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# A NEW APPROACH TO TONE IN LUGANDA

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Since McCawley 1970, the Luganda tone system has been well known for its property of allowing at most one H[igh] to L[ow] pitch drop per word. To account for this property, the underlying system has been analyzed both in terms of underlying accents of various kinds (e.g. diacritic) and in terms of underlying tone (e.g. H vs.  $\emptyset$ ). Most accentual proposals, however, fail to account for the fact that THREE marks are necessary to characterize the high to low ‘melody’: a mark for the first H mora, a mark for the place of the H-to-L drop, and a mark for the place of the last L mora. After evaluating previous accentual and tonal analyses, we present a new approach to tone in Luganda that integrates tone and accent in the following way: (i) Accent in Luganda consists of designating certain moras as metrically strong (and hence capable of attracting tone); (ii) Tone in Luganda consists of lexical and grammatical occurrences of underlying HL contours (or ‘potential pitch drops’). This new analysis, which continues to recognize the importance of the H to L pitch drop, provides additional evidence for the coexistence of tone and accent, which may interact in complex ways in the same language.\*

**1. INTRODUCTION.** One of the most controversial issues in the study of prosodic systems concerns the exact nature of ‘pitch accent’. While early typological studies conveniently identified languages as having either lexical tone or lexical stress, it is now generally accepted that tone and stress may co-occur in the same language. In addition, the distribution of tones in some languages is so predictable or reduced that the same prosodic system is interpreted by one linguist as ‘tonal’ but by another linguist as ‘accentual’. In both cases, the term ‘pitch accent’ has been applied, as if to say that there is a third prosodic type. If there has been a noticeable lack of consensus on these matters, it is in part due to the fact that most of the world’s mixed or indeterminate prosodic systems have not been adequately documented—and hence cannot be properly evaluated. As a result, the same basic data from a handful of languages are cited to support contradictory views of what is a tone-, stress-, or pitch-accent system. Within this context, no African tone system has received more attention than that of Luganda, a Bantu language spoken in Uganda. Luganda has often been cited as having a pitch-accent system, and it has also figured in a number of controversies within autosegmental tonology (e.g. the theoretical issue of how to capture a three-way contrast using binary tone features and/or diacritic accents). In this paper we seek to accomplish three goals. First, we evaluate the different accounts of Luganda tone that have appeared in the literature. Second, we expand the empirical base of such studies to include tonal facts that this literature has not adequately addressed. Finally, we examine the question of whether the underlying Luganda prosodic system should

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be analyzed as accentual or tonal. We argue that the Luganda system is best analyzed with underlying HL contour tones which are attracted to metrically strong positions within Luganda words. In the following sections we examine previous analyses of Luganda tone and then turn to our own proposal. We shall see that the HL contour analysis naturally reflects the ‘pitch-accent’ appearance of Luganda tone, particularly the well-known H[igh] to L[ow] pitch drop discussed in §2. We shall conclude that a contour analysis should also be considered for other prosodic systems that have similar pitch-accent properties.

**2. H TO L PITCH DROP.** Starting in the 1960s, a number of distinguished Bantuists sorted out the major complexities of the Luganda tone system and provided analyses of them (see especially Tucker 1962, 1967, Cole 1967, Meeussen 1965, 1966, and Stevick 1969). By the early 1970s theoretical phonologists had discovered this literature and had made the following basic observation concerning word-level tone in Luganda (Heny 1974:1):

- (1) ‘... (at most) a single High-Low sequence occurs in every major lexical item in the language.’

That is, a Luganda word either has no H to L pitch drop, as in 2a–b, or it has a single pitch drop, as in 2c–d.<sup>1</sup>

- |        |                  |                     |                  |   |  |                   |
|--------|------------------|---------------------|------------------|---|--|-------------------|
| (2) a. | <i>a-sib-a</i>   | ‘he ties’           | c.               | <u><i>ba</i></u> - <u><i>sib</i></u> - <i>a</i>   | ‘they tie’   |                   |
|        | <i>a-lagir-a</i> | ‘he commands’       |                  | <u><i>ba</i></u> - <u><i>lagir</i></u> - <i>a</i> | ‘they command’                                       |                   |
|        | b.               | <i>a-tu-sib-a</i>   | ‘he ties us’     | d.  | <u><i>ba</i></u> - <u><i>tu-sib</i></u> - <i>a</i>   | ‘they tie us’     |
|        |                  | <i>a-tu-lagir-a</i> | ‘he commands us’ |   | <u><i>ba</i></u> - <u><i>tu-lagir</i></u> - <i>a</i> | ‘they command us’ |

