Tone in Saxwe

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8 Conclusions

In this chapter, I sketch a global view of the Saxwe tone system as the interplay of underlying lexical tones, grammatical tones, and structurally-driven boundary tones. These elements undergo changes in the phonology and are interpreted in the phonetic implementation. I then follow this by discussing both further avenues of research as well as the implications of this study in the field of tone studies.

I begin section 8.1 by giving an overview of lexical and postlexical operations. I also summarize the factors that help us to understand the asymmetry of the Saxwe inventory of underlying noun tone patterns, including historical factors related to consonant-tone interaction and language development. The tonal phenomena that are specifically related to prosodic structure are also outlined in this global overview. In addition, the Two-Feature model of tone is described as the best model for explaining the Saxwe data.

The possibilities for further research are discussed in section 8.2. Finally, in section 8.3. I look at the implications of this study in light of what is known about Kwa tone languages specifically and African tone languages more generally.

8.1 A global overview

8.1.1 Overview of lexical and postlexical operations

The phonological operations that make up the Saxwe tonal system can be divided into those that take place at the lexical stage and those that take place at the postlexical stage. These are summarized below along with some implementation details.

(462) Saxwe tonal phenomena in the lexical and postlexical stages

Lexical stage

input:	• Underlying lexical tone (sections 3.6 and 3.7)
further tone at the word-level:	• Left M- floating tone on head of NP in the absence of one of the initial vowels /a/, /ɛ/, or /o/ (section 4.3) • Right H_{ω} PW boundary (section 4.1) on PWs which have a right edge $]_{PW}]_{PW}$ structure (including compounds, as well as words derived through verbal reduplication)
morpho-phonological tonal operations (unordered):	• Optional word-initial elision of initial vowel of complex noun (243) • Obigatory word-internal elision of initial vowel of noun in complex forms (248) • Copy of tone to verb reduplication prefix (section 4.4.3) • Tonal phenomena associated with the affixation of 1SG and 3SG pronominal suffixes to the verb (section 4.6)

Postlexical stage

input:	• Words and their associated tones or tonal boundaries from the output of the lexical stage; grammatical tone (sections 5.1 through 5.7)
structurally-driven boundary tones at the level of the IP:	• Default right $L_{\%}$ IP boundary (section 3.5) • Right $H_{\%}$ IP boundary on topics in topicalization constructions (section 5.7) and on assertions which have on their right edge a clause with a syntactic gap (section 5.8)
postlexical tonal operations (ordered):	• $L_{\%}$ association (94) and (416) • Nominal floating H deletion (151) and (417) • Contour simplification A (159) and B (160) and (418) • Grammatical tone docking A and B (102) and (419) • Partial L spread (106) and (420) • Tonal spread (72) and (421)

In looking at this summary, we see that there are structurally-driven influences on tone in both the lexical and postlexical stages. Tonal PW boundaries are generated in the lexical stage, while tonal IP boundaries are generated in the postlexical stage. Interestingly, there is no tonal boundary associated specifically with the PhP in the Saxwe system.

8.1.2 Asymmetries in underlying tone patterns

When we look at the input for the lexical stage, we remark quickly that there are several kinds of asymmetry in the paradigms of underlying tone patterns. For example, if we take the case of nouns, there are some patterns which are only realized on nouns with non-depressor onsets (a category which includes /b/ and /ɖ/)

and other patterns which are realized most commonly, but not exclusively, on nouns with depressor onsets.

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

	Voiceless obstruents, sonorants, /ɖ/, and /b/ in onset	
/M.H/	[ōsɔ́]	horse
/M.M/	[ōxɛ̄]	bird
/M.M ^{H}/	[ōsī°]	female, wife
/M.H ^{M}/	[ōklâ]	soul (a category of 2 words only)
	Voiced obstruents in onset, but also at least one example with each of the other types of consonant categories above	
/M.LH/	[ōgbɔ̀^{R}]	goat
/M.L/	[ōdǎ̀]	snake
/M.L ^{H}/	[ōɦwè°]	fish
/L.H/	[òd_{Z}ǔ]	rain

As is discussed at length in chapter 3, a large part of this asymmetry is due to the lexicalization of phonological operations that, in the diachronic history, involved L tone being inserted in the environment of a depressor. This lexicalization was likely galvanized by language contact between speakers of a two-tone Gbe language with speakers of a three-tone Yoruboid language (section 1.1).

