# Tone in Saxwe

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# 3 Monomorphemic tone patterns and common tonal processes

In this chapter, I present an analysis of monomorphemic nouns and verbs in Saxwe which includes an inventory of the underlying tone patterns as well as a description of the operations that are required to derive the surface forms of these words. The organization of this chapter is as follows. In section 3.1, I outline the three-way tonal contrast of the Saxwe tone system. Before proceeding to an analysis of the underlying tone patterns of nouns and verbs, I first cover in section 3.2 a process of tonal spread that is widely observed in Saxwe utterances. I then discuss automatic downstep of H in section 3.3 and non-automatic downstep of H in section 3.4. In section 3.5, I describe the default $L_{\%}$ boundary that is found at the right edge of most utterances.

With these background topics having been covered, I proceed in section 3.6 to the analysis of underlying tone in verbs. Then in section 3.7, I give an analysis of the underlying tone patterns for nouns. Section 3.8 discusses the fact that unlike with verbs, the tone patterns of certain nouns are not distributed consistently with respect to the type of consonant found in the noun. I then discuss the implications of this observation. Section 3.9 presents some thoughts with regard to the historical development of Saxwe tone. Finally, summaries and conclusions are provided in section 3.10.

## 3.1 A three-way system: /H, M, L/

In Saxwe, there are three tonal heights which are the realization of a three-way underlying tonal contrast: /H, M, L/. Utterance-final /M/ and /L/ are both realized with the final downglide that is frequently seen on utterance-final /L/ in many African languages. The reason for this is discussed in section 3.5.

In the following near minimal triplets, we see in the second syllable of these nouns examples of each of the three tonal heights.

| | | | | |
|---|---|---|---|---|
| (69) | /M.H/ | [ābɔ́] | arm | sxw-L0051-VCV nouns-arm-un.wav |
| | /M.M/ | [ābā] | forked branch | sxw-L0249-VCV nouns-forked branch-un.wav |
| | /M.L/ | [ābɔ̀] | cooked beans | sxw-L0184-VCV nouns-cooked beans-un.wav |
| (70) | /M.H/ | [ōɖ́á] | silence | sxw-L0221-VCV nouns-silence-un.wav |
| | /M.M/ | [ōɖ̄ā] | hair | sxw-L0174-VCV nouns-hair-un.wav |
| | /M.L/ | [ōɖ̀ɔ̀] | fishing net | sxw-L0203-VCV nouns-fishing net-un.wav |

| | | | | |
|---|---|---|---|---|
| (71) | /M.H/ | [ōmɔ́] | path | sxw-L0227-VCV nouns-path-un.wav |
| | /M.M/ | [āmĩ̄] | oil | sxw-L0264-VCV nouns-oil-un.wav |
| | /M.L/ | [ōmɔ̀] | machine | sxw-L0161-VCV nouns-machine-un.wav |

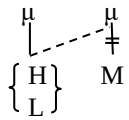
While there are only three underlying tones, these tones combine to form a fairly large number of surface tone patterns that can be realized on monomorphemic verbs or nouns. This is the topic of sections 3.6 and 3.7.

## 3.2 Tonal spread

In Saxwe, either H or L will spread onto a TBU that carries M, delinking the M. This spread is iterative within an intonational phrase (IP).

The rule of Tonal spread can be depicted as follows.

(72) Tonal spread (iterative):




The iterative spread of H is seen in (73) below.

| | | | | | |
|---|---|---|---|---|---|
| (73) | /ōló | wɔ̄̃ | ōxɛ̄/ | → | [ōló wɔ́ óxɛ̂] |
| | crocodile | forget | bird | | |
| | A crocodile forgot a bird. sxw-L0363-clause frames-un.wav | | | | |

Ignoring for the moment the final fall at the end of the utterance in (73) which is explained in section 3.5, we see that H spreads from the second TBU in the utterance to the end of the utterance. This is because the remaining TBUs in the utterance carry M tone.

At any point where a spreading H encounters a L, H is no longer permitted to spread, as shown in (74).

| | | | | | |
|---|---|---|---|---|---|
| (74) | /ōló | ɦwlɛ̀ | ōxɛ̄/ | → | [ōló ɦwlɛ̀ òxɛ̀] |
| | crocodile | save | bird | | |
| | A crocodile saved a bird. sxw-L0375-clause frames-un.wav | | | | |

In (74), H spread is blocked by the L linked to /ɦwlɛ̀/ 'save'. In (75), H spread is blocked by the L linked to the anterior marker /ò/ (see section 1.8.2 for an overview of TAM markers). Note that this example shows that it is L tone, not the presence of a depressor consonant, that blocks H spread.

(75) /ōlóˊ ò sēˋ/ → [ōlóˊ ò sèˋ]
crocodile ANT hear
The crocodile had heard. sxw-L0174-auxiliaries-un.wav

An underlying H is equally effective in blocking the spread of H. This is discussed in section 3.4, which describes non-automatic downstep in Saxwe.

The spread of L is analogous to the spread of H. In (76) we see an example of this L spread.

(76) /ōdǎ̀ wɔ̄̃ ōxɛ̄ˋ/ → [ōdǎ̀ wɔ̀̃ òxɛ̀ˋ]
snake forget bird
A snake forgot a bird. sxw-L0368-clause frames-un.wav

In (76), the L which initiates L spread is underlyingly associated with a syllable that has a depressor onset. However, underlying L may also spread in an utterance where there is no depressor consonant. This is true in (77), where the L from the anterior marker /ò/ spreads to the underlying M TBU of the following verb /sē/ 'hear'.

(77) /ōlóˊ ò sēˋ/ → [ōlóˊ ò sèˋ]
crocodile ANT hear
The crocodile had heard. sxw-L0174-auxiliaries-un.wav

The spread of L is blocked by underlying H.

(78) /ōdǎ̀ wɔ̄̃ ōwɪ́ˊ/ → [ōdǎ̀ wɔ̀̃ òwɪ́ˊ]
snake forget bee
A snake forgot a bee. sxw-L0399-clause frames-un.wav

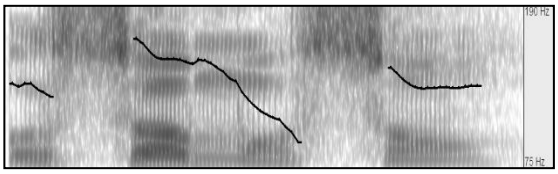
## 3.3 Automatic downstep of H

In Saxwe, in any H – L – H sequence where a surface L is followed by a surface H within an IP, the level of the second H is lowered in pitch frequency ($F_0$) in comparison with that of the preceding H (see section 2.3). Stated differently, automatic downstep of H is triggered by a L tone that is linked to a TBU in the output to the phonetic implementation. This is not restricted to a certain syntactic or morphological domain, but is instead relevant within the domain of the IP. However, whether there is statistically significant recursive downstep is a more complex question; in this section I provide a brief summary of the data and conclusions of the more extensive instrumental study which is discussed at length in chapter 7.

In keeping with common practice, automatic downstep in this study is assumed to be present but is not marked in surface forms; the (↓) symbol is reserved for marking non-automatic downstep, discussed in sections 3.4 and 7.3.

An example of the lowering of H triggered by surface L is shown in (79).

(79) /ōsɔ́ mɔ̀̌ sɔ̋́/
[ōsɔ́ mɔ̀̌ sɔ́] 'A horse left again'
horse REPET leave sxw-L0197-auxiliaries-un.wav

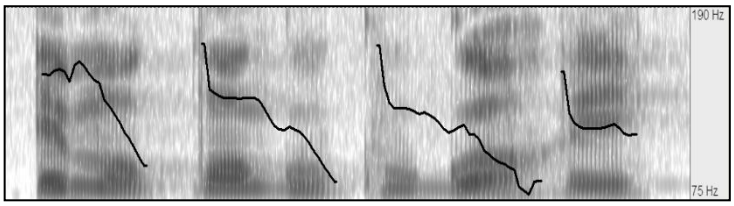



ō- **sɔ́** mɔ̀̌ **sɔ̋́**

In (79), the $F_0$ level of the second H (on the syllable [sɔ̋́]) is roughly equivalent to that of the initial M tone in this and other M - H - L - H sequences.[38]

There can be multiple iterations of automatic downstep of H within an IP. In (80), we see an example of this.

(80) /M- é mɔ̀̌ kpɔ̋́ M- gùkú gɔ̀ xé/
[é mɔ̀̌ kpɔ̋́ gùkú gɔ̀ xé]
3SG REPET see corn.porridge bottom this
He again saw the bottom [crust] of the corn porridge.
sxw-L0078-register tests-un.wav




**é** mɔ̀̌ **kpɔ̋́** gù- **kú-** gɔ̀ **xé**

In (80), syllables with surface H are marked in bold. We see that there is a progressive lowering of the $F_0$ of each H with each reoccurrence of L followed by H.

[38] This can be compared to a M - L - H sequence where the H is realized at a higher $F_0$ than the M.

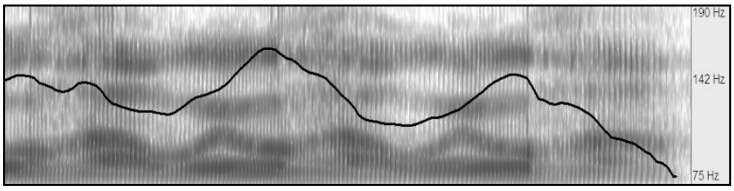
While at first glance, this may seem to be good evidence of iterative automatic downstep, the details are more complex.

In order to qualify as downstep, the degree of lowering must exceed that which could be attributable to declination. In addition, in order to claim that this downstep is iterative, it must exceed a single instance of stepping down. Section 7.3 gives the results of an instrumental study of four Saxwe speakers on the subject of iterative downstep of H. As a result of that study, I conclude that for all speakers, there is a single instance of lowering of the $F_0$ of H in a H - L - H sequence which is largely facilitated by the anticipatory raising of the first H. In addition, for some speakers of Saxwe, there is a further instance of stepping down of H which exceeds the lowering attributable to declination. However, this automatic downstep of H exists for a maximum of two iterations, after which the progressive lowering of the ceiling of H is no longer in excess of what can be attributed simply to declination.

The automatic lowering of H is not marked in any way in output forms in this study, but is assumed to be a reality even though unmarked. This assumption is justified in the case of the speaker André Taïve, whose data are depicted here in this section and who consistently produces two iterations of automatic downstep of H.

A related question to be answered is whether Ls are also automatically downstepped; that is, whether a L following a H is lowered in $F_0$ in comparison with a preceding L. In (81), it appears at first glance that the 'basement' of L is lowered just as the 'ceiling' of H is, creating a terracing effect (Clements, 1979).

(81) /ōɦ̀ wé ōɦ̀ wé ōɦ̀/ → [ōɦ̀ wě óɦ̀ wě óɦ̀]
song AM song AM song
a song of a song of a song sxw-L0092-register tests-un.wav




ō- **ɦ̀** wě ó- **ɦ̀** wě ó- **ɦ̀**

However, again we need to look more closely at the complexities of defining downstep. In order to qualify as downstep, the lowering of the $F_0$ of L must exceed any lowering that can be attributed to declination. Furthermore, in order to be iterative, the stepping down of L must occur more than once. Given this definition, I conclude in section 7.4 that there is no automatic downstep of L in Saxwe. Some speakers (like André Taïve, whose data are depicted here) have a single instance of lowering of the $F_0$ of L, facilitated by the fact that the first L in the utterance is slightly raised with respect to baseline levels of L. (The IP-final drop in $F_0$ in (81) is attributable to a $L_{\%}$ boundary which is discussed in section 3.5.) No

speaker studied demonstrated more than a single instance of lowering of L beyond that attributable to declination, so we cannot conclude that there is iterative automatic downstep of L in Saxwe.

## 3.4 Non-automatic downstep of H

Section 3.2 describes the rule of Tonal spread, which states that H and L both spread rightward to a TBU that is linked to M tone. As a result of Tonal spread, M is delinked. The spread of H and L to this adjacent TBU is iterative within an IP and is not restricted by syntactic or morphological considerations.

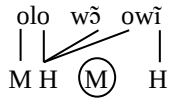
When a spreading H encounters an underlying H, spreading is stopped and the result is that two Hs are now separated by floating M. In the phonetic implementation (discussed further in section 7.3), the second H is realized as a downstepped H. In my transcription of surface forms, I use the superscript down arrow (ꜜ) to indicate this non-automatic downstep.

However, non-automatic downstep is not restricted to contexts where there has been Tonal spread. Any time that a floating M appears between two surface H tones, the output is realized as [H-ꜜH]. Stated differently, non-automatic downstep of H is triggered by a floating M tone in the output to the phonetic implementation. This is not restricted to a certain syntactic or morphological domain, but is instead relevant at any time that this sequence occurs within the IP. There are a number of floating M tones, both lexical and grammatical, that trigger downstep of H in Saxwe; these are discussed in sections 3.7.4, 4.3, 4.7, and 5.1.

In this section, I describe non-automatic downstep of H and provide a brief summary of the data and conclusions of the instrumental study which is discussed at length in chapter 7.

(82) /ōló wɔ̃̄ ōwɪ́/ → [ōló wɔ̃́ óꜜwɪ́]
crocodile forget bee
A crocodile forgot a bee. sxw-L0393-clause frames-un.wav

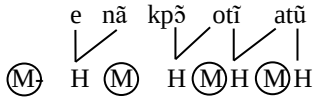
Structurally, this utterance is represented in (83).

(83)



If the conditions for the downstep of H occur in successive iterations, one can have iterative lowering of the register of H. At the stage of phonetic implementation, every new occurrence of H on the tonal tier may be marked by further lowering of the pitch $F_0$.

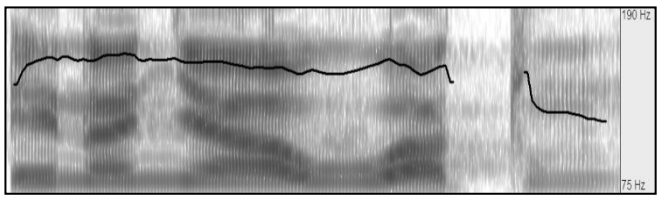
(84) /$^{M-}$ é nã̄ kpɔ́ ōtī́ ātū́/ → [é nā́ ↓kpɔ́ ó↓tī́ á↓tū́]
3SG FUT see tree five
He will see five trees. sxw-L0117-register tests-un.wav

Structurally, this would be represented as in (85) following H spread.[39]

(85)



More than one M may be delinked before a spreading H reaches a second H within the IP. We can compare (86), where non-automatic downstep occurs once, with (87), where non-automatic downstep occurs three times. Each instance of a syllable with underlying H tone is marked in bold below the pitch trace.

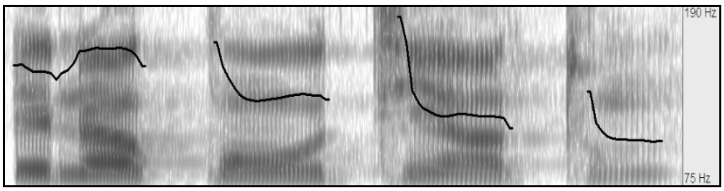
(86) /$^{M-}$ é nã̄ ŋã̄ āwū ātū́/
[é nā́ ŋā́ áwú á↓tū́]
3SG FUT wash shirt five
He will wash five shirts. sxw-L0128-register tests-un.wav




**é** nā́ ŋā́ á- wú á- **↓tū́**

[39] The $^{M-}$ notation on the pronoun is the left floating M tone on nouns that do not have one of the initial vowels /a/, /ɛ/, or /o/. This is described in section 4.3.

(87) /$^{M-}$ é nā̃ kpɔ́ ōtī́ ātū́/
[é nā́ ↓kpɔ́ ó↓tī́ á↓tū́]
3SG FUT see tree five
He will see five trees. sxw-L0117-register tests-un.wav




**é** nā́ **↓kpɔ́** ó- **↓tī́** á- **↓tū́**

There are three occurrences of downstep of H in (87). The $F^0$ of the last surface H overlaps with the phonetic space where L is often realized by the speaker of this utterance.

So far we have seen that each new occurrence of floating M between two Hs on the tonal tier at the surface level results in a lowering of the 'ceiling' with regard to the pitch at which H is realized. It is clearly the floating M which is the trigger for non-automatic downstep because in cases like (88) where there are successive surface Hs but no floating M, there is no downstep. This can be compared with (89), where there is downstep.

(88) /ōlóo sɔ́/ → [ōlóo sɔ́]
crocodile leave
A crocodile left. sxw-L0023-clause frames-un.wav

(89) /ōlóo nā̃ sɔ́/ → [ōlóo ná ↓sɔ́]
crocodile FUT leave
A crocodile will leave. sxw-L0013-auxiliaries-un.wav

Floating M tones in Saxwe are not always a result of Tonal spread; they have multiple sources. The floating M that triggers non-automatic downstep may be floating because of the loss of a vocalic segment. For example, in Saxwe, there is an optional process of initial vowel elision at the boundary between verb and object in fast speech. This elision can occur when the object has a M initial vowel that is either /o/ or /ɛ/ (see sections 1.4.6 and 4.2).

When an initial vowel is elided, the M tone is not deleted, but remains as a floating tone. This floating M triggers non-automatic downstep of a following H (see (91) and (93)) just as if the initial vowel had not been elided.

(90) /āfí kpɔ́ ōsú ɲwɛ̋́/ → [āfí kpɔ́ ó↓sú ɲwɛ̋́]
Afi see husband good
Afi found a good husband. sxw-L0005-other clauses-un.wav

(91) /āfí kpɔ́ ōsú ɲwɛ̋́/ → [āfí kpɔ́ ↓sú ɲwɛ̋́]
Afi see husband good
Afi found a good husband. sxw-L0006-other clauses-un.wav

(92) /$^{M-}$kōfí tṹ ōtã́/ → [kōfí tṹ ó↓tã́]
Kofi spit saliva
Kofi spit. sxw-L0003-other clauses-un.wav

(93) /$^{M-}$kōfí tṹ ōtã́/ → [kōfí tṹ ↓tã́]
Kofi spit saliva
Kofi spit. sxw-L0004-other clauses-un.wav

We see then that automatic downstep and non-automatic downstep of H in Saxwe do not have the same trigger. Automatic downstep of H is triggered by a surface L between two Hs, while non-automatic downstep of H is triggered by a floating M between two Hs. Chapter 6 discusses what these two triggers have in common.

The details of the phonetic implementation of non-automatic downstep of H are addressed in section 7.3. Here, I summarize by saying that for some speakers, non-automatic downstep of H is iterative up to four steps of lowering (the maximum tested in my recordings), which results in the level of H descending below the speaker's baseline levels for the realization of L. For these speakers (including the one whose data are depicted in this chapter), automatic downstep of H and non-automatic downstep of H are not equivalent in terms of $F_0$ measurements.