Unlike most other Bantu languages, Luganda does not permit two H to L pitch drops within the same word. This observation led different scholars to compare Luganda with Tokyo Japanese. Thus, McCawley (1970:528) noted: ‘Indeed, pretty much the same statements can be made about pitch information in the underlying forms of Ganda as in the case of Standard Japanese ... in both languages, the underlying form of a noun must specify where (if anywhere) a high pitch is followed by a low pitch, and that is sufficient information to predict its tonal behavior.’<sup>2</sup> Or, as Heny (1971:187) put it: ‘... however Japanese is analyzed, Ganda should be analyzed in a similar fashion’. While McCawley 1968 argued for an accentual interpretation of pitch in Tokyo Japanese, it is

<sup>1</sup> Underlyingly ‘tonic’ vowels are underlined, while ‘nontonic’ (or toneless) vowels are not. As will be seen, much of this paper is concerned with the proper characterization of this underlying opposition.

Some tone marks are omitted from vowels in exx. 2–3 in order to make the H to L pattern clear; rules for predicting pitches on unmarked vowels will be given below in this section and in §3. Hyphens in example words indicate morpheme boundaries. In this paper, H[igh] tone is marked by ´, L[ow] tone by ` , and a HL falling tone by ˘. The verb stem includes the verb root plus all suffixes.

<sup>2</sup> Even restricted to nouns, this statement is not quite correct. Examples such as *mù-góbá* ‘driver’ and *mù-wàlá* ‘girl’ show that the number of H tones (here 1 vs. 0) before the drop may be contrastive. See also the discussion of the verbal data in ex. 3.

largely through Heny's insistence that an analogous interpretation continues to be applied to Luganda:

'In both systems, the occurrence of a drop from High to Low, at most (or precisely) once per word, is taken to be a significant aspect of the system, the position of this is fixed in some way, and then the other tones in the word are for the most part derived from there by spreading rules, etc.... it is likely that Ganda, too, is a pitch-accent language' (Heny 1971:191).

There are, however, important differences between Tokyo Japanese and Luganda. In the former, as shown by McCawley, it is possible to predict the tones from a single mark indicating the location of the pitch drop. Generally, moras preceding this mark are H and moras following this mark are L. As McCawley knew (1970), one needs much more information to predict the tones in Luganda. The examples in 2c–d involve a single H tone mora, as do the examples in 3a–c, where we have changed the verb roots from 'non-tonic' *-sib-* 'tie' and *-lagir-* 'command' to 'tonic' *-lab-* 'see' and *-wulir-* 'hear'.

- |        |  |               |    |   |                |
|--------|--|---------------|----|---|----------------|
| (3) a. | $\overline{a-lab-} \underline{a}$      | 'he sees'     | c. | $\overline{ba-} \underline{lab-a}$      | 'they see'     |
|        | $\overline{a-wu} \underline{lir-a}$    | 'he hears'    |    | $\overline{ba-} \underline{wulir-a}$    | 'they hear'    |
| b.     | $\overline{a-tu-kub-} \underline{a}$   | 'he hits us'  | d. | $\overline{ba-tu-kub-} \underline{a}$   | 'they hit us'  |
|        | $\overline{a-tu-wu} \underline{lir-a}$ | 'he hears us' |    | $\overline{ba-tu-wu} \underline{lir-a}$ | 'they hear us' |

The examples in 3d show three H tone moras preceding the drop. While the drop from H to L occurs in exactly the same place in 3b and 3d, a second mark would seem to be required to indicate where the H pitch begins. Consequently, it would be more accurate to compare Luganda not with Tokyo, but rather with Osaka Japanese, where there is a contrast between words having a HL vs. a LHL pitch contour.

