The Autosegmental Approach to Tone in Lusoga

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1. Introduction

One of the major contributions of autosegmental approach to tone was its application to Bantu. In works such as Goldsmith (1976a,b; 1990) and the papers in Clements & Goldsmith (1984), a new way was opened up to account for the often opaque relationship between underlying vs. surface H(igh) and L(ow) tonal representations. In many cases the question that arose concerned whether Bantu H and L tones behave in an equipollent way as they do in many West African and other tone systems vs. requiring a more syntagmatic and privative, perhaps accentual interpretation. Thus, beyond having an underlying binary contrast, traceable to Proto-Bantu (Greenberg 1948), the present-day two-height Bantu tone systems exhibit considerable variation in at least two senses. First, there is the question concerning which of the tonal elements are "phonologically activated" (Clements 2001): only /H/? only /L/? both /H/ and /L/? Second, there is the variation in the phonological rules that the one or two tones undergo. Chief among these are tone spreading, tone shifting, tone anticipation, tone insertion and deletion, contour tone simplification, boundary tone phenomena, and OCP effects that prohibit sequences of the same tone, e.g. /H-H/ → H-L or H-Ø. It is these latter processes which provide the evidence for whether a system should be interpreted as equipollent /H/ vs. /L/, privative /H/ vs. Ø or privative /L/ vs. Ø (cf. Stevick 1969, Odden 1995, Hyman 2001, 2007, Kisseberth & Odden 2003, Marlo 2013).

In this paper I add to the repertory of privative /L/ vs. Ø tone systems by addressing some of the tonal properties of Lusoga, the most closely related language to Luganda, on which considerably more tonal research has been done (see Hyman & Katamba 2010 and references cited therein).[1] In the following sections I will account for the tonal patterns on Lusoga verb infinitives, first diachronically (§2), then synchronically (§3) in terms of traditional autosegmental phonology. In §4 I extend the analysis to nouns and noun reduplication and conclude in §5 that John Goldsmith's autosegmental phonology still provides the best tools to the express the basic insights as to what is going on in Bantu tone systems.

[1] The term Lusoga refers to several different Bantu speech varieties spoken in Busoga sub-region including sometimes Lulamogi, which should instead be recognized as dialectal with Lugwere JE17 (Hyman 2014, Hyman & Merrill 2016). The current study focuses on Lutenga, the standard Lusoga dialect, which has been the subject of considerable recent, especially lexicographic work (Gulere 2009, Nabirye 2009, Nzogi & Diprose 2012). Although I have relied on these resources for confirmation, the data presented in study is based on the speech of Fr. Fred Jenga, a native of Wairaka (Jinga District).

2. A diachronic analysis of Lusoga infinitives

In this section we begin by considering the tones on affirmative infinitives, as these reveal the central properties of the tone system in a rather straightforward way. Since there are several ways to interpret Lusoga tone synchronically, the discussion in this section will account for the data in terms of the historical tonal changes that have taken place since pre-proto-Luganda-Lusoga. I will therefore start with a synchronic analysis of /H/ vs. Ø which corresponds to Proto-Bantu *H and *L, after which a different analysis will be proposed in §3.

As seen in the two tone patterns in (1), Lusoga is like most Bantu languages in distinguishing two lexical tone patterns in infinitives. As indicated, these tone patterns correspond with *L or *H tone in Proto-Bantu:[2]

(1)		*L root		*H root	
	1σ	ò-kú-gw-á	'to fall'	ò-kú-ty-à	'to fear'
		ò-kú-mw-á	'to shave'	ò-kú-ly-à	'to eat'
	2σ	ò-kú-bál-á	'to count'	ò-kú-bòn-á	'to see'
		ò-kú-lím-á	'to cultivate'	ò-kú-kùb-á	'to beat'
	3σ	ò-kú-lágír-á	'to command'	ò-kú-ghùlìr-á	'to hear'
		ò-kú-lúmúk-á	'to run away'	ò-kú-sèkùl-á	'to pound'
	4σ	ò-kú-súmúlúl-á	'to untie'	ò-kú-kàlàkát-á	'to scrape'
		ò-kú-kálírír-á	'to grill'	ò-kú-fùkàmír-á	'to kneel'
	5σ	ò-kú-lágír-ágán-á	'to command e.o.'	ò-kú-ghùlìr-ágán-á	'to hear e.o.'
		ò-kú-súmúlúl-ír-á	'to untie for (s.o.)'	ò-kú-kàlàkát-ír-á	'to scrape for (s.o.)'
		STEM = H^n		STEM = L((L)H^n)	

The forms in (1) are arranged by the number of syllables in the stem, which consists of a verb root, possibly extended by derivational suffixes such as *-agan-* 'reciprocal' and *-ir-* 'applicative', and an inflectional final vowel (FV), here /-a/. As seen, the infinitive is marked with a L tone vowel prefix *ò-* known as the "augment" in Bantu, followed by the H tone noun class 15 prefix *-kú-*. Both it and all subsequent tones are H in the left column (corresponding to Proto-Bantu *L verb roots). In the right column, the first stem syllable drops to L in all cases, and the FV *-á* will be H unless the stem is monosyllabic. It is important to note that the longer verbs require two L tone stem vowels before the remaining vowels are H. I shall refer to this as the two L tone

[2] In citing examples I write *ci* and *ji* (pronounced with alveopalatal affricates) to reflect the pronunciation of my language consultant, rather than *ki* and *gi*, as in Standard Lusoga orthography. When not preceded by *m, b* stands for [β] and *gh* for voiced velar [ɣ] varying with [ɯ] and sometimes [w], while *th, dh, nh* are dental consonants which contrast with alveolar *t, d, n.*

requirement, or 2LTR. The forms in (2) whose first syllable has a long vowel (VV) show that the two L tone requirement is a property of moras, not syllables:

(2)	2σ	ò-kú-zíík-á	'to bury'	ò-kú-lèèt-á	'to bring'
		ò-kú-túúnd-á	'to sell'	ò-kú-tùùng-á	'to weave'
	3σ	ò-kú-súúbír-á	'to hope'	ò-kú-fàànán-á	'to resemble'
		ò-kú-táándík-á	'to begin'	ò-kú-tààmbúl-á	'to walk'
	4σ	ò-kú-yáándúlúz-á	'to spread out'	ò-kú-fùùdhúlúlá	'to spit out'
		ò-kú-dóóndólím-á	'to make idle talk'	ò-kú-sààndúkúl-á	'to uncover'