Cross-linguistically, there is a phonetic correlation between voiced obstruents and lowering of pitch and between voiceless obstruents and raising of pitch even in languages where there is no phonological relationship between consonants and tone. It is argued that the development of tone can be explained by the interrelationship between auditory and articulatory factors and pitch (Hombert et al., 1979). Once phonologization and subsequent lexicalization of tone occurs, however, lexical tone no longer has a consistent relationship with either phonetics or phonological features.

In section 3.6.5, we see that if we only considered Saxwe verbs, we could draw the conclusion that Saxwe is a tone system with an underlying two-way /H, Ø/ contrast and that there are phonological rules which govern L insertion and M insertion (section 3.9). Taking into account data from the rest of the language, however, we realize that such rules may describe historical sound changes, but cannot be considered to describe synchronic phonological processes. For example, 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 (defined from observations of verb tone as voiced obstruents excluding /b/ and /ɖ/), but that are nonetheless lexically assigned a tone pattern that is typically associated with depressors. In the noun inventory, a word that doesn't include a depressor consonant can still be lexically assigned a tone pattern like /M.LH/ or

/M.L/. This is evidence that L in Saxwe cannot be generated solely by an operation that would insert L following an underlyingly voiced consonant. In the synchronic phonology, tone patterns that include contrastive L tone may now be lexically assigned to any word.

Beyond the category of monomorphemic nouns, there are other words and morphemes in the lexicon that include L in their lexically-assigned tone patterns in the absence of any depressor consonant. These include borrowed words (section 4.5); ideophones (section 4.9); floating grammatical L morphemes that mark negation, YNQs, and fronted topics (sections 5.2, 5.6, and 5.7); and a handful of other grammatical morphemes.

The presence of the /L.H/ tone pattern is perhaps the most outstanding example of lack of symmetry in the paradigm of noun tone patterns given in (463) for two reasons. First, the initial vowel for these nouns is L rather than M. Second, the tone following the depressor consonant is H rather than LH. There are some reasons for thinking that language contact is the source of this tone pattern, and we can even hypothesize where these words may have originated. Not only is /L.H/ a pattern that exists in Yoruba—a language in which initial vowels of nouns can be either L or M—but this pattern is also phonetically implemented in Saxwe the same way as it would be in Yoruba, as [L.LH]. Yoruba has a rule which spreads L to a following H without delinking the H (Pulleyblank, 1986, p. 112), similar to the rule of Partial L spread in Saxwe (183).[121] Both of these facts lend some credence to the idea that nouns of the /L.H/ tone pattern come, either directly or indirectly, from a Yoruboid language or from Yoruba itself.

Words which are lexically assigned the /L.H/ pattern contain depressor consonants and nevertheless do *not* have an immediately following L tone. Other words that contain a depressor consonant but do not have a L linked underlyingly to the immediately following TBU are: borrowed words (section 4.7), ideophones (section 4.9), and the numeral /ɛ̄dɛ́/ 'six'.

Although in Saxwe L is no longer obligatorily related to the presence of a depressor, there is still some phonological interaction between consonants and tone in the present-day tone system—seen in an operation which groups together voiced obstruents with sonorants. The process of Partial L spread (106) applies when the intervening consonant between a L and a H is linked either to the feature [sonorant] or to the feature [voice] (the latter being the distinguishing feature of voiced obstruents). Partial L spread accounts for the surface [LH] contours on forms like [òdʒǔ] 'rain'. Voiced obstruents and sonorants have been known to function together as depressors in other languages, such as in Kotoko (Odden, 2007) and Ngizim (Bradshaw, 1999).

[121] 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 a voiced obstruent or a sonorant.

8.1.3 Tones that are relevant at the word level

At the word level, there is a left M- floating tone that is found on the head of a noun phrase (section 4.3) and a right H_ω boundary that is assigned to complex words created through derivation or compounding that have a structure of nested PW boundaries at their right edge (section 4.1).