Other speakers are limited to a maximum of two non-automatic downsteps of H. For these speakers, there is a closer correspondence between the two kinds of downsteps in terms of $F_0$ measurements.

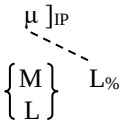
I finish this section with the question of whether there is non-automatic downstep of L. The instrumental studies in section 7.4 show clearly that there is no lowering of L triggered by a floating M that is in excess of the lowering that can be attributable to declination. This means that M does not function in the phonetic implementation as a trigger for the downstepping of L. Section 6.2 discusses the reason why this is the case.

Before proceeding with a discussion of the underlying tonal patterns of verbs and nouns, I turn now to the right edge $L_{\%}$ IP boundary tone in Saxwe, as this boundary bears an influence on the surface realization of nouns and verbs in isolation.

## 3.5 Right edge L% IP boundary tone

In Saxwe, there is a L boundary tone on the right edge of the IP, which I symbolize as L%. This L% IP boundary tone is responsible for falling pitches on the right edge of the IP. The L% boundary tone is associated to the final TBU of the IP in a postlexical operation described in (94). This rule is ordered first in the postlexical derivation.

(94) L% association



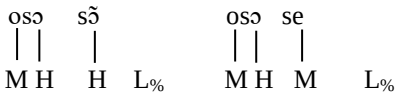

This rule of L% association states that the L% IP boundary tone will become associated to the final TBU of the IP if the final tone of the IP is a non-H tone (either M or L).[40] The rule of L% association is sensitive to floating tones and PW tonal boundaries (see section 4.1) in addition to those tones that are associated to a TBU. In Saxwe, the tone which precedes the L% boundary may be one of three tones: H, M, or L. Given this three-way choice, M must pattern either with H or with L. Here we see that it patterns with L. Section 6.2 discusses why this is the case.

We see a final falling tone in (95)a, where there is an underlying M preceding the L% IP boundary, but not in (95)b, where a H precedes the L% boundary.

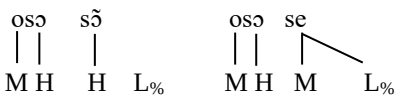
| | | | | |
|---|---|---|---|---|
| (95) | a. | /ōsɔ́ | sɛ̄/ | A horse heard. |
| | | [ōsɔ́ | sɛ̂] | sxw-L0026-clause frames-un.wav |
| | b. | /ōsɔ́ | sɔ̋́/ | A horse left. |
| | | [ōsɔ́ | sɔ̋́] | sxw-L0029-clause frames-un.wav |

The derivation of these forms looks as follows.

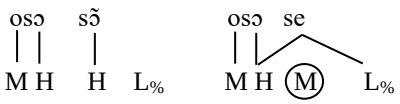
[40] There are parallels between this rule of L% association and the role attributed to the L% boundary tone in the 'autosegmental-metrical' theory of intonational phonology applied to non-tonal languages. Ladd (1996) describes the boundary as follows: "The L% boundary tone can best be described as indicating the absence of final rise. After L phrase tone, it indicates a fall to the bottom of the speaking range, but after H phrase tone it indicates a level sustention of the previous tone" (p. 88).

(96) a. 

Underlying forms

b. 

L% association

c. 

Tonal spread

The right L% boundary tone fails to associate to the final TBU of an IP in three cases: (1) when there is a H linked to the final TBU of the IP, (2) when there is a lexical floating H at the right edge of the IP, or (3) when there is a prosodically-derived Hω boundary at the right edge of the IP. Examples of failure of the L% boundary tone to associate due to a floating lexical H can be found in sections 3.7.3 and 3.7.7, and examples that are due to a Hω boundary tone can be found in section 4.1.

Note in (96)c that a TBU that is linked to a right L% boundary tone is still susceptible to having H spread to it if there is a M linked to that TBU. The M tone makes the TBU a candidate for acquiring H through Tonal spread and the presence of an associated L% boundary does not impede this.

In many of the derivations of this study (particularly those which do not include lines of association), I do not mark the default L% boundary in underlying forms. Its presence is assumed unless noted otherwise (for example in section 5.8 where the alternative H% boundary is discussed). In cases where a final H is present, the L% boundary never becomes associated to a TBU and therefore never becomes realized at the surface level. In cases where L% association results in this boundary tone becoming associated to a TBU, that is consistently indicated in the derivation.

Having now covered the rule of Tonal spread, the processes of automatic and non-automatic downstep of H, as well as the right edge L% IP boundary, we can now begin the analysis of the underlying forms of monomorphemic verbs and nouns in Saxwe.

## 3.6 Monomorphemic verbs – underlying tones

I begin with the analysis of the underlying tones of verbs rather than nouns because verbs have simpler underlying tone patterns. In addition, verbs have consistent patterns of consonant-tone interaction—unlike words of other lexical categories. The following are the surface tonal patterns for verbs in isolation. The isolation form for

verbs is the imperative in Saxwe. Included in this table are the percentage of verbs in my database which have this tone pattern.

The superscript [$^{R}$] indicates a tendency toward a slight upglide in pitch—an upglide that does not approach the height of a [LH] contour or even a [LM] contour.[41] Some speakers produce more of an upglide than others.

The surface tones of monomorphemic verbs are seen in (97); recordings are at: https://drive.google.com/open?id=1Lsu0ipaXPX8yb7DGoF7dH57S73NoSpBQ.

(97) C(C)V-shaped verbs – surface tones

| | | | |
|---|---|---|---|
| | **Voiceless obstruents** | | |
| [H] | [sɔ́] | leave | 62/291 (21%) |
| [L] | [sɛ̀] | hear | 60/291 (21%) |
| | **Sonorants, /ɖ/, and /b/** | | |
| [LH] | [jɔ̌] | call | 38/291 (13%) |
| [L] | [lɛ̀] | exist | 43/291 (15%) |
| | **Voiced obstruents** | | |
| [L$^{R}$] | [và$^{R}$] | come | 39/291 (13%) |
| [L] | [gbɔ̀] | return | 49/291 (17%) |

Here, we see surface tone patterns grouped according to whether the onset of the verb belongs to one of three groups: (1) voiceless obstruents, (2) voiced obstruents, or (3) a third category comprised of sonorants, /ɖ/, and /b/. In section 1.4.4, I explain that the phoneme /ɖ/ has a nasal allophone [n], and the phoneme /b/ has a nasal allophone [m].

For verbs, there is no ambiguity in the interaction of the sounds [b] and [m] or [ɖ] and [n] with tonal patterns. Verbs containing either [b] or [m], for example, pattern consistently with sonorants in having one of two surface realizations: [LH] or [L]. This is demonstrated in (98), which shows all of the verbs in my database which contain either the sound [b] or [m].

[41] This upglide is demonstrated on nouns by means of an instrumental study in sections 7.5.3 and 7.5.4.

(98) **C(C)V verbs with onsets [b] and [m]**

| | | | | |
|---|---|---|---|---|
| [LH] | [mɛ̌] | be clean | [mɔ̌] | be bald |
| | [mǎ] | divide | [bɛ̌] | begin |
| | [mɛ̌] | be fine to the touch | [bɛ̌] | pick up |
| | [mɔ̌] | cause to eat | [blǎ] | attach |
| | [mjɔ̌] | tighten | [bǐ] | be cooked |
| | [mɔ̌] | deny | [bjɔ̌] | ask for a thing |
| [L] | [mɛ̀] | grill | [bì] | burn |
| | [mɛ̀] | sting, bite | [blì] | roll |
| | [mɪ̀] | swallow | [bɔ̀] | meet |
| | [mʊ̀] | fall over, be demolished | [bù] | think |
| | [bɛ̀] | hide | [bjà] | ripen, be ripe |
| | [bà] | draw up (water) | | |

The underlying tones of monomorphemic verbs are less complex than their surface forms would lead one to believe. The following are the underlying tone patterns of verbs in Saxwe.[42]

(99) C(C)V-shaped verbs – underlying patterns and surface tones

| | | |
|---|---|---|
| | **Non-depressors – voiceless obstruents, sonorants, /ɖ/ and /b/** | |
| /H/ | [sɔ́] | leave |
| | [jɔ̌] | call |
| /M/ | [sè] | hear |
| | [lè] | exist |
| | **Depressors – voiced obstruents** | |
| /LH/ | [và$^{R}$] | come |
| /L/ | [gbɔ̀] | return |

Verbs can be divided into two subsets: those with non-depressor onsets and those with depressor onsets. In this table of underlying tone patterns, we see that there is no further subdivision of the subset of verbs with non-depressors when we address underlying rather than surface tone. Verbs containing voiceless obstruents, sonorants, /ɖ/, or /b/—all of which together make up the category of non-depressors—are all either /H/ or /M/.

A general statement that can be made is that for both subsets of onset type (the non-depressor subset and the depressor subset), there is an underlying pattern that includes /H/ and one that is non-high (either /M/ or /L/). Another point worth

[42] This analysis differs from that in Beavon-Ham (2012).

underlining is that for verbs, my database contains no exceptions to the patterns of consonant-tone interaction that we see here.

We still must explain the surface forms seen in (97). For instance, we must be able to explain why sonorants have a surface [LH] realization for /H/ tone, why the surface [$L^R$] pattern is described as the realization of underlying /LH/, and why the /M/ verbs are realized [L]. In the next sections, I examine each underlying tone pattern, beginning with the subset of non-depressors.

Before continuing, I briefly note that there is a grammatical tone which marks the imperative in Saxwe. In studies of Gbe languages, the imperative has been analyzed as a floating grammatical L which docks or fails to dock to the verb, depending on the consonant quality of the verb onset (Bradshaw, 1999; Stahlke, 1971). In Saxwe as well, there is evidence that the imperative is a floating grammatical L. This floating L interacts with the tones of verbs in a way that is consistent with floating grammatical tones in other environments, and its presence is largely responsible for the surface forms seen in (97).

### 3.6.1 The /H/ verb

I begin the explanation of these underlying patterns with a discussion of /H/ tone when it is lexically assigned to a verb that has a voiceless obstruent onset. The following shows the H tone verbs /sɔ́/ 'leave' and /kpɔ́/ 'see' in frames where they follow each of three underlying tone possibilities: H, M, and L. The verb /sɔ́/ is utterance-final in (100)a-f and the verb /kpɔ́/ is utterance-medial in (100)g-i.

(100) Tonal frames for the /H/ verb with a voiceless obstruent onset[43]

| | | | | |
|---|---|---|---|---|
| a. | /ōsɔ́ sɔ́/ | [ōsɔ́ sɔ́] | A horse left. | sxw-L0029-clause frames-un.wav |
| b. | /ōxɛ̄ sɔ́/ | [ōxɛ̄ sɔ́] | A bird left. | sxw-L0011-clause frames-un.wav |
| c. | /ōdà̰ sɔ́/ | [ōdà̰ sɔ́] | A snake left. | sxw-L0053-clause frames-un.wav |
| d. | /ōsɔ́ nã̄ sɔ́/ | [ōsɔ́ nã́ ↓sɔ́] | A horse will leave. | sxw-L0001-auxiliaries-un.wav |
| e. | /ōdà̰ nã̄ sɔ́/ | [ōdà̰ nà̰ sɔ́] | A snake will leave. | sxw-L0031-auxiliaries-un.wav |
| f. | /sɔ́/ | [sɔ́] | Leave. | sxw-L0141-verbs-leave-un.wav |

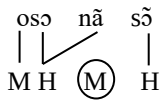
[43] Underlying tones, not phonemes, are in focus in underlying representations. Therefore, /ɖ/ will not be marked for [n], /b/ will not be marked for [m], and /j/ will not be marked for [ɲ] here and elsewhere in the remainder of this study.

| | | | | |
|---|---|---|---|---|
| g. | /ōsɔ́ kpɔ̄́ ōwɪ́/ | [ōsɔ́ kpɔ̄́ ó↓wɪ́] | A horse saw a bee. | sxw-L0383-clause frames-un.wav |
| h. | /ōkpɔ̄ kpɔ̄́ ōwɪ́/ | [ōkpɔ̄ kpɔ̄́ ó↓wɪ́] | A leopard saw a bee. | sxw-L0384-clause frames-un.wav |
| i. | /ōdɑ̀ kpɔ̄́ ōwɪ́/ | [ōdɑ̀ kpɔ̄́ ó↓wɪ́] | A snake saw a bee. | sxw-L0386-clause frames-un.wav |

In each of these utterances in (100)a-f, right edge $L_{\%}$ association fails to occur because of the H of /sɔ̄́/ 'leave'. The TBU of the verb /sɔ̄́/ is realized H in every utterance where it occurs—it is not subject to L spread, nor to any process in the phonetic implementation that would alter this realization.

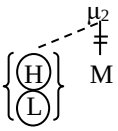
In (100)d, the surface structure has two occurrences of H which are separated by a floating M, and therefore the second occurrence is realized as a downstepped ↓H in the phonetic implementation. Following application of the rule of Tonal spread (see section 3.2), the utterance would look as follows.

(101)

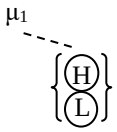



In the citation form [sɔ̄́], 'leave', the verb is the imperative form. Because of this, there is a floating L preceding the verb. In Saxwe, a floating H or L does not dock rightward onto a TBU that carries H or L tone. This is described in the rules of Grammatical tone docking A and B, which are shown here and also referred to in sections 5.2 and 5.4.

(102) Grammatical tone docking A




Grammatical tone docking B



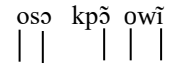
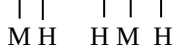
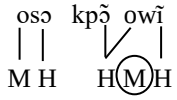

These rules of Grammatical tone docking are two-part and ordered, with rule A ordered before rule B. These rules state that a floating grammatical H or L will only dock rightward onto a following TBU if that TBU has M tone. If this condition is met, the floating grammatical tone docks and delinks the M. If rightward docking is not possible (either because the following TBU has H or L tone

or because there is no following TBU), the floating grammatical H or L will dock leftward to the preceding TBU.[44]

In the case of [sɔ́], 'leave', the floating L of the imperative is unable to dock to the TBU of the verb because there is a H associated to that TBU. As a result, the floating L remains floating.

In the utterances (100)g-i where the H verb /kpɔ̃́/ 'see' occurs utterance-medially, the realization of this verb is the same as the realization of the verb /sɔ̃́/ 'leave' in utterance-final utterances. Also, the initial vowel of the immediately following noun is realized H even though its underlying tone is M. This is due to Tonal spread. The following is the derivation of [ōsɔ́ kpɔ̃́ ó↓wĩ́] 'a horse saw a bee'.

(103)

| | |
|---|---|
|  | Underlying forms |
|  | $L_{\%}$ association (NA) |
|  | Tonal spread |

I turn now to the /H/ pattern when it is lexically assigned to a verb with a sonorant onset (including in this category the sounds /ɖ/ and /b/). Here in (104) we see a very close resemblance to the surface forms in (100) with two exceptions, both of which are circled.

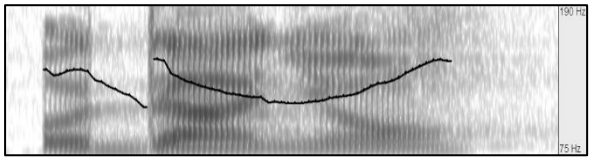
(104) Tonal frames for the /H/ verb with a sonorant onset

| | | | | |
|---|---|---|---|---|
| a. | /ōsɔ́ ɲɔ́/ | [ōsɔ́ ɲɔ́] | A horse is good. | sxw-L0028-clause frames-un.wav |
| b. | /ōxɛ̄ ɲɔ́/ | [ōxɛ̄ ɲɔ́] | A bird is good. | sxw-L0010-clause frames-un.wav |
| c. | /ōdə̀ ɲɔ́/ | [ōdə̀ ɲɔ̌] | A snake is good. | sxw-L0052-clause frames-un.wav |
| d. | /ōsɔ́ nə̃̀ ɲɔ́/ | [ōsɔ́ nə̃̀ ↓ɲɔ́] | A horse will be good. | sxw-L0003-auxiliaries-un.wav |
| e. | /ōdə̀ nə̃̀ ɲɔ́/ | [ōdə̀ nə̃̀ ɲɔ́] | A snake will be good. | sxw-L0033-auxiliaries-un.wav |
| f. | /ɲɔ́/ | [ɲɔ̌] | Be good. | sxw-L0207-verbs-good (be)-un.wav |

There are surface rising pitches on the realizations of the verb 'be good' in (104)c and f. In (105), we see the pitch trace of (104)c.

[44] Floating grammatical M does not dock but only plays a role in triggering downstep or creating an environment for rule B of Contour simplification to apply. This is seen in section 5.1.

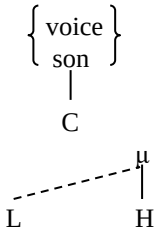
(105) /ōdə̀ ɲɔ́/ 'a snake is good' → [ōdə̀ ɲɔ̌]




ō də̀ **ɲɔ̌**

Here, there is a rising pitch on the last syllable going from L to H. Here and in other sections of this study, we see that there is an operation in Saxwe that spreads L onto a H TBU in the environment where the intervening consonant is voiced at the surface level. This rule is shown below and also referred to in section 3.7.8.

(106) Partial L spread




Because voicing is normally assigned by default to sonorants and it is unclear at what point in the phonology that default assignment occurs with respect to tonal rules, this rule states that this spread happens in the environment of an intervening consonant which is either: (1) voiced at the underlying level (*i.e.* a voiced obstruent), or (2) a sonorant. This is a rule of partial spread because the H is not delinked; there is simply a surface [LH] rise on the second TBU.

This rule is ordered before the rule of Tonal spread. If this were not the case, one would expect to see the same sort of surface [LH] contour in (104)d [ōdə̀ nə̀ ɲɔ́] 'a snake will be good', derived from /ōdə̀ nə̃ ɲɔ́/. The two possibilities are shown below.

(107) Correct rule ordering: Partial L spread prior to Tonal spread

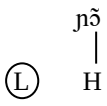
| /ōdə̀ ɲɔ́/ | /ōdə̀ nə̃ ɲɔ́/ | Underlying forms |
|---|---|---|
| -- | -- | $L_{\%}$ association |
| ōdə̀ ɲɔ̌ | -- | Partial L spread |
| -- | ōdə̀ nə̀ ɲɔ́ | Tonal spread |
| [ōdə̀ ɲɔ̌] | [ōdə̀ nə̀ ɲɔ́] | Surface |

(108) Incorrect rule ordering: Tonal spread prior to Partial L spread

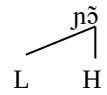
| /ōdǎ ɲɔ́/ | /ōdǎ nǎ̃ ɲɔ́/ | Underlying forms |
|---|---|---|
| -- | -- | $L_{\%}$ association |
| -- | ōdǎ nǎ ɲɔ́ | Tonal spread |
| ōdǎ ɲɔ̌ | ōdǎ nǎ ɲɔ̌ | Partial L spread |
| [ōdǎ ɲɔ̌] | *[ōdǎ nǎ ɲɔ̌] | Surface |

We can now look at the citation form [ɲɔ̌] 'be good' of (104)f. Here, the rising pitch is again due to the Partial L spread. In this case, it is the floating L of the imperative which spreads onto the following H TBU.