We thus obtain forms such as *ò-kú-fàànán-á* 'to resemble', rather than **ò-kú-fàànàn-á*, where the two L tones would be counting syllables. However, if the first syllable is short and the second long, the whole of the second syllable (and hence three moras) will be affected:

(3)	3σ	ò-kú-támíír-á	'to become drunk'	ò-kú-tègèèr-á	'to know'
		ò-kú-kólóót-á	'to purr'	ò-kú-dàlàànd-á	'to climb'
	4σ	ò-kú-dóbóónkán-á	'to get spoiled'	ò-kú-sèrèèngétá	'to roll down'
		ò-kú-kólóót-ír-á	'to purr for (s.o.)'	ò-kú-mèsùùnkán-á	'to be shiny'

This is because Lusoga does not allow LH rising tone syllables (**ò-kú-tègèér-á* etc.). Finally, note that when the verb root begins with a vowel, the *-kú-V-* sequence becomes *-kw-VV-*, with the /u/ gliding to [w] and the root-initial vowel undergoing compensatory lengthening, e.g. /o-ku-ey-a/ → *ò-kw-ééy-á* 'to sweep'. As seen in the forms on the right in (4), where a HL falling tone results, the L of the bimoraic syllable counts in calculating one of the two L tone moras:

(4)	2σ	ò-kw-ééy-á	'to sweep'	ò-kw-éèt-á	'to call'
		ò-kw-íídh-á	'to come'	ò-kw-îìt-á	'to kill'
	3σ	ò-kw-óógér-á	'to speak'	ò-kw-îìnìk-á	'to dip, immerse'
		ò-kw-íígál-á	'to close'	ò-kw-îìngìr-á	'to enter'
	4σ	ò-kw-íídhúkír-á	'to remember'	ò-kw-áàsìmúl-á	'to sneeze'
		ò-kw-áásííkán-á	'to scream'	ò-kw-áàgàànán-á	'to meet, find'

Having established these patterns, we now turn to their interpretation. First, we note that the LH^n pattern of *L verb infinitives is reminiscent of Luganda, which can also realize such infinitives as all L: *ò-kú-bál-á* ~ *ò-kù-bàl-à* 'to count'. The normal analysis of Luganda is that these surface tones are due to initial %L and (optional) final

H% boundary tones. For now, we can assume the same here.[3] Concerning the forms on the right, it is clear that the tone of the *H root is anticipated onto the infinitive prefix which was historically *L. We thus propose a rule of H tone anticipation (HTA) which shifts a H tone to the preceding mora. As a result, if the underlying representation of 'to beat' is /o-ku-kúb-a/ it will become *o-kú-kub-a* by HTA (but see below for more detail and alternatives). That the final H is due to a phrasal H% boundary tone is also justified by the fact that the L of infinitives ending H-L is realized with level rather than falling pitch before pause, i.e. *ò-kú-ty-à˚* 'to fear', *ò-kú-lyà˚* 'to eat' (where L˚ represents a level L tone).[4] The historical underlying representations (URs) of infinitives are as shown in (5):

(5)		/Ø/ root		/H/ root	
	1σ	ò-kú-gú-á %L H%	'to fall'	ò-kú-tì-à˚ %L H H%	'to fear'
	2σ	ò-kú-bál-á %L H%	'to count'	ò-kú-bòn-á %L H H%	'to see'
	3σ	ò-kú-lágír-á %L H%	'to command'	ò-kú-ghùlìr-á %L H H%	'to hear'
	4σ	ò-kú-súmúlúl-á %L H%	'to untie'	ò-kú-kàlàkát-á %L H H%	'to scrape' 'to kneel'
	5σ	ò-kú-lágír-ágán-á %L H%	'to command e.o.'	ò-kú-ghùlìr-ágán-á %L H H%	'to hear e.o.'

As seen, I have posited a %L boundary tone which links to the augment vowel *ò-*. In the forms on the left the final H% tone associates onto all of the preceding moras up to the initial L. In the forms on the right, the H on the initial mora of the root shifts onto the toneless infinitive prefix /-ku-/. The boundary H% links to the final vowel unless the last two syllables of the word end H-L. In this case, H% stays out, but levels the final L to the non-falling L˚: *ò-kú-ty-à˚* 'to fear'.[5] Because this non-falling L˚ is predictable (e.g. it occurs at the end of a declarative, but not an interrogative sentence), it will not be transcribed except when it is under discussion.

The above analysis leaves two open questions. The first concerns the two L tone requirement (2TLR) that we mentioned: Whenever there is a H to L transition, the L is

[3] In contexts where the augment vowel is absent (e.g. following a negative verb), the infinitive prefix *ku-* takes the %L tone, e.g. *kù-gw-á* 'to fall', *kù-bál-á* 'to count', *kù-lágír-á* 'to command'. The *H tone forms do not realize the %L since *kú-* carries a H tone (anticipated from the verb root): *kú-ty-à* 'to fear', *kú-bòn-á* 'to see', *kú-ghùlìr-á* 'to hear'.

[4] Although not further discussed here, the final H% boundary tone is not present in yes-no questions or imperatives. Thus, compare: *è-cí-sàghó* 'bag', *è-cí-kópò˚* 'cup' (with H%) vs. *gùl-à è-cí-sàghò* 'buy the bag!', *gùl-à è-cí-kópò* 'buy the cup!' (both without H%, the latter falling to L rather than L). This extends also to hearer-directed epithets, e.g. *ìwè mú-sìrù* 'you idiot!' (cf. *ò-mú-sìrú* 'stupid person').

[5] While this might first appear to be an Obligatory Contour Principle effect prohibiting *H-H, it is more likely the result of a constraint against a phrase-final H-$^{\downarrow}$H sequence, which may only occur phrase-medially.

realized on two moras, unless it can't be. There is a single L in *ò-kú-ty-à°* 'to fear' since there is only one post-H syllable, and in *ò-kú-kùb-á* 'to beat', where linking of the H% boundary tone overrides the 2LTR. In other words, it is preferable to violate the H-L-L requirement than to leave the H% unassociated. But why should there be such a double L tone requirement that produces forms like *ò-kú-ghùlìr-á* 'to hear' and *ò-kú-kàlàkát-á* 'to scrape' instead of **ò-kú-ghùlír-á* and **ò-kú-kàlákát-á*? The answer is historical. The output tones are derived diachronically as in (6).

