prefix surfaces with H tone. In all other cases, it surfaces with L tone. In the examples that follow, when the preconsonantal nasal is not marked with a H tone, it surfaces as L-toned.

(224)	mí-ń-dú	‘I am cultivating’
	o-o-dú	‘you are cultivating’
	e-e-dú	‘he is cultivating’
	wɔ-n-dú	‘we are cultivating’
	nyɛ-n-dú	‘you (pl.) are cultivating’
	amɛ-n-dú	‘they are cultivating’

The assimilation of the progressive prefix to single vowel SP’s is illustrated below.



The forms in (226) demonstrates that SP deletion must precede the assimilation of the nasal to /o/ and /e/, since the nasal prefix remains unchanged in these forms.

- (226) ákú n-dú 'Aku is cultivating'
ako n-dú 'Ako is cultivating'

If assimilation applied before assimilation, we would expect the derivation in (227).

- (227) /ákú e-n-dú/
↓ assimilation to /e/
ákú e-e-dú
↓ subject prefix deletion
*[ákú e-du]

CV L roots undergo the HL rule after the first person singular prefix and H-toned nasal prefix; in other cases, they do not change tone in this tense.

- | | | | | |
|-------|----------|---------------------|-----------|------------------|
| (228) | mí-ń-'wó | 'I am wearing' | mí-ń-'chá | 'I am digging' |
| | e-e-wo | 'he is wearing' | e-e-cha | 'he is digging' |
| | ákú ń-wo | 'Aku is wearing' | ákú n-cha | 'Aku is digging' |
| | mí-ń-'dá | 'I am growing up' | mí-ń-'jó | 'I am dancing' |
| | e-e-da | 'he is growing up' | e-e-jo | 'he is dancing' |
| | ákú n-da | 'Aku is growing up' | ákú n-jo | 'Aku is dancing' |

CV toneless roots behave like CV L roots.

- | | | | | |
|-------|----------|---------------------|----------|------------------|
| (229) | mí-ń-'hó | 'I am passing by' | mí-ń-'lé | 'I am knowing' |
| | e-e-ho | 'he is passing by' | e-e-le | 'he is knowing' |
| | ákú ń-ho | 'Aku is passing by' | ákú n-le | 'Aku is knowing' |

CVV L roots undergo no tone change.

- | | | | | |
|-------|-----------|-------------------|-----------|-------------------|
| (230) | mí-ń-tóó | 'I am floating' | mí-ń-doo | 'I am roasting' |
| | e-e-tóó | 'he is floating' | e-e-doo | 'he is roasting' |
| | ákú n-tóó | 'Aku is floating' | ákú n-doo | 'Aku is roasting' |
| | mí-ń-sóó | 'I am catching' | | |
| | e-e-sóó | 'he is catching' | | |
| | ákú n-sóó | 'Aku is catching' | | |

The CVV toneless root behaves like CVV L roots.

- | | | |
|-------|-----------|-------------------|
| (231) | mí-ń-hao | 'I am worrying' |
| | e-e-hao | 'he is worrying' |
| | ákú ń-hao | 'Aku is worrying' |

CVCV LH roots undergo plateauing when preceded by a H tone.

- | | | | | |
|-------|-------------------------|-------------------|-------------------------|------------------|
| (232) | mí-ŋ- ¹ kásé | ‘I am learning’ | mí-m- ¹ májé | ‘I am sending’ |
| | e-e-kásé | ‘he is learning’ | e-e-májé | ‘he is sending’ |
| | ákú ŋ-kásé | ‘Aku is learning’ | ákú m-májé | ‘Aku is sending’ |
| | mí-ŋ- ¹ húlú | ‘I am jumping’ | mí-ŋ- ¹ kójó | ‘I am judging’ |
| | e-e-húlú | ‘he is jumping’ | e-e-kójó | ‘he is judging’ |
| | ákú ŋ-húlú | ‘Aku is jumping’ | ákú ŋ-kójó | ‘Aku is judging’ |

CVV LHL roots also undergo plateauing when preceded by a H tone.

- | | | | | |
|-------|------------------------|-------------------|------------------------|------------------|
| (233) | mí-m- ¹ béê | ‘I am sweeping’ | mí-n- ¹ sââ | ‘I am mending’ |
| | e-e-béê | ‘he is sweeping’ | e-e-sââ | ‘he is mending’ |
| | ákú m-béê | ‘Aku is sweeping’ | ákú n-sââ | ‘Aku is mending’ |
| | mí-ŋ- ¹ hòô | ‘I am selling’ | | |
| | e-e-hòô | ‘he is selling’ | | |
| | ákú ŋ-hòô | ‘Aku is selling’ | | |

CV LH roots undergo plateauing as well, when preceded by a H tone. In other cases, the rising tone of the root is unchanged, and this induces rising tone lengthening, as in [e-e-droó] below.

- | | | |
|-------|------------------------|------------------|
| (234) | mí-n- ¹ dró | ‘I am helping’ |
| | e-e-droó | ‘he is helping’ |
| | ákú n-droó | ‘Aku is helping’ |

CV H roots do not undergo a tone change.

- | | | | | |
|-------|----------|------------------|------------|----------------------|
| (235) | mí-ŋ-fó | ‘I am weeping’ | mí-m-bé | ‘I am quarrelling’ |
| | e-e-fó | ‘he is weeping’ | e-e-bé | ‘he is quarrelling’ |
| | ákú ŋ-fó | ‘Aku is weeping’ | ákú m-bé | ‘Aku is quarrelling’ |
| | mí-ŋ-wó | ‘I am lifting’ | mí-ŋm-kpó | ‘I am peeling’ |
| | e-e-wó | ‘he is lifting’ | e-e-kpó | ‘he is peeling’ |
| | ákú ŋ-wó | ‘Aku is lifting’ | ákú ŋm-kpó | ‘Aku is peeling’ |

CVCV HH roots do not change tone.

- | | | | | |
|-------|--------------|------------------------|------------|------------------|
| (236) | mí-ŋm-gbólé | ‘I am massaging’ | mí-n-jálé | ‘I am rinsing’ |
| | e-e-gbólé | ‘he is massaging’ | e-e-jálé | ‘he is rinsing’ |
| | ákú ŋm-gbólé | ‘Aku is massaging’ | ákú n-jálé | ‘Aku is rinsing’ |
| | mí-ŋ-kádi | ‘I am making a mark’ | mí-ŋ-fóté | ‘I am pouring’ |
| | e-e-kádi | ‘he is making a mark’ | e-e-fóté | ‘he is pouring’ |
| | ákú ŋ-kádi | ‘Aku is making a mark’ | ákú ŋ-fóté | ‘Aku is pouring’ |

CVCV HL roots undergo the HL rule.

- | | | | | |
|-------|--------------|------------------|--------------|-------------------|
| (237) | mí-ńǵ-ǵé'né | 'I am untying' | mí-m-bó'té | 'I am entering' |
| | e-e-ǵé'né | 'he is untying' | e-e-bó'té | 'he is entering' |
| | ákú ńǵ-ǵé'né | 'Aku is untying' | ákú m-bó'té | 'Aku is entering' |
| | mí-ń-chá'lá | 'I am mending' | mí-ńǵ-fú'tú | 'I am mixing' |
| | e-e-chá'lá | 'he is mending' | e-e-fú'tú | 'he is mixing' |
| | ákú n-chá'lá | 'Aku is mending' | ákú ńǵ-fú'tú | 'Aku is mixing' |

CVV HL roots also undergo the HL rule.

- | | | | | |
|-------|------------|----------------------|-------------|--------------------|
| (238) | mí-m-bó'í | 'I am starting' | mí-m-mí-'á | 'I am pressing' |
| | e-e-bó'í | 'he is starting' | e-e-mí-'á | 'he is pressing' |
| | ákú m-bó'í | 'Aku is starting' | ákú m-mí-'á | 'Aku is pressing' |
| | mí-ń-ká'é | 'I am remembering' | mí-m-pí-'í | 'I am suffering' |
| | e-e-ká'é | 'he is remembering' | e-e-pí-'í | 'he is suffering' |
| | ákú ń-ká'é | 'Aku is remembering' | ákú m-pí-'í | 'Aku is suffering' |

3.6. Habitual

The habitual is formed by a subject prefix, L-tone prefix, root, and /-ɔ/ suffix. The suffix assimilates to root final /a/.

- | | | | | |
|-------|--------|---------------------|---------|-------------------|
| (239) | e-ma-a | 'he strikes (hab.)' | e-cha-a | 'he digs (hab.)' |
| | e-lá-a | 'he sings (hab.)' | e-ba-a | 'he comes (hab.)' |

In all other cases, the suffix surfaces as [ɔ].

The floating L tone in this tense does not associate to subject prefixes. CV L roots are unchanged, and SP's are deleted after an NP subject in this tense.

- | | | | | |
|-------|----------|---------------------|----------|---------------------|
| (240) | mí-nu-ɔ | 'I drink (hab.)' | mí-jo-ɔ | 'I dance (hab.)' |
| | e-nu-ɔ | 'he drinks (hab.)' | e-jo-ɔ | 'he dances (hab.)' |
| | ákú nu-ɔ | 'Aku drinks (hab.)' | ákú jo-ɔ | 'Aku dances (hab.)' |

CV toneless verbs behave like CV L verbs in this tense.