(109)




Underlying form
$L_{\%}$ association (NA)
Grammatical tone docking (NA)

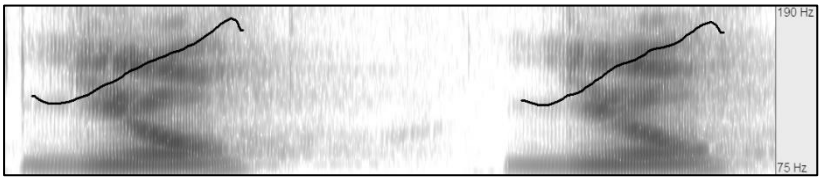



Partial L spread
Tonal spread (NA)

One may raise the question of whether Partial L spread is truly a valid phonological operation in the language, or whether the rising pitch observed on a form like [ɲɔ̌] is simply a phonetic phenomenon—a delay in the attainment of a target pitch such that the target $F_0$ is reached late within the syllable after an intonational boundary or after a surface L. The instrumental studies in section 7.2 show that there is for some speakers a phonetic peak delay in all-H utterances; the highest $F_0$ of an utterance of multiple H syllables is often produced on the second syllable rather than the first. One might question whether the Partial L spread here is also a phonetic effect, occurring within the duration of a single syllable.

There are several reasons for categorizing this rise as phonological rather than phonetic. First, the rising observed on this form—unlike the delay in peak attainment seen in section 7.2—involves a rise from a point low in the speaker's $F_0$ range (where L would be realized) to a point high in the speaker's range. Moreover, there is some indication of deliberate widening of these endpoints through a slight initial dip in $F_0$ and a slight final peak in $F_0$. This can be seen in the two repetitions of [ɲɔ̌] shown in (110).

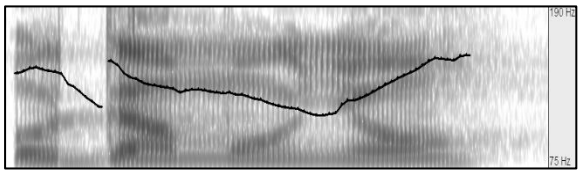
(110) /ɲɔ́/ 'be.good' → [ɲɔ̌]




**ɲɔ̌** **ɲɔ̌**

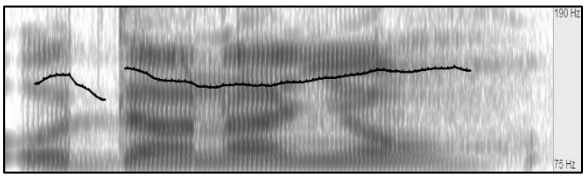
More convincing, however, is the argument that the surface rise can help distinguish between underlying lexical differences. We see this in the two utterances shown below where in the first case, the TBU preceding the H of /ɲɔ́/ has an underlying lexical L, and in the second case, the TBU preceding /ɲɔ́/ has an underlying lexical M (realized as surface L because of Tonal spread). Both are shown within the same graphing range of 75 to 190 Hz.

(111) /ōdə̀ mɔ̀ ɲɔ́/ 'a snake is again (REPET) good' → [ōdə̀ mɔ̀ ɲɔ̌]
sxw-L0229-auxiliaries-un.wav




ō- də̀ mɔ̀ **ɲɔ̌**

(112) /ōdə̀ nə̄ ɲɔ́/ 'a snake will be (FUT) good' → [ōdə̀ nə̀ ɲɔ́]
sxw-L0033-auxiliaries-un.wav




ō- də̀ nə̀ **ɲɔ́**

There is in (111) a widening of the $F_0$ endpoints that make up the extremes of the [LH] rise.[45] In comparison, the distinctions between surface M, L, and H in

[45] There seems to be anticipatory phonetic lowering of the $F_0$ of L in anticipation of the [LH] rise. Another type of anticipatory lowering of the L immediately preceding a H is described in section 7.4.

(112) involve relatively small $F_0$ differences. Partial L spread, with its [LH] output, appears to be a phonological recovery strategy for distinguishing between underlying M and L in the TBU preceding the H.

I turn now to an analysis of the second tonal option for verbs that have non-depressor onsets.

### 3.6.2 The /M/ verb

The following are utterances that show how a /M/ verb is realized when it follows TBUs that are H, M, or L. The following utterances contain the verb /sē/ 'hear'.

(113) Tonal frames for the /M/ verb with a voiceless obstruent onset

| | | | | |
|---|---|---|---|---|
| a. | /ōsɔ́ sē/ | [ōsɔ́ sê] | A horse heard. | sxw-L0026-clause frames-un.wav |
| b. | /ōxɛ̄ sē/ | [ōxɛ̄ sê] | A bird heard. | sxw-L0008-clause frames-un.wav |
| c. | /ōdə̀ sē/ | [ōdə̀ sè] | A snake heard. | sxw-L0050-clause frames-un.wav |
| d. | /ōsɔ́ nə̃́ sē/ | [ōsɔ́ nə́ sê] | A horse will hear. | sxw-L0002-auxiliaries-un.wav |
| e. | /ōdə̀ nə̃́ sē/ | [ōdə̀ nə̀ sè] | A snake will hear. | sxw-L0032-auxiliaries-un.wav |
| f. | /sē/ | [sè] | Hear. | sxw-L0020-verbs-hear-un.wav |

Voiceless obstruents and sonorants are both part of the category of non-depressors. This is confirmed when we see the tonal behavior of the verbs /lē/ 'exist, be present, be at' and /wɔ̃̄/ 'forget' when placed in the same tonal environments as /sē/. In (114), there are utterances containing /lē/ in utterance-final position, and utterances containing the verb /wɔ̃̄/ in utterance-medial position.

(114) Tonal frames for the /M/ verb with a sonorant onset

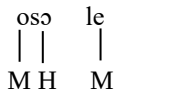
| | | | | |
|---|---|---|---|---|
| a. | /ōsɔ́ lē/ | [ōsɔ́ lê] | A horse is present. | sxw-L0025-clause frames-un.wav |
| b. | /ōxɛ̄ lē/ | [ōxɛ̄ lê] | A bird is present. | sxw-L0007-clause frames-un.wav |
| c. | /ōdə̀ lē/ | [ōdə̀ lè] | A snake is present. | sxw-L0049-clause frames-un.wav |
| d. | /ōsɔ́ nə̃́ lē/ | [ōsɔ́ nə́ lê] | A horse will be present. | sxw-L0004-auxiliaries-un.wav |
| e. | /ōdə̀ nə̃́ lē/ | [ōdə̀ nə̀ lè] | A snake will be present. | sxw-L0034-auxiliaries-un.wav |
| f. | /lē/ | [lè] | Be present, exist. | sxw-L0005-verbs-be at, exist-un.wav |

| | | | | |
|---|---|---|---|---|
| g. | /ōsɔ́ wɔ̄ ōwǐ/ | [ōsɔ́ wɔ́ ó↓wǐ] | A horse forgot a bee. | sxw-L0395-clause frames-un.wav |
| h. | /ōkpɔ̄ wɔ̄ ōwǐ/ | [ōkpɔ̄ wɔ̄ ōwǐ] | A leopard forgot a bee. | sxw-L0396-clause frames-un.wav |
| i. | /ōdɔ̀̄ wɔ̄ ōwǐ/ | [ōdɔ̀̄ wɔ̀̄ òwǐ] | A snake forgot a bee. | sxw-L0399-clause frames-un.wav |

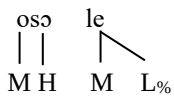
In (114)g-i where the verb is utterance-medial, we see that if there is a H or L tone preceding the M TBU, the /M/ verb is realized either H or L because of Tonal spread. The floating M that results from Tonal spread triggers non-automatic downstep when it is located between two Hs, as in (114)g.

In utterances (114)a-e, the verb is utterance-final. The association of the right edge L% intonational boundary to the final TBU (section 3.5) is responsible for the final fall or downglide on all of these forms. This association occurs whenever the L% boundary is not immediately preceded by a H. Note that the pitch level in utterances (114)a-e begins at either H, M, or L levels (depending on the level of the TBU that precedes) and descends or trails downward from there. The derivation of (114)a would look as follows.

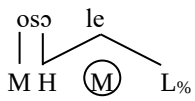
(115)




Underlying forms




L% association
Partial L spread (NA)



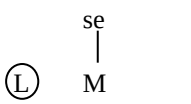

Tonal spread

At first glance, the least straightforward part about the /M/ pattern for monomorphemic verbs is its surface realization in isolation. In isolation, there is no consistent difference between the surface realization of a /M/ verb like (114)f /lɛ̄/ 'exist, be present', which is realized as [lè] and that of a /L/ verb like /gbɔ̀̌/ 'return', which is realized as [gbɔ̀̌] (section 3.6.3).[46] Both are produced as a surface L with downglide.

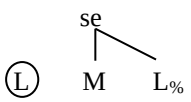
[46] Sometimes in the vowel duration of /M/ verbs such as /sɛ̄/ 'hear', there is a brief initial phonetically raised $F_0$ because of the raising effect of voiceless obstruents—a well-documented phenomenon (Hombert, Ohala, & Ewan, 1979). This does not last long into the duration of the vowel.

The reason toneless monosyllabic verbs such as [sè] and [lè] are realized as such in isolation has to do with the floating L of the imperative. According to rules A and B of Grammatical tone docking (102), a floating H or L can dock rightward if the following TBU is M. Here, the underlying M TBU of the verbs /sē/ 'hear' or /lē/ 'be, be present, exist' creates the right environment for the floating L to dock.

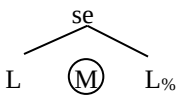
(116)




Underlying form




$L_{\%}$ association




Grammatical tone docking
Partial L spread (NA)
Tonal spread (NA)

The realization of this output from the phonology is a surface L with final downglide.[47]

### 3.6.3 The /L/ verb

Having discussed verbs that have onsets that are non-depressors, I move now to verbs that have a depressor onset. In the categorization of tone patterns of verbs repeated here in (117), we see that verbs with depressor onsets are either /LH/ or /L/, unlike verbs with non-depressor onsets, which are either H/ or /M/.

[47] The speaker whose data this analysis is largely built on has virtually no $F_0$ distinction between M and L baseline levels in longer all-M and all-L utterances (section 7.2). Therefore, were the L tone of the imperative not present, there still may not be a significant difference between the surface realization of the /M/ verb and the /L/ verb in the imperative form, especially given that the right $L_{\%}$ boundary is linked to both. However, there are other reasons to believe that the imperative L is present and able to link to the TBU of the verb here (sections 3.6.1 and 3.6.4). In addition, I have observed that speakers who do have a baseline $F_0$ difference between all-M and all-L utterances still realize the imperative /M/ and /L/ verbs at the same $F_0$ levels and are unable themselves to distinguish between verbs of the two categories in this environment.

(117) C(C)V-shaped verbs - patterns of consonant interaction

| | | |
|---|---|---|
| | **Non-depressors—voiceless obstruents, sonorants, /ɖ/ and /b/** | |
| /H/ | [sɔ́] | leave |
| | [jɔ́] | call |
| /M/ | [sè] | hear |
| | [lè] | exist |
| | **Depressors—voiced obstruents** | |
| /LH/ | [và$^{R]}$ | come |
| /L/ | [gbɔ̀] | return |

Taking first the /L/ verb, we can see how it fares in various tonal frames. The verbs used in these utterances are /gbɔ̀/ 'return' and /ɦwlɛ̀/ 'save'.

(118) Tonal frames for the /L/ verb

| | | | | |
|---|---|---|---|---|
| a. | /ōsɔ́ gbɔ̀/ | [ōsɔ́ gbɔ̀] | A horse returned. | sxw-L0027-clause frames-un.wav |
| b. | /ōxɛ̄ gbɔ̀/ | [ōxɛ̄ gbɔ̀] | A bird returned. | sxw-L0009-clause frames-un.wav |
| c. | /ōdǎ̀ gbɔ̀/ | [ōdǎ̀ gbɔ̀] | A snake returned. | sxw-L0051-clause frames-un.wav |
| d. | /ōsɔ́ nā̃ gbɔ̀/ | [ōsɔ́ nā́ gbɔ̀] | A horse will return. | sxw-L0006-auxiliaries-un.wav |
| e. | /ōdǎ̀ nā̃ gbɔ̀/ | [ōdǎ̀ nā̀ gbɔ̀] | A snake will return. | sxw-L0036-auxiliaries-un.wav |
| f. | /gbɔ̀/ | [gbɔ̀] | Return. | sxw-L0014-verbs-return-un.wav |
| g. | /ōsɔ́ ɦwlɛ̀ ōwɪ́/ | [ōsɔ́ ɦwlɛ̀ òwɪ́] | A horse saved a bee. | sxw-L0403-clause frames-un.wav |
| h. | /ōkpɔ̄ ɦwlɛ̀ ōwɪ́/ | [ōkpɔ̄ ɦwlɛ̀ òwɪ́] | A leopard saved a bee. | sxw-L0404-clause frames-un.wav |
| i. | /ōdǎ̀ ɦwlɛ̀ ōwɪ́/ | [ōdǎ̀ ɦwlɛ̀ òwɪ́] | A snake saved a bee. | sxw-L0406-clause frames-un.wav |

The underlying /L/ verbs are realized L in all tonal environments. When utterance-final as in (118)a-f, this L has a final downglide because of the association of the right edge L% boundary to the verb. When Tonal spread causes a M to be delinked as in (118), this M plays no role in triggering non-automatic downstep of L in the phonetic implementation. The reason for this is discussed in section 6.2.3.

While the tonal behavior of /L/ verbs is straightforward, /LH/ verbs are often less transparent in their surface forms. I turn now to this category of verb.

### 3.6.4 The /LH/ verb

The following are utterances that contain the /LH/ verbs /vă/ 'come' and /gbɛ̌/ 'refuse, reject'. In these transcriptions, the superscript $^{R}$ stands for a final slight upglide in pitch. This upglide is more pronounced in certain utterances than in others.

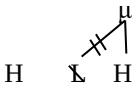
(119) Tonal frames for the /LH/ verb

| | | | | |
|---|---|---|---|---|
| a. | /ōsɔ́ vă/ | [ōsɔ́ vá] | A horse came. | sxw-L0030-clause frames-un.wav |
| b. | /ōxɛ̄ vă/ | [ōxɛ̄ và$^{R}$] | A bird came. | sxw-L0012-clause frames-un.wav |
| c. | /ōɖa̰ vă/ | [ōɖa̰ và$^{R}$] | A snake came. | sxw-L0054-clause frames-un.wav |
| d. | /ōsɔ́ nā̰ vă/ | [ōsɔ́ ná̰ và$^{R}$] | A horse will come. | sxw-L0005-auxiliaries-un.wav |
| e. | /òɖa̰ nā̰ vă/ | [ōɖa̰ nà̰ và$^{R}$] | A snake will come. | sxw-L0035-auxiliaries-un.wav |
| f. | /vă/ | [và$^{R}$] | Come. | sxw-L0208-verbs-come-un.wav |
| g. | /ōsɔ́ gbɛ̌ ōwḭ́/ | [ōsɔ́ gbɛ́ ó↓wḭ́] | A horse rejected a bee. | sxw-L0389-clause frames-un.wav |
| h. | /ōkpɔ̄ gbɛ̌ ōwḭ́/ | [ōkpɔ̄ gbɛ̀ ōwḭ́] | A leopard rejected a bee. | sxw-L0390-clause frames-un.wav |
| i. | /ōɖa̰ gbɛ̌ ōwḭ́/ | [ōɖa̰ gbɛ̀ ōwḭ́] | A snake rejected a bee. | sxw-L0392-clause frames-un.wav |

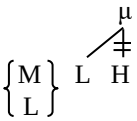
In Saxwe, underlying lexical /LH/ on a TBU does not remain intact at the surface level as LH in monomorphemic contexts. In these utterances in (119), we see that following a L or a M, the phonemic contour /LH/ is realized L—with some phonetically-implemented nuances to be discussed shortly. Following a H, it is realized H.

This requires a rule of Contour simplification. In fact, there are two rules of Contour simplification, which I label as rules A and B. The following are the rules of Contour simplification.

(120) Contour simplification A:




(121) Contour simplification B:




The rule of Contour simplification A states that in the environment of a preceding H, an underlying LH contour is simplified by deleting the L. The rule of Contour simplification B states that in the environment of a preceding non-H (a M or L), an underlying LH contour is simplified by delinking the H (thereby creating a floating H). In both cases, the contour is simplified in a manner so that the surface realization of the underlying LH contour will approximate (in broad terms) the surface pitch of the preceding TBU.

We can now return to the utterances in (119). I consider first the case of the phonemic /LH/ contour which is realized H following an underlying H. The following is the derivation of (119)a /ōsɔ́ vă/ 'a horse came'.

(122)

| | |
|---|---|
| osɔ va | Underlying forms |
| M H L H | $L_{\%}$ association (NA) |
| osɔ va | Contour simplification |
| M H H | Partial L spread (NA) |
| | Tonal spread (NA) |

The output of the phonetic implementation is [ōsɔ́ vá].

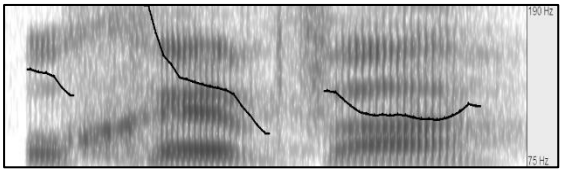
When the underlying /LH/ contour follows an underlying L or M TBU, it is the L part of the /LH/ contour of a verb such as /vă/ that is retained. However, it is realized with phonetically-implemented nuances which are due to the presence of the floating H. We can look at (119)b /ōxɛ̄ vă/ 'a bird came' as an example of the application of rule B of Contour simplification.

(123)

| | | |
|---|---|---|
| oxɛ va | Underlying forms | |
| M L H | $L_{\%}$ association (NA) | |
| oxɛ va | Contour simplification | |
| M L (H) | Partial L spread (NA) | |
| | Tonal spread (NA) | |

The output of the phonetic implementation in this case is [ōxē và$^{R}$], in which the L–floating H is realized utterance-finally as having a slight upglide of pitch. This slight upglide is more pronounced for some speakers than for others, but it never rises in the way that a surface [LH] might. The upglide is seen on the final syllable in the pitch trace below.