(6)	*stage 1*		*stage 2*		*stage 3*		*stage 4*		*stage 5*
a.	*ó-ku-bón-a H H	>	ò-ku-bón-a H	>	ò-ku-bón-à H L	>	ò-kú-bòn-à H L L	>	ò-kú-bòn-á %L H L H%
b.	*ó-ku-ghúlir-a H H	>	ò-ku-ghúlir-a H	>	ò-ku-ghúlìr-a H L	>	ò-kú-ghùlìr-a H L L	>	ò-kú-ghùlìr-á %L H L L %H
c.	*ó-ku-kálakat-a H H	>	ò-ku-kálakat-a H	>	ò-ku-kálàkat-a H L	>	ò-kú-kàlàkat-a H L L	>	ò-kú-kàlàkát-á %L H L L %H
d.	*ó-ku-lim-a H	>	ò-ku-lim-a	>	ò-ku-lim-a	>	ò-ku-lim-a	>	ò-kú-lím-á %L %H

At historical stage 1, the augment /ó-/ is *H as is the first mora of the root in (6a-c). Other moras are phonologically toneless. In stage 2 the deletion of the augment *H is the first change I propose, since it characterizes most of the closely related languages as well. This is followed by a rule of L tone insertion (LTI) after the last H of a word, a process well known from Luganda (Hyman & Katamba 2010:72). It is in stage 4 that Lusoga parts company with Luganda: H tones are anticipated onto the preceding mora, in this case onto the toneless infinitive prefix **-ku-*. As seen, I have indicated an overt L tone in its place, much as Hyman & Valinande (1985) originally proposed as a "L tone trace" of /H/ in Kinande.[6] As seen, this produces the double L tone sequence that precedes the final H% boundary tone which, along with initial %L, is assigned in stage 5 to all remaining toneless moras, the H% counting from the end of the word.

One of the arguments for early lowering (here, deletion) of the augment H is that this is a very common change in the closest Bantu languages in the interlacustrine area (but not in Lulamogi (Hyman 2014)). The derivations in (6) confirm this decision and provide a second reason that augment *H > Ø had to be the first change. Had augment lowering been recognized as part of the *H > L change occurring in stage 4, i.e. at the stage of general HTA, denecessitating stage 2, we would have expected the derivation of toneless root infinitives such as 'to cultivate' to begin with two L tones:

[6] Stage 4 likely represents a telescoping involving an intermediate HL falling tone stage H-HL-L, as proposed for Ruwund (Nash 1992-4), a language which subsequently inverted the original Bantu tones to /L/ vs. Ø.

(7)

stage 1		*stage 3*		*stage 4*		*stage 5*
*ó-ku-lim-a	>	ó-kù-lim-a	>	ò-kù-lim-a	>	*ò-kù-lím-á
H		H L		L L		L L H%

Instead, as seen in (6d) and previous examples, such infinitives (and other underlyingly toneless words in the language) begin with a single L (cf. *ò-mú-límí* 'farmer').[7]

There is in fact clear synchronic evidence that the *H augment still has an underlying /H/ which surfaces whenever there is a preceding toneless proclitic, such as /na/ 'with, and':

(8)

a.	/na= ó-ku-lim-a/	>	na= ó-kù-lim-a	>	ná= ò-kù-lim-a	>	n' óò-kù-lím-á
	H		H L		H L L		HL L H%
b.	/na= ó-ku-bón-a/	>	na= ó-ku-bón-à	>	ná= ò-kú-bòn-à	>	n' óó-kú-bòn-á
	H H		H H L		H L H L L		HH H L H%

In (8a) the /H/ of the augment is preserved after *na=* onto which it is anticipated. With vowel coalescence and final H% assignment, the output is *n'óò-kù-lím-á* 'and to cultivate'. The augment /H/ is also preserved in (8b), where the root *-bón-* 'see' is also underlyingly /H/. After HTA, vowel coalescence, and H% assignment, we should but do not obtain an initial falling tone (**n'óò-kú-bòn-á*). Instead, the expected L on *n'óò-* is lost by a rule of H tone plateauing (HTP) by which a H-L^n-H sequence becomes all H within a word. We thus obtain *n'óó-kú-bòn-á* 'and to see'. As in Luganda, HTP is responsible for the generalization that there cannot be a H-L^n-H sequence in a Lusoga word.[8] The corresponding forms without an augment confirm that /na/ does not have a H tone of its own: *nà=kú-bòn-á, nà=kù-lím-á.* We can thus firmly establish that the augment morpheme preserves evidence of its original *H in synchronic Lusoga.[9] What is important is that unlike the augment, other initial Ls from *H are able to assign a H to the final mora of a preceding word.[10] In other words, when initial, the augment behaves as if it were from *L.

[7] Synchronically, one could still formulate the double-L constraint to be in effect only when there is a preceding H in the output, as when the augment *H is saved by a preceding enclitic (see (8a) below).

[8] HTP must of course apply before the assignment of the phrasal H% boundary tone or we would obtain **n'óó-kú-bón-á* instead of the correct *n'óó-kù-bòn-á*. Since HTP is a word-level rule and H% is not assigned until the phrasal phonology, this is not a problem.

[9] This H is also presumably responsible for the allomorph *ní=* 'with, and', which occurs in contexts where an augment is required, but cannot be spelled out by an initial vowel, e.g. *y-á-bì-tà mù=cì-tábó ní= mú=cí-kópò* 'he put them (class 8 *-bi-*) in the book and in the cup'. After a negative verb, where nominals do not take an augment, *na=* occurs instead: *tì-y-á-bì-tà mù=cì-tábó nà= mù=cí-kópò* 'he didn't put them in the book and in the cup'.

[10] Thus compare *ò-kú-bòn-à à-bá-kàlí* 'to see women', where the augment *à-* of 'women' fails to raise the final L of 'to see' vs. à-bá-kàlí bà-sèk-á 'the women laugh', where the *H of the subject marker **bá-* shifts its H onto the final syllable of 'women'.

To conclude this subsection we consider the realization of affirmative infinitives with an object marker (OM). Since all OMs have the same tone in Lusoga, it will suffice to illustrate the tone patterns with the same OM throughout, here *-tu-* 'us'. As can be seen in (9), forms containing either a *L or *H root show the same tones: The OM is L, as is the first mora of verb stems of two or more syllables. (One syllable stems take the H% boundary tone.) In other words, the OM + first syllable of the verb stem have the same tonal patterns as the *H verb forms without an OM—although realized one syllable to the left: Whereas the forms in (1b) begin with two stem L tones, those in (9) have a L OM followed by one L stem mora.