- | | | | | |
|-------|----------|------------------------|----------|--------------------|
| (241) | mí-ho-ɔ | 'I pass by (hab.)' | mí-ba-a | 'I come (hab.)' |
| | e-ho-ɔ | 'he passes by (hab.)' | e-ba-a | 'he comes (hab.)' |
| | ákú ho-ɔ | 'Aku passes by (hab.)' | ákú ba-a | 'Aku comes (hab.)' |

The vowel of CVV L stems undergoes shortening before the vowel suffix in this tense.

(242)	e-joo	‘he sharpened’	e-tɔɔ	‘he floated’
	mí-jo-ɔ	‘I sharpen (hab.)’	mí-tɔ-ɔ	‘I float (hab.)’
	e-jo-ɔ	‘he sharpens (hab.)’	e-tɔ-ɔ	‘he floats (hab.)’
	ákú jo-ɔ	‘Aku sharpens (hab.)’	ákú tɔ-ɔ	‘Aku floats (hab.)’
	e-sɔɔ	‘he caught’		
	mí-sɔ-ɔ	‘I catch (hab.)’		
	e-sɔ-ɔ	‘he catches (hab.)’		
	ákú sɔ-ɔ	‘Aku catches (hab.)’		

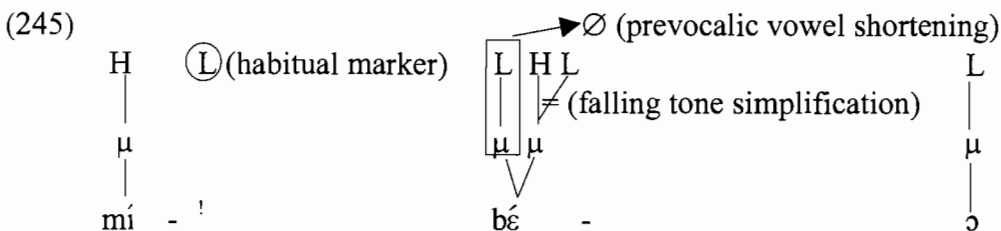
CVCV toneless roots do not change.

(243)	mí-chɔmɔ-ɔ	‘I twist (hab.)’	mí-sɔle-ɔ	‘I pray (hab.)’
	e-chɔmɔ-ɔ	‘he twists (hab.)’	e-sɔle-ɔ	‘he prays (hab.)’
	ákú chɔmɔ-ɔ	‘Aku twists (hab.)’	ákú sɔle-ɔ	‘Aku prays (hab.)’
	mí-bɔle-ɔ	‘I surround (hab.)’	mí-kata-a	‘I lift (hab.)’
	e-bɔle-ɔ	‘he surrounds (hab.)’	e-kata-a	‘he lifts (hab.)’
	ákú bɔle-ɔ	‘Aku surrounds (hab.)’	ákú kata-a	‘Aku lifts (hab.)’

CVV LHL roots undergo vowel shortening, which also deletes the initial L tone of the root. The downstep in these forms is due to the floating L tone of the habitual. Due to falling tone simplification, the roots themselves actually surface as H since they are followed by a suffix.

(244)	e-bɛê	‘he swept’	e-saâ	‘he mended’
	mí- ¹ bɛ-ɔ	‘I sweep (hab.)’	mí- ¹ sá-a	‘I mend (hab.)’
	e-bɛ-ɔ	‘he sweeps (hab.)’	e-sá-a	‘he mends (hab.)’
	ákú ¹ bɛ-ɔ	‘Aku sweeps (hab.)’	ákú ¹ sá-a	‘Aku mends (hab.)’
	e-fɛê	‘he did’		
	mí- ¹ fɛ-ɔ	‘I do (hab.)’		
	e-fɛ-ɔ	‘he does (hab.)’		
	ákú ¹ fɛ-ɔ	‘Aku does (hab.)’		

The derivation of these forms is given below.



CVV LH roots undergo no change, since diphthongs are bisyllabic and therefore do not undergo the vowel shortening rule. Additionally, these roots do not undergo plateauing, since the L tone prefix blocks plateauing in this tense.

- (246) mǐ-fuá-a 'I hug (hab.)'
 e-fuá-a 'he hugs (hab.)'
 ákú fuá-a 'Aku hugs (hab.)'

CV LH roots look like CVV LHL roots in this tense, undergoing vowel shortening with deletion of the initial L tone. The downstep is due to the floating L of the habitual.

- (247) e-droó 'he helped'
 mǐ-¹dró-ɔ 'I help (hab.)'
 e-dró-ɔ 'he helps (hab.)'
 ákú ¹dró-ɔ 'Aku helps (hab.)'

CVCV LH roots do not change.

- | | | | |
|-----------------|---------------------|--------------|--------------------------|
| (248) mǐ-kasé-ɔ | 'I learn (hab.)' | mǐ-chwalá-a | 'I beat grain (hab.)' |
| e-kasé-ɔ | 'he learns (hab.)' | e-chwalá-a | 'he beats grain (hab.)' |
| ákú kasé-ɔ | 'Aku learns (hab.)' | ákú chwalá-a | 'Aku beats grain (hab.)' |
| mǐ-hulú-ɔ | 'I jump (hab.)' | mǐ-kojó-ɔ | 'I judge (hab.)' |
| e-hulú-ɔ | 'he jumps (hab.)' | e-kojó-ɔ | 'he judges (hab.)' |
| ákú hulú-ɔ | 'Aku jumps (hab.)' | ákú kojó-ɔ | 'Aku judges (hab.)' |

The floating L tone is manifested as a downstep between final-H subjects and initial-H roots, as with the CV H roots.

- | | | | |
|-----------------------------|--------------------|-----------------------|--------------------|
| (249) mǐ- ¹ fó-ɔ | 'I weep (hab.)' | mǐ- ¹ wó-ɔ | 'I lift (hab.)' |
| e-fó-ɔ | 'he weeps (hab.)' | e-wó-ɔ | 'he lifts (hab.)' |
| ákú ¹ fó-ɔ | 'Aku weeps (hab.)' | ákú ¹ wó-ɔ | 'Aku lifts (hab.)' |

CVCV H roots follow the same pattern.

- | | | | |
|--------------------------------|---------------------|--------------------------|----------------------|
| (250) mǐ- ¹ chósé-ɔ | 'I train (hab.)' | mǐ- ¹ gbélé-ɔ | 'I open (hab.)' |
| e-chósé-ɔ | 'he trains (hab.)' | e-gbélé-ɔ | 'he opens (hab.)' |
| ákú ¹ chósé-ɔ | 'Aku trains (hab.)' | ákú ¹ gbélé-ɔ | 'Aku opens (hab.)' |
| mǐ- ¹ fóté-ɔ | 'I pour (hab.)' | mǐ- ¹ télé-ɔ | 'I carry (hab.)' |
| e-fóté-ɔ | 'he pours (hab.)' | e-télé-ɔ | 'he carries (hab.)' |
| ákú ¹ fóté-ɔ | 'Aku pours (hab.)' | ákú ¹ télé-ɔ | 'Aku carries (hab.)' |

CVCV HL roots do not undergo the HL rule, since the suffix is L-toned, giving the tone sequence HLL, which does not trigger the HL rule.

(251)	mí- ¹ kóta-a	‘I fold (hab.)’	mí- ¹ bóte-ɔ	‘I enter (hab.)’
	e-kóta-a	‘he folds (hab.)’	e-bóte-ɔ	‘he enters (hab.)’
	ákú ¹ kóta-a	‘Aku folds (hab.)’	ákú ¹ bóte-ɔ	‘Aku enters (hab.)’
	mí- ¹ káne-ɔ	‘I count (hab.)’	mí- ¹ kpála-a	‘I herd (hab.)’
	e-káne-ɔ	‘he counts (hab.)’	e-kpála-a	‘he herds (hab.)’
	ákú ¹ káne-ɔ	‘Aku counts (hab.)’	ákú ¹ kpála-a	‘Aku herds (hab.)’

CVV HL roots also do not undergo the HL rule.

(252)	mí- ¹ káe-ɔ	‘I remember (hab.)’	mí- ¹ bɔ́i-ɔ	‘I start (hab.)’
	e-káe-ɔ	‘he remembers (hab.)’	e-bɔ́i-ɔ	‘he starts (hab.)’
	ákú ¹ káe-ɔ	‘Aku remembers (hab.)’	ákú ¹ bɔ́i-ɔ	‘I start (hab.)’

3.7. Future

The future tense is comprised of a subject prefix, /bǎ-/ prefix, and root. The first person singular surfaces as [m-ǎ-], possibly through the process described in section 1.2.4.4. CV H roots do not change tone in this tense. Since there is no floating tone prefix to associate to the SP, /e-/ is deleted following an NP subject in this tense.

(253)	m-ǎ-fó	‘I will weep’	m-ǎ-lá	‘I will sing’
	e-baá-fó	‘he will weep’	e-baá-lá	‘he will sing’
	ákú baá-fó	‘Aku will weep’	ákú baá-lá	‘Aku will sing’
	m-ǎ-tá	‘I will narrate’	m-ǎ-wó	‘I will lift’
	e-baá-tá	‘he will narrate’	e-baá-wó	‘he will lift’
	ákú baá-tá	‘Aku will narrate’	ákú baá-wó	‘Aku will lift’

CVCV HH roots also do not change tone.