But this is not all. Stevick's careful 1969 examination of Luganda verb forms in particular indicated not only that the number of H tones preceding the drop could be contrastive, but also that the number of L tones following the drop could be contrastive. This is seen in the following examples:

- |        |                                      |             |    |   |                  |
|--------|--------------------------------------|-------------|----|---|------------------|
| (4) a. | $\overline{ba-} \underline{wulir-a}$ | 'they hear' | b. | $\overline{ba-} \underline{li-wulir-a}$ | 'they will hear' |
|        | [báwùlírá]                           |             |    | [báliwùlírá]                            |                  |

In 4a, as in 2c–d and 3, there is one L mora following the drop, while in 4b there are two. In each case the moras following the last L are lexically toneless and receive their tones at the phrase level. To indicate the contrast between 4a and 4b, we provide phonetic transcriptions of these two words as they appear finally with a H phrasal-boundary tone (H%). Nontonic moras receive the H% tone, while tonic L moras do not. The same facts can be observed in 5, where all of the verb forms in 2 and 3 are transcribed as they occur with the H% boundary tone:

- |        |                        |                  |    |                        |               |
|--------|------------------------|------------------|----|------------------------|---------------|
| (5) a. | $\grave{a-sib-á}$      | 'he ties'        | b. | $\grave{a-láb-à}$      | 'he sees'     |
|        | $\grave{a-lágír-á}$    | 'he commands'    |    | $\grave{a-wùlír-á}$    | 'he hears'    |
|        | $\grave{a-tú-sib-á}$   | 'he ties us'     |    | $\grave{a-tù-láb-à}$   | 'he sees us'  |
|        | $\grave{a-tú-lágír-á}$ | 'he commands us' |    | $\grave{a-tù-wùlír-á}$ | 'he hears us' |

c. <i>bá-sib-á</i>	‘they tie’	d. <i>bá-làb-á</i>	‘they see’
<i>bá-làgír-á</i>	‘they command’	<i>bá-wùlír-á</i>	‘they hear’
<i>bá-tù-sib-á</i>	‘they tie us’	<i>bá-tù-láb-à</i>	‘they hit us’
<i>bá-tù-làgír-á</i>	‘they command us’	<i>bá-tù-wùlír-á</i>	‘they hear us’

The H% will map onto as many NONTONIC vowels from the right as it can, subject only to the condition that it leave at least one (tonic or nontonic) vowel unaffected. In 5a this results in a single L tone followed by a sequence of Hs, while in 5b only the final vowel is affected—and only if there is another nontonic vowel preceding it. In 5c all the vowels are affected except the one following tonic *bá-*, while in 5d zero, one, or two vowels appropriately link to the H%. At a later stage, any vowel which does not have a tone (e.g. the subject prefix *a-*) receives a default L specification.

What is required to account for contrasts such as those in 4 and 5 is a THREE-WAY opposition among (tonic) H, (tonic) L, and (nontonic)  $\emptyset$  moras—only the last of which can be affected by the H% tone.<sup>3</sup> As a result, both the number of Hs and the number of Ls in the H–L melody are contrastive. Thus, while Tokyo Japanese can be described with a single diacritic mark representing the place of a H to L pitch drop, three marks are needed in Luganda: one to mark the first H, one to mark the place of the pitch drop (i.e. either the last H or the first L), and one to mark the last L. Since three marks are necessary in the Heny/McCawley approach to Luganda, this raises the question of whether the Luganda tone system is properly viewed in such accentual terms.

In this paper we present a new approach to Luganda tone that incorporates the Heny/McCawley insight of a H to L melody and also solves some outstanding tonal problems that have not yet been addressed. In the following sections we shall first continue our short history of the study of Luganda tone into the 1980s. In §§3–4 we survey and evaluate the different attempts that have been made to apply the concepts of autosegmental and metrical phonology to Luganda tone. Arguing that accentual approaches to Luganda tone should be rejected in favor of a tonal approach, we then consider (§5) the need to revise the tonal analysis of Hyman 1982. In §6 and §7 we present a compromise solution to Luganda tone that captures the essential insights we and others have expressed concerning the notion of ‘pitch accent’ in Luganda and other Bantu languages. In this new approach the underlying tone is a HL contour whose placement is determined in part by an attraction to metrically strong positions within the Luganda word. Advantages of the resulting system are demonstrated from patterns throughout the grammar including verbs, nouns, pronouns, and numerals.

**3. ACCENTUAL APPROACHES TO TONE IN LUGANDA.** As mentioned above, there have been a number of proposals designed to capture the generalization in ex. 1. Most of these share the intuition that the restriction of at most one

<sup>3</sup> The one exception to this statement concerns cases where a form ends in a sequence of two or more (tonic) L tones. In this case only, the H% will link to the final tonic L. The form *a-ba-li-lab-a* ‘they who will see’ in 15b below is such an example, and is therefore pronounced [ábálibábá].