(9)

	*L root		*H root	
1σ	ò-kú-tù-mwá	'to shave us'	ò-kú-tù-ty-á	'to fear us'
2σ	ò-kú-tù-bàl-á	'to count us'	ò-kú-tù-bòn-á	'to see us'
3σ	ò-kú-tù-làgír-á	'to command us'	ò-kú-tù-ghùlír-á	'to hear us'
4σ	ò-kú-tù-sùmúlúl-á	'to untie us'	ò-kú-tù-kàlákát-á	'to scrape us'
5σ	ò-kú-tù-sùmúlúl-ír-á	'to untie for us'	ò-kú-tù-kàlákát-ír-á	'to scrape for us'

To account for the H on the prefix *-ku-*, the OM has to have been *H in the infinitive. In the following derivations I start with stage 2, i.e. where the augment *H has already been deleted.

(10) a. o-ku-tú-lagir-a > > o-ku-tú-làgir-a > ò-kú-tù-làgír-á
H H L %L H L L H%

b. o-ku-tú-ghúlir-a > o-ku-tú-ghùlir-a > > ò-kú-tù-ghùlír-á
H H H L %L H L L H%

In the case of the *L root form in (10a), the derivation is straightforward: LTI inserts a L after the H of the OM *-tú-* 'us', whose H is then anticipated onto the infinitive prefix *-ku-*, leaving a L tone trace. This produces a double L sequence, allowing the H% boundary tone to link to the final two toneless moras of the word. The derivation in (10b) is similar, the main difference being in the change of a contiguous sequence of H tones to H + L. Known as Meeussen's Rule (MR) (Goldsmith 1984b), a change of H-H to H-L attributable to the Obligatory Contour Principle (OCP) is quite common in Eastern Bantu languages. As in Luganda, MR must precede LTI, or else the wrong output with too many Ls will obtain, as in (11).

(11) o-ku-tú-ghúlir-a > ò-ku-tú-ghúlìr-a > ò-kú-tù-ghùlìr-a > *ò-kú-tù-ghùlìr-á
L H H L H H L L H L L L H L L H%

Since MR produces H-L sequences, it bleeds LTI, which will apply only after the last H of a word that is not followed by L.

However, when we turn to consider forms with two (ultimately three) OMs, a problem arises:

(12)	a.	o-ku-cí-tú-bal-ir-a	>	ò-kú-cì-tù-bàl-ír-á	'to count it for us'
		H H		%L H L L L H%	
	b.	o-ku-cí-tú-kúb-ir-a	>	ò-kú-cì-tù-kùb-ír-á	'to beat it for us'
		H H H		%L H L L L H%	
	c.	o-ku-cí-mú-tú-ghá-er-a	>	ò-kú-cì-mù-tù-ghè-èr-á	'to give it to him for us'
		H H H H		%L H L L L L H%	

The forms with a *H verb root in (12b,c) work by the rules discussed above: In each case MR applies to all but the first of a sequence of H tones. Thus, H-H-H becomes H-L-L in (12b) and H-H-H-H becomes H-L-L-L in (12c). Since MR has created these Ls, LTI does not apply. The problem, however, is why the toneless verb root /-bal-/ 'count' has a L tone in (12a). According to what we have seen above, the application of MR that changes *-cí-tú-* to *-cí-tù-* should have bled LTI. This unexpected L is found only on the root-initial mora. One ad hoc move would be to assume an early copying of the H of an OM onto the first mora of a *L verb root, thereby merging it with *H roots. Both would then correctly undergo MR. Another alternative is to recognize an internal structure to the infinitive (and perhaps other verb forms). The OM + stem constituent is known in Bantu as the macro-stem and excludes any earlier prefixes, including other OMs. In order to avoid the incorrect output seen above in (11), LTI must not be operative within the stem level phonology, but rather comes into play at the macro-stem and word levels. As seen in (13), a cyclic analysis produces the correct outputs in (12a,b):

(13)	a.	*cycle 1:*		[tu-	[bal-ir-a]]		*cycle 1:*		[tu-	[kub-ir-a]]
		(LTI)		H	Ø		(MR)		H	H
					↓					↓
					L					L
	b.	*cycle 2:*	[ci-	[tu-	bal-ir-a]]		*cycle 2:*	[ci-	[tu-	kub-ir-a]]
		(MR)	H	H	L		(MR)	H	H	L
				↓					↓	
				L					L	

As indicated, both LTI and MR apply in the first cycle, but MR must apply first (or, again, we will derive the incorrect output in (11)). Whether this solution turns out to be correct or not, it is important to note that this happens only in the affirmative infinitive. In other parts of the paradigm, a single, pre-stem OM is toneless. Before

moving on to propose a restructured analysis of the Lusoga tonal system, I present a table of the personal OMs to show that they all do show the same tones independent of whether their shape is CV-, N- or V-:[11]

(14)

	*L root	*H root	
1sg	ò-kúù-n-dàgír-á	ò-kúù-m-pùlír-á	'to command/hear me'
2sg	ò-kú-kù-làgír-á	ò-kú-kù-ghùlír-à	'to command/hear you sg.'
3sg	ò-kú-mù-làgír-á	ò-kú-mù-ghùlír-á	'to command/hear him/her'
1pl	ò-kú-tù-làgír-á	ò-kú-tù-ghùlír-á	'to command/hear us'
2pl	ò-kú-bà-làgír-á	ò-kú-bà-ghùlír-á	'to command/hear you pl.'
3pl	ò-kú-bà-làgír-á	ò-kú-bà-ghùlír-á	'to command/hear them'
refl	ò-kw-éè-làgír-á	ò-kw-éè-ghùlír-á	'to command/hear oneself/oneselves'

With this established we can now evaluate the above analysis and, as I shall now suggest, adopt another.