(254)	m-ǎ-chósé	‘I will train’	m-ǎ-gbélé	‘I will open’
	e-baá-chósé	‘he will train’	e-baá-gbélé	‘he will open’
	ákú baá-chósé	‘Aku will train’	ákú baá-gbélé	‘Aku will open’
	m-ǎ-télé	‘I will carry’	m-ǎ-fóté	‘I will pour’
	e-baá-télé	‘he will carry’	e-baá-fóté	‘he will pour’
	ákú baá-télé	‘Aku will carry’	ákú baá-fóté	‘Aku will pour’

CVCV HL roots undergo the HL rule.

(255)	m-ǎ-ká ¹ né	‘I will count’	m-ǎ-kó ¹ tá	‘I will fold’
	e-baá-ká ¹ né	‘he will count’	e-baá-kó ¹ tá	‘he will fold’
	ákú baá-ká ¹ né	‘Aku will count’	ákú baá-kó ¹ tá	‘Aku will fold’
	m-ǎ-bó ¹ te	‘I will enter’	m-ǎ-kpá ¹ lá	‘I will herd’
	e-baá-bó ¹ te	‘he will enter’	e-baá-kpá ¹ lá	‘he will herd’
	ákú baá-bó ¹ te	‘Aku will enter’	ákú baá-kpá ¹ lá	‘Aku will herd’

CVV HL roots also undergo the HL rule.

- | | | | | |
|-------|--------------|---------------------|--------------|---------------------|
| (256) | m-á-ká'ě | 'I will remember' | m-á-ká'ě | 'I will remember' |
| | e-baá-ká'ě | 'he will remember' | e-baá-ká'ě | 'he will remember' |
| | áku baá-ká'ě | 'Aku will remember' | áku baá-ká'ě | 'Aku will remember' |
| | m-á-bó'í | 'I will start' | m-á-bó'á | 'I will gather' |
| | e-baá-bó'í | 'he will remember' | e-baá-bó'á | 'he will gather' |
| | áku baá-bó'í | 'Aku will remember' | áku baá-bó'á | 'Aku will gather' |

CV L roots undergo the HL rule when not followed by an object.

- | | | | | |
|-------|--------------------------|------------------|---------------------------|----------------|
| (257) | m-á- ¹ jó | 'I will dance' | m-á- ¹ chá | 'I will dig' |
| | e-baá- ¹ jó | 'he will dance' | e-baá- ¹ chá | 'he will dig' |
| | áku baá- ¹ jó | 'Aku will dance' | áku baá- ¹ chá | 'Aku will dig' |
| | m-á- ¹ lá | 'I will dream' | m-á- ¹ fó | 'I will cut' |
| | e-baá- ¹ lá | 'he will dream' | e-baá- ¹ fó | 'he will cut' |
| | áku baá- ¹ lá | 'Aku will dream' | áku baá- ¹ fó | 'Aku will cut' |

When followed by a H-toned object, these roots undergo plateauing, as in [e-baá-¹fó tú] 'he will cut a gun'. When followed by a L-toned object, these roots surface with L tone, as in [e-baá-jo adoá] 'he will dance the Adoa'.

CV toneless roots behave like CV L roots.

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|-------|--------------------------|-----------------|--------------------------|--------------------|
| (258) | m-á- ¹ bá | 'I will come' | m-á- ¹ hó | 'I will pass by' |
| | e-baá- ¹ bá | 'he will come' | e-baá- ¹ hó | 'he will pass by' |
| | áku baá- ¹ bá | 'Aku will come' | áku baá- ¹ hó | 'Aku will pass by' |

CVCV toneless roots surface as L.

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|-------|---------------|------------------|--------------|---------------------|
| (259) | m-á-chóm̩ | 'I will twist' | m-á-sóle | 'I will pray' |
| | e-baá-chóm̩ | 'he will twist' | e-baá-sóle | 'he will pray' |
| | áku baá-chóm̩ | 'Aku will twist' | áku baá-sóle | 'Aku will pray' |
| | m-á-kata | 'I will lift' | m-á-bóle | 'I will surround' |
| | e-baá-kata | 'he will lift' | e-baá-bóle | 'he will surround' |
| | áku baá-kata | 'Aku will lift' | áku baá-bóle | 'Aku will surround' |

CVV toneless roots also surface as L.

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|-------|-------------|------------------|
| (260) | m-á-hao | 'I will worry' |
| | e-baá-hao | 'he will worry' |
| | áku baá-hao | 'Aku will worry' |

CVV L roots do not change.

(261)	m-á-doo	‘I will roast’	m-á-kaa	‘I will take a vow’
	e-baá-doo	‘he will roast’	e-baá-kaa	‘he will take a vow’
	ákú baá-doo	‘Aku will roast’	ákú baá-kaa	‘Aku will take a vow’
	m-á-gbɔɔ	‘I will hunt’		
	e-baá-gbɔɔ	‘he will hunt’		
	ákú baá-gbɔɔ	‘Aku will hunt’		

CVV LH roots undergo plateauing.

(262)	m-á- ¹ fúá	‘I will hug’
	e-baá- ¹ fúá	‘he will hug’
	ákú baá- ¹ fúá	‘Aku will hug’

CVV LHL roots also undergo plateauing.

(263)	m-á- ¹ béê	‘I will sweep’	m-á- ¹ sáâ	‘I will mend’
	e-baá- ¹ béê	‘he will sweep’	e-baá- ¹ sáâ	‘he will mend’
	ákú baá- ¹ béê	‘Aku will sweep’	ákú baá- ¹ sáâ	‘Aku will mend’
	m-á- ¹ fěê	‘I will do’	m-á- ¹ lóô	‘I will collect’
	e-baá- ¹ fěê	‘he will do’	e-baá- ¹ lóô	‘he will collect’
	ákú baá- ¹ fěê	‘Aku will do’	ákú baá- ¹ lóô	‘Aku will collect’

CV LH roots undergo plateauing, and surface with a short vowel.

(264)	m-á- ¹ dró	‘I will help’
	e-baá- ¹ dró	‘he will help’
	ákú baá- ¹ dró	‘Aku will help’

CVCV LH roots also undergo plateauing.

(265)	m-á- ¹ kásé	‘I will learn’	m-á- ¹ chwálá	‘I will beat grain’
	e-baá- ¹ kásé	‘he will learn’	e-baá- ¹ chwálá	‘he will beat grain’
	ákú baá- ¹ kásé	‘Aku will learn’	ákú baá- ¹ chwálá	‘Aku will beat grain’
	m-á- ¹ húlú	‘I will jump’	m-á- ¹ kójó	‘I will judge’
	e-baá- ¹ húlú	‘he will jump’	e-baá- ¹ kójó	‘he will judge’
	ákú baá- ¹ húlú	‘Aku will jump’	ákú baá- ¹ kójó	‘Aku will judge’

3.8. Negative future

The negative future is formed by a subject prefix, floating H tone prefix, root, H tone suffix, and /-ŋ/ suffix. Since the future negative has a H tone suffix, so that every verb root ends in a H tone, the citation forms are unclear as to whether the /-ŋ/ suffix has an underlying L or downstepped H tone. If the suffix were underlyingly L-toned, the HL rule would produce the downstepped H tone on the suffix. However, no other verb suffix

undergoes the HL rule except the participial /-m₂/. Furthermore, in (266), we see that when followed by a L-toned object, the suffix retains the downstepped H tone; since the conditions for neither the HL rule nor plateauing are met in these examples, the downstepped H tone must be underlying, so these are not actually instances of the HL rule.

- (266) é-¹gbé-¹ŋ ako ‘he will not kill Ako’
 mī-¹dū-¹ŋ yɛɛ-i ‘I will not cultivate yams’
 é-¹jó-¹ŋ adoá ‘he will not dance the Adoa’

CV H roots undergo no tone change, and the H of the root triggers polarity on SP’s, so that they surface as L or are deleted (following an NP subject).

- (267) mī-lá-¹ŋ ‘I will not sing’ mī-fó-¹ŋ ‘I will not weep’
 e-lá-¹ŋ ‘he will not sing’ e-fó-¹ŋ ‘he will not weep’
 ákú lá-¹ŋ ‘Aku will not sing’ ákú fó-¹ŋ ‘Aku will not weep’
 mī-dū-¹ŋ ‘I will not cultivate’ mī-kpé-¹ŋ ‘I will not chew’
 e-dū-¹ŋ ‘he will not cultivate’ e-kpé-¹ŋ ‘he will not chew’
 ákú dū-¹ŋ ‘Aku will not cultivate’ ákú kpé-¹ŋ ‘Aku will not chew’

CV toneless roots pattern with CV H roots, since the H tone suffix surfaces on the root and triggers polarity.

- (268) mī-hó-¹ŋ ‘I will not pass by’ mī-lé-¹ŋ ‘I will not know’
 e-hó-¹ŋ ‘he will not pass by’ e-lé-¹ŋ ‘he will not know’
 ákú hó-¹ŋ ‘Aku will not pass by’ ákú lé-¹ŋ ‘Aku will not know’
 mī-bá-¹ŋ ‘I will not come’ mī-wó-¹ŋ ‘I will not wear’
 e-bá-¹ŋ ‘he will not come’ e-wó-¹ŋ ‘he will not wear’
 ákú bá-¹ŋ ‘Aku will not come’ ákú wó-¹ŋ ‘Aku will not wear’

CVV H roots undergo vowel shortening in this tense, since the suffix is tone-bearing and therefore moraic.