The left M- floating tone cannot be understood without an understanding what the prototypical noun looks like in Saxwe. The canonical shape of a monomorphemic noun is V.C(C)V. The initial vowel is M (with the sole exception being the L initial vowel in the exceptional L.H pattern). If we look beyond the category of monomorphemic nouns in Saxwe, we see that nouns that begin with a consonant—whether pronouns, borrowed words, noun compounds, derived nouns, or any word of any other lexical category which functions in a clause as the head of an NP—all show evidence of having a M- floating tone on their left edge.[122] There are two kinds of evidence for this: (1) when the noun follows a H tone from a preceding word, the H on the first syllable of the noun is downstepped; and (2) when the first TBU of the noun is associated to both L and H in an underlying LH sequence, this sequence is always simplified in a manner that indicates the presence of a preceding [-upper] tone, regardless of what the tone on the preceding word in the utterance is.

In summary, the M initial vowel on nouns that are vowel-initial and the M- floating tone on the left edge of consonant-initial nouns and nominalized forms are in complementary distribution and all serve to satisfy what appears to be a templatic constraint that the head of an NP be distinguished by an initial M tone and that the initial consonant in the word be preceded by this M tone. Historically, the M initial vowels and the M- floating tone were most likely part of a now-defunct noun class marking system.[123]

The right H_ω boundary is assigned to complex words created through derivation or compounding which have at their right edge a structure of nested right edge PW boundaries (that is, a $]_{PW}]_{PW}$ structure). It is not assigned to words created through suffixation.

Yip (2002) notes some cross-linguistic findings regarding the similarities between lexical tone and phrasal boundaries, including the fact that both use level tone primitives, both can be subject to the OCP, and both can have one-to-many or many-to-one relationships of association. What the H_ω PW boundary has in common

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[122] Nouns of the L.H pattern could have a left M- floating tone. There is, however, no way to test for its presence; [-upper] is a feature of both L and M tone and given that this feature is shared, there is no downstep (section 7.4) or other tonal indication which could provide evidence of the M- floating tone.

[123] There are also noun-verb pairings that indicate that there may have been historic processes (no longer productive) that derived nouns from verbs through the prefixation of a vowel with M tone to a verb. Such pairings include examples like [ōkú] 'death' derived from [kú] 'die'.

with phrasal boundaries is that it is assigned to particular structural boundaries rather than to individual lexical items. Historically, it may well have had a surface realization; the H_{ω} boundary has cross-dialectical cognates where the H is realized as a surface H tone (section 4.1).

There is no difference between the behavior of the left M- floating tone and that of any other floating M. There is, however, an important difference between the behavior of the right H_{ω} boundary and that of a floating grammatical H; the right H_{ω} boundary does not dock to an adjacent TBU the way a floating grammatical H does (sections 5.4 and 5.5). Because neither the M- floating tone nor the H_{ω} boundary will dock to a TBU, they cannot be spread either.

8.1.4 Boundary tones at the level of the IP

Interestingly, boundary tones do not exist at the level of the PhP in Saxwe. Two boundary tones are generated at the level of the IP: the $L_{\%}$ and $H_{\%}$ IP boundaries. These boundary tones are assigned with relation to prosodically-defined structures, but the assignment of the $H_{\%}$ IP boundary also takes into account certain syntactic considerations.

The right $L_{\%}$ boundary is the default on an IP. The usefulness of the right $L_{\%}$ IP boundary is that it provides a single mechanism for all of the following observed realizations of a final underlying /M/ in utterance-final contexts: the final downglide on [L], the [ML] surface contour, and the [HL] surface contour. This is shown in the following examples.

(464)	a.	/$^{M-}$ kájí	sē	$^{L\%}$/	[kájí	**sê**]	Kayi heard.
							sxw-L0028-other clauses-un.wav
	b.	/$^{M-}$ sōsā	sē	$^{L\%}$/	[sōsā	**sē**]	Sosa heard.
							sxw-L0027-other clauses-un.wav
	c.	/$^{M-}$ kúdʒɔ̀	sē	$^{L\%}$/	[kúdʒɔ̀	**sè**]	Kudjo heard.
							sxw-L0026-other clauses-un.wav

The right $L_{\%}$ IP boundary is associated with finality or completeness and is therefore absent in contexts of incompleteness, such as at the right edge of a declarative clause that has a syntactic gap (section 5.8). In these cases, we do not get the final fall or downglide of F_0 on an underlying /M/ which we see when the $L_{\%}$ IP boundary is present. Instead, the alternative right $H_{\%}$ IP boundary is generated; it is responsible for the absence of any pitch-lowering phonetic phenomena. This is seen in (465).