3. A synchronic reanalysis

In the preceding section we started with an underlying contrast between /H/ and Ø and introduced L tones in the course of the derivation. These were seen to originate from four distinct sources (TBU = tone-bearing unit):

(15)

a.	Meeussen's Rule (MR):	H-H → H-L
b.	L tone insertion (LTI):	insert a following L if the last tone of a word is H
c.	H tone anticipation (HTA):	leave a L tone on a TBU whose H has been anticipated onto the preceding TBU
d.	%L boundary tone:	assign an initial %L boundary tone

In contrast, the rules involving the introduction of more H tones were HTP and the assignment of the final H% boundary tone which changes final L-L to L-H and links to a word-final sequence of toneless moras. The question is whether we should not have considered starting with a different underlying tonal contrast. In (16) I enumerate several of the possible underlying analyses of a two-height tone system, illustrated on the last three syllables of *kù-bál-á* '(it is) to count' and *kú-bòn-á* '(it is) to see', where the absence of the augment indicates an abstract zero copula:[12]

(16) a. /H/ vs. Ø : /ku-bal-a/ /ku-bón-a/

[11] As seen in the examples, the class 2 OM *-ba-* 'them' is used also with the meaning 'you plural'.

[12] Compare *mù-límí* 's/he's a farmer', *mú-kàzí* 'she's a woman'. I leave out consideration a system of /H/ vs. /L/ vs. Ø with a ternary contrast.

b. /H/ vs. /L/ : /kù-bàl-à/ /kù-bón-à/
c. /L/ vs. Ø : /ku-bal-a/ /ku-bòn-a/
d. /H/ vs. /L/ : /kú-bál-á/ /kú-bòn-á/

(16a) is the privative analysis considered in §2. (16b) differs only in proposing non-H moras are /L/ instead of toneless. Both (16a) and (16b) correspond to the historical tones, the choice being whether one thinks Proto-Bantu had a privative system (Stevick 1969) or an equipollent one (Greenberg 1948).[13] In contrast, the two analyses in (16c) and (16d) represent restructurings of the inherited system: (16c) assumes a privative contrast with /L/ as the marked tone, while (16d) keeps an equipollent contrast, but with the historical tones inverted. Either analysis would of course greatly affect the way that the rules in (15) are expressed—something to which I will return below when I further consider (and justify) a /L/ vs. Ø analysis.

First, however, let us note that the problem with the more historically direct analyses in (16a,b) is that a L tone trace has to be mysteriously left in the place of a /H/ tone that is anticipated onto the preceding TBU. What might be advantageous is an analysis that represents the marked tone as having both a H and L component. There are multiple ways to do this in autosegmental phonology. Other possibilities is to consider that the marked tone is a composite of both H and L. As seen in (17), this can be done in one of three ways.

(17) a. μ b. μ c. μ
/\ | |
H L H L H L

Instead of /H/, (17a) treats the marked tone as a /HL/ contour. This approach was adopted for Luganda by Hyman & Katamba (1993) and more recently by Jones (2015) for Luganda, Kinande, and Shi. However, it is not necessary to assume that both tones are underlyingly linked. In the representation in (17b), a linked H is followed by an unlinked L, while in (17c) a linked L is preceded by an unlinked H. In order to get the tonal anticipation of PB *H onto the preceding mora in Lusoga, the following would be needed, assuming that the preceding mora is toneless:

(18) a. if (17a), the H of the linked HL would delink from its sponsoring mora and relink to the preceding mora
b. if (17b), the unlinked L would link to the mora and delink the H from its sponsoring mora, which would then relink to the preceding mora

[13] Since both /H, L/ and /H, Ø/ Bantu languages are attested today, the question is whether the original system treated the tones as relatively symmetric, both activated in the phonology, or whether the non-H tone was inactive, with L pitch being a default. Discussion of this would take us quite far afield from the intention of this paper.

c. if (17c), the unlinked H would link to the preceding mora

Of the three possibilities, (18c) appears to be the simplest analysis.[14] It is therefore appropriate to consider how the rules that would be required compare to those in the /H, Ø/ and /L, Ø/ analyses, as in (19).

(19) a. augment lowering: H → Ø at the left edge of a clitic group
b. Meeussen's Rule (MR): unlinked H → Ø between two linked Ls (which then "fuse" to avoid an OCP violation)
c. L tone insertion (LTI): if the last /L/ of a word is preceded by Ø, spread it onto the next mora
d. H tone anticipation (HTA): link an unlinked H to the preceding mora
e. %L boundary tone: assign an initial %L boundary tone

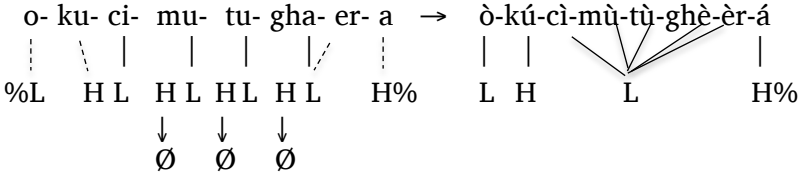
Although I continue to express each process as a rule, recall that the input-output relations could be derived by ranking of appropriate constraints. In (19a) I have expressed augment lowering as the deletion of its unlinked H. The reason for this is that unlike other would-be initial /^{H}L/ prefixes, e.g. most subject prefixes, the unlinked H (indicated by ^{H}) is never anticipated onto a preceding word, e.g. *ò-kú-bòn-à ò-mú-límí* 'to see a farmer', where the verb 'to see' ends L-L (cf. note 10). Thus, the initial unlinked H of the augment would have to be deleted to avoid being assigned to the FV -á of the infinitive. Since H% works differently (see (23a) below), as well as word-initial subject markers (see note 10), the most direct analysis, which I shall adopt, is to recognize two tonal allomorphs of the augment morpheme. In the /^{H}L/ analysis, this would the augment would be toneless (Ø) if word initial, /^{H}L/ if preceded by a proclitic. (In the /L/ vs. Ø analysis ultimately to be adopted, this allomorph of the augment would be /L/.)[15]

To help us decide whether the marked tone should be /^{H}L/ or /L/, consider what happens if the H of /^{H}L/ attempts to be anticipated onto a mora that itself has a L, i.e. in the MR context. As schematized in (20), MR would have to be expressed as the deletion of any unlinked H between linked Ls:

[14] All three analyses would require a L spreading rule to produce a sequence of two L tones, so this does not distinguish between them. The solution in (17c) resembles the one proposed by Goldsmith (1984a) for Tonga, although without the use of asterisk notation. All of the above alternatives can also be tested against other Bantu systems with historical H tone anticipation, e.g. Kinande (Mutaka 1994, Jones 2015), Tembo (Kaji 1996) and Totela (Crane 2014).