(124) /ōxē vǎ/ → [ōxē và$^{R}$]




ō- xē **và$^{R}$**

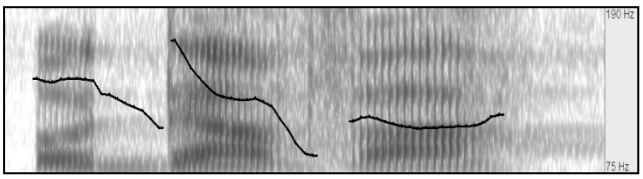
Besides triggering utterance-final upglide, the L–floating H sequence that is obtained as a result of Contour simplification may trigger other effects on surface realization. There can be an initial lowering of $F_0$ of this L within the duration of the TBU. This is described through instrumental tests summarized in sections 7.5.3 and 7.5.4. The $F_0$ of this TBU may be discernibly lower than the $F_0$ of a preceding L. This can be seen in (119)c /ōdə̀ vǎ/ 'a snake came', shown in (125).

(125)

| | | |
|---|---|---|
| odã va | Underlying forms | |
| M L L H | $L_{\%}$ association (NA) | |
| odã va | Contour simplification | |
| M L L (H) | Partial L spread (NA) | |
| | Tonal spread (NA) | |

The output of the phonetic implementation is [ōdə̀ và$^{R}$]. A pitch trace of this utterance is shown below.

(126) /ōdǎ̀ vǎ/ → [ōdǎ̀ và$^{R}$]




ō- dǎ̀ **và$^{R}$**

In section 7.4, we see that in the phonetic implementation, Saxwe speakers demonstrate an anticipatory lowering of the L TBU immediately preceding an IP-final H. Here, it is as though this anticipatory lowering of the $F_0$ of L occurs despite the fact that the IP-final H that follows is a floating tone.

A final effect of the L–floating H sequence is that the floating H blocks L spread. This is seen in (119)h /ōkpɔ̄ gbɛ̌ ōwǐ/ 'a leopard rejected a bee', derived in (127).

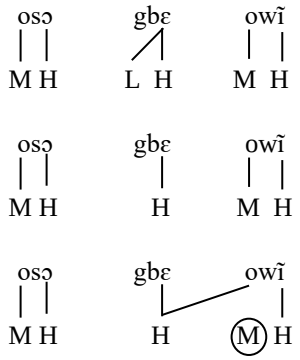
(127)

| | | |
|---|---|---|
| okpɔ gbɛ owĩ | | Underlying forms |
| ⌊ ⌈ \| \| | | $L_{\%}$ association (NA) |
| M L H M H | | |
| okpɔ gbɛ owĩ | | Contour simplification |
| ⌊ \| \| | | Partial L spread (NA) |
| M L(H) M H | | Tonal spread (NA) |

The surface realization of this utterance is [ōkpɔ̄ gbɛ̀ ōwǐ]. The floating H that results from Contour simplification blocks the spread of L, so that when Tonal spread occurs, there is no spread of L and the following TBU is realized M.

Given that the L of an underlying /LH/ contour does not participate in Tonal spread (because of the floating H following it), we must examine whether the H of an underlying /LH/ contour ever participates in Tonal spread. The answer is indicated in (119)g /ōsɔ́ gbɛ̌ ōwǐ/ 'a horse rejected a bee'. The derivation of this utterance is shown below.

(128)




This utterance is realized [ōsɔ́ gbɛ́ ó↓wĩ́]. Because the underlying /LH/ contour of the verb follows a H, it is simplified according to rule A of Contour simplification (120) by deleting the L. The H spreads onto the following M TBU and delinks it, so that the following H TBU is realized as a downstepped H.

If we compare (128) /ōsɔ́ gbɛ̌ ōwĩ́/ to (127) /ōkpɔ̄ gbɛ̌ ōwĩ́/, we see that the manner in which the underlying /LH/ contour is simplified—whether it is the L or H which remains linked to the vowel—determines whether there is to be H spread or not. Put in derivational terms, the rules of Contour simplification must be ordered before the rule of Tonal spread, as can be seen by comparing (129) to (130).

(129) Correct rule ordering: Contour simplification prior to Tonal spread

| /ōsɔ́ gbɛ̌ ōwĩ́/ | /ōkpɔ̄ gbɛ̌ ōwĩ́/ | Underlying forms |
|---|---|---|
| -- | -- | L% association |
| ōsɔ́ gbɛ́ ōwĩ́ | ōkpɔ̄ gbɛ̀ $^{H}$ ōwĩ́ | Contour simplification |
| -- | -- | Partial L spread |
| ōsɔ́ gbɛ́ ó $^{M}$ wĩ́ | -- | Tonal spread |
| [ōsɔ́ gbɛ́ ó↓wĩ́] | [ōkpɔ̄ gbɛ̀ ōwĩ́] | Surface |

(130) Incorrect rule ordering: Tonal spread prior to Contour simplification

| /ōsɔ́ gbɛ̌ ōwĩ́/ | /ōkpɔ̄ gbɛ̌ ōwĩ́/ | Underlying forms |
|---|---|---|
| -- | -- | L% association |
| -- | -- | Partial L spread |
| ōsɔ́ gbɛ̌ ó $^{M}$ wĩ́ | ōkpɔ̄ gbɛ̌ ó $^{M}$ wĩ́ | Tonal spread |
| ōsɔ́ gbɛ́ ó $^{M}$ wĩ́ | ōkpɔ̄ gbɛ̀ $^{H}$ ó $^{M}$ wĩ́ | Contour simplification |
| [ōsɔ́ gbɛ́ ó↓wĩ́] | *[ōkpɔ̄ gbɛ̀ ó↓wĩ́] | Surface |

If the rule of Tonal spread is ordered before the rules of Contour simplification, we get the incorrect surface form *[ōkpɔ̄ gbɛ̀ ó↓wĩ́] from /ōkpɔ̄ gbɛ̌ ōwĩ́/.

We can also examine how the rules of Contour simplification are ordered with respect to the rule of Partial L spread. In order to do this, we must look at an utterance that has two /LH/ verbs back to back.

(131) /ōŋ̄ vă gbɛ̌/ → [ōŋ̄ và gbɛ̌]
cow come refuse
A cow eventually refused. sxw-L0255-auxiliaries-un.wav

(132) Correct rule ordering: Contour simplification prior to Partial L spread

| | |
|---|---|
| /ōŋ̄ vă gbɛ̌/ | Underlying forms |
| -- | $L_{\%}$ association |
| ōŋ̄ và $^{H}$ gbɛ́ | Contour simplification |
| ōŋ̄ và $^{H}$ gbɛ̌ | Partial L spread |
| -- | Tonal spread |
| [ōŋ̄ và gbɛ̌] | Surface |

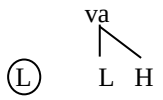
(133) Incorrect rule ordering: Partial L spread prior to Contour simplification

| | |
|---|---|
| /ōŋ̄ vă gbɛ̌/ | Underlying forms |
| -- | $L_{\%}$ association |
| -- | Partial L spread |
| ōŋ̄ và $^{H}$ gbɛ́ | Contour simplification |
| -- | Tonal spread |
| *[ōŋ̄ và gbɛ́] | Surface |

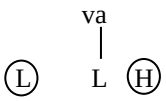
Only the rule ordering in (132) where Contour simplification occurs prior to Partial L spread yields the correct surface form with its [LH] contour. Interestingly, in the derivation in (132), it is evident that the simplification of both contours takes place simultaneously. In addition, we see that the floating H that is the result of Contour simplification does not interfere with the Partial L spread.

Before leaving the subject of the /LH/ verb, I return to the isolation form, which has a floating L of the imperative preceding it. Recall that the rules of Grammatical tone docking (102) state that a grammatical tone will only dock to the rightward TBU if this TBU is M. Thus the L of the imperative does not dock to the TBU of a /LH/ verb in its imperative form. However, the floating L does provide the correct environment for the rule of Contour simplification B to be applied, with the result that H is delinked. The final realization is a surface form [và$^{R}$] with a slight utterance-final upglide. The derivation is shown below.

(134)




Underlying form
$L_{\%}$ association (NA)




Contour simplification
Grammatical tone docking (NA)
Partial L spread (NA)
Tonal spread (NA)

This concludes the examination of each of the four underlying tones that may be lexically associated with monomorphemic verbs. Before turning to an examination of the underlying tone patterns associated with monomorphemic nouns, I first mention some thoughts regarding the historical development of verb tone.

### 3.6.5 Thoughts on the historical development of verb tone

If we look at the table of underlying lexical tone of verbs repeated below in (135), there appears to be a certain arbitrariness to the tone categories at first glance. One expects perhaps to see that in a tone system with a 3-way underlying tonal opposition, there would be three underlying tone patterns. Instead, verbs with depressor onsets are either /LH/ or /L/, and this is opposed to an option of either /H/ or /M/ for verbs with non-depressor onsets.

(135) C(C)V-shaped verbs – underlying patterns and surface tones

| | **Non-depressors—voiceless obstruents, sonorants, /ɖ/ and /b/** | |
|---|---|---|
| /H/ | [sɔ́] | leave |
| | [jɔ̌] | call |
| /M/ | [sɛ̀] | hear |
| | [lɛ̀] | exist |
| | **Depressors—voiced obstruents** | |
| /LH/ | [và$^{R]}$ | come |
| /L/ | [gbɔ̀] | return |

I believe that this apparent arbitrariness is attributable to the historical development of tone in Saxwe. In section 1.1, I discuss the fact that the Saxwe people are theorized to be a people of Yoruboid origin who migrated into the Gbe-speaking region. The Gbe languages that have been the subject of tone analysis are frequently analyzed as having a two-way underlying tonal contrast which yields three (or four in the case of one dialect) surface heights because of consonant-tone interaction. Such an analysis has been claimed for Ewe (Ansre, 1961; Clements, 1978; Stahlke, 1971) and Gen (Bole-Richard, 1983), although it has also been

shown that there are some anomalous forms which call into question this analysis (Bradshaw, 1999).

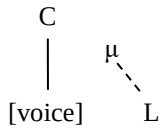
The Yoruboid languages, on the other hand, frequently have a three-way underlying tonal contrast (Wedekind, 1985). Yoruba itself is well-documented as having a three-way underlying tonal contrast (Akinlabi, 1985; Pulleyblank, 1986).

If Saxwe is indeed a result of language contact between a people of Yoruboid origins and a people of Gbe origins, then it is also likely a product of contact between a tone system of two-way underlying contrast and one of three-way underlying contrast.

Let us assume that in the Gbe system, there was at the time of language contact a two-way underlying system (reconstructed as /H, Ø/) that, because of consonant interaction, yielded three surface heights. The non-high tone in all Gbe languages is usually realized as L in a syllable whose onset is a depressor consonant.

As a result of the contact between such a two-tone language and a three-tone language that already had L in its inventory of underlying contrasts, the L acquired lexical status as a toneme in its own right, no longer merely the phonetic realization of a toneless TBU when following a depressor. There would therefore have been a tone change as shown in (136).

(136) *L insertion




This would have yielded the following progression.

(137) Hypothesized historical progression of Saxwe tone – intermediate

| | *2-tone system | | *L insertion |
|---|---|---|---|
| Non-depressors | H | → | H |
| | Ø | → | Ø |
| Depressors | H | → | LH |
| | Ø | → | L |

Finally, what was a default phonological rule of M insertion eventually became a lexical assignment of M. Such a tone change is shown below.

(138) *M insertion

$$Ø \rightarrow M$$

The entire progression would be as indicated in (139).

(139) Hypothesized historical progression of Saxwe tone – final

| | *2-tone system | | *L insertion | | *Ø→M |
|---|---|---|---|---|---|
| Non-depressors | H | → | H | → | H |
| | Ø | → | Ø | → | M |
| Depressors | H | → | LH | → | LH |
| | Ø | → | L | → | L |

The resulting four categories are the present-day four tone patterns assigned to verbs as seen in (135). If we consider only Saxwe verbs, we could imagine that these rules of L insertion and M insertion in (136) and (138) still have the status of being phonological rules in a synchronic system. If this were the case, the best way to categorize the underlying tones of verbs would be to analyze all verbs as being either /H/ or /Ø/.

However, the data coming from monomorphemic nouns—as well as data from other parts of speech—provide strong reasons for maintaining that Saxwe does indeed have a /H, M, L/ three-way underlying contrast. I turn now to this topic.

## 3.7 Monomorphemic nouns – underlying tone

Saxwe monomorphemic nouns have a V.C(C)V shape that includes an initial vowel. This initial vowel, discussed in section 1.4.6, is either /o/, /a/, or /ɛ/. While this initial vowel may historically have been a noun class prefix, it is no longer a functional prefix. A function the initial vowel does have is that of assuring that nouns are minimally bisyllabic in their lexical forms; there is a constraint in Saxwe that with the exception of pronouns and borrowed nouns, nouns must be bisyllabic in their lexical forms.

Initial vowels in Saxwe are usually associated with M tone. The exception to this is found in the [L.LH] tone pattern listed in (140), where the initial vowel is linked to L tone instead of M.

The following are the surface tone patterns for monomorphemic nouns. The full list of nouns and their recordings can be found at the following site: https://drive.google.com/open?id=1muj7g8mvBq33Fyq5c2-4XkEdiNPXs8xB.

(140) V.C(C)V-shaped nouns – surface tone patterns

| | **Voiceless obstruents, sonorants, some of /ɖ/ & /b/** | | **Followed by determiner /lá/** | **Frequency of the tonal pattern** |
|---|---|---|---|---|
| [M.H] | [ōsɔ́] | horse | [ōsɔ́ lá] | 79/295 (27%) |
| | [ōlɔ́] | crocodile | [ōlɔ́ lá] | |
| [M.M] | [ōxɛ̄] | bird | [ōxɛ̄ lá] | 62/295 (21%) |
| | [ōŋ̃ĩ̃] | cow | [ōŋ̃ĩ̃ lá] | |
| [M.M°] | [ōsī°] | female, wife | [ōsī lá] | 17/295 (6%) |
| | [ōnɔ̃̄°] | mother | [ōnɔ̃̄ lá] | |
| [M.HL] | [ōklâ] | soul | [ōklá ↓lá] | 2/295 (1%) |
| . | **Voiced obstruents, but also at least one of everything else** | | | |
| [M.L$^{R}$] | [ōgbɔ̀$^{R}$] | goat | [ōgbɔ̀ lă] | 47/295 (16%) |
| [M.L] | [ōdə̀] | snake | [ōdə̀ là°] | 63/295 (22%) |
| [M.L°] | [ōɦwè°] | fish | [ōɦwè là°] | 13/295 (4%) |
| [L.LH] | [òdʒǔ] | rain | [òdʒǔ lá] | 11/295 (4%) |

There are a few things to be aware of in these representations given for the phonetic tone. First, the [M.M] pattern has a falling pitch at the end of the word, whereas the [M.M°] pattern does not.

Second, the [M.L$^{R}$] pattern has a slight upglide on the L, and the [M.L°] pattern has a non-falling L, although for individual tokens, these two surface patterns can sound similar. There can be an initial lowering of $F_0$ of L in the [M.L$^{R}$] pattern within the beginning of the duration of the TBU, and possibly within the duration of the onset consonant itself. This is described through instrumental tests summarized in sections 7.5.3 and 7.5.4. Note also that the determiner [lá] is realized differently when following words of each of these two patterns.

Looking at this overview, we can say that there are two subsets of tone patterns that may be assigned to monomorphemic nouns in Saxwe—subsets that can simplistically be called the depressor subset and the non-depressor subset. However, there are inconsistencies in the assignment of lexical tone with respect to consonant quality. Some nouns that contain non-depressors are exceptionally assigned tone patterns that normally belong to the depressor subset of noun tone patterns. These are seen below.

(141) **Exceptional words:** nouns with non-depressors that have tone patterns normally assigned to nouns of the depressor subset

| | | |
|---|---|---|
| [M.L$^{R}$] | [ōmì$^{R}$] | excrement |
| | [ānɔ̀$^{R}$] | breast |
| | [ɛnɛ̀$^{R}$] | palm kernel |
| | [ōlì$^{R}$] | hoe |
| [M.L] | [ābɔ] | cooked beans |
| | [ōbà] | manioc dish |
| | [ōmɔ̀] | machine |
| | [ōɖɔ] | fishing net |
| [M.L°] | [ōmlɛ̀°] | fishhook |
| | [ōjɛ°] | spider |
| | [ōtà°] | head |
| [L.LH] | [òbǒ] | disabled person |
| | [àmɔ̌] | tofu (recently adopted word) |

Just over half of these exceptional nouns include the sounds [b] or [m], and three of them include the sounds [ɖ] or [n]. In section 1.4.4, I discuss the fact that there has been a longstanding debate among Gbe researchers as to the status of these sounds, which are in complementary distribution—[m] and [n] occurring before nasalized vowels and [b] and [ɖ] occurring before non-nasalized vowels. I follow the fairly well-established precedent of analyzing /b/ and /ɖ/ as the underlying phonemes and [m] and [n] as their respective allophones (Bole-Richard, 1983; Capo, 1991; Lefebvre & Brousseau, 2002).

Among verbs, the sounds /b/ and its allophone [m], as well as /ɖ/ and its allophone /n/ all fall into the category of non-depressors, and behave accordingly in a predictable way with regard to tone patterns. However, for nouns, the pattern is not as consistent.

The data in (142) include all instances in my corpus of monomorphemic V.(C)CV noun containing either [b] or [m]. Here we see the inconsistency well displayed. Seven of the eight tone patterns are attested among this group. Neither the sound [b] nor the sound [m] is predictably assigned a tone pattern from one or the other of the two subsets of tone patterns—whether the depressor subset or the non-depressor subset.

(142) V.C(C)V nouns involving [b] and [m]

| | **Tone patterns of the non-depressor subset** | |
|---|---|---|
| [M.H] | [ābɔ́] | arm |
| | [ōbjá] | harmattan |
| | [ōbó] | amulet |
| | [āmā́] | corn dish |
| | [āmṵ́] | raw food |
| | [ɛ̄mwĩ́] | mosquito |
| | [ōmɔ̃́] | path |
| [M.M] | [ābā] | forked branch |
| | [ābī] | wound |
| | [ābwī] | syringe, injection |
| | [āmĩ̃] | oil |
| | [ɛ̄mɛ̃̄] | person |
| [M.M°] | [āmã̄°] | leaf |
| | [āmjɔ̃°] | left side |
| [M.HL] | --- | |

| | **Tone patterns of the depressor subset** | |
|---|---|---|
| [M.L$^{R}$] | [ōmì$^{R}$] | excrement |
| [M.L] | [ābɔ̀] | cooked beans |
| | [ōbà] | manioc dish |
| | [ōmɔ̃̀] | machine |
| [M.L°] | [ōmlɛ̃̀°] | fishhook |
| [L.LH] | [òbǒ] | disabled person |
| | [àmɔ̃̌] | tofu (recent word) |

We can therefore summarize the data presented thus far by saying that the top four patterns in (140) are tone patterns only observed in nouns that contain a non-depressor (excluding from consideration those nouns containing /b/ and /ḍ/), but the bottom four patterns are observed in nouns that contain a depressor as well as some nouns that contain non-depressors. Moreover, it is not clear from these data how /b/ and [m], /ḍ/ and [n] should be categorized—whether as depressors or as non-depressors. This said, we can proceed to an analysis of the underlying tonal patterns for nouns.