(465) /M- é jí ōwā́ nā́ ōnú́ nā́ M- é sē Ø H% /
[é jí ↓wā́ nā́ ↓nú́ nā́ ↓é **sé**]
3SG like (lit. receive odor) of thing REL 3SG hear
He liked the thing he heard. sxw-L0013-final fall tests-un.wav

Both the L% IP boundary and the H% IP have some phonetic characteristics that differentiate them from lexical or grammatical tone. The right L% IP boundary is characterized by a downward descent toward the bottom of the speaker's F_0 range rather than the attainment of a certain low F_0 target. The right H% IP boundary, unlike a floating grammatical H tone, does not dock to a TBU.[124]

8.1.5 Theoretical underpinnings: the Two-Feature model

Saxwe is a language that provides support for the view that the Two-Feature model of Yip (1980, 1989) and Clements (1981) has explanatory power when applied to African tone languages (chapter 6). The Two-Feature model provides an explanation for asymmetries in Saxwe tonal phenomena, especially the frequent occurrences where M and L function in an oppositional relationship to H. This asymmetry is captured well by the [+/-upper] distinction.

The relevance and primacy of the [+/-upper] register feature is understandable in light of the probable development of the current tonal system. This system likely evolved through language contact where one of the languages had a two-way underlying {H, M} or {H, Ø} contrast and a third surface height (L) derived in the environment of certain consonants (section 3.9). If the current underlying three-tone system has evolved through the subdivision of the lower height of a two-tone system, we correctly have a primary two-way distinction between [+/-upper] register, with a subdivision of the lower [-upper] register. In addition, we see now that some tonal phenomena support the notion of [-upper] being a natural class, while other tonal phenomena group together H and L in the natural class of [-raised] tones.

We also see in the Saxwe system evidence supporting Jiang-King's (1996) tonal hierarchy {[+U] > [-R] > [+R]}. Tonal processes such as Grammatical tone docking (419) and Tonal spread (421) favor the realization of H and L over that of M.

Finally, we see in section 7.3 that studies of the implementation of downstep point to speakers having differing strategies for the phonetic realization of the [+/-upper] registers in long utterances of seven or nine TBUs. Some speakers favor a relatively fixed threshold between the [+upper] and [-upper] registers, while others have a very flexible boundary between these registers. Those with the

[124] Topics in a topicalization structure which have extra prosodic lengthening may also have a slight upglide in F_0 attributable to the right H% IP (section 5.7).

inflexible threshold will allow downstep of H to occur only until the F_0 of H reaches the speaker's lower limit of [+upper] realization (roughly corresponding with the F_0 baseline F_0 values for an all-H utterance), while those with the flexible boundary will allow downstep of H to continue iteratively without limit. Thus the realization of H at the end of an utterance may be well below where the all-L baseline F_0 values would be for that speaker.

For those speakers with a fixed threshold between the [+upper] and [-upper] registers, Tonal spread (421), normally an iterative operation, fails to apply at a certain point because otherwise it would produce the floating M tone which would trigger non-automatic downstep on the following TBU. This raises the question of whether the flexibility of the boundary between registers is an element of the phonetics or of the phonology. It seems likely that it is a parameter within the phonology since one would not expect an aspect of phonetic implementation to interfere with the operation of a phonological rule.

8.2 Further research

This study describes the variety of Saxwe spoken in and around the Houeyogbe township. However, Saxwe is part of the Gbe continuum (where "language" boundaries are fuzzy) and within the larger group of people who are generally understood to speak Saxwe, there are several sub-groups—including those who live in and around Houeyogbe, those who live in and around Bopa, and those who live in and around Lobogo (see map in Appendix A). There is considerable need for further research in exploring the differences in tonal realization of these different sub-groups of spoken Saxwe, and to what degree the differences are phonological (such as assigning differing underlying lexical tone patterns to words) and to what degree they are phonetic (such as having differing strategies of phonetic implementation).

Aside from dialectical differences, there is evidence that within single dialects, there is both interspeaker and intraspeaker variability in tonal production. In this study, I have noted periodic instances where I have had occasion to observe interspeaker or intraspeaker variability, but much could be done in checking the consistency of production of tone among speakers and in repeated observations of single speakers. A particular area of interest would be to look into the minor noun tone patterns (section 3.7) to see how much variability there is in the lexical assignment of these patterns to specific words. Another possibility would be to check some of the more tonally complex grammatical tone paradigms that involve floating tones or the $H_{\%}$ IP boundary (sections 5.4, 5.5, 5.8) to see how much variability there is in tonal production in these contexts.