Luganda requires three such marks: (1) a mark where the H tone begins; (2) a mark where the H tone ends (or where the L begins); and (3) a mark where the L tone ends. As a consequence, the mapping of a single HL word melody in Luganda is considerably more complex, as seen in the Initial Tone Association Rule (ITAR) of Hyman 1982:

$$(7) \# X \overset{*}{V} (C_0 \overset{*}{V})^Q Y \#\# \quad (\text{where } Y \text{ does not contain any } \overset{*}{V})$$

$\begin{array}{c} | \\ \text{H} \\ | \\ \text{L} \end{array}$

According to 7, 'the L of the HL accentual melody associates with all but the FIRST asterisked vowel of the LAST accentual sequence of a word' (Hyman 1982: 12). This ITAR departs from the rules found in Haraguchi 1977 in several ways: first, initial tone linking is not restricted to a single asterisked vowel, but rather may potentially occur with several. Second, it is the L that is linked by the ITAR, rather than the H.<sup>5</sup> Third, the field had not yet (and has not since) seen such a complicated ITAR, sensitive to whether or not each asterisked vowel is in turn preceded by another asterisked vowel.<sup>6</sup> And finally, 7 does not apply at all to Luganda words lacking an asterisk, which must not receive any lexical tone at all. This last point also contrasts with Haraguchi's analysis of Japanese, where the H of the HL melody links to the final vowel of a word lacking an asterisk.

For all these Luganda-specific reasons, as well as for formal and conceptual arguments presented in Hyman 1982, Hyman & Byarushengo 1984, and Pulleyblank 1986, the diacritic asterisk analysis was subsequently rejected, just as it has since been rejected for Japanese (cf. Archangeli & Pulleyblank 1984, Poser 1984, and Clark 1987—who essentially arrive at Meeussen's 1972 view of Tokyo Japanese as a 'restricted tone system').

**3.2. METRICAL ACCENT.** Metrical accent is a logical possibility that we have occasionally entertained over the years, but to the best of our knowledge it has not been proposed for Luganda in the literature. The idea is that tone-bearing units differ as to whether they have a grid mark or not, as seen in 8.

$$(8) \begin{array}{l} a- \quad tu- \quad -lagir- \quad -a \\ b\overset{x}{a}- \quad tu- \quad -w\overset{x}{u}lir- \quad -a \end{array}$$

This analysis would differ from the diacritic accent approach in that these grid

<sup>5</sup> This is no problem for Goldsmith (1976, 1984), who allows for either tone of a HL or LH melody to link to the designated asterisked slot. Note that the ITAR in 7 can be amended to link the H instead to all asterisked vowels that are not in turn preceded by an asterisked vowel. The L would then link to remaining asterisked vowels to the right of the last linked H. This variant was not followed by Hyman (1982), who preferred for the free H to link automatically to all vowels to the left of the linked Ls, including toneless vowels on preceding words. Just as in Stevick 1969, lexical and postlexical tonal processes were not adequately distinguished, something that was corrected in the H/Ø tonal analysis also presented in Hyman 1982.

<sup>6</sup> One other consequence: since 7 requires reference to at least two asterisked vowels, any word that has only one underlying asterisk must undergo asterisk doubling onto the following vowel (Hyman 1982:12). This turns out to be a problem for the standard tonal analysis as well, but will fall out naturally from the new proposal we make in §6.

marks serve as potential heads of metrical constituents (hence satisfying Pulleyblank's objection [1986: Ch. 5] to diacritic accents in general). One could begin by grouping each succession of gridded vowels into an unbounded left-headed foot; these feet would then be joined into metrical words. Tone assignment would consist of the following steps: first, a single HL melody would be introduced for each word that has metrical structure. ('Nontonic' words would not have any metrical structure, and hence would not receive a HL melody.) Second, the H of the HL melody would link to the head (i.e. the first) vowel of each foot. Third, the L would associate to all of the gridded positions following the last H. The result ultimately would be a H on all footed vowels up to and including the first vowel of the last foot, and a L on subsequent gridded positions within the last foot.<sup>7</sup>

**3.3. CATEGORIAL ACCENT.** Related to the metrical account is another foot-based approach. Developing earlier ideas in Heny 1971, 1974, Heny & Wheeler (1982) propose a categorial analysis of the HL pitch drop in Luganda. As in the metrical account in §3.2, Heny & Wheeler propose that moras join together to create feet (Fs). Rather than having the pitch drop after the last head-of-foot, Heny & Wheeler develop a system in which the drop occurs after the last foot of the word. To create such feet, each vowel is assigned one of two values, as shown in 9.