The following is an overview of the Saxwe underlying tonal patterns for monomorphemic nouns.

(143) V.C(C)V-shaped nouns – underlying patterns and surface tones

| | **Voiceless obstruents, sonorants, some of /ɖ/ and /b/** | | **Frequency of the tonal pattern** |
|---|---|---|---|
| /M.H/ | [ōsɔ́] | horse | 27% |
| | [ōlɔ́] | crocodile | |
| /M.M/ | [ōxɛ̄] | bird | 21% |
| | [ōɲĩ] | cow | |
| /M.M $^{H}$/ | [ōsī°] | female, wife | 6% |
| | [ōnɔ̃°] | mother | |
| /M.H $^{M}$/ | [ōklâ] | soul | 1% |
| | **Voiced obstruents, but also at least one of everything else** | | |
| /M.LH/ | [ōgbɔ̀$^{R}$] | goat | 16% |
| | [ōlì$^{R}$] | hoe | |
| /M.L/ | [ōdə̀] | snake | 22% |
| | [ōmɔ̀] | machine | |
| /M.L $^{H}$/ | [ōɦwè°] | fish | 4% |
| | [ōtà°] | head | |
| /L.H/ | [òdʒǔ] | rain | 4% |
| | [òbǒ] | disabled person | |

In sections 3.7.1 through 3.7.8, I describe these tone patterns in detail.

### 3.7.1 The /M.H/ noun tone pattern

I begin with the tone patterns that are found lexically assigned to monomorphemic nouns with non-depressor consonants. In each of these four patterns, the initial vowel is M. These tonal patterns involve the tones H or M, but never L, as shown below.

(144) Tone patterns found exclusively on nouns with non-depressors, including some /b/ and some /ɖ/

| | | | |
|---|---|---|---|
| /M.H/ | [ōsɔ́] | horse | 27% |
| | [ōlɔ́] | crocodile | |
| /M.M/ | [ōxɛ̄] | bird | 21% |
| | [ōɲĩ] | cow | |
| /M.M $^{H}$/ | [ōsī°] | female, wife | 6% |
| | [ōnɔ̃°] | mother | |
| /M.H $^{M}$/ | [ōklâ] | soul | 1% |

The first tone pattern, /M.H/, is shown in various tonal frames in (145) using the nouns /ōsɔ́/ 'horse' and /ōwɪ́/ 'bee' as examples of words with this tone pattern.

(145) Tonal frames for /M.H/ noun tone pattern

| | | | | |
|---|---|---|---|---|
| a. | /ōsɔ́ sɔ̃́/ | [ōsɔ́ sɔ̃́] | A horse left. | sxw-L0029-clause frames-un.wav |
| b. | /ōsɔ́ sɛ̄/ | [ōsɔ́ sê] | A horse heard. | sxw-L0026-clause frames-un.wav |
| c. | /ōsɔ́ gbɔ̀̃/ | [ōsɔ́ gbɔ̃̀] | A horse returned. | sxw-L0027-clause frames-un.wav |
| d. | /M- é kpɔ̃́ ōsɔ́/[48] | [é kpɔ̃́ ó↓sɔ́] | He saw a horse. | sxw-L0213-clause frames-un.wav |
| e. | /M- ō xɔ̄ ōsɔ́/ | [ō xɔ̄ ōsɔ́] | You bought a horse. | sxw-L0214-clause frames-un.wav |
| f. | /ōsɔ́ ɦwlɛ̃̀ ōwɪ́/ | [ōsɔ́ ɦwlɛ̃̀ òwɪ́] | A cow saved a bee. | sxw-L0403-clause frames-un.wav |

Given the tonal rules and phenomena discussed in sections 3.2 through 3.5, the tonal behavior seen in (145) is fairly straightforward. Where there is no H or L preceding it, the initial vowel is realized M. The initial vowel acquires H tone through Tonal spread if there is a preceding H in the utterance, as in (145)d /M- é kpɔ̃́ ōsɔ́/ 'he saw a horse'. When this happens, the underlying H (as in that of /ōsɔ́/) is realized as a downstepped H in a case of non-automatic downstep triggered by a floating M between Hs. The surface form of (145)d is [é kpɔ̃́ ó↓sɔ́].

Alternatively, the initial vowel may acquire L tone through Tonal spread, as in (145)f /ōsɔ́ ɦwlɛ̃̀ ōwɪ́/ 'a cow saved a bee'. In this case, the underlying H (as in that of /ōwɪ́/) is realized as an automatically downstepped H. The surface realization of (145)f is [ōsɔ́ ɦwlɛ̃̀ òwɪ́].

The right edge L% IP boundary is not able to associate to the right edge of an IP ending in /ōsɔ́/ or /ōwɪ́/ because of the H of this underlying tone pattern.

### 3.7.2 The /M.M/ noun tone pattern

The second tone pattern to be described is /M.M/. For this pattern, there is a single M linked to both the initial vowel and the TBU of the following syllable of the noun. An example of a word with this pattern is /ōxɛ̄/ 'bird', realized in isolation as [ōxɛ̃] with a falling M on the final TBU.[49]

[48] The left floating M- on [M- é] is present on nouns which do not have one of the initial vowels /a/, /ɛ/, or /o/. It is descrbied in section 4.3.

[49] After using this word as a keyword for recordings of this tone pattern in a number of tonal

(146) Tonal frames for /M.M/ noun tone pattern

| | | | | |
|---|---|---|---|---|
| a. | /ōxɛ̄ sɔ́/ | [ōxɛ̄ sɔ́] | A bird left. | sxw-L0011-clause frames-un.wav |
| b. | /ōxɛ̄ sē/ | [ōxɛ̄ sē] | A bird heard. | sxw-L0008-clause frames-un.wav |
| c. | /ōxɛ̄ gbɔ̀/ | [ōxɛ̄ gbɔ̀] | A bird returned. | sxw-L0009-clause frames-un.wav |
| d. | /$^{M-}$ é kpɔ́ ōxɛ̄/ | [é kpɔ́ óxɛ̂] | He saw a bird. | sxw-L0207-clause frames-un.wav |
| e. | /$^{M-}$ ō xɔ̄ ōxɛ̄/ | [ō xɔ̄ ōxɛ̂] | You bought a bird. | sxw-L0208-clause frames-un.wav |
| f. | /ōɲ̃ ɦwlɛ̀̃ ōxɛ̄/ | [ōɲ̃ ɦwlè òxɛ̀] | A cow saved a bird. | sxw-L0376-clause frames-un.wav |

This /M.M/ tone pattern is realized at a M level if there is no preceding H or L in the IP. This is seen in (146)a, b, c, and e.[50] Otherwise, the noun (both initial vowel and following syllable) is realized either H or L because of Tonal spread, as seen in (146)d and f.

When an utterance ends with a noun of this tonal pattern, the right edge $L_{\%}$ boundary tone associates to the noun, causing the final pitch of the utterance to be falling—either from the H level, the M level, or the L level depending on whether Tonal spread occurs or not. This is seen in (146)d, e, and f. The following is the derivation of (146)d /$^{M-}$ é kpɔ́ ōxɛ̄/ 'he saw a bird'.[51]

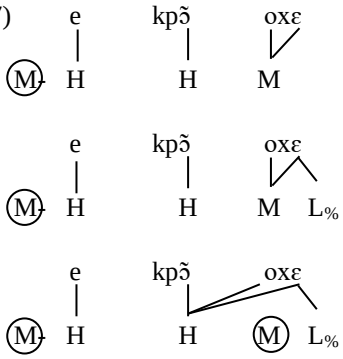
---

frames, I discovered that some speakers assign it the /M.H/ tone pattern and pronounce it [M.H]. The reality is that there is interdialectical and interspeaker variation with regard to the lexical tone pattern assigned to certain nouns. I signal this variation for those words where I am aware of it.

[50] The baseline $F_0$ for an all-M utterance is quantified for four speakers in section 7.2.

[51] The $^{M-}$ notation on the pronoun is the left floating M tone on nouns that do not have one of the initial vowels /a/, /ɛ/, or /o/. This is described in section 4.3.

(147)




Underlying forms

L% association
Contour simplification (NA)
Partial L spread (NA)

Tonal spread

The surface realization of this is [é kpɔ́ óxɛ̂], which has a final falling pitch starting at the height of a H tone. Note that the floating M has no effect on surface realization when located between a H and the L% boundary, just as it has no effect when located between a H and a L anywhere else.

### 3.7.3 The /M.M $^{H}$/ noun tone pattern

The next tone pattern seen for the subset of non-depressors is /M.M $^{H}$/. This pattern has a floating H at the end of the noun. This is a fairly rare tonal pattern, found in only six percent of nouns in my database of monomorphemic nouns.

The following are examples of this tone pattern in tonal frames, where /ōsī $^{H}$/ 'wife, female, woman', and /ōnɔ̄ $^{H}$/ 'mother' are the words used to represent this tonal pattern.[52] These words are realized in isolation as [ōsī°] and [ōnɔ̄°].

(148) Tonal frames for /M.M $^{H}$/ noun tone pattern

| | | | | |
|---|---|---|---|---|
| a. | /ōsī $^{H}$ sɔ́/ | [ōsī sɔ́] | The wife left. | sxw-L0089-clause frames-un.wav |
| b. | /ōsī $^{H}$ sɛ̄/ | [ōsī sɛ̄] | The wife heard. | sxw-L0086-clause frames-un.wav |
| c. | /ōsī $^{H}$ gbɔ̀/ | [ōsī gbɔ̀] | The wife returned. | sxw-L0087-clause frames-un.wav |
| d. | /$^{M-}$ é kpɔ́ ōsī $^{H}$/ | [é kpɔ́ ósí] | He saw his wife. | sxw-L0239-clause frames-un.wav |
| e. | /$^{M-}$ ō xɔ̄ ōsī $^{H}$/ | [ō xɔ̄ ōsī°] | You bought a wife. | sxw-L0240-clause frames-un.wav |
| f. | /$^{M-}$ é ɦwlɛ̀ ōnɔ̄ $^{H}$/ | [é ɦwlɛ̀ ònɔ̀°] | He saved his mother. | sxw-L0007-other clauses-un.wav |

[52] It is interesting to note that [ōsī°] 'wife' and [ōnɔ̄°] 'mother', both of which have this tone pattern, can also have the meaning 'his wife' or 'his/her mother'. This dual sense, however, is present only for the two words of this tonal pattern that are kinship terms.

In all respects except one, words of this tonal pattern function like those of the /M.M/ tone pattern. Utterance-medially, the floating H has no effect on either the TBU of the noun in question or the TBU of the following word. In (148)b, for example, the verb /sɛ̄/ does not show any evidence of association to this floating H. In general, lexical floating Hs do not become associated to TBUs in Saxwe.

The only environment in which this tone pattern is realized differently from the /M.M/ pattern is IP-finally. The floating H of the /M.M $^{H}$/ tone pattern prevents the right L% IP boundary tone from associating to the final TBU of a noun with this pattern. Because there is no association of the L% boundary tone, there are none of the utterance-final falling pitches that are seen in (146). We can see this in (148)d /$^{M-}$ é kpɔ́ ōsī $^{H}$/ 'he saw his wife' which has as its surface realization [é kpɔ́ ósí]. Note that H is spread in this utterance just as it is in (146)d /$^{M-}$ é kpɔ́ ōxɛ̄/ 'he saw a bird', which is realized as [é kpɔ́ óxɛ̂]. The difference is that while there is a final falling pitch in [é kpɔ́ óxɛ̂], there is no falling pitch in [é kpɔ́ ósí].

Essentially, the floating H of this tone pattern is a mechanism for helping to explain why the right edge L% IP boundary does not associate to an utterance that ends in a noun of the /M.M $^{H}$/ tone pattern. The hypothesis that there is a floating H at the end of these nouns is also supported by dialectical comparison; some of the words that have this tone pattern in Saxwe have a surface rising tone in Ewe. One can compare [āmāá] 'greens' in Ewe to non-falling [āmã̄°] 'greens/leaf' in Saxwe, and [àkpāá] 'fish' in Ewe to [ākpā°] 'species of fish' in Saxwe (Stahlke, 1971).

However, there is a problem that is created by the existence of this floating H. Unlike the floating H that is created through Contour simplification, this particular floating H has no other effects on surface realizations of utterances besides the prevention of L% association. For example, in section 3.6.4, I describe the fact that the floating H obtained as a result of Contour simplification has the effect of blocking Tonal spread. This is not the case for the floating H of the /M.M $^{H}$/ tone pattern.

(149) Additional tonal frames for /M.M $^{H}$/ noun tone pattern

| | | | |
|---|---|---|---|
| a. | /$^{M-}$ é kpɔ́ ōnɔ̄ $^{H}$ lē blɛ́/ | [é kpɔ́ ónɔ́ lé ↓blɛ́] | He saw his mother there. sxw-L0008-other clauses-un.wav |
| b. | /$^{M-}$ é ɦwlɛ̀ ōnɔ̄ $^{H}$ lē blɛ́/ | [é ɦwlɛ̀ ònɔ̀ lè blɛ́] | He saved his mother there. sxw-L0009-other clauses-un.wav |

The question then is how to account for the difference between the role of this H and that of the H created through Contour simplification in the phonological component. The following is the list of general derivational operations established thus far and listed in order of application.

(150) $L_{\%}$ association
Contour simplification
Partial L spread
Tonal spread

One way to account for the difference between these two floating tones is to posit a rule of Nominal floating H deletion which is ordered just prior to Contour simplification.

(151) Nominal floating H deletion

(H) → Ø

It is important that the only floating Hs being deleted should be those that are lexically associated with monomorphemic nouns because there are grammatical floating Hs that must remain present throughout the derivation (section 5.4). It is also important that only floating Hs be deleted, because there are lexical floating Ms that need to remain present throughout the derivation in order to trigger non-automatic downstep (section 3.7.4).

The rule of Nominal floating H deletion enables us to differentiate between (a) the floating H of the /M.M $^{H}$/ noun tone pattern which does not have continued relevance to the phonology and the phonetic implementation after the point in the derivation where $L_{\%}$ association occurs, and (b) the floating H that is created during Contour simplification which does have continued relevance to the phonology and the phonetic implementation after the point in the derivation where $L_{\%}$ association occurs.

The following then is the derivation of (149)a /$^{M-}$ é kpɔ́ ōnɔ̄ $^{H}$ lē blɛ́/.[53]

(152)

| | | | | | | |
|---|---|---|---|---|---|---|
| e | kpɔ̃ | onɔ̃ | le | blɛ | | Underlying forms |
| \| | \| | V | \| | \| | | $L_{\%}$ association (NA) |
| (M-) H | H | M (H) | M | H | | |
| e | kpɔ̃ | onɔ̃ | le | blɛ | | Nominal floating H deletion |
| \| | \| | V | \| | \| | | Contour simplification (NA) |
| (M-) H | H | M | M | H | | Partial L spread (NA) |
| e | kpɔ̃ | onɔ̃ | le | blɛ | | Tonal spread |
| \| | \ | | | \| | | |
| (M-) H | H | (M) | | H | | |

[53] The $^{M-}$ notation on the pronoun is the left floating M tone on nouns that do not have one of the initial vowels /a/, /ɛ/, or /o/. This is described in section 4.3.

The floating M between Hs triggers non-automatic downstep during the phonetic implementation and the utterance is realized as [é kpɔ́ ónɔ́ lé ↓blɛ́].

### 3.7.4 The /M.H $^{M}$/ noun tone pattern

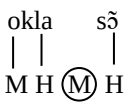
The final tonal pattern from the non-depressor subset, /M.H $^{M}$/, is seen in only two words in a noun database of 295, and is therefore a negligible part of the data. These two words, [ōklâ] 'soul' and [ōklô] 'day', are similar at the segmental level.[54] Bole-Richard (1983, 113-114) suggests that words like these may have resulted from the deletion of a vowel, which helps explain the presence of consonant clusters in these words. While they could probably be labeled as residue, the tonal behavior of these words is not hard to explain.

(153) Tonal frames for /M.H $^{M}$/ noun tone pattern

| | | | | |
|---|---|---|---|---|
| a. | /ōklá $^{M}$ sɔ́/ | [ōklá ↓sɔ́] | The soul left. | sxw-L0131-clause frames-un.wav |
| b. | /ōklá $^{M}$ sē/ | [ōklá sê] | The soul heard. | sxw-L0128-clause frames-un.wav |
| c. | /ōklá $^{M}$ gbɔ̀/ | [ōklá gbɔ̀] | The soul returned. | sxw-L0129-clause frames-un.wav |
| d. | / $^{M-}$ é kpɔ́ ōklá $^{M}$/ | [é kpɔ́ ó↓klâ] | He saw the soul. | sxw-L0249-clause frames-un.wav |
| e. | / $^{M-}$ ō xɔ̄ ōklá $^{M}$/ | [ō xɔ̄ ōklâ] | You bought a soul. | sxw-L0250-clause frames-un.wav |
| f. | /$^{M-}$ é ɦwlɛ̀ ōklá $^{M}$/ | [é ɦwlɛ̀ òklâ] | He saved a soul. | sxw-L0010-other clauses-un.wav |

Utterance-medially, the floating M at the end of this /M.H $^{M}$/ tone pattern triggers non-automatic downstep when the word is followed by a H TBU. This non-automatic downstep occurs in (153)a [ōklá ↓sɔ́], represented below.

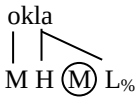
(154)




Because the rule of L$_{\%}$ association is sensitive to floating tones, nouns of the /M.H $^{M}$/ tone pattern are associated to the L$_{\%}$ IP boundary when they appear utterance-finally, as illustrated below. This is why we see the final falling pitches in (153)d, e, and f. The isolation form of the word is shown below.

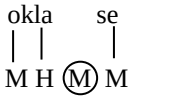
[54] While the speakers I consulted for this study do not include it among words that have this tonal pattern, I have heard [āklô] 'boat, canoe' pronounced with this tonal pattern as well.