There are multiple topics in the domain of phonetic implementation that merit more study. For example, there are some indications from this study that underlying tone on the TBU of a syllable may already be exerting an effect on F_0 production during the duration of syllable onsets, specifically voiced consonant onsets (section 7.5.3). This may be most clearly observed in comparing the /M.LH/

noun tone pattern with the /M.L ^{H}/ pattern, since there are fairly subtle phonetic differences between the surface realizations of these two patterns. This would need to be studied using test parameters that closely control for syllable onset.

Another question related to phonetic implementation is the question of which factors play into the preplanning that governs the anticipatory raising of H. For example, one could explore whether the anticipatory raising of H has more to do with the number of L–H iterations that follow within an utterance or whether it more closely correlates with the number of TBUs there are in the utterance (section 7.3).

Again related to preplanning is the question of whether the anticipatory raising of H before L is more significant in terms of F_0 values before an alternating H–L–H sequence of tones than it would be if this sequence was simply a H–L sequence, and furthermore whether this anticipatory raising of H would be as significant if the sequence of H–L–H alternating tones was found later in the utterance. Similarly, one could study whether the anticipatory lowering of L before a H is more significant when it occurs on the penultimate TBU of an utterance than it would be elsewhere within the utterance. These two latter tests would help contribute to a more general understanding of whether anticipatory dissimilatory F_0 phenomena are more extreme at the beginning or end of the utterance than they would be at an utterance-medial position.

The downstep of H tone in Saxwe also needs to be explored more fully. In particular, what is needed is further research within the Saxwe population in order to confirm whether the flexible/inflexible threshold between the [+upper] and [-upper] registers is truly a parameter that is relevant for all speakers and to what degree the observations noted here in this study might be altered by other confounding factors such as the length of the utterances being recorded and the relative complexity of syntactic structure within utterances.

8.3 Broader implications

This study of Saxwe tone provides the first comprehensive documentation of a previously undocumented tone system. It also gives evidence for a three-way underlying tone contrast in a Gbe language. From this study, we have insight into what can happen when a (Gbe) language with a two-way underlying tonal contrast and phonological consonant-tone interactions comes into contact with a (Yoruboid) language with a three-way underlying tonal contrast and no phonological consonantal influence. There are at least three potential possibilities.

The first possibility would be a simplification of tonal complexity that reduces both systems to the lowest common denominator. The phonological consonant influences would be lost from the one side (resulting in an underlying *and* surface two-way distinction), and the three-way underlying tonal contrast from the other side would be reduced to a two-way contrast—perhaps by reanalyzing the two bottom levels of tone as members of a single tonal category.

The second possibility would be a preservation of the phonological relationship of consonant-tone interaction in an underlying two-way system. If this route were taken, all lexical items from the language whose surface tone did not conform to such a system might be reanalyzed in light of syllable-initial consonant features, and their lexically assigned tones would be redefined if necessary so that they might generate surface tones in conformity with the system.

The third possibility, which is what we observe, is that the complexity of having a three-way underlying contrast is preserved. For this to happen, the surface tonal heights which are generated from phonological rules of consonant interaction are reanalyzed as underlying tones and those words coming from the language with the three-way tonal contrast end up skewing distributional patterns that might otherwise look symmetrical.

So it is currently the case, for example, that any of the three H, M, or L tones can follow a non-depressor consonant in Saxwe (section 3.7). However, as a vestige of the system in which phonological rules governed a consonant's influence on tone, we see that only H or L—never M—is seen to follow a depressor consonant (strictly defined as voiced obstruents excluding /b/ and /d̪/).[125]

We see then that the process of tone change leading to the current Saxwe system appears to have favored greater complexity in the lexicon over greater complexity in the phonological component—specifically a complexity involving consonant-tone interaction. This finding supports literature on the subject of tonogenesis which hypothesizes a diachronic progression starting with the universally recognized phonetic effects of consonant quality on initial F_0 levels of the following vowel, leading to a phonologized relationship between consonants and surface tone heights, and ending with a lexicalization of multiple tone levels (Hombert et al., 1979).