- (269) e-yóó ‘he recognized’
 mī-yó-¹ŋ ‘I will not recognize’
 e-yó-¹ŋ ‘he will not recognize’
 ákú yó-¹ŋ ‘Aku will not recognize’

CVCV HH roots undergo no change.

- (270) mī-fóté-¹ŋ ‘I will not pour’ mī-kádi-¹ŋ ‘I will not make a mark’
 e-fóté-¹ŋ ‘he will not pour’ e-kádi-¹ŋ ‘he will not make a mark’
 ákú fóté-¹ŋ ‘Aku will not pour’ ákú kádi-¹ŋ ‘Aku will not make a mark’

(271) m₁-hálá-¹ŋ 'I will not choose' m₁-ch₀m₀-¹ŋ 'I will not twist'
e-hálá-¹ŋ 'he will not choose' e-ch₀m₀-¹ŋ 'he will not twist'
áku hálá-¹ŋ 'Aku will not choose' áku ch₀m₀-¹ŋ 'Aku will not twist'

(272) e-fuá 'he hugged'
 m₁-fúá-[!]ŋ 'I will not hug'
 é-[!]fúá-ŋ 'he will not hug'
 ákú é-[!]fúá-ŋ 'Aku will not hug'

(273) \acute{e} fú á \acute{y}
 (plateauing) = LH LH LH
 H (negative tense marker)

(274) e-droó 'he helped'
 mí-[!]dró-[!]ń 'I will not help'
 é-[!]dró-[!]ń 'he will not help'
 ákú é-[!]dró-[!]ń 'Aku will not help'

(275)	e-hulú	'he jumped'	e-kojó	'he judged'
	mí- ¹ húlú- ¹ ŋ	'I will not jump'	mí- ¹ kójó- ¹ ŋ	'I will not judge'
	é- ¹ húlú- ¹ ŋ	'he will not jump'	é- ¹ kójó- ¹ ŋ	'he will not judge'
	ákú é- ¹ húlú- ¹ ŋ	'Aku will not jump'	ákú é- ¹ kójó- ¹ ŋ	'Aku will not judge'
	e-májé	'he sent'		
	mí- ¹ májé- ¹ ŋ	'I will not send'		
	é- ¹ májé- ¹ ŋ	'he will not send'		
	ákú é- ¹ májé- ¹ ŋ	'Aku will not send'		

CVCV HL roots surface as H¹H, since the suffix H surfaces on the second syllable of the root due to plateauing, which causes the underlying L of the stem to delink and surface as a downstep. These also trigger polarity since they have initial H tone.

- (276) mǐ-fě'né-¹ŋ 'I will not untie' mǐ-kó'tá-¹ŋ 'I will not fold'
 e-fě'né-¹ŋ 'he will not untie' e-kó'tá-¹ŋ 'he will not fold'
 ákú fě'né-¹ŋ 'Aku will not untie' ákú kó'tá-¹ŋ 'Aku will not fold'

The derivation of these forms is shown below.

- (277) e - fě'né - ¹ŋ
 † (polarity) † (plateauing)
 H (neg. marker) H L H (floating H suffix) (L)H

CVV HL roots surface as H¹H for the same reason.

- (278) mǐ-bǒ'¹í-ŋ 'I will not start' mǐ-bó'á-ŋ 'I will not gather'
 e-bǒ'¹í-ŋ 'he will not start' e-bó'á-ŋ 'he will not gather'
 ákú bǒ'¹í-ŋ 'Aku will not start' ákú bó'á-ŋ 'Aku will not gather'
 mǐ-ká'¹é-ŋ 'I will not remember' mǐ-ká'¹é-ŋ 'I will not remember'
 e-ká'¹é-ŋ 'he will not remember' e-ká'¹é-ŋ 'he will not remember'
 ákú ká'¹é-ŋ 'Aku will not remember' ákú ká'¹é-ŋ 'Aku will not remember'

CV L roots surface as ¹H due to the floating H suffix.

- (279) e-cha 'he dug' e-la 'he dreamed'
 mǐ-¹chá-ŋ 'I will not dig' mǐ-¹lá-ŋ 'I will not dream'
 é-¹chá-ŋ 'he will not dig' é-¹lá-ŋ 'he will not dream'
 ákú é-¹chá-ŋ 'Aku will not dig' ákú é-¹lá-ŋ 'Aku will not dream'
 e-kpɛ 'he sewed' e-jo 'he danced'
 mǐ-¹kpɛ-ŋ 'I will not sew' mǐ-¹jó-ŋ 'I will not dance'
 é-¹kpɛ-ŋ 'he will not sew' é-¹jó-ŋ 'he will not dance'
 ákú é-¹kpɛ-ŋ 'Aku will not sew' ákú é-¹jó-ŋ 'Aku will not dance'

In these forms, the H tone associates to the root due to plateauing, and the underlying L delinks and surfaces as a downstep, as shown below.

- (280) é ¹jó ¹ŋ
 †
 L H (L) H

CVV L verbs undergo vowel shortening. They surface as ¹H due to the floating H suffix.

(281)	e-gbɔɔ	‘he hunted’	e-doo	‘he roasted’
	mí- ¹ gbɔ- ¹ ŋ	‘I will not hunt’	mí- ¹ dó- ¹ ŋ	‘I will not roast’
	é- ¹ gbɔ- ¹ ŋ	‘he will not hunt’	é- ¹ dó- ¹ ŋ	‘he will not roast’
	áku é- ¹ gbɔ- ¹ ŋ	‘Aku will not hunt’	áku é- ¹ dó- ¹ ŋ	‘Aku will not roast’
	e-tɔɔ	‘he floated’	e-tuu	‘he approached’
	mí- ¹ tɔ- ¹ ŋ	‘I will not float’	mí- ¹ tú- ¹ ŋ	‘I will not approach’
	é- ¹ tɔ- ¹ ŋ	‘he will not float’	é- ¹ tú- ¹ ŋ	‘he will not approach’
	áku é- ¹ tɔ- ¹ ŋ	‘Aku will not float’	áku é- ¹ tú- ¹ ŋ	‘Aku will not approach’

The CVV toneless root surfaces with the floating H tone suffix of the negative future. This induces polarity and SP deletion after the NP subject.

(282)	e-hao	‘he worried’
	mí- ¹ háó- ¹ ŋ	‘I will not worry’
	e- ¹ háó- ¹ ŋ	‘he will not worry’
	áku háó- ¹ ŋ	‘Aku will not worry’

CV HL roots undergo falling tone simplification and surface as level H.

(283)	e-hê	‘he bought’	e-kwê	‘he looked at’
	mí- ¹ hé- ¹ ŋ	‘I will not buy’	mí- ¹ kwé- ¹ ŋ	‘I will not look at’
	e- ¹ hé- ¹ ŋ	‘he will not buy’	e- ¹ kwé- ¹ ŋ	‘he will not look at’
	áku hé- ¹ ŋ	‘Aku will not buy’	áku kwé- ¹ ŋ	‘Aku will not look at’

CVV LHL roots undergo falling tone simplification, plateauing, and vowel shortening.

(284)	ebɛê	‘he swept’	e-feê	‘he did’
	mí- ¹ bɛ- ¹ ŋ	‘I will not sweep’	mí- ¹ fɛ- ¹ ŋ	‘I will not do’
	é- ¹ bɛ- ¹ ŋ	‘he will not sweep’	é- ¹ fɛ- ¹ ŋ	‘he will not do’
	áku é- ¹ bɛ- ¹ ŋ	‘Aku will not sweep’	áku é- ¹ fɛ- ¹ ŋ	‘Aku will not do’
	e-hoô	‘he cooked’		
	mí- ¹ hó- ¹ ŋ	‘I will not cook’		
	é- ¹ hó- ¹ ŋ	‘he will not cook’		
	áku é- ¹ hó- ¹ ŋ	‘Aku will not cook’		

In the form [é-¹bɛ-¹ŋ] above, the input may be assumed to be /é-bɛê-¹ŋ/. Falling tone simplification applies since the falling tone of the root is in phrase-medial position. This gives an intermediate stage *[é-bɛê-¹ŋ], and it is assumed that the suffix H is simply deleted. Plateauing applies, spreading the final H of the root to the first vowel and delinking the L tone, giving *[é-¹bɛê-¹ŋ]. Vowel shortening applies to the root, producing the surface form, [é-¹bɛ-¹ŋ].

3.9. Subordinate

The subordinate form appears in constructions such as [e-e-tá'ó ní mǎ-'bá] 'he wants me to come', with 'come' in the subordinate. It consists of a H-tone prefix, subject prefix, and root. CV H roots undergo no tone change.

(285)	mǎ-dú	'that I cultivate'	mǎ-fó	'that I weep'
	é-dú	'that he cultivate'	é-fó	'that he weep'
	ákú á-dú	'that Aku cultivate'	ákú á-fó	'that Aku weep'
	mǎ-lá	'that I sing'	mǎ-mó	'that I catch'
	é-lá	'that he sing'	é-mó	'that he catch'
	ákú á-lá	'that Aku sing'	ákú á-mó	'that Aku catch'

CVCV HH roots also undergo no tone change.

(286)	mǎ-fóté	'that I pour'	mǎ-gbéle'	'that I open'
	é-fóté	'that he pour'	é-gbéle	'that he open'
	ákú á-fóté	'that Aku pour'	ákú á-gbéle'	'that Aku open'
	mǎ-kádí	'that I make a mark'		
	é-kádí	'that he make a mark'		
	ákú á-kádí	'that Aku make a mark'		

CVV HL roots undergo the HL rule, surfacing as H¹H.