(155)

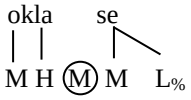



In (153)b /ōklá $^{M}$ sē/ 'the soul heard', we see that the floating M of the /M.H $^{M}$/ tone pattern does not block the spread of H tone any more than a surface M would. Below is a derivation of this utterance.

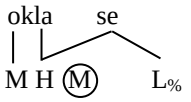
(156)




Underlying forms




L% association
Nominal floating H deletion (NA)
Contour simplification (NA)
Partial L spread (NA)




Tonal spread

This utterance is realized as [ōklá sê]. I assume that the multiple floating Ms merge in accordance with the OCP as they do elsewhere when H or L spreads across multiple M TBUs.

This concludes the discussion of tone patterns seen on monomorphemic nouns of the non-depressor subset. In summary, we can say that these tone patterns are all made up of some combination of H and M. This is not true of the remaining four tone patterns—those found primarly on nouns that contain depressors. I turn now to this subset of tone patterns.

### 3.7.5 The /M.LH/ noun tone pattern

In these next sections I address tone patterns that are lexically assigned to nouns that have depressor consonants as well as to a handful of nouns with onsets of all other types within the category of non-depressors (sonorants, voiceless obstruents, [b], [m], [ɖ], and [n]). These tone patterns are summarized below.

(157) Tone patterns found on nouns with depressors as well as other nouns

| | | | |
|---|---|---|---|
| /M.LH/ | [ōgbɔ̀$^{R}$] | goat | 16% |
| | [ōlì$^{R}$] | hoe | |
| /M.L/ | [ōdà] | snake | 22% |
| | [ōmɔ̀] | machine | |
| /M.L $^{H}$/ | [ōɦwè°] | fish | 4% |
| | [ōtà°] | head | |
| /L.H/ | [òdʒǔ] | rain | 4% |
| | [òbŏ] | disabled person | |

Looking at the tonal patterns in (157), we see that the first three patterns all have in common the fact that L is the first (and sometimes only) tone lexically associated to the second TBU in a position immediately following the consonant—a consonant which is, in most cases, a voiced obstruent. This observation is reminiscent of what was observed for verbs in section 3.6.5 and is addressed again in section 3.9 in the discussion of the historical development of these tone patterns.

Note also that there is one tone pattern among these four which has a L initial vowel rather than a M initial vowel. This is discussed in section 3.7.8, as well as in section 3.9 which addresses the historical development of tone patterns.

I turn now to a description of each of these four tone patterns. The first, /M.LH/, has an underlying /LH/ contour, just as with the /LH/ verbs described in section 3.6.4. The following are examples of tonal frames that include the nouns /ōvŭ/ 'dog' and /ōɦɔ̆/ 'hawk', both of which have the /M.LH/ tone pattern.

(158) Tonal frames for /M.LH/ noun tone pattern

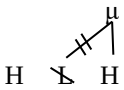
| | | | | |
|---|---|---|---|---|
| a. | /ōvŭ/ | [ōvù$^{R}$] | dog | sxw-L0064-VCV nouns-dog-un |
| b. | /ōvŭ sɔ́/ | [ōvù sɔ́] | A dog left. | sxw-L0065-clause frames-un.wav |
| c. | /ōvŭ lē/ | [ōvù lē][55] | A dog is present. | sxw-L0061-clause frames-un.wav |
| d. | /ōvŭ gbɔ̀/ | [ōvù gbɔ̀] | A dog returned. | sxw-L0063-clause frames-un.wav |
| e. | /$^{M-}$ é kpɔ́ ōvŭ/ | [é kpɔ́ óvù$^{R}$] | He saw a dog. | sxw-L0225-clause frames-un.wav |
| f. | /$^{M-}$ ō xɔ̄ ōvŭ/ | [ō xɔ̄ ōvù$^{R}$] | You bought a dog. | sxw-L0226-clause frames-un.wav |
| g. | /ōŋ̄ ɦwlɛ̄ ōɦɔ̆/ | [ōŋ̄ ɦwlɛ̄ òɦɔ̀$^{R}$] | A cow saved a hawk. | sxw-L0447-clause |

[55] This falling M is difficult to distinguish from a falling L in this particular context where it follows a L. Nevertheless, there is a slight instrumental difference.

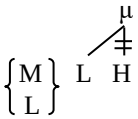
| | | | | |
|---|---|---|---|---|
| h. | /ōvv̌ lē blέ/ | [ōvv̂ lē blé] | A dog is there. | frames-un.wav<br>sxw-L0247-register |
| i. | /ōvv̌ nɔ̄ gbɔ̀/ | [ōvv̂ nɔ̄ gbɔ̀] | A dog (HAB) returns. | tests-un.wav<br>sxw-L0017-register<br>tests-un.wav |

To facilitate the understanding of these tonal frames, I repeat from section 3.6.4 the rules of Contour simplification, divided into two parts—A and B. Essentially, these rules reflect the fact that in Saxwe, it is generally preferred that underlying LH contours not be realized as surface contours (although there are some exceptions to this which are discussed later in this chapter). The following are the rules of Contour simplification.

(159) Contour simplification A:




(160) Contour simplification B:




The rule of Contour simplification A states that in the environment of a preceding H, an underlying LH contour is simplified by deleting the L. The rule of Contour simplification B states that in the environment of a preceding non-H (a M or L), an underlying LH contour is simplified by delinking the H (thereby creating a floating H).

Having reviewed the rules of Contour simplification, we can proceed with a detailed look at the utterances in (158). In all of (158)a-i, the noun that has the underlying LH contour also has an underlying M initial vowel at the beginning of the word. Because of the presence of the M initial vowel, the rule of Contour simplification B is applied and the underlying LH contour is simplified by delinking the H. This creates a floating H.

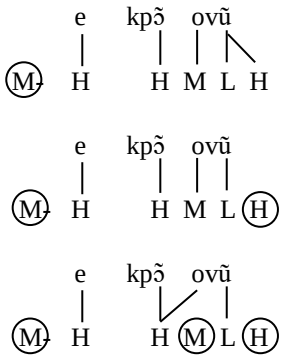
(161)


underlying surface

Just as with the L–floating H sequence that is the result when /LH/ verbs undergo Contour simplification, the L–floating H sequence on nouns is responsible for several observations at the level of the phonetic implementation. All floating Hs have an effect on surface forms utterance-finally because of their role in preventing the right edge $L_{\%}$ boundary tone from associating to the final TBU of the utterance. Beyond merely having a pitch that doesn't fall or downglide utterance-finally, the surface realization of the underlying /M.LH/ pattern has a slight upglide on the L (represented by the superscript [$^{R}$]). This is demonstrated in sections 7.5.3 and 7.5.4.

When a word with the /M.LH/ appears at the end of an utterance composed of multiple words, this upglide may or may no longer be as clearly discernible, but the noun always ends with a non-falling L. This is seen in [é kpɔ́ óvù$^{R}$] 'he saw a dog', derived from /$^{M-}$ é kpɔ́ ōvŭ/.[56]

(162)



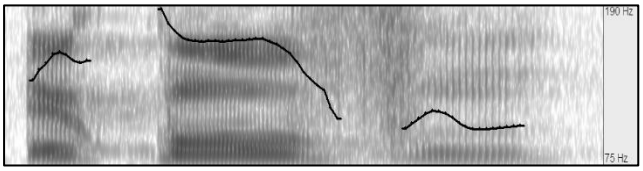

Underlying forms
$L_{\%}$ association (NA)
Nominal floating H deletion (NA)

Contour simplification
Partial L spread (NA)

Tonal spread

The surface realization of this utterance is [é kpɔ́ óvù$^{R}$]. We see the pitch trace of this utterance in (163) below.

(163) /$^{M-}$ é kpɔ́ ōvŭ/ 'he saw a dog' → [é kpɔ́ óvù$^{R}$]



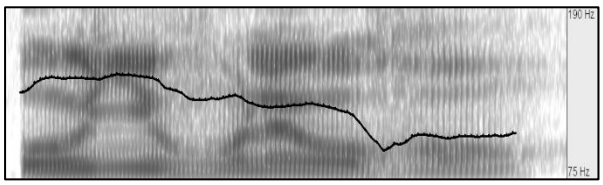

é kpɔ́ ó- **vŭ$^{R}$**

Besides triggering utterance-final upglide, the L–floating H sequence that is obtained through Contour simplification triggers other effects on surface realization. In some cases, there appears to be a lowering of the L of a L–floating H sequence in

[56] The $^{M-}$ notation on the pronoun is the left floating M tone on nouns that do not have one of the initial vowels /a/, /ɛ/, or /o/. This is described in section 4.3.

anticipation of the following H, even though this H may be a floating tone. This is reminiscent of the anticipatory lowering of L immediately preceding an IP-final H discussed in section 7.4. One may also observe a combination of a raising of pitch of the TBUs that surround this L (especially a following H) as well as a lowering of the L itself—thus a widening of the range of $F_0$ between the TBU associated to the L of the the L–floating H sequence and the surrounding TBUs. This raising of $F_0$ is discussed in section 7.5.4. In (164) below, we see the IP-final lowering of L in the environment of a floating H.

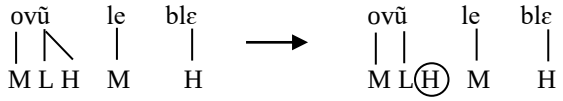
(164) /ōɲ̃ ɦwlɛ̀ ōɦɔ̌/ 'a cow saved a hawk' → [ōɲ̃ ɦwlɛ̀ òɦɔ̀$^{R}$]




ō- ɲ̃ ɦwlɛ̀ ò- **ɦɔ̀$^{R}$**

Another important role filled by the floating H obtained through simplification of the /M.LH/ tone pattern is that it blocks the spread of L to a following M TBU, just as a surface H blocks the spread of L (section 3.2). This can be seen in (158)h [ōvù lē blɛ́] 'a dog is there', derived from /ōvŭ lē blɛ́/. The derivation is shown below.

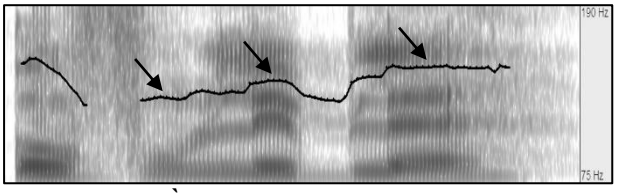
(165)




underlying surface

When L spread is blocked by this underlying or floating H, we obtain the relatively rare situation of having a surface M appear in an utterance in a position where there has been a preceeding surface L. Normally, the rule of Tonal spread would cause any underlying M that follows a preceeding surface L to be realized L. However, because this floating H blocks the spread of L, underlying M is realized as surface M in this particular context. This is seen in the upward stair-stepping of the L–M–H sequence of TBUs in (166).

(166) /ōvv̌ lē blɛ́/ 'a dog is there' → [ōvv̌̀ lē blɛ́]




ō- **vv̌̀** **lē** **blɛ́**

Before finishing the discussion of the /M.LH/ tone pattern, I touch on noun-noun compounds that contain this tone pattern. Polymorphemic forms are discussed in detail in section 4.4. Here, however, I give a few of these forms because they represent the only context in which the /LH/ TBU of a /M.LH/ noun can be immediately preceded by a H tone. Thus is gives us the chance to see what occurs in this environment.

In compounding, the initial vowel of a non-initial noun along with its tone is deleted. In addition, compounds are followed by a right edge $H_\omega$ boundary tone (like a floating H, but generated as a result of prosody rather than assigned lexically), discussed in section 4.1.

(167) Tonal frames for /M.LH/ noun tone pattern – noun-noun compounds

| | | | | |
|---|---|---|---|---|
| a. | /ōkɔ́-dǎ $^{H\omega}$/ | [ōkɔ́-dǎ́] | sand work | sxw-L0280-polymorphemic nouns-un.wav |
| b. | /ōtɔ̄-dǎ $^{H\omega}$/ | [ōtɔ̄-dǎ] | river work | sxw-L0281-polymorphemic nouns-un.wav |
| c. | /ōglɛ̀-dǎ $^{H\omega}$/ | [ōglɛ̀-dǎ] | field work | sxw-L0282-polymorphemic nouns-un.wav |

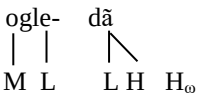
In (167)a, the L of the /LH/ contour is deleted as described in rule A of Contour simplification.

(168)


underlying surface

In (167)b and c, the conditions would be right for the rule B of Contour simplification to be applied except that there is a boundary $H_\omega$ already present to the right of the underlying /LH/ contour. Example (167)c is shown below.

(169)



Delinking the H of the underlying /LH/ contour would produce two adjacent unlinked Hs, thereby creating an OCP-related violation. Therefore, no delinking happens and the underlying /LH/ contour from the /M.LH/ tone pattern is, rather exceptionally, realized as a surface [LH] contour. This is discussed further in section 4.4.

### 3.7.6 The /M.L/ noun tone pattern

Having discussed one of the more complicated noun tone patterns, I move to a simpler tone pattern to explain—the /M.L/ tonal pattern. The words /ōdə̀/ 'snake', /ōɦà/ 'pig', and /āɦə̀/ 'brain' are used in the following utterances to illustrate the behavior of this tone pattern in various tonal frames.

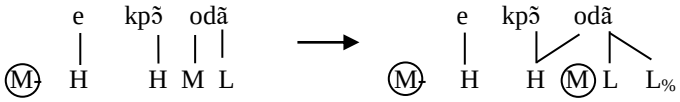
(170) Tonal frames for /M.L/ noun tone pattern

| | | | | |
|---|---|---|---|---|
| a. | /ōdə̀ sɔ́/ | [ōdə̀ sɔ́] | A snake left. | sxw-L0053-clause frames-un.wav |
| b. | /ōdə̀ lē/ | [ōdə̀ lè] | A snake is present. | sxw-L0049-clause frames-un.wav |
| c. | /ōdə̀ gbɔ̀/ | [ōdə̀ gbɔ̀] | A snake returned. | sxw-L0051-clause frames-un.wav |
| d. | /M- é kpɔ́ ōdə̀/ | [é kpɔ́ ódə̀] | He saw a snake. | sxw-L0217-clause frames-un.wav |
| e. | /M- ō xɔ̄ ōdə̀/ | [ō xɔ̄ ōdə̀] | You bought a snake. | sxw-L0218-clause frames-un.wav |
| f. | /ōŋ̄ ɦwlɛ̀ ōɦà/ | [ōŋ̄ ɦwlɛ̀ òɦà] | A cow saved a pig. | sxw-L0448-clause frames-un.wav |
| g. | /ōdə̀ lē blɛ́/ | [ōdə̀ lè blɛ́] | A snake is there. | sxw-L0248-register tests-un.wav |
| h. | /ōdə̀ nɔ̄ gbɔ̀/ | [ōdə̀ nɔ̀ gbɔ̀] | A snake (HAB) returns. | sxw-L0017-register tests-un.wav |

The underlying L of the /M.L/ tone pattern blocks H spread. This is illustrated in (170)d and below, using as an example the utterance [é kpɔ́ ódə̀] 'he saw a snake', derived from /M- é kpɔ́ ōdə̀/.[57]

[57] The M- notation on the pronoun is the left floating M tone on nouns that do not have one of the initial vowels /a/, /ɛ/, or /o/. This is described in section 4.3. It does not affect the surface output here.

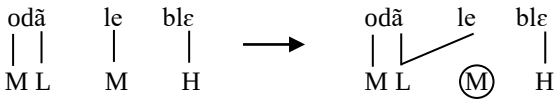
(171)




underlying surface

The L of the /M.L/ tone pattern spreads to any M TBU to its right, delinking the M according to the rule of Tonal spread. This is seen in [ōdə̀ lè blɛ́] 'a snake is there', derived from /ōdə̀ lē blɛ́/.

(172)




underlying surface

The floating M has no effect between a L and a H in an utterance such as (172).

### 3.7.7 The /M.L $^{H}$/ noun tone pattern

The next tone pattern to describe has a floating H at the right edge of the noun in its underlying form (similar to the floating H on the /M.M $^{H}$/ tonal pattern). Unlike the floating H obtained as a result of Contour simplification operating on the /M.LH/ tone pattern (see section 3.7.5), the only influence this floating H has on the phonology or phonetics is to prevent association of the right $L_{\%}$ boundary. Utterances (either single word or multiple word) that end with a noun of this tone pattern do not have a final downglide on the utterance-final L. In any position other than utterance-final, this tone pattern behaves in the same manner as does the /M.L/ pattern. The following tonal frames contain the noun [ōɦwè°] 'fish', derived from /ōɦwè $^{H}$/.

(173) Tonal frames for /M.L $^{H}$/ noun tone pattern

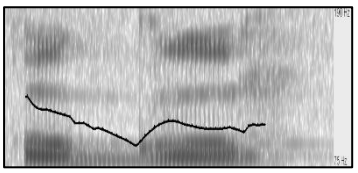
| | | | | |
|---|---|---|---|---|
| a. | /ōɦwè $^{H}$ sɔ̃́/ | [ōɦwè sɔ̃́] | A fish left. | sxw-L0095-clause frames-un.wav |
| b. | /ōɦwè $^{H}$ lē/ | [ōɦwè lè] | A fish is present. | sxw-L0091-clause frames-un.wav |
| c. | /ōɦwè $^{H}$ gbə̀̃/ | [ōɦwè gbə̀̃] | A fish returned. | sxw-L0093-clause frames-un.wav |
| d. | /$^{M-}$ é kpɔ́ ōɦwè $^{H}$/ | [é kpɔ̃́ ɔ́ɦwè°] | He saw a fish. | sxw-L0229-clause frames-un.wav |
| e. | /$^{M-}$ ō xɔ̄ ōɦwè $^{H}$/ | [ō xɔ̄ ōɦwè°] | You bought a fish. | sxw-L0230-clause frames-un.wav |

| | | | | |
|---|---|---|---|---|
| f. | /ōŋ̄ ɦwlɛ̀ ōɦwè $^{H}$/ | [ōŋ̄ ɦwlɛ̀ òɦwè°] | A cow saved a fish. | sxw-L0012-other clauses-un.wav |
| g. | /ōɦwè $^{H}$ lē blɛ́/ | [ōɦwè lè blɛ́] | A fish is there. | sxw-L0013-other clauses-un.wav |
| h. | /ōɦwè $^{H}$ nɔ̄ gbɔ̀/ | [ōɦwè nɔ̀ gbɔ̀] | A fish (HAB) returns. | sxw-L0013-other clauses-un.wav |

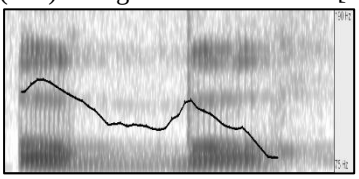
The important questions to answer in examing this tone pattern are: (1) how the /M.L $^{H}$/ pattern differs from the /M.L/ pattern, and (2) how the /M.L $^{H}$/ pattern differs from the /M.LH/ pattern.