It is interesting to consider the question of how relatively robust or fragile might be the intermediary state of affairs where a language has phonologized consonant-tone interactions. How often or how long is this phonologized consonant-tone interaction preserved in a language contact situation when there is competing pressure to lexicalize phonologically-derived tone heights? This question will be difficult to answer because languages that have phonologized consonant-tone interaction are relatively rare and there is not often enough documentation of these systems dated from an early enough time to be able to consider whether tone change has taken place in the interim. The Saxwe data suggest that this stage is strongly susceptible to evolving and moving toward the lexicalization of tonal heights. It would be particularly interesting to study cases where there are multiple closely related languages of which only one or two show evidence of having phonologized

[125] Another possibility, documented in Pearce (2007), is that a new kind of phonologized consonant-tone interaction may develop such that lexical items whose tone does not conform to expectations of the relationship between consonants and tone have their syllable-initial consonant features reanalyzed in light of the tone.

consonant-tone interaction. In this case, the questions to explore would be whether the anomalous languages showed evidence of evolving toward lexicalization and whether the surrounding languages showed evidence of evolving from a previous stage of phonologized consonant-tone interaction.

Moving on from the subject of consonant-tone interaction, we see in this study that one of the claims made is that PW and IP boundaries play a significant role in the final realization of utterances. Lexical tones and structurally-generated tones interact and are both relevant during the phonetic implementation. If these claims regarding the significance of these prosodic boundaries in Saxwe are true, it would be profitable to compare the roles played by prosodic boundaries in other Gbe languages and, more widely, in the Kwa languages. Boundary phenomena have been explored in Ewe; specifically, a PhP boundary is identified in Ewe (Clements, 1978). This kind of boundary has not been identified in Saxwe, nor do there appear to be any PhP-level boundary phenomena in Saxwe. In addition, several different kinds of floating tones have been identified at the edge of certain categories of words in Ewe and Mina (Ameka, 1999; Bole-Richard, 1983; Stahlke, 1971). If these floating tones are derived in the environment of particular structures at the PW-level (whether or not there are syntactic considerations involved), I propose that the terminology of PW boundaries could also be used for these floating tones. The fact that in some of these cases, the floating tone associates to a TBU prior to phonetic implementation does not make it ineligible to be labeled as a boundary tone (Yip, 2002).

The right edge $L_{\%}$ IP boundary is not always labeled as such; frequently, it is simply assumed that in the phonetic implementation, there is a final downglide of F_0 on L tone at the right edge of the IP unless this L is followed by a floating H. It is also frequently assumed that this same downglide does not occur on a H found at the right edge of the IP. Whether there is downglide or a falling pitch on final underlying M may not always be specified. As a result of examining the Saxwe system, I am convinced that it is useful, particularly in light of cross-language comparisons, to formalize the presence of the $L_{\%}$ IP boundary and the interactions this boundary has with specific tones, as well as the syntactic considerations that may contribute to the presence or absence of this boundary.

A practical implication coming from the observation of boundary tonal phenomena is that tonal studies must always compare forms that are syntactically equivalent, starting with the most basic monomorphemic forms and moving on in complexity only when the tones of these basic forms are well understood. This argument, made by Snider (2014) and Marlo (2013) among others, has proven to be of great importance in the present study on Saxwe tone. Without an *a priori* understanding of the importance of boundary tonology and syntactically-conditioned tonal phenomena in a given language, improper pairings of forms can be presented as demonstrating constrast. Only a comparison that controls for boundary and syntactically-conditioned factors can be counted on to represent a true case of contrast in analogous environments.

Moving to the topic of phonetic implementation, we see that this study highlights the difficulty of stating conclusively whether downstep exists in a given language. There may be a need for a universally recognized understanding of downstep—possibly specifying such things as how many iterative steps of lowering one would expect to observe and whether the lowering of F_0 must exceed the rate of lowering that can be attributed simply to declination. A confounding factor in describing the lowering of F_0 is the anticipatory raising of F_0. When we describe lowering trends, we must be clear whether we are describing lowering with respect to an initially raised level of F_0, or whether the lowering is defined only with respect to baseline trends of F_0 production for single-tone utterances.

A final statement with regard to downstep is that there is a continuing need for cross-linguistic comparisons of the phonetic implementation of tone. The Saxwe data suggest that within a given language, there is a possibility that there could be considerable interspeaker variation in phonetic implementation.