- (9) a. F/N F/N F/N F/N F/N  
*a- tu- -lagir- -a (a-tu-lagir-a)*  
 N F/N N F/N F/N  
 b. *ba- tu- -wulir- -a (bá-tú-wúlir-a)*

Vowels which are marked as accented (or H tone) in other accounts are here identified as N (neutral). Vowels which are unmarked (or toneless) in other accounts are designated as F/N, meaning an element that would form a foot if followed by a neutral element.<sup>8</sup> The data covered by Heny & Wheeler are rather limited, taken mostly from the main-clause present negative, and yet they must already make some questionable moves. For example, they must consider an initial word boundary to have the value F/N just in case the pitch drop is after the first mora of the word (as in 2c-d and 3c). They must also assign the value N to a final word boundary in case the pitch drop occurs within the last syllable (as in *à-gùl-â* 'he who buys').

**3.4. DYNAMIC ACCENT.** The last accentual analysis involves direct reference to a feature of pitch drop. In a recent study, Wright (1988) adopts Clark's (1976)

<sup>7</sup> This metrical account is but one of several possibilities. For example, one could also begin by assigning a second grid mark to any gridded vowel that is not in turn preceded by a gridded vowel, and then gather up all of the gridded vowels into a single metrical constituent. A HL melody would then be assigned, with the H linking to all double-gridded vowels and the L to all single-gridded vowels. See n. 5 for a restatement of the ITAR in (7) that is quite similar to this metrical account—though lacking the grid marks.

<sup>8</sup> Compare Heny's earlier accounts (1971, 1974), which also identified historically H vowels as neutral and historically L (or toneless) vowels as D (determinant).

dynamic approach to tone and her use of pitch-change markers to analyze Luganda. As illustrated in 10, either vowels are unmarked or they carry a down arrow ( $\downarrow$ ) indicating an immediately following potential pitch drop.

- (10) *a-*      *tu-* *-lagir-*      *-a*  
*ba-*  $\downarrow$  *tu-* *-wul*  $\downarrow$  *ir-* *-a*

Concatenating such morphemes shows that, scanning from right to left, the first of the last uninterrupted sequence of pitch-drop indicators in the word is in fact realized as a descent from H to L (see the ITAR in 7 for a nearly equivalent statement). Even if this procedure can identify the place of pitch drop, it does not seem to offer any advantage in predicting where the H pitch begins and where the L pitch leaves off. Like Heny & Wheeler, Wright is concerned almost exclusively with getting the pitch drop in the right place and does not consider a wide range of data even in that pursuit.

4. DISCUSSION. In §3 we have briefly outlined four different kinds of accentual approaches to Luganda tone. As we shall see in §5 and §6, there are also purely tonal solutions to be considered. We must therefore ask why so many authors have been tempted to regard Luganda tone as a case of accent. The major reason seems to be the basic property cited in ex. 1: a putative advantage of an accentual analysis is that it directly captures this property of ‘at most one drop from H to L’. But does it? We have tried to show the need to locate three separate ‘marks’ in order to predict how the HL melody will be realized on a given Luganda word—the place of the first H, the place of the H to L drop, and the place of the last L.

Most researchers who have been impressed with the ‘accentual’ nature of Luganda have been preoccupied with finding the second mark. It is this preoccupation that, in our opinion, has led some Luganda researchers astray. Since Tokyo Japanese requires at most one mark per word, one might wish to identify this mark with the so-called ‘culminative’ function of accentual systems.<sup>9</sup> However, given the need for three marks in Luganda, the case for accent is considerably weaker. In fact, the basic property in 1 can very easily be captured by establishing a general sequential constraint of the following form: \*H L H. Since a L tone cannot occur between H tones (at the lexical level), there will be at most one drop from H to L per word.<sup>10</sup> Thus, a strictly tonal account has real viability.

Independently of the facts of Luganda, we should be worried about describing

<sup>9</sup> We would still prefer an underlying prelinked H tone, however, as in Archangeli & Pulleyblank 1984 and Poser 1984, for the reasons about to be enumerated.