The answer to the first question is that in their isolation forms, the /M.L $^{H}$/ and /M.L/ patterns sound and look very distinct. The two patterns are demonstrated for four Saxwe speakers in sections 7.5.1 and 7.5.2. Here, I show one example of each pattern.

(174) /ōgò $^{H}$/ 'bottle, container' → [ōgò°]



(175) /ōgbò/ 'bean fritter' → [ōgbò]



In comparing (174) and (175), we see clearly the downglide of $F_0$ on /ōgbò/, compared to the lack of downglide on /ōgò $^{H}$/. Also, the initial M of /ōgbò/ is realized at a higher $F_0$ than the initial M of /ōgò $^{H}$/.

The next question is how the /M.L $^{H}$/ pattern differs from the /M.LH/ pattern. In their surface isolation forms, the /M.L $^{H}$/ tone pattern differs in rather subtle ways from the surface realization of the /M.LH/ tone pattern. Both are realized with a final non-falling L. The differences have to do with how much of an upglide is realized and the degree of pitch $F_0$ difference between the initial M and the following L. These differences are explored for four Saxwe speakers in section 7.5.3.

We must turn to their realizations in noun-noun compounds in order to see more clearly how the /M.L $^{H}$/ pattern differs from the /M.LH/ pattern. When a noun

of the /M.L $^{H}$/ pattern comes second in a noun-noun compound, the result is always a final non-falling surface L. This is seen in (176).

(176) Noun-noun compounds containing a noun of the /M.L $^{H}$/ pattern

| | | | | |
|---|---|---|---|---|
| a. | /ōtɔ́-gò $^{H\ H\omega}$/ | [ōtɔ́-gò°] | father's bottle | sxw-L0292-polymorphemic nouns-un.wav |
| b. | /ɛ̄sɪ̄-gò $^{H\ H\omega}$/ | [ɛ̄sɪ̄-gò°] | water bottle | sxw-L0293-polymorphemic nouns-un.wav |
| c. | /āɦà̰-gò $^{H\ H\omega}$/ | [āɦà̰-gò°] | beverage bottle | sxw-L0294-polymorphemic nouns-un.wav |

This can be compared to cases where a noun of the /M.LH/ pattern comes second in a noun-noun compound. Here, the surface result is either a LH rising pitch or simply a final H.

(177) Noun-noun compounds containing a noun of the /M.LH/ pattern

| | | | | |
|---|---|---|---|---|
| a. | /ōkɔ́-dǎ̰ $^{H\omega}$/ | [ōkɔ́-dá̰] | sand work | sxw-L0280-polymorphemic nouns-un.wav |
| b. | /ōtɔ̄-dǎ̰ $^{H\omega}$/ | [ōtɔ̄-dǎ̰] | river work | sxw-L0281-polymorphemic nouns-un.wav |
| c. | /ōglè-dǎ̰ $^{H\omega}$/ | [ōglè-dǎ̰] | field work | sxw-L0282-polymorphemic nouns-un.wav |

Moreover, when these two underlying tonal patterns are followed by the definite marker [lá], the surface realizations are different.[58]

(178) Nouns of the /M.L $^{H}$/ and /M.LH/ patterns followed by [lá]

| | | | | |
|---|---|---|---|---|
| a. | /ōɦwè $^{H}$/ | [ōɦwè là°] | the fish | sxw-L0077-noun phrases-un.wav |
| b. | /ōvṵ̌/ | [ōvṵ̌ lă] | the dog | sxw-L0021-noun phrases-un.wav |

Another difference between the /M.LH/ pattern and the /M.L $^{H}$/ pattern is that the floating H of the /M.L $^{H}$/ tone pattern does not block L spread. To illustrate this, I derive here in (179) the utterances [ōɦwè lè blɛ́] 'a fish is there' (underlying /ōɦwè $^{H}$ lē blɛ́/), and [ōvṵ̌ lē blɛ́] 'a dog is here' (underlying /ōvǔ lē blɛ́/).

[58] The tonal behavior of the determiner [lá] is unusual and is discussed in greater detail in section 4.8.

(179) Derivations of /ōvŭ lē blɛ́/ and /ōɦwè $^{H}$ lē blɛ́/

| /ōvŭ lē blɛ́/ | /ōɦwè $^{H}$ lē blɛ́/ | Underlying forms |
|---|---|---|
| -- | -- | $L_{\%}$ association |
| -- | ōɦwè lē blɛ́ | Nominal floating H deletion |
| ōvṳ̆ $^{H}$ lē blɛ́ | -- | Contour simplification |
| -- | -- | Partial L spread |
| -- | ōɦwè lè blɛ́ | Tonal spread |
| [ōvṳ̆ lē blɛ́] | [ōɦwè lè blɛ́] | Surface |

To summarize, we see that the floating H of the /M.L $^{H}$/ pattern only serves to prevent $L_{\%}$ association utterance-finally. Utterance-medially, the /M.L $^{H}$/ pattern behaves exactly as does the /M.L/ pattern. Moreover, it is important in the output to the phonetic implementation that the floating H of the /M.L $^{H}$/ pattern no longer be present, or be present in a different way than the floating H of the /M.LH/ pattern which has undergone Contour simplification. Given the derivational approach used in this study, one way to account for the subtle differences in surface realization of the isolation forms of the /M.L $^{H}$/ and /M.LH/ patterns is to have a rule that erases the floating H of the /M.L $^{H}$/ pattern at the necessary point in the derivation. This rule, the rule of Nominal floating H deletion, is given in (151). This rule, along with the rules of $L_{\%}$ association and Contour simplification, are the mechanisms that explain the different surface forms generated from the underlying three-way contrast between the patterns /ōvŭ/ 'dog', /ōɦwè $^{H}$/ 'fish', and /ōdə̀/ 'snake'.

(180) Derivations of /ōvŭ/, /ōɦwè $^{H}$/, and /ōdə̀/

| /ōvŭ/ | /ōɦwè $^{H}$/ | /ōdə̀/ | Underlying form |
|---|---|---|---|
| -- | -- | ōdə̀ $^{L\%}$ | $L_{\%}$ association |
| -- | ōɦwè | -- | Nominal floating H deletion |
| ōvṳ̆ $^{H}$ | -- | -- | Contour simplification |
| -- | -- | -- | Partial L spread |
| -- | -- | -- | Tonal spread |
| [ōvṳ̆$^{R}$] | [ōɦwè°] | [ōdə̀] | Surface |

One final note to make about the /M.L $^{H}$/ pattern is that there is interspeaker variation regarding which lexical items are assigned this pattern. The analysis here is largely based on the data given by André Taïve, or speaker AT. In the instrumental studies carried out and summarized in section 7.5, we see that of the four speakers recorded, speakers BL, KS, and NG each assigned to two (out of ten) of speaker AT's /M.L $^{H}$/ nouns a different tone pattern. Speaker BL did not include among words of the /M.L $^{H}$/ pattern: [oɲjã] 'corn weevil' and [omlɛ̃] 'fishhook'. Speaker KS did not include among words of the /M.L $^{H}$/ pattern: [omlɛ̃] 'fishhook' and [aɦa] 'side'. Speaker NG did not include among words of the /M.L $^{H}$/ pattern: [oɲjã] 'corn weevil' and [aɦa] 'side'. This may indicate that this tone pattern is dying out.

### 3.7.8 The /L.H/ noun tone pattern

I finish the analysis of noun tone patterns with what is perhaps the most interesting noun tone pattern—that which is realized [L.LH] in isolation and which is underlyingly /L.H/. In (181), I repeat the overview of tone patterns that are seen in nouns of the depressor subset. The /L.H/ tone pattern accounts for 4% of the nouns in my data set.

(181) Tone patterns found on nouns with depressors as well as other nouns

| | | | |
|---|---|---|---|
| /M.LH/ | [ōgbɔ̀$^{R}$] | goat | 16% |
| | [ōlì$^{R}$] | hoe | |
| /M.L/ | [ōdǎ̀] | snake | 22% |
| | [ōmɔ̀] | machine | |
| /M.L $^{H}$/ | [ōɦwè°] | fish | 4% |
| | [ōtà°] | head | |
| /L.H/ | [òdʒǔ] | rain | 4% |
| | [òbǒ] | disabled person | |

The unusual aspects of this [L.LH] noun tone pattern are two-fold. First, this tone pattern has an initial vowel that is not M, but instead L. Not only is this initial vowel realized at a lower pitch than that of the other initial vowels, but also its TBU blocks H spread. This is a situation unknown for any other noun tone pattern in Saxwe. Moreover, analyses of other Gbe languages usually claim to have only one underlying tone for the initial vowel of nouns. In Ewe, there are two surface tones seen on initial vowels of nouns. However, most analyses of Ewe (Ansre, 1961; N. Smith, 1968; Stahlke, 1971) interpret these as allotonic variations of a single underlying toneme.

The second observation is that this tone pattern, unlike the others which are typically found in words that have depressor consonants, does not have L as the first underlying tonal element following the consonant onset of the second syllable.

In the following table, I give examples of the tonal behavior of nouns that have the pattern in question. These examples include the /L.H/ nouns [òdʒǔ] 'rain' and [àgbǎ] 'dish'.

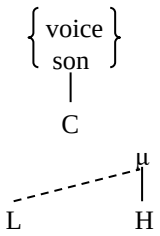
(182) Tonal frames for /L.H/ noun tone pattern

| | | | | |
|---|---|---|---|---|
| a. | /òdʒú sɔ̃́/ | [òdʒǔ sɔ̃́] | The rain left. | sxw-L0113-clause frames-un.wav |
| b. | /òdʒú lɛ̄/ | [òdʒǔ lê] | The rain is present. | sxw-L0109-clause frames-un.wav |
| c. | /òdʒú gbɔ̀̃/ | [òdʒǔ gbɔ̀̃] | The rain returned. | sxw-L0111-clause frames-un.wav |
| d. | /M- é kpɔ́̃ òdʒú/ | [é kpɔ́̃ òdʒǔ] | He saw the rain. | sxw-L0241-clause frames-un.wav |
| e. | /M- ō xɔ̄ òdʒú/ | [ō xɔ̄ òdʒǔ] | You bought the rain. | sxw-L0242-clause frames-un.wav |
| f. | /M- é zʊ̀̃ òdʒú/ | [é zʊ̀̃ òdʒǔ] | He insulted the rain. | sxw-L0015-other clauses-un.wav |
| g. | /òdʒú lɛ̄ blɛ́/ | [òdʒǔ lé ↓blɛ́] | The rain is there. | sxw-L0016-other clauses-un.wav |
| h. | /òdʒú nɔ̃̄ dʒà/ | [òdʒǔ nɔ̃́ dʒà] | The rain (HAB) falls. | sxw-L0017-other clauses-un.wav |
| i. | /ādí̱-gbā́/ | [ādí̱-gbā́] | soap dish | sxw-L0295-polymorphemic nouns-un.wav |
| j. | /ɛ̄sɪ̃̄-gbā́/ | [ɛ̄sɪ̃̄-gbā́] | water dish | sxw-L0296-polymorphemic nouns-un.wav |
| k. | /āɦà̰-gbā́/ | [āɦà̰-gbā̰] | drink dish | sxw-L0297-polymorphemic nouns-un.wav |

Looking at all of the tonal forms in (182), we see that the initial vowel is realized L in every environment and is not susceptible to becoming H through Tonal spread. We also see that [òdʒǔ] and [ògbă] are realized with a surface [LH] rise in all tonal environments where the initial vowel is present—a situation which is very different from that of the /M.LH/ pattern of nouns described in section 3.7.5. Moreover, in (182)b, g and h, we see that H is the tone that spreads from a noun of the /L.H/ pattern onto a following M TBU.

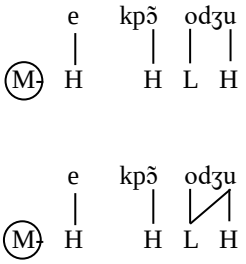
Given that this tone pattern is underlyingly /L.H/, it is the rule of Partial L spread which is responsible for the surface [L.LH] realization. That rule is repeated here for ease of reference.

(183) Partial L spread



All of the words with the surface [L.LH] pattern have either a sonorant or a voiced obstruent as the onset of the second syllable of the V.C(C)V noun. In addition, all of these words have a L as the initial vowel. Therefore the environment is right for the underlying /L.H/ pattern to be realized as [L.LH]. An example is given below from (182)d, /M- é kpɔ̃́ ɔ̀dʒú/ 'he saw rain'.[59]

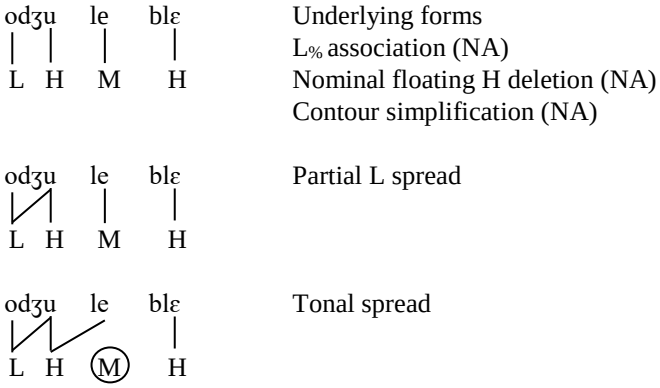
(184)




The surface realization of this utterance is [é kpɔ̃́ ɔ̀dʒŭ].

In addition, we can see the spread of H from a noun of the /L.H/ pattern below in the utterance (182)g /ɔ̀dʒú lɛ̄ blɛ́/ 'the rain is there'.

(185)




The surface realization of this utterance is [ɔ̀dʒŭ lé ↓blɛ́].

Research into this group of words shows that at least some of the words may be borrowings from neighboring Yoruboid languages. Section 1.1 describes the historical relationship Saxwe is hypothesized to have with the Yoruboid languages. In addition to this historical relationship, there is ongoing interaction between the Saxwe people and their neighbors to the east, many of whom speak Yoruba or

[59] The floating M- tone to the left of the pronoun [é] is present on nouns that do not have an initial vowel which is /a/, /ɛ/, or /o/. It is discussed in section 4.3 and does not affect the surface output of the pronoun in this derivation.

Yoruboid languages. In Yoruba, the initial vowel of nouns is either M or L, so if some of these words are borrowed from Yoruba, this would help to explain the anomalous appearance of L as the initial vowel in these nouns. The fact that this L initial vowel was not raised to adapt to Saxwe phonology suggests that the borrowing may have occurred among a population of Saxwe speakers that had a relatively high level of bilingualism.

Others of these words seem to have been derived from verbs. The verbs in question are mentioned in (186) below.

The following is a complete list of the words from my data set bearing this tone pattern and possible sources for some of these nouns. The proposed relationship is more straightforward for some nouns than for others.

Note that two of these words were initially produced by my primary consultant (speaker AT) with a /L.H/ tone pattern and then later this pronunciation was abandoned in favor of the pronunciation associated with a /M.LH/ tone pattern.

(186) Words with the /L.H/ tone pattern

**/L.H/ pattern confirmed by speaker AT**

| | | |
|---|---|---|
| /àdó/ | dirt wall | Yoruba: [ādódó] 'conical house' (Fakinlede, 2003) |
| /àgbā́/ | dish | Yoruba: [àgbá] 'cylindrical container' (Fakinlede, 2003) |
| /òdʒú/ | rain | Yoruba: [òdʒò] 'rain' (Akinlabi, p.c.) |
| /àmɔ̄́/ | tofu | Idaasha: [àmɔ̄̌] 'locally produced cheese' |
| /àdɔ́/ | nest | |
| /òbó/ | disabled person | |
| /òdū́/ | trash | |
| /òvwɛ̄́/ | evil | in Saxwe /vɔ̄/ v. means 'to fear' |
| /òdʒló/ | desire | in Saxwe /dʒlǒ/ v. means 'to desire' |
| /ògbá/ | hat | in Saxwe /gbă/ v. means 'to roof' |
| /òɲjã̄́/ | need | in Saxwe /ɲjă̄́/ v. means 'to be in need of' |

**/L.H/ pattern used and then abandoned by speaker AT**

| | | |
|---|---|---|
| /àgbó/ | ram | Yoruba: [àgbò] 'ram' (Akinlabi, p.c.) |
| /àdá/ | penis | Yoruba: [àdām̄́] 'hereditary trait' (Abraham 1962) |

**/L.H/ pattern used by other speakers**

| | |
|---|---|
| /òɲɔ̄́/ | hawk |

One final observation is that this surface [L.LH] realization is the surface realization in Ewe and Gen for the primary non-high tone pattern for nouns of the depressor subset. That is to say that in those languages, the cognate of the Saxwe /M.LH/ tone pattern (analyzed as /M.H/ in Ewe, /L.H/ in Gen, and /L.H/ in Fon) is realized [L.LH]. For example, [ōvù̌$^{R}$] 'dog' in Saxwe is [àvùú] in Ewe and [àvŭ̌] in Fon and Gen (Bole-Richard, 1983; Brousseau, 1993; Stahlke, 1971).

In addition, /L.H/ is a pattern that exists in Yoruba—a language in which initial vowels of nouns can be either L or M—and this pattern is realized the same way in Saxwe ([L.LH]) as it would be in Yoruba. Yoruba has a rule which spreads L to a following H without delinking the H (Pulleyblank, 1986, p. 112), reminiscent of the rule of Partial L spread in Saxwe (183).[60]

What this means is that the /L.H/ pattern in Saxwe, although it is a minor tone pattern in Saxwe, is realized with a surface realization that is a frequently-heard surface realization in surrounding Gbe and Yoruboid languages. It is perhaps for this reason that words are being incorporated into the Saxwe lexicon with this surface realization despite its oddities with respect to the general Saxwe tone system.[61]

This concludes the overview of the eight observed underlying tone patterns of nouns. It does not conclude, however, the entire discussion of these tone patterns. In section 3.8, I look at the nouns that do not have depressor consonants but that display the same tone patterns as nouns of the depressor subset. In section 3.9, I explore some ideas as to how the noun tone patterns developed.

## 3.8 Inconsistencies in the distribution of noun tone patterns

In the study of verbs, we see evidence that depressors in Saxwe are voiced obstruents excluding /b/ and /ɖ/, while non-depressors are voiceless obstruents, sonorants, /ɖ/ and /b/. This division is clearly established for verbs, but for nouns, the clear distinction begins to crumble. Assuming this definition of depressors, we see in the summary of tone patterns given in this chapter that there are four tone patterns that only nouns with non-depressor onsets will be assigned. On the other hand, there are four other tone patterns—those that involve L—that are usually assigned to nouns with depressor onsets, but can also be assigned to nouns with non-depressor onsets.

The following are the words in my data set which are exceptional in the sense that they have a tone pattern usually assigned to words that have a depressor consonant. These nouns, however, do not include a depressor consonant.