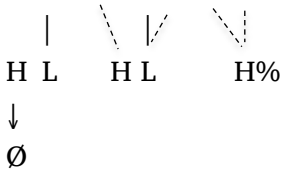
[15] The historical process was undoubtedly the deletion of *H directly, as many languages do not tolerate a H tone vowel at the left edge. When phrase-initial, the Ø allomorph acquires a L tone which can be attributed to the initial %L boundary tone, as shown in (20).

(20) o- ku- ci- mu- tu- gha- er- a → ò-kú-cì-mù-tù-ghè-èr-á ‘to give it to him for us’



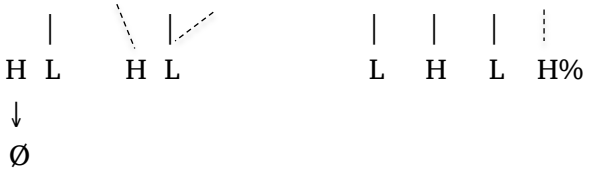
As a result of MR, only the unlinked H of the first OM /-´cì-/ ‘it’ (class 7) is able to link to the preceding mora, here the toneless infinitive prefix /-ku-/. Also shown in (20) is the spreading of the last L on to the toneless mora of the applicative suffix *-er-*, since Lusoga does not allow LH rising tones. As a result the phrase-final H% boundary tone can only link to the single mora of the last syllable. In the output to the right I show the sequence of Ls fusing as a branching structure so as not to violate the OCP. Accordingly, LTI is expressed as L tone spreading (LTS), as in (21).

(21) o- ku- kalakat -a → ò-kú-kàlàkát-á ‘to scrape’

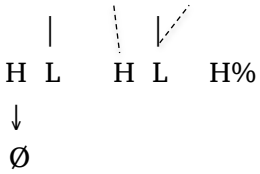


As shown, the /L/ of /-´kàlakat-/ ‘scrape’ spreads onto the second mora. This can be interpreted as a response to the 2LTR. The H% boundary tone links to the last two moras that follow. As was seen in (1), shorter verb stems will not be able to exhibit both L tone spreading (LTS) and linking of H%:

(22) a. o- ku- bon- a → o- ku- bon- a ò-kú-bòn-á ‘to see’



b. o- ku- ti- a → ò-kú-ty-à˚ ‘to fear’



In (22a), the H% boundary tone links to the final vowel /-a/. Since LTI is a word-level rule, the L tone of /-´bòn-/ ‘see’ first spreads onto the FV in (23a), after which phrase-level H% is assigned to the FV, thereby delinking the L. In (23b) H% cannot link or a LH rising tone would result. Instead, the L of the root /-´tì-/ ‘fear’ spreads onto the final

vowel. The result is a final level L˚ tone which is prevented from falling to the lowest pitch by the unlinked H% boundary tone.

In considering different approaches, I have been assuming that the analysis which most directly accounts for the facts is the one to be preferred, in other words, the analysis that requires the fewest changes between underlying and output tones. The Goldsmith-type /^{H}L, Ø/ analysis represents an improvement over the historical /H, Ø/ analysis in §2 which required HTA to both anticipate the H onto the preceding TBU, as well as introduce a L trace on the TBU of the /H/. In the /^{H}L/ analysis, the L is already linked to the correct output TBU, and the reason for anticipation is encoded in the unlinked property of the /^{H}/. However, MR requires multiple deletions of the /H/, as was seen in (20). Importantly, this can be avoided if we start instead with underlying /L/. If /L, Ø/ were postulated we would need to reinterpret the above earlier rules as follows:

(23)	a.	augment lowering:	the augment would be underlyingly /L/ after a proclitic, elsewhere Ø
	b.	Meeussen's Rule (MR):	a sequence of /L/'s fuses as one multilinked L (preceded by a H tone)
	c.	L tone spreading (LTS):	if the last /L/ of a word is preceded by Ø, spread it onto the next mora
	d.	H tone anticipation (HTA):	insert a H tone on a toneless TBU that precedes a L or sequence of Ls
	e.	%L boundary tone:	assign an initial %L boundary tone

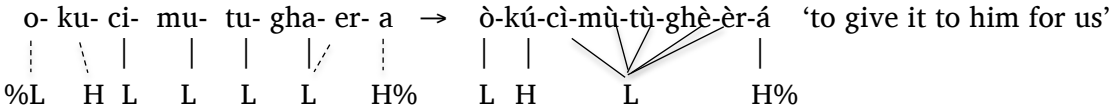
As indicated in (23a), the augment would have a /L/ tone allomorph after a proclitic, otherwise be toneless. Meeussen's Rule (23b) now becomes a simple process of L tone fusion to avoid an OCP violation. In (23c), the old LTI rule has been reinterpreted as L tone spreading (LTS) rule. (23d) inserts a H to the TBU that precedes a L or sequence of Ls. The result is surprisingly efficient—in fact, I would argue superior both to the /H, Ø/ and /^{H}L, Ø/ analyses.

The one minor complication of the /L/ vs. Ø approach is the need of a rule of H tone insertion (HTI) which inserts a H before a L (or the first L of a sequence of Ls). This is not unprecedented, as tone systems often place requirements on what can precede or follow a specific tone.[16] I thus adopt the /L/ vs. Ø analysis in the remainder of this study: In underlying representations toneless moras will continue to be unmarked, e.g. /o-ku-bal-a/ 'to count', while /L/ moras will be indicated with a grave

[16] Interestingly, the requirement that a L be preceded by a H is identical to the constraint I proposed for Tianjin dialect of Mandarin (Hyman 2007:17-18). In both languages a L must be approached from a H pitch level. What this means in Lusoga is that a default L cannot be inserted before a L. The only input /L/ or sequence of /L/'s in Lusoga that will not be preceded by a H is the initial %L which has no TBU preceding it.

accent, e.g. /o-ku-bòn-a/ 'to see'. An unmarked TBU that immediately precedes the vowel marked with the grave accent is pronounced H by a process of H tone insertion (HTI), e.g. *o-kú-bòn-a*. As seen in these underlying representations, I will continue to assume that the augment vowel is underlyingly toneless when occurring initially, but /L/ when preceded by a proclitic. With these assumptions, the derivation in (21) above can now be greatly simplified, as in (24):

(24)



As seen, the only rules needed now are the LTS rule to satisfy the 2LTR and the H inserted before the sequence of Ls, which can again be assumed to fuse into a single L autosegment, as to the right of the arrow in (24). In comparison with (21) there is considerable economy in not assuming that every input /L/ has a H before it. While this may seem to be at odds with Goldsmith's melodic approach to Bantu, the autosegmental framework is crucial in this analysis, as will also be seen in the following section.