(287)	mǎ-bó' ¹	'that I start'	mǎ-bó' ¹ á	'that I gather'
	é-bó' ¹	'that he start'	é-bó' ¹ á	'that he gather'
	ákú á-bó' ¹	'that Aku start'	ákú á-bó' ¹ á	'that Aku gather'
	mǎ-ká' ¹ é	'that I remember'	mǎ-mí' ¹ á	'that I press'
	é-ká' ¹ é	'that he remember'	é-mí' ¹ á	'that he press'
	ákú á-ká' ¹ é	'that Aku remember'	ákú á-mí' ¹ á	'that Aku press'

CVCV HL roots also undergo the HL rule.

(288)	mǎ-chá' ¹ lá	'that I mend'	mǎ-fě' ¹ né	'that I untie'
	é-chá' ¹ lá	'that he mend'	é-fě' ¹ né	'that he untie'
	ákú á-chá' ¹ lá	'that Aku mend'	ákú á-fě' ¹ né	'that Aku untie'
	mǎ-fú' ¹ tú	'that I mix'		
	é-fú' ¹ tú	'that he mix'		
	ákú á-fú' ¹ tú	'that Aku mix'		

CV L roots undergo the HL rule, surfacing as ¹H.

(289)	má- ¹ fí	‘that I tie’	má- ¹ jó	‘that I dance’
	é- ¹ fí	‘that he tie’	é- ¹ jó	‘that he dance’
	ákú á- ¹ fí	‘that Aku tie’	ákú á- ¹ jó	‘that Aku dance’
	má- ¹ kɔ̃	‘that I bite’		
	é- ¹ kɔ̃	‘that he tie’		
	ákú á- ¹ kɔ̃	‘that Aku tie’		

CV toneless roots also undergo the HL rule.

(290)	má- ¹ bá	‘that I come’	má- ¹ hó	‘that I pass by’
	é- ¹ bá	‘that he come’	é- ¹ hó	‘that he pass by’
	ákú á- ¹ bá	‘that Aku come’	ákú á- ¹ hó	‘that Aku pass by’

CVV LHL roots undergo plateauing, surfacing as ¹HHL.

(291)	má- ¹ béê	‘that I sweep’	má- ¹ féê	‘that I do’
	é- ¹ béê	‘that he sweep’	é- ¹ féê	‘that he do’
	ákú á- ¹ béê	‘that Aku sweep’	ákú á- ¹ féê	‘that Aku do’
	má- ¹ hóô	‘that I sell’	má- ¹ hóô	‘that I cook’
	é- ¹ hóô	‘that he sell’	é- ¹ hóô	‘that he cook’
	ákú á- ¹ hóô	‘that Aku sell’	ákú á- ¹ hóô	‘that Aku cook’

CVCV LH roots also undergo plateauing.

(292)	e-balá	‘he wrapped’	e-hulú	‘he jumped’
	má- ¹ bálá	‘that I wrap’	má- ¹ húlú	‘that I jump’
	é- ¹ bálá	‘that he wrap’	é- ¹ húlú	‘that he jump’
	ákú á- ¹ bálá	‘that Aku wrap’	ákú á- ¹ húlú	‘that Aku jump’
	e-kasé	‘he learned’	e-májé	‘he sent’
	má- ¹ kásé	‘that I learn’	má- ¹ májé	‘that I send’
	é- ¹ kásé	‘that he learn’	é- ¹ májé	‘that he send’
	ákú á- ¹ kásé	‘that Aku learn’	ákú á- ¹ májé	‘that Aku send’

CVV L roots do not change tone in the subordinate.

(293)	má- ¹ gbɔɔ	‘that I hunt’	má- ¹ sɔɔ	‘that I catch’
	é- ¹ gbɔɔ	‘that he hunt’	é- ¹ sɔɔ	‘that he catch’
	ákú á- ¹ gbɔɔ	‘that Aku hunt’	ákú á- ¹ sɔɔ	‘that Aku catch’
	má- ¹ tɔɔ	‘that I float’		
	é- ¹ tɔɔ	‘that he float’		
	ákú á- ¹ tɔɔ	‘that Aku float’		

The CVV toneless root behaves like CVV L roots.

- (294) mǎ-hao ‘that I worry’
 é-hao ‘that he worry’
 ákú á-hao ‘that Aku worry’

CVCV toneless roots also do not change tone.

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|-------|-------------|------------------|------------|-------------------|
| (295) | mǎ-chǔmǔ | ‘that I twist’ | mǎ-sǒle | ‘that I pray’ |
| | é-chǔmǔ | ‘that he twist’ | é-sǒle | ‘that he pray’ |
| | ákú á-chǔmǔ | ‘that Aku twist’ | ákú á-sǒle | ‘that Aku pray’ |
| | mǎ-chukɔ | ‘that I roast’ | mǎ-hala | ‘that I choose’ |
| | é-chukɔ | ‘that he roast’ | é-hala | ‘that he choose’ |
| | ákú á-chukɔ | ‘that Aku roast’ | ákú á-hala | ‘that Aku choose’ |

3.10. Imperative

The singular imperative is formed by a verb root, suffix H, and /-mǔ/ suffix that is used only with ‘long’ roots (CV roots with a contour tone, or roots with two morae). CVCV H roots are unchanged.

- (296) yóó-mǔ ‘recognize!’

CVCV HH roots also undergo no change.

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|-------|---------|----------------|----------|---------|
| (297) | fǔté-mǔ | ‘pour!’ | gbélé-mǔ | ‘open!’ |
| | kádí-mǔ | ‘make a mark!’ | | |

CVCV LH roots do not change tone.

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|-------|-----------|---------------|---------|---------|
| (298) | kojó-mǔ | ‘judge!’ | basá-mǔ | ‘grab!’ |
| | chwalá-mǔ | ‘beat grain!’ | majé-mǔ | ‘send!’ |

In CVCV toneless roots, the suffix H spreads all the way to the left edge of the root, so that these roots surface as HH.

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|-------|----------|--------------|---------|-------------|
| (299) | e-chǔmǔ | ‘he twisted’ | e-sǒle | ‘he prayed’ |
| | chǔmǔ-mǔ | ‘twist!’ | sǒlé-mǔ | ‘pray!’ |
| | e-chukɔ | ‘he roasted’ | e-kata | ‘he lifted’ |
| | chúkɔ-mǔ | ‘roast!’ | kátá-mǔ | ‘lift!’ |

CVCV HL roots undergo plateauing.

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|-------|-----------------------|----------|------------------------|----------|
| (300) | bó ¹ té-mǔ | ‘enter!’ | chá ¹ lá-mǔ | ‘mend!’ |
| | fú ¹ tú-mǔ | ‘mix!’ | ká ¹ né-mǔ | ‘count!’ |

CVV HL roots also undergo plateauing.

- | | | | | |
|-------|---------------------|-------------|---------------------|----------|
| (301) | ká'é-m _o | 'remember!' | bó'í-m _o | 'start!' |
| | bó'á-m _o | 'gather!' | mí'á-m _o | 'press!' |

CV LH roots undergo rising tone lengthening.

- (302) droó-m_o 'help!'

CV roots which are toneless or have a level tone do not surface with the /-m_o/ suffix. CV H roots are shown below.

- | | | | | |
|-------|----------------|----------|----|---------|
| (303) | chú | 'send!' | lá | 'sing!' |
| | m _o | 'catch!' | wá | 'help!' |

The form in (304) indicates that either the [l] in this root is moraic, or else there is still a trace of the underlying first vowel²¹; otherwise, such verbs would be expected to pattern with CV roots, which do not surface with the suffix.

- (304) e-gbla ~ e-gbala 'he dragged'
 gblá-m_o 'drag!'

As demonstrated by the CV toneless roots, when the /-m_o/ suffix does not surface, there is still a floating H tone suffix, so that the toneless roots surface as H.

- | | | | | |
|-------|------|-----------|------|----------------|
| (305) | e-ba | 'he came' | e-ho | 'he passed by' |
| | bá | 'come!' | hó | 'pass by!' |
| | e-le | 'he knew' | e-wo | 'he wore' |
| | lé | 'know!' | wó | 'wear!' |

CV L roots undergo rising tone lengthening, since the association of the floating H tone to the root gives a LH sequence on an underlyingly short vowel.

- | | | | | |
|-------|------|-------------|-------|----------------|
| (306) | e-jo | 'he danced' | e-cha | 'he dug' |
| | joó | 'dance!' | chaá | 'dig!' |
| | e-fo | 'he cut' | e-tí | 'he scratched' |
| | foó | 'cut!' | tíí | 'scratch!' |

The derivation of these lengthened forms is shown below.

- (307) chă → chaá
 | |
 L H LH

²¹ See Trutenau (1972) for discussion of 'backward masking' in Gã.

CV₁V₁ toneless roots surface with level H tone. Optionally, these verbs surface with rising tone, but without the suffix (e.g., [sɔ́ɔ]). This is the same pattern followed by CV L roots, suggesting that these roots may optionally be analyzed as CV L.

- | | | | | |
|-------|----------|-------------|---------|--------------|
| (308) | e-sɔɔ | ‘he caught’ | e-doo | ‘he roasted’ |
| | sɔ́ɔ-mɔ̌ | ‘catch!’ | dóó-mɔ̌ | ‘roast!’ |

The CV₁V₂ toneless root surfaces with level H tone.