---

[60] The L spread rule in Yoruba applies in all contexts, whereas the rule of Partial L spread in Saxwe applies only when the consonant preceding the H is underlyingly voiced or is a sonorant.

[61] My prediction would be that the lexical assignment of words to this /L.H/ tone pattern will increase gradually at the expense of the /M.LH/ pattern—reflecting an increasing departure from the landscape painted by the old system in which L tone was generated in the presence of a depressor through a phonological operation. I believe the intraspeaker and interspeaker variation seen in section 7.5 is part of this tendency.

(187) Exceptional words with tone patterns usually connected with depressors

| | | |
|---|---|---|
| /M.LH/ | [ōmì$^{R}$] | excrement |
| | [ānɔ̀$^{R}$] | breast |
| | [ɛ̄nɛ̀$^{R}$] | palm kernel |
| | [ōlì$^{R}$] | hoe |
| /M.L/ | [ābɔ̀] | cooked beans |
| | [ōbà] | manioc dish |
| | [ōmɔ̀] | machine |
| | [ōɖɔ̀] | fishing net |
| /M.L $^{H}$/ | [ōmlɛ̀°] | fishhook |
| | [ōjɛ̀°] | spider |
| | [ōtà°] | head |
| /L.H/ | [ɔ̀bɔ̌] | disabled person |
| | [àmɔ̌] | tofu (recent word) |

The fact that a noun that doesn't include a depressor consonant can be lexically assigned a tonal pattern like /M.LH/ or /M.L/ is evidence that L in Saxwe cannot be generated solely by an operation that would insert L following an underlyingly voiced consonant. Such a rule may have been part of the diachronic phonology. In the synchronic phonology, however, tone patterns that include contrastive L tone have become lexicalized such that they may now be assigned to words that contain non-depressor consonants. Voicing is no longer a conditioning factor for L.

It is true that in several cases, these exceptional words contain /b/, its allophone [m], /ɖ/, or its allophone [n]. It may be that the ambiguity as to the status of these consonants (see section 1.4.4) contributed to the current inconsistencies. However, there are other consonants to be found among these exceptional words, including sonorants and one consonant that is not even voiced at the surface level, seen in /ōtà $^{H}$/ 'head'. The L which is a part of the tone pattern assigned to this word cannot be generated by a phonological rule inserting L in the environment of a voiced consonant.

The following are tonal frames that show these exceptional words behaving tonally in the same way as their counterparts with depressor onsets.

(188) Non-depressor consonant with /M.LH/ noun tone pattern

a. /M- kō kpə́ **ōlǐ̌** lē blέ́/ [kō kpə́ **ólì̀** lē blέ́] I saw a hoe there.
sxw-L0034-Exceptional tone patterns-un.wav

b. /M- jē H sē **ōlǐ̌**/ [jē sē ōlì̀R ] They heard a hoe.
sxw-L0004-Exceptional tone patterns-un.wav

(189) Non-depressor with /M.L/ noun tone pattern

a. /M- kō kpə́ ōḍɔ̀ lē blέ́/ [kō kpə́ óḍɔ̀ lè blέ́] I saw a fishing net there.
sxw-L0033-Exceptional tone patterns-un.wav

b. /M- jē H sē ōḍɔ̀/ [jē sē ōḍɔ̀] They heard a fishing net.
sxw-L0017-Exceptional tone patterns-un.wav

(190) Non-depressor /M.L H/ noun tone pattern

a. /M- kō kpə́ ōjὲ H lē blέ́/ [kō kpə́ ójὲ lè blέ́] I saw a spider there.
sxw-L0032-Exceptional tone patterns-un.wav

b. /M- jē H sē ōjὲ H/ [jē sē ōjὲ°] They heard a spider.
sxw-L0013-Exceptional tone patterns-un.wav

In all these examples, there is no presence of a depressor consonant to explain the tonal behavior of the nouns in these utterances—in particular to explain the presence of L tone.

Next to to the inconsistencies in alignment of tone patterns with consonant quality, the presence of the /L.H/ tone pattern is perhaps the next most outstanding example of an inconsistency in the paradigm of noun tone patterns. This is for two reasons. First, the initial vowel for these nouns is L rather than M, as it is for all other noun tone patterns. Second, this tone pattern is of the depressor subset of tone patterns, and yet it does not have a L immediately following the consonant, as do all the other tone patterns in that subset.

## 3.9 Thoughts on the historical development of noun tone patterns

The tonal landscape of nouns is quite a bit more complex than that of verbs. Not only are there more tonal patterns for nouns than there are for verbs, but also the possible choice of tone patterns is not assigned consistently with regard to consonant quality the way it is with verbs. All of these complexities are consistent with Smith's (2011) observation that nouns often show more phonological contrasts than do words of other grammatical categories.

The reason for this complexity in nouns may have to do with the history of the Saxwe language having developed from the contact of a Yoruboid language with a Gbe language (see section 1.1).

The first three tone patterns in each subset (depressors and non-depressors) are those which clearly have correlates in another Gbe language. These are shown in (191).

(191) Six underlying tone patterns for nouns in Saxwe with surface forms

| | **Voiceless obstruents, sonorants, some /ɖ/ and some /b/** | |
|---|---|---|
| /M.H/ | [ōsɔ́] | horse |
| /M.M/ | [ōxɛ̄] | bird |
| /M.M $^{H}$/ | [ōsī°] | female, wife |
| | **Voiced obstruents, but also at least one each of all other types of consonants** | |
| /M.LH/ | [ōgbɔ̀$^{R}$] | goat |
| /M.L/ | [ōdɛ̀̃] | snake |
| /M.L $^{H}$/ | [ōɦwè°] | fish |

We can compare these to the tone patterns of nouns in Ewe (Peki dialect). These data in (192) come from Ansre (1961) and are organized in light of Stahlke's (1971) ideas regarding underlying forms. These are discussed in greater detail in section 2.8.1.

(192) Underlying tone patterns for nouns in Ewe

| | **Voiceless obstruent or sonorant onset** | | | |
|---|---|---|---|---|
| | CV-shaped noun | | VCV-shaped noun | |
| /(M.)H/ | [tú] | gun | [àkpé] | thanks |
| /(M.)M/ | [klò] | knee | [àfi] | mouse |
| /(M.)MH/ | [pɛ̄ɛ́] | chisel | [àkpāá] | fish |
| | **Voiced obstruent onset** | | | |
| | CV-shaped noun | | VCV-shaped noun | |
| /(M.)H/ | [gbɔ̀ɔ́] | goat | [àvùú] | dog |
| /(M.)M/ | [bè] | thatch | [àdzò] | riddle |
| /(M.)MH/ | [gòó] | gourd | [àdèé] | saliva |

The relationship between the Saxwe tone patterns and the Ewe tone patterns is fairly easy to describe if one hypothesizes certain historical tone changes. I begin the earlier stage in Gbe tone development with a reconstructed underlying

two-way /H, Ø/ tonal contrast. I have reconstructed three possible tone patterns for nouns.

(193) Hypothesized historical progression of Saxwe nouns – early stage

| *2-tone system |
|---|
| Ø.H |
| Ø.Ø |
| Ø.ØH |

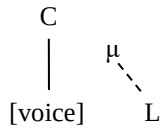
To arrive at Stahlke's (1971) underlying structures for Ewe shown in (192), a simple change from toneless TBUs to lexical assignment of M is needed at this stage. For Saxwe, however, the underlying /Ø.ØH/ pattern must be modified such that the H is floating rather than linked to the skeletal structure.

(194) Hypothesized historical progression of Saxwe nouns – first intermediate stage

| *2-tone system | | *floating tone |
|---|---|---|
| Ø.H | ⟶ | Ø.H |
| Ø.Ø | ⟶ | Ø.Ø |
| Ø.ØH | ⟶ | Ø.Ø $^{H}$ |

The next tone change follows the phonologization of phonetic effects of consonant interaction. In this tone change, L is lexically inserted in any syllable that has a depressor consonant onset in a position immediately following the onset. This process may have been galvanized by the contact of such a two-tone language with a three-tone Yoruboid language that already had L in its inventory of underlying contrasts. The relevant tone change is shown in (195).

(195) *L insertion




This would have yielded the following progression.

(196) Hypothesized historical progression of Saxwe nouns – 2nd intermediate stage

| | *2-tone system | | *floating tone | | *L insertion |
|---|---|---|---|---|---|
| Non-depressors | Ø.H | → | Ø.H | → | Ø.H |
| | Ø.Ø | → | Ø.Ø | → | Ø.Ø |
| | Ø.ØH | → | Ø.Ø $^{H}$ | → | Ø.Ø $^{H}$ |
| Depressors | Ø.H | → | Ø.H | → | Ø.LH |
| | Ø.Ø | → | Ø.Ø | → | Ø.L |
| | Ø.ØH | → | Ø.Ø $^{H}$ | → | Ø.L $^{H}$ |

Finally, the completion of the process would require M to be lexically assigned rather than simply being the default surface realization of a toneless TBU. This tone change is the same that is needed for reconstructing the Ewe tone patterns of (192) directly from the reconstructed earlier tone patterns of (193). This tone change is shown below.

(197) *M insertion

$$Ø \rightarrow M$$

The entire progression is as follows.

(198) Hypothesized historical progression of Saxwe nouns – final

| | *2-tone system | | *floating tone | | *L insertion | | *Ø→M |
|---|---|---|---|---|---|---|---|
| Non-depressors | Ø.H | → | Ø.H | → | Ø.H | → | M.H |
| | Ø.Ø | → | Ø.Ø | → | Ø.Ø | → | M.M |
| | Ø.ØH | → | Ø.Ø $^{H}$ | → | Ø.Ø $^{H}$ | → | M.M $^{H}$ |
| Depressors | Ø.H | → | Ø.H | → | Ø.LH | → | M.LH |
| | Ø.Ø | → | Ø.Ø | → | Ø.L | → | M.L |
| | Ø.ØH | → | Ø.Ø $^{H}$ | → | Ø.L $^{H}$ | → | M.L $^{H}$ |

What we arrive at in the final column of (198) is six of the eight current tone patterns that exist for nouns in Saxwe. We also have a good explanation for why, in the majority of cases, tone patterns are distributed according to the type of consonant in the noun.

In section 3.6.5, we see that if we only considered Saxwe verbs, we could imagine that these rules of L insertion and M insertion still have the status of being phonological rules within a synchronic system, and that Saxwe is still a tone system with an underlying two-way contrast. Looking at nouns, however, we can no longer feasibly make this claim. There are (at least) four reasons why this is so. First, the distribution of noun tone patterns is no longer consistent along lines of consonant type; there are a number of nouns that do not include a depressor consonant but that carry a tone pattern that is typically associated with depressors.[62] Second, the fourth tone pattern associated with non-depressors, /M.H $^{M}$/, would be /Ø.H $^{Ø}$/ if there was a synchronic rule of M insertion—meaning that the pattern would involve a toneless TBU that was floating. This notion of a floating toneless TBU requires several degrees of abstraction that are not necessarily warranted. Third, the fourth tone pattern in the depressor subset is /L.H/. The initial L of this tone pattern cannot be obtained through a rule of L insertion. Lastly, the /L.H/ tone pattern doesn't have a L following the onset, even though in many cases this onset is a depressor consonant.

## 3.10 Conclusions

This chapter has focused on the analysis of underlying tone patterns of verbs and nouns in Saxwe and the description of the derivational rules needed to explain surface forms. In this conclusion, I briefly summarize these topics and discuss why the Saxwe tone system is of interest within the study of Gbe tone.

The underlying patterns of Saxwe noun and verbs are compared in the table below. In this table, I leave out the /M.H $^{M}$/ tone pattern because of its rarity.

(199) Saxwe nouns and verbs – underlying tone patterns summary

**Voiceless obstruents, sonorants, /ɖ/ and /b/—non-depressors**

| **Verbs** | **Nouns** |
|---|---|
| /H/ | /M.H/ |
| /M/ | /M.M/ |
| | /M.M $^{H}$/ |

**Typically voiced obstruents—depressors**

| **Verbs** | **Nouns** |
|---|---|
| /LH/ | /M.LH/ |
| /L/ | /M.L/ |
| | /M.L $^{H}$/ |
| | /L.H/ |

[62] There is also the number 'six' /ɛ̄dɛ́/ which includes a depressor consonant but carries a tone pattern (/M.H/) typically associated with non-depressors.

When we compare the underlying patterns for nouns and verbs and disregard the initial vowel, we see that the four tone patterns of verbs are identical to the four most frequent tone patterns of nouns. Nouns, however, are far more complex than verbs. Not only are there more tone patterns to account for among nouns, but the distribution of tone patterns with relation to consonant quality is not consistent in nouns as it is in verbs. Section 3.8 discusses these questions of distribution and the fact that a tone pattern such as /M.L/ can be lexically assigned to a word that does not include a depressor consonant.

Since it is the /M/ *vs.* /L/ distinction which is the one that is not usually attested in Gbe languages, (Bole-Richard, 1983; Brousseau, 1993; Clements, 1978; Stahlke, 1971), this is the contrast which requires the most justification. In sections 3.8 and 3.9, I discuss the fact that the case for /L/ as a distinct toneme finds its best support from among the noun data. There are 23 out of 295 nouns in my database—roughly 8%—that are not able to be well explained otherwise. These include the nouns of the /L.H/ pattern and the nouns that do not contain depressor consonants, but still have lexically assigned tone patterns that include L.[63]

This is not to say, however, that the case for /L/ as a distinct toneme is made only through the data from nouns. There are other words in the language that support this underlying three-way contrast. Beyond the category of monomorphemic nouns, there are words and morphemes in the lexicon that include L in their lexically-assigned tone patterns and that do not contain depressor consonants. These include borrowed words (see section 4.5), ideophones (see section 4.9), floating grammatical morphemes that mark negation, YNQs, and fronted topics (see sections 5.2, 5.6, and 5.7 ), and the following grammatical morphemes.

(200) Morphemes that have L tone but that do not contain a depressor

| | |
|---|---|
| /ò/ | anterior (TAM) marker |
| /ɔ̀/ | negation marker |
| /mì/ | 2PL |
| /mɔ̀/ | repetitive (TAM) marker |
| /tèjē/ | 1SG POSS |
| /tɔ̀wē/ | 2SG POSS |

We can take the words out of this list that are TAM markers (both of which are L) and contrast them with M and H TAM markers.

[63] Individual nouns that fit into both categories are not counted twice in this calculation.

(201) Contrast of /H/, /M/, and /L/ TAM markers

| | | | | |
|---|---|---|---|---|
| a. | /ōsɔ́ ò sɔ̋/ | [ōsɔ́ ò sɔ̋] | The horse had (ANT) left. | sxw-L0161-auxiliaries-un.wav |
| b. | /ōsɔ́ mɔ̀ sɔ̋/ | [ōsɔ́ mɔ̀ sɔ̋] | The horse (REPET) left again. | sxw-L0197-auxiliaries-un.wav |
| c. | /ōsɔ́ nɑ̃̀ sɔ̋/ | [ōsɔ́ nɑ̃́ ↓sɔ̋] | The horse will (FUT) leave. | sxw-L0001-auxiliaries-un.wav |
| d. | /ōsɔ́ nɔ̃̀ sɔ̋/ | [ōsɔ́ nɔ̃́ ↓sɔ̋] | The horse (HAB) leaves. | sxw-L0073-auxiliaries-un.wav |
| e. | /ōsɔ́ á sɔ̋/ | [ōsɔ́ á sɔ̋] | The horse may (SBJV) leave. | sxw-L0037-auxiliaries-un.wav |
| f. | /ōsɔ́ nɪ́ sɔ̋/ | [ōsɔ́ nɪ́ sɔ̋] | The horse should (JUSS) leave. | sxw-L0018-other clauses-un.wav |

Here we see three different surface melodies depending on the underlying tone of the TAM marker.

In this chapter, six derivational operations are described to account for the tonal alternations in Saxwe utterances. They are given below. The ordering of the first five of these operations relative to each other is discussed in sections 3.6 and 3.7. The only operation for which the ordering has not been established in this chapter is the rule of Grammatical tone docking (with parts A and B), which is discussed further in section 5.4.

(202) Operations that generate surface tone patterns in Saxwe

**Ordered**
$L_{\%}$ association (94)
Nominal floating H deletion (151)
Contour simplification A (159) and B (160)
Partial L spread (106)
Tonal spread (72)

**Not yet ordered**
Grammatical tone docking A and B (102)

Note that all of the operations listed in (202) are postlexical operations. Section 2.4 discusses the fact that lexical operations are only word-internal and cannot apply across words. Moreover, lexical operations cannot refer to phrasal boundaries. The very first operation in (202) refers to the right boundary of the IP, therefore it must be a postlexical operation. This being the case, the rules that follow must also describe postlexical operations. We see that many of the rules involve interactions between tones that may be found across word boundaries.

This chapter includes some discussion of downstep. I describe in section 3.3 the phenomenon of automatic downstep, described as the lowering of the 'ceiling' of H following a surface L. The related phenomenon, non-automatic downstep, is addressed in section 3.4. Non-automatic downstep of H is described as the lowering of the 'ceiling' of H whenever a floating M comes between surface Hs. One of the interesting things about the Saxwe tone system is that automatic and non-automatic downstep of H are not triggered by the same thing; automatic downstep of H is triggered by a surface L, whereas non-automatic downstep of H is triggered by a floating M.

Finally, I end this chapter with some hypotheses regarding the historical development of the present-day Saxwe tone pattern. It is likely that consonant-tone interaction in an early Gbe stage began with phonetically-motivated processes whereby the physics of voicing an obstruent resulted in a situation where pitch levels were, on average, lower following voiced obstruents than they were following other consonants—a situation well attested elsewhere (Hombert, Ohala, & Ewan, 1979). Eventually this could have resulted in a redundantly contrastive situation where a phonological operation inserted L following depressors.

It seems clear, however, from the many inconsistencies observed in the noun data as well as in other grammatical categories that L in Saxwe now has a life of its own independent of depressors and can be lexically assigned to words that contain consonants of all types or no consonant at all.

It is impossible to know whether the diachronic tone changes hypothesized in section 3.9 would have occurred progressively over a long period of time or in a relatively short period. It seems likely that the catalyst for much of the change was the contact between two languages—one with an underlying two-way tonal contrast and significant phonological interaction between consonants and tone, the other with a three-way tonal contrast and no phonological (but some phonetic) interaction between consonants and tone. The majority of the Saxwe data reflect the first language source, while the 'inconsistent' forms reflect the second. Whether the 'inconsistent' forms represent an ever-increasing trend is a question that can only be answered through long-term study of this tone system. In any case, this tone system provides an interesting case study for what can happen when two fairly different tone systems are brought into contact.