4. A closer look at H tone plateauing

In this section I will further develop H tone plateauing (HTP) to show that Goldsmith's (1976a,b) original idea, that a free (in this case, inserted) H tone will link to as many tone-bearing units as are available works well in Lusoga. The evidence will come from noun stem reduplication. To appreciate this process, it is necessary, first, to say a few words about the structure of nouns.

As was seen in the case of the infinitive, which is in fact a noun class 15 nominal, the vast majority of Lusoga nouns take an augment vowel and noun class prefix of the shape CV-, V- or N-. The basic noun classes are exemplified in (25).

(25)

	class 1:	ò-mú-límí	'farmer'	class 2:	à-bá-límí	'farmers'
	class 3:	ò-mú-líró	'fire'	class 4:	è-mí-líró	'fires'
	class 5:	è-ì-búgá	'gourd'	class 6:	à-má-búgá	'gourds'
	class 7:	è-cí-tábó	'book'	class 8:	è-bí-tábó	'books'
	class 9:	è-n-dhóvú	'elephant'	class 10:	è-n-dhóvú	'elephants'
	class 11:	ò-lú-súsú	'skin'	class 10:	è-n-súsú	'skins'
	class 12:	à-ká-tíkó	'mushroom'	class 14:	ò-bú-tíkó	'mushrooms'

As seen, the above noun classes form the singular-plural pairs 1/2, 3/4, 5/6, 7/8, 9/10, 11/10 and 12/14.[17] Like the *L root infinitives in (1), all of the above nouns are underlyingly toneless (other than the potential for the augment to be /L/ if preceded by a proclitic). When their stems reduplicate, they remain toneless, surfacing with the %L and H% boundary tones:

(26) a. ò-mú-límí-límí ‘a lousy ol’ farmer, not a real farmer’
b. è-cí-tábó-tábó ‘a lousy ol’ book, not a real book’
c. à-bú-tíkó-tíkó ‘lousy ol’ mushrooms, not real mushrooms’

As seen in the glosses, noun stem reduplication is used to express a contemptuous view of the object, which is seen as inadequate, an inferior example of what it should be. Thus, *ò-mú-límí-límí* can be used to refer to someone who farms badly, or who thinks he is a farmer, but isn’t.

While no tonal issues arise when the nouns are toneless, a quite different story obtains when there is a H to L pitch drop in the word. Such nouns may have one or more Hs and one or more Ls. In addition, the final syllable of a noun can be lexically L or Ø, with final H(s) attributed to the boundary H%, as before. Representative tone patterns are shown in (27) for noun stems of different lengths:

(27)	σ	/L/	:	/o-mu-tì/	→	ò-mú-tì	‘tree’
	σ–σ	/L-Ø/	:	/o-mu-kàzi/	→	ò-mú-kàzí	‘woman’
		/Ø-L/	:	/e-ki-kopò/	→	è-cí-kópò	‘cup’
	σ:–σ	/LØ-Ø/	:	/e-ki-wùuka/	→	è-cí-wùùká	‘insect’
		/ØL-Ø/	:	/a-ka-saàle/	→	à-ká-sáàlé	‘arrow’
		/ØØ-L/	:	/e-ki-deedè/	→	è-cí-déédè	‘grasshopper’
	σ–σ–σ	/L-Ø-Ø/	:	/o-bu-thùpuzi/	→	ò-bú-thùpùzí	‘corruption’
		/Ø-L-Ø/	:	/o-mu-pakàsi/	→	ò-mú-pákàsí	‘porter’
		/Ø-Ø-L/	:	/o-mu-vubukà/	→	ò-mú-vúbúkà	‘adolescent’

As seen, each pattern has one underlying /L/, preceded by all H tones except the augment, which receives the %L boundary tone. Where possible the /L/ undergoes LTS onto a following syllable. Finally, the H% boundary tone links to the final syllable unless it ends /L/.

While there are other less common tone patterns, the above will serve as input to the reduplication process, exemplified in (28). Again, the meaning is one of disparagement: ‘a lousy ol’ tree’, ‘a not very good cup’ etc

[17] In addition to the above, there are several derived noun classes used to create diminutives, augmentatives, and locatives. We will not be concerned with these here.

(28)	σ	/L/	:	/o-mu-tì/	→	ò-mú-tíí-tì
	σ–σ	/L-Ø/	:	/o-mu-kàzi/	→	ò-mú-kází-kàzí
		/Ø-L/	:	/e-ki-kopò/	→	è-cí-kópó-kópò
	σ:–σ	/LØ-Ø/	:	/e-ki-wùuka/	→	è-cí-wúúká-wùùká
		/ØL-Ø/	:	/a-ka-saàle/	→	à-ká-sáálé-sáàlé
		/ØØ-L/	:	/e-ki-deedè/	→	è-cí-déédé-déédè
	σ–σ–σ	/L-Ø-Ø/	:	/o-bu-thùpuzi/	→	ò-bú-thúpúzí-thùpùzí
		/Ø-L-Ø/	:	/o-mu-pakàsi/	→	ò-mú-pákásí-pákàsí
		/Ø-Ø-L/	:	/o-mu-vubukà/	→	ò-mú-vúbúká-vúbúkà

The observed output tones show that the second stem has the same tones as in the non-reduplicated noun in (27), while the preceding first stem is all H. There are at least three analyses that can account for these facts.

(i) We might propose that the first stem is the reduplicant, which does not copy the tones of the base. If the /L/ tone is not copied, then HTI will link the inserted H to all preceding TBUs except the augment. This approach departs, however, from what we know about Bantu noun reduplication in two ways (cf. Mutaka & Hyman 1990:103 for Kinande): First, we expect the second stem to be the reduplicant. Second, unlike verb stem reduplication, we expect the tones to be copied. It is of course possible that Lusoga has restructured the inherited system, but since this defection is surprising, let us consider the other two options.

(ii) We might copy the tone and then fix it up to produce the outputs observed in (28). An example of how this might work is shown in (29).