- | | | |
|-------|---------|--------------|
| (309) | e-hao | ‘he worried’ |
| | háó-mɔ̌ | ‘worry!’ |

CVV LHL roots have falling tone simplification, and surface as LH.

- | | | | | |
|-------|-----------|------------|---------|-------------|
| (310) | e-bɛɛ | ‘he swept’ | e-feê | ‘he did’ |
| | bɛ́ɛ-mɔ̌ | ‘sweep!’ | feé-mɔ̌ | ‘do!’ |
| | e-hɔ̌ɔ̌ | ‘he sold’ | e-hoô | ‘he cooked’ |
| | hɔ́ɔ̌-mɔ̌ | ‘sell!’ | hoó-mɔ̌ | ‘cook!’ |

CV HL roots also undergo falling tone simplification.

- | | | | | |
|-------|--------|-------------|---------|--------------|
| (311) | e-hê | ‘he bought’ | e-kwê | ‘he watched’ |
| | hê-mɔ̌ | ‘buy!’ | kwé-mɔ̌ | ‘watch!’ |

The second-person plural imperative is formed by a subject prefix /nyé-/ , root, and /-a/ suffix. The /-a/ suffix does not undergo the HL rule, so it surfaces as L. CV H roots do not change tone.

- | | | | | |
|-------|-----------|----------------|-----------|---------------|
| (312) | nyé-lá-a | ‘sing (pl.)!’ | nyé-chú-a | ‘send (pl.)!’ |
| | nyé-mɔ̌-a | ‘catch (pl.)!’ | nyé-wá-a | ‘help (pl.)!’ |

CVV H roots undergo vowel shortening.

- | | | |
|-------|----------|--------------------|
| (313) | nyé-yó-a | ‘recognize (pl.)!’ |
|-------|----------|--------------------|

CVCV HH roots do not change tone.

- | | | | | |
|-------|-------------|----------------------|-------------|---------------|
| (314) | nyé-fɔ́tɛ-a | ‘pour (pl.)!’ | nyé-gbélé-a | ‘open (pl.)!’ |
| | nyé-kádi-a | ‘make a mark (pl.)!’ | | |

CVCV HL roots do not undergo the HL rule because of the L-toned suffix.

- | | | | | |
|-------|------------|----------------|-------------|----------------|
| (315) | nyé-bóte-a | ‘enter (pl.)!’ | nyé-chála-a | ‘mend (pl.)!’ |
| | nyé-fútu-a | ‘mix (pl.)!’ | nyé-káne-a | ‘count (pl.)!’ |

CVV HL roots also do not undergo the HL rule.

- (316) nyé-káe-a ‘remember (pl.)!’ nyé-bó̄i-a ‘start (pl.)!’
 nyé-mí̄a-a ‘press (pl.)!’ nyé-bó̄a-a ‘gather (pl.)!’

CVCV toneless roots do not change in this tense, and surface as L.

- (317) nyé-sòle-a ‘pray (pl.)!’ nyé-chukɔ-a ‘roast (pl.)!’
 nyé-hala-a ‘collect (pl.)!’

CVV L roots also surface as L, and long vowels are shortened.

- (318) nyé-sɔ-a ‘catch (pl.)!’ nyé-do-a ‘roast (pl.)!’

The CVV toneless root undergoes no change, surfacing as L.

- (319) nyé-hao-a ‘worry (pl.)!’

CV toneless roots surface as L.

- (320) nyé-ba-a ‘come (pl.)!’ nyé-ho-a ‘pass by (pl.)!’

CV L roots do not change tone.

- (321) nyé-fo-a ‘cut (pl.)!’ nyé-jo-a ‘dance (pl.)!’
 nyé-tī-a ‘scratch (pl.)!’

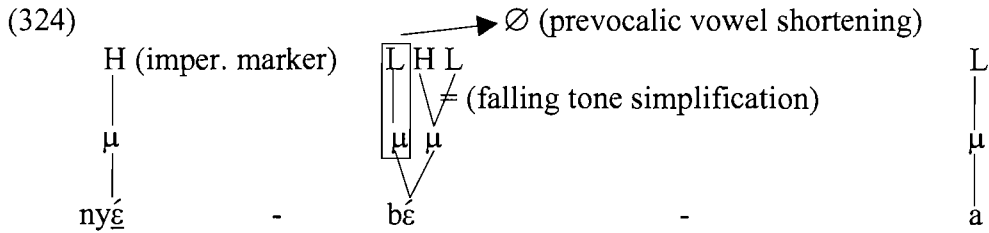
CVCV LH roots undergo plateauing.

- (322) e-kojó ‘he judged’ e-basá ‘he grabbed’
 nyé-kójó-a ‘judge (pl.)!’ nyé-básá-a ‘grab (pl.)!’
 e-chwalá ‘he beat grain’ e-majé ‘he sent’
 nyé-^lchwalá-a ‘beat grain (pl.)!’ nyé-^lmájé-a ‘send (pl.)!’

CVV LHL roots undergo falling tone simplification and vowel shortening, surfacing as H.

- (323) e-bɛɛ ‘he swept’ e-feɛ ‘he did’
 nyé-bé-a ‘sweep (pl.)!’ nyé-fé-a ‘do (pl.)!’
 e-hɔ̄ ‘he sold’ e-hō ‘he cooked’
 nyé-hɔ̄-a ‘sell (pl.)!’ nyé-hó-a ‘cook (pl.)!’

The derivation of these forms is shown below.



CV HL roots also undergo falling tone simplification.

- (325) e-hê 'he bought' e-kwê 'he watched'
 nyɛ-hé-a 'buy (pl.)!' nyɛ-kwé-a 'watch (pl.)!'

CV LH roots undergo plateauing.

- (326) e-droó 'he helped'
 nyɛ-[!]dró-a 'help (pl.)!'

The hortative consists of the phrase /nyɛ-há-a/, the first person plural prefix /wó/, verb root, and /-a/ suffix. Tone rules apply in the hortative just as they do in the plural imperative described above. Just as in the plural imperative, tone in CV H roots does not change. Note that just as the HL rule does not apply to the /-a/ suffix phrase-finally, plateauing also does not apply to the suffix.

- (327) nyɛ-há-a wó-lá-a 'let's sing' nyɛ-há-a wó-dú-a 'let's cultivate'
 nyɛ-há-a wó-chú-a 'let's send' nyɛ-há-a wó-wá-a 'let's help'

CVV H roots follow the same pattern, and undergo vowel shortening.

- (328) nyɛ-há-a wó-yó-a 'let's recognize'

CVCV H roots also do not change tone.

- (329) nyɛ-há-a wó-fóté-a 'let's pour' nyɛ-há-a wó-gbélé-a 'let's open'

CVCV HL roots do not change tone.

- (330) nyɛ-há-a wó-bóte-a 'let's enter' nyɛ-há-a wó-chála-a 'let's mend'
 nyɛ-há-a wó-káne-a 'let's count' nyɛ-há-a wó-fútu-a 'let's mix'

CVV HL roots also do not change.

- (331) nyɛ-há-a wó-káe-a 'let's remember' nyɛ-há-a wó-bói-a 'let's start'

CVCV toneless roots surface as L.

- (332) nyé-há-a wó-chǝmǝ-a ‘let’s twist’ nyé-há-a wó-sǝle-a ‘let’s pray’

CVV L roots surface as L, and long vowels are shortened before the suffix.

- (333) nyé-há-a wó-sǝ-a ‘let’s catch’ nyé-há-a wó-tǝ-a ‘let’s float’

The CVV toneless root surfaces as L.

- (334) nyé-há-a wó-hao-a ‘let’s worry’

CV toneless roots surface as L.

- (335) nyé-há-a wó-ba-a ‘let’s come’ nyé-há-a wó-ho-a ‘let’s pass by’

CV L roots do not change tone in the hortative.

- (336) nyé-há-a wó-cha-a ‘let’s dig’ nyé-há-a wó-fo-a ‘let’s cut’
nyé-há-a wó-jo-a ‘let’s dance’

CV LH roots undergo plateauing.

- (337) e-droó ‘he helped’
nyé-há-a wó-[!]dró-a ‘let’s help’

CVCV LH roots also undergo plateauing.

- (338) e-kojó ‘he judged’ e-hulú ‘he jumped’
nyé-há-a wó-[!]kójó-a ‘let’s judge’ nyé-há-a wó-[!]húlú-a ‘let’s jump’

CVV LHL roots undergo falling tone simplification and vowel shortening.

- (339) e-bǝê ‘he swept’ e-hoô ‘he cooked’
nyé-há-a wó-bǝ-a ‘let’s sweep’ nyé-há-a wó-hó-a ‘let’s cook’

The derivation of [nyé-há-a wó-bǝ-a] is given below.

- (340)
-
- ... wó - bǝ - a

CV H roots also undergo falling tone simplification.

- | | | | | |
|-------|------------------|-------------|-------------------|---------------|
| (341) | e-hê | ‘he bought’ | e-kwê | ‘he watched’ |
| | nyĕ-há-a wó-hé-a | ‘let’s buy’ | nyĕ-há-a wó-kwé-a | ‘let’s watch’ |

3.11 Negative imperative

The singular negative imperative consists of the prefix [kaá-] (argued to have a short vowel underlyingly) and a verb root. CV H roots do not change tone.