(29) a. reduplicated input: /o-mu-pakàsi-pakàsi/ ‘a lousy ol’ porter’

L L

b. H tone insertion: o-mu-pakasi-pakasi

H L H L

c. H tone plateauing: o-mu-pakasi-pakasi

H L

d. Output with %L…H% ò-mú-pákásí-pákàsí

As seen, the /L/ is copied in (29a). In (29b) HTI inserts a H before each of the Ls. This is followed by HTP in (29c), which deletes the L occurring between the two Hs, which then fuse into a single multilinked tone. In (29d) %L links to the augment and H% to the last syllable of the noun.

(iii) While (29) undoubtedly represents the correct historical derivation, the facts can be much more simply accounted for in a third analysis. In (29c) the deletion of the L and the fusion of the Hs by HTP are assumed to be a response to the prohibition against two H to L pitch drops within a word, well-known from Luganda (McCawley 1970) and already recognized for Lusoga (van de Wal 2004:29). However, the Lusoga facts allow us to dispense with the insertion of two separate H autosegments in (29b). We maintain that the /L/ is copied, as in (29), but the first L undergoes a rule of L deletion:

(30) L tone deletion (LTD) L → Ø / __ L

A L tone is deleted when followed by another L tone within the word. Since the rule is stated without reference to TBUs, this process will take place "at a distance", as seen now in (31).

(31) a. reduplicated input: /o-mu-pakàsi-pakàsi/ 'a lousy ol' porter'

L L

b. L tone deletion: o-mu-pakasi-pakasi

L

c. H tone insertion: o-mu-pakasi-pakasi

H L

d. Output with %L...H% ò-mú-pákásí-pákàsí

Because the L of the first stem is always deleted, the result will always be as above: the first stem will be all H, while the second maintains the same output tones as it would have had when not reduplicated.

It is clear that we can now reject the analysis in (29). However, it needs to be shown why (31) should be preferred over the first proposal which, recall, was to not copy the L tone in the first place. The evidence comes from the behavior of certain enclitics such as /-ò/ 'your sg.' and /-è/ 'his/her', which agree with the preceding noun in noun class. The following examples show how /-è/ affects the nouns in (27).

(32)

σ	/L/	:	/o-mu-tì/	→	ò-mú-tíí =gwè
σ–σ	/L-Ø/	:	/o-mu-kàzi/	→	ò-mú-kází =wè
	/Ø-L/	:	/e-ki-kopò/	→	è-cí-kópó =cè
σ:–σ	/LØ-Ø/	:	/e-ki-wùuka/	→	è-cí-wúúká =cè

	/ØL-Ø/	: /a-ka-saàle/	→	à-ká-sáálé =kè
	/ØØ-L/	: /e-ki-deedè/	→	è-cí-déédé =cè
σ–σ–σ	/L-Ø-Ø/	: /o-bu-thùpuzi/	→	ò-bú-thúpúzí =bwè
	/Ø-L-Ø/	: /o-mu-pakàsi/	→	ò-mú-pákásí =wè
	/Ø-Ø-L/	: /o-mu-vubukà/	→	ò-mú-vúbúká =wè

As seen, the different tone patterns merge as all H before 'his/her' (as well as /-ò/ 'your sg.').[18] This is exactly parallel to the all H first stem in (31), with the L of the noun stem being deleted before the /L/ enclitic, as in (33).

(33) a. noun + enclitic input: /o-mu-pakàsi =o-e/ 'his/her porter'

L L

b. L tone deletion: o-mu-pakasi =we

L

c. H tone insertion: o-mu-pakasi =wè

H L

d. Output with %L ò-mú-pákásí-pákàsí

In this case, however, there is no question about starting without a tone, since the noun stems must be entered into the lexicon with different tonal representations. Instead, their /L/ tone is deleted before these enclitics—as, I suggest, also occurs on the first stem of the reduplicated noun.[19] I will now consider the significance of the Lusoga facts in the final section.

5. Conclusion

In the preceding sections we have considered different analyses of the basic tonal properties of Lusoga witin the context of autosegmental phonology. While I did not opt for the HL melodic approach, the result is still one that the autosegmental approach is best equipped to handle. As was seen, the OCP prohibits successive L tones on the tonal

[18] The same all H pattern is found on toneless nouns as well: *ò-mú-límí =wè* 'his/her farmer', *è-cí-tábó =cè* 'his/her book' etc.

[19] Having two instances of HTI, one before the /L/ of the noun, one before /-è/ or /-ò/, similar to (29), again seems unnecessarily complex. An allomorphy approach, as advocated by Archangeli & Pulleyblank (2015), seems equivalent, but would require every noun stem to list a second toneless allomorphy—in fact, every morpheme, since derived noun stems are polymorphemic. Since L tone deletion is general and predictable, I will assume that the rule of LTD in (30) is the more motivated approach.

tier, functioning as a conspiracy with different repairs: If the Ls are linked to successive TBUs, they fuse into a single, multilinked L, as in (29c). If there are intervening toneless TBUs, the rule of LTD deletes the first L. That the two L tones can "see" each other at a distance is something explicitly observed in autosegmental representations such as (31a) and (33a), where the two Ls are adjacent on the tonal tier. The result is not inconsequential, as there has been a definite trend of distinterest in, if not active opposition to abstract representations in phonology (cf. the discussion in Hyman 2015). The representational questions raised by the above Lusoga facts are thus interesting not only in what they have to contribute to tonal typology, but also from the point view of determining how different phonological representations can differ from their surface outputs. I have suggested that the Lusoga tone system contrasts /L/ vs. Ø and that the Hs that are observed on the surface derive either from a rule of HTI or from the final H% boundary tone. The tonal facts presented have been intentionally chosen to make this point, keeping things relatively simple. However, the rest of the tone system, e.g. the tonal morphology of the verb and tonal interactions at the phrase level, is consistent with this analysis, with only a few potential tweaks, e.g. sensitivity to certain grammatical categories. In work in progress, I am now considering the possibility that Lusoga has a true "inverted" tone system with marked, underlying /L/ and default H. Rather than a rule of HTI, the Hs that are observed before a L or sequence of L TBUs might simply be there by a late default spelling rule. This would also affect the H% final boundary tone. In all of the analyses considered above it was assumed that H% is generally present at the end of a phrase except in questions and imperatives (cf. note 4). If H is a default, then imperatives would require a final L%, and the final Hs in declaratives and citation forms would be default. So far, this reinterpretation requires its own tweaks and, in any case, takes us far beyond the scope of the goal of the present paper, which I hope has been established: the basic autosegmental insight, that tones and TBUs are semi-autonomous and hence can "see" each other at a distance, have been confirmed in the Lusoga tone system.

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