- | | | | | |
|-------|---------|----------------|--------|---------------|
| (342) | kaá-chú | ‘don’t send!’ | kaá-lá | ‘don’t sing!’ |
| | kaá-m̩ | ‘don’t catch!’ | kaá-wá | ‘don’t help!’ |

CVV H roots also undergo no tone change.

- | | | |
|-------|---------|--------------------|
| (343) | kaá-yóó | ‘don’t recognize!’ |
|-------|---------|--------------------|

CVCV H roots are unchanged.

- | | | | | |
|-------|----------|----------------------|-----------|---------------|
| (344) | kaá-ǎté | ‘don’t pour!’ | kaá-gbéle | ‘don’t open!’ |
| | kaá-kádí | ‘don’t make a mark!’ | | |

CV HL roots do not change tone.

- | | | | | |
|-------|--------|--------------|---------|----------------|
| (345) | kaá-hê | ‘don’t buy!’ | kaá-kwê | ‘don’t watch!’ |
|-------|--------|--------------|---------|----------------|

CVV L roots do not change.

- | | | | | |
|-------|---------|---------------------|---------|----------------|
| (346) | kaá-sɔɔ | ‘don’t catch!’ | kaá-doo | ‘don’t roast!’ |
| | kaá-kaa | ‘don’t take a vow!’ | | |

The CVV toneless root surfaces as L.

- | | | |
|-------|---------|----------------|
| (347) | kaá-hao | ‘don’t worry!’ |
|-------|---------|----------------|

CVCV toneless roots also surface as L.

- | | | | | |
|-------|-----------|----------------|----------|------------------|
| (348) | kaá-chɔmɔ | ‘don’t twist!’ | kaá-sɔle | ‘don’t pray!’ |
| | kaá-chukɔ | ‘don’t roast!’ | kaá-hala | ‘don’t collect!’ |

CVCV HL roots undergo the HL rule.

- | | | | | |
|-------|------------------------|----------------|-------------------------|----------------|
| (349) | kaá-bó ¹ té | ‘don’t enter!’ | kaá-chá ¹ lá | ‘don’t mend!’ |
| | kaá-fú ¹ tú | ‘don’t mix!’ | kaá-ká ¹ né | ‘don’t count!’ |

CVV HL roots also undergo the HL rule.

- | | | | | |
|-------|----------|-------------------|----------|----------------|
| (350) | kaá-ká'ě | 'don't remember!' | kaá-bó'í | 'don't start!' |
| | kaá-bo'á | 'don't gather!' | kaá-mí'á | 'don't press!' |

CV L roots undergo the HL rule.

- | | | | | |
|-------|----------------------|------------------|----------------------|--------------|
| (351) | kaá- ¹ jó | 'don't dance!' | kaá- ¹ fó | 'don't cut!' |
| | kaá-tí | 'don't scratch!' | kaá-'chá | 'don't dig!' |

CV toneless roots also undergo the HL rule.

- | | | | | |
|-------|----------------------|---------------|----------------------|------------------|
| (352) | kaá- ¹ bá | 'don't come!' | kaá- ¹ hó | 'don't pass by!' |
|-------|----------------------|---------------|----------------------|------------------|

CVV LH roots undergo plateauing.

- | | | |
|-------|-----------------------|--------------|
| (353) | kaá- ¹ fúá | 'don't hug!' |
|-------|-----------------------|--------------|

CV LH roots also undergo plateauing, and thus fail to undergo rising tone lengthening in the negative imperative.

- | | | |
|-------|-----------------------|---------------|
| (354) | kaá- ¹ dró | 'don't help!' |
|-------|-----------------------|---------------|

CVCV LH roots undergo plateauing.

- | | | | | |
|-------|------------------------|---------------------|------------------------|---------------|
| (355) | kaá- ¹ kójó | 'don't judge!' | kaá- ¹ básá | 'don't grab!' |
| | kaá-'chwálá | 'don't beat grain!' | kaá-'májé | 'don't send!' |

CVV LHL roots also undergo plateauing.

- | | | | | |
|-------|-----------------------|----------------|-----------------------|---------------|
| (356) | kaá- ¹ béê | 'don't sweep!' | kaá- ¹ fěê | 'don't do!' |
| | kaá- ¹ hóô | 'don't sell!' | kaá- ¹ hóô | 'don't cook!' |

In these forms, a floating H tone marker must associate from the right side of the /ka-/ prefix. This is required to produce the rising tone on the singular form of the negative imperative, as in [kaá-lá] 'don't sing!' (the prefix vowel lengthens due to the rising tone). If the H tone associated to the left side of /ka-/, we would expect a falling tone instead of a rising tone. Because of the rising tone in this form, we know that /ka-/ has an underlying L tone; if it were toneless, we would expect a surface H tone instead of a rising tone.

The plural imperative is made up of the prefixes /nyɛ-/ and /ka-/, H tone prefixes, verb root, and /-a/ suffix. CVV H roots, shown below, undergo vowel shortening. Here, we see that the long vowel in [kaá-] is due to the rising tone in the singular imperative, since the prefix has a short vowel in the plural (357).

- | | | |
|-------|---------------------------|--------------------------|
| (357) | nyɛ- ¹ ká-yó-a | 'don't recognize (pl.)!' |
|-------|---------------------------|--------------------------|

CVCV H roots are shown below.

- (358) nyé-¹ká-fóté-a ‘don’t pour (pl.)!’
 nyé-¹ká-gbélé-a ‘don’t open (pl.)!’
 nyé-¹ká-kádí-a ‘don’t make a mark (pl.)!’

CVCV HL roots do not undergo the HL rule or plateauing since they are followed by a L-toned suffix.

- (359) nyé-¹ká-bóte-a ‘don’t enter (pl.)!’ nyé-¹ká-chála-a ‘don’t mend (pl.)!’
 nyé-¹ká-fútu-a ‘don’t mix (pl.)!’ nyé-¹ká-káne-a ‘don’t count (pl.)!’

CVV HL roots also do not change, due to the the suffix.

- (360) nyé-¹ká-káe-a ‘don’t remember (pl.)!’ nyé-¹ká-bóí-a ‘don’t start (pl.)!’
 nyé-¹ká-bóa-a ‘don’t gather (pl.)!’ nyé-¹ká-mía-a ‘don’t press (pl.)!’

CV H roots are shown below.

- (361) nyé-¹ká-chú-a ‘don’t send (pl.)!’ nyé-¹ká-lá-a ‘don’t sing (pl.)!’
 nyé-¹ká-mó-a ‘don’t catch (pl.)!’ nyé-¹ká-wá-a ‘don’t help (pl.)!’

CV L roots do not change.

- (362) nyé-¹ká-jo-a ‘don’t dance (pl.)!’ nyé-¹ká-fo-a ‘don’t cut (pl.)!’
 nyé-¹ká-tí-a ‘don’t scratch (pl.)!’ nyé-¹ká-cha-a ‘don’t dig (pl.)!’

CVCV toneless roots surface as L.

- (363) nyé-¹ká-chómó-a ‘don’t twist (pl.)!’ nyé-¹ká-sóle-a ‘don’t pray (pl.)!’
 nyé-¹ká-chukó-a ‘don’t roast (pl.)!’ nyé-¹ká-hala-a ‘don’t collect (pl.)!’

CV toneless roots surface as L.

- (364) nyé-¹ká-ba-a ‘don’t come (pl.)!’ nyé-¹ká-ho-a ‘don’t pass by (pl.)!’

The CV₁V₂ toneless root is unchanged.

- (365) nyé-¹ká-hao-a ‘don’t worry (pl.)!’

CV₁V₁ L roots undergo vowel shortening.

- | | | | | |
|-------|---------------------------|---------------------------|---------------------------|-------------------------|
| (366) | e-sɔɔ | ‘he caught’ | e-doo | ‘he roasted’ |
| | nyɛ- ¹ ká-sɔ-a | ‘don’t catch (pl.)!’ | nyɛ- ¹ ká-do-a | ‘don’t roast (pl.)!’ |
| | e-kaa | ‘he took a vow’ | e-tuu | ‘he approached’ |
| | nyɛ- ¹ ká-ka-a | ‘don’t take a vow (pl.)!’ | nyɛ- ¹ ká-tu-a | ‘don’t approach (pl.)!’ |

The CV LH root undergoes plateauing.

- (367) nyɛ-¹ká-¹dró-a ‘don’t help (pl.)!’

CVCV LH roots undergo plateauing.

- | | | | | |
|-------|---------------------------------------------|----------------------|-------------------------------------------|---------------------|
| (368) | nyɛ- ¹ ká- ¹ kójó-a | ‘don’t judge (pl.)!’ | nyɛ- ¹ ká- ¹ básá-a | ‘don’t grab (pl.)!’ |
| | nyɛ- ¹ ká- ¹ chwálá-a | ‘don’t beat (pl.)!’ | nyɛ- ¹ ká- ¹ májé-a | ‘don’t send (pl.)!’ |

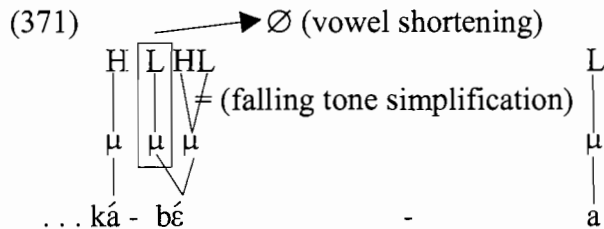
CVV LH roots undergo plateauing.

- (369) nyɛ-¹ká-¹fúá-a ‘don’t hug (pl.)!’

CVV LHL roots undergo falling tone simplification and vowel shortening.

- | | | | | |
|-------|---------------------------|----------------------|---------------------------|---------------------|
| (370) | nyɛ- ¹ ká-bé-a | ‘don’t sweep (pl.)!’ | nyɛ- ¹ ká-fě-a | ‘don’t do (pl.)!’ |
| | nyɛ- ¹ ká-hǎ-a | ‘don’t sell (pl.)!’ | nyɛ- ¹ ká-hó-a | ‘don’t cook (pl.)!’ |

The derivation of [nyɛ-¹ká-bé-a] is represented below.



CV HL roots also undergo falling tone simplification.

- | | | | | |
|-------|---------------------------|--------------------|----------------------------|----------------------|
| (372) | nyɛ- ¹ ká-hé-a | ‘don’t buy (pl.)!’ | nyɛ- ¹ ká-kwé-a | ‘don’t watch (pl.)!’ |
|-------|---------------------------|--------------------|----------------------------|----------------------|

The negative hortative consists of the prefix /nyɛ-/, prefix /ka-/, /há-a/, prefix /wɔ-/, verb root, and /-a/ suffix.

CVV H roots undergo vowel shortening.

- (373) nyɛ-ka-há-a wɔ-yó-a ‘let’s not recognize’

CVCV H roots do not change.

- (374) nyɛ-ka-há-a wɔ-fóté-a 'let's not pour'
 nyɛ-ka-há-a wɔ-gbélé-a 'let's not open'
 nyɛ-ka-há-a wɔ-kádí-a 'let's not make a mark'

CVCV HL roots do not undergo the HL rule, due to the L-toned suffix.

- (375) nyɛ-ka-há-a wɔ-bóte-a 'let's not enter'
 nyɛ-ka-há-a wɔ-chála-a 'let's not mend'
 nyɛ-ka-há-a wɔ-fútu-a 'let's not mix'
 nyɛ-ka-há-a wɔ-káne-a 'let's not count'

CVV HL roots also do not change.

- (376) nyɛ-ka-há-a wɔ-káe-a 'let's not remember'
 nyɛ-ka-há-a wɔ-bɔ́i-a 'let's not start'
 nyɛ-ka-há-a wɔ-bóa-a 'let's not gather'
 nyɛ-ka-há-a wɔ-míá-a 'let's not press'

CV H roots do not change.

- (377) nyɛ-ka-há-a wɔ-chú-a 'let's not send'
 nyɛ-ka-há-a wɔ-lá-a 'let's not sing'
 nyɛ-ka-há-a wɔ-mɔ́-a 'let's not catch'
 nyɛ-ka-há-a wɔ-wá-a 'let's not help'

CVCV toneless roots surface as L.

- (378) nyɛ-ka-há-a wɔ-chɔ́mɔ́-a 'let's not twist'
 nyɛ-ka-há-a wɔ-sɔ́le-a 'let's not pray'
 nyɛ-ka-há-a wɔ-chukɔ́-a 'let's not roast'
 nyɛ-ka-há-a wɔ-hala-a 'let's not collect'

CVCV LH roots do not change.

- (379) nyɛ-ka-há-a wɔ-kojó-a 'let's not judge'
 nyɛ-ka-há-a wɔ-basá-a 'let's not grab'
 nyɛ-ka-há-a wɔ-chwalá-a 'let's not beat grain'
 nyɛ-ka-há-a wɔ-májé-a 'let's not send'

CV LH roots undergo rising tone lengthening.

- (380) nyɛ-ka-há-a wɔ-droó-a 'let's not help'

CVV LHL roots undergo falling tone simplification.

- (381) nyɛ-ka-há-a wɔ-bɛ́ɛ-a 'let's not sweep'
 nyɛ-ka-há-a wɔ-féɛ-a 'let's not do'
 nyɛ-ka-há-a wɔ-hɔ́ɔ-a 'let's not sell'
 nyɛ-ka-há-a wɔ-hoó-a 'let's not cook'

CV HL roots undergo falling tone simplification.

- (382) nyɛ-ka-há-a wɔ-hé-a 'let's not buy'
 nyɛ-ka-há-a wɔ-kwé-a 'let's not watch'

A /ní-/ prefix is optional before the root. The /wɔ-/ prefix surfaces with H tone in these cases.

- (383) nyɛ-ka-há-a ní-wɔ́-jo-a ~ 'let's not dance'
 nyɛ-ka-há-a wɔ-jo-a
 nyɛ-ka-há-a ní-wɔ́-fo-a ~ 'let's not cut'
 nyɛ-ka-há-a wɔ-fo-a
 nyɛ-ka-há-a ní-wɔ́-ti-a ~ 'let's not scratch'
 nyɛ-ka-há-a wɔ-ti-a

CV toneless roots behave like CV L roots.

- (384) nyɛ-ka-há-a ní-wɔ́-ba-a 'let's not come'
 nyɛ-ka-há-a ní-wɔ́-ho-a 'let's not pass by'

The CV₁V₂ root undergoes no change.

- (385) nyɛ-ka-há-a wɔ-hao-a 'let's not worry'

CV₁V₁ roots undergo vowel shortening.

- nyɛ-ka-há-a wɔ-sɔ-a 'let's not catch'
 nyɛ-ka-há-a wɔ-do-a 'let's not roast'
 nyɛ-ka-há-a wɔ-gbɔ-a 'let's not hunt'

3.12. Participial

The participial consists of a root and L-toned suffix /-mɔ/. Below are shown CV L verbs, where the suffix is unchanged.

- | | | | |
|--------|------------|-------|-----------|
| cha-mɔ | 'digging' | ko-mɔ | 'biting' |
| ma-mɔ | 'building' | fu-mɔ | 'burying' |

CV toneless roots are indistinguishable from CV L roots in this tense.

- (386) ho-m₂ 'passing by' lɛ-m₂ 'knowing'

CVV L roots also show no tone change, as shown below.

- (387) joo-m₂ ‘sharpening’ tɔɔ-m₂ ‘floating’
 sɔɔ-m₂ ‘catching’

The CVV toneless root behaves like CVV L roots.

- (388) hao-m₂ 'worrying'

CVCV toneless roots are shown in (161). These forms also undergo no change.

- | | | | | | |
|-------|----------|--------------|--|------------|------------|
| (389) | səle-mɔ̌ | ‘praying’ | | chomɔ̌-mɔ̌ | ‘twisting’ |
| | halə-mɔ̌ | ‘collecting’ | | chukɔ̌-mɔ̌ | ‘roasting’ |

Following a root with a final H tone, the participial suffix surfaces with a downstepped H tone due to the HL rule. This occurs after CV H roots, shown below.

- (390) lá-¹mó 'singing' dú-¹mó 'cultivating'
kpé-¹mó 'chewing' kpá-¹mó 'rubbing'

This is also the case with CVV LH roots.

- (391) fuá-¹mó 'hugging'

CV LH roots undergo rising tone lengthening, surfacing with a long vowel. They also induce the HL rule on the suffix, as shown below.

- (392) droó-¹mó 'helping'

CVCV LH roots also induce the HL rule on the suffix.

- (393) chwálá-⁻¹mó ‘beating (rice)’ hulú-⁻¹mó ‘jumping’
balá-⁻¹mó ‘wrapping’ kujú-⁻¹mó ‘judging’

CVCV HH roots also induce the HL rule.

- (394) chósé-¹mó 'training' gbélé-¹mó 'opening'
télé-¹mó 'carrying (on the head)' kádí-¹mó 'making a mark on'

These data suggest that the suffix is underlyingly L-toned and that the downstepped H in the examples in (394) results from application of the HL rule.

(395) e-kpá dú-¹mò shòò 'he stopped cultivating on Wednesday'
 e-kpá gbélé-¹mò kɛ kaklá 'he stopped opening with a knife'
 e-kpá chwálá-¹mò kɛ cho 'he stopped beating with a stick'

With CVV LHL roots, the HL rule also applies to the suffix, indicating that falling tone simplification applies before the HL rule.

If the HL rule applied first, these roots would still have a final L tone at the time of application, and therefore the HL rule would not have any effect on the suffix. Since the HL rule does, in fact, apply to the suffix in these examples, falling tone simplification must have applied first, so that the roots have final H tone, which then triggers the HL rule.

(397) *bóte-mə* 'entering' *káne-mə* 'counting'
lómə-mə 'cursing' *kóta-mə* 'folding'

(398) lóo-m₂ ‘collecting’ b₂oi-m₂ ‘starting’
 k₂ae-m₂ ‘remembering’ b₂oa-m₂ ‘gathering’

This paper has provided a description of aspects of the phonology of Gã with an emphasis on tonal processes. I have shown that the CV verb roots previously referred to as ‘irregular’ are actually toneless, and that roots of other prosodic types are best analyzed as toneless as well. In fact, a clear three-way contrast among underlying H tone, L tone, and \emptyset is present throughout the language; most of the SP’s have also been shown to be toneless. It has also been demonstrated that Gã makes use of floating tones, which interact with lexical tone in complex but principled ways. The elicitation of verb paradigms allows an understanding of the system of tone rules that negotiate among underlying tones. The syllabification of vowel sequences and its effect on tone has also been discussed; further research in this area is likely to shed more light on this issue.

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