<sup>10</sup> As we shall see, there is a rule of L tone deletion that removes such L tones between Hs. If there is such a constraint, it would have to hold both at the lexical or word level and between adjacent phonological words (PWs) within the tone group. As shown in Hyman 1988, a tone group consisting of three PWs can have two pitch drops if the middle PW is toneless: [[HL][Ø][HL]]. Consequently, we don’t see this constraint as identifiable on a real domain, but rather the result of the operation of L tone deletion. Surface violations are caused by the assignment of the boundary H%, as we have seen, as well as by the postlexical leftward H tone spreading, as formalized in 17 below.

tone with nontonal devices; assuming their availability, we have to ask when nontonal devices are desirable or necessary. With respect to diacritic accents, the most commonly invoked nontonal device, we see the problems discussed in §§4.1–4.5.

**4.1. INDETERMINACY.** While one might wish for clearcut criteria to establish whether a tonal or an accentual analysis is warranted, the literature reveals a wide range of analyses of the same tone system or of similar tonal phenomena in related Bantu languages. To take one example, Goldsmith 1984 describes Tonga with asterisked vowels to which the L of a HL melody links by convention. By contrast, Sukuma is described in Goldsmith 1985 without asterisks, but rather with LH melodies, the L of which is prelinked. There seems to be no reason why Tonga could not have been analyzed in the same way as Sukuma, or vice versa. If diacritic accents are available for this purpose, we will most certainly face such an indeterminacy in much of the Bantu zone.

**4.2. REDUNDANCY.** If diacritic accents are available, they would provide a third option: underlying representations in which tones and asterisks co-occur. Riiland 1988 presents such an analysis of Kinyarwanda, where every underlying H tone is prelinked to an asterisked vowel. While there is some reason to think that diacritics might be involved in Bantu tone systems to a limited degree (perhaps as Kidima 1989 suggests for Kiyaka), we would hope that their use could be restricted to cases where they have a metrical function (cf. our analysis of the Luganda constructions in §6).

**4.3. LIMITATION TO TONE.** A third objection to diacritic accents is that they are always introduced for the sole purpose of accounting for tone. They therefore become little more than a second tonal representation, generally marking locations where historical H tones once stood. This is made all the more clear by the fact that they have the same formal properties as tone. Thus the literature has cases where diacritic accents float (Stevick 1969), cases where rules refer to [−\*] (Odden 1985), and so forth. We would certainly reject a second representation for other features—e.g. a diacritic representation of [±cont], [±back], etc. But if these asterisks are real, why don't features other than tone refer to them? Specifically, why can't a diacritic accent have a strengthening effect on a consonant or vowel, such as the effect one observes with metrical accent (or stress)?

**4.4. POWER.** This last question brings us to our next objection: asterisks provide excessive power, as pointed out in Hyman 1982 and Pulleyblank 1986. If asterisks are available, their interaction with a H/L/∅ tonal opposition defines six different representations, as in 11. While tonal representations such as those in 11a are standardly accepted, the question is whether those in 11b should be distinguished from them. For example, could a rule alter a H tone only if it is linked to an asterisked vowel, or vice-versa? We claim it could not.<sup>11</sup> By out-

<sup>11</sup> Odden (1985) argues for such a distinction in Kimatuumbi, but later recognizes (1988) that asterisks are not needed at all.

lawing the diacritic asterisk notation as a substitute for tonal representation, we thus arrive at a more constrained theory.

- (11) a.  $\begin{array}{ccc} \check{V} & \check{V} & \check{V} \\ | & | & \\ H & L & \end{array}$     b.  $\begin{array}{ccc} \check{V}^* & \check{V}^* & \check{V}^* \\ | & | & \\ H & L & \end{array}$

**4.5. EMPIRICAL ADEQUACY.** A final issue that must be raised concerning accentual analyses is how they work for an extended range of data. As we have already pointed out, not all accentual analyses have been tested against a full range of Luganda data, and the question thus remains open whether they can even work—or, if they can, at what price. Even Stevick 1969, the most comprehensive accentual analysis of Luganda tone, contains several ad-hoc stipulations (e.g. floating accent marks, unmotivated boundaries, etc.). Over the past several years we have applied a number of analyses to a wide range of tonal phenomena in the language. We conclude that at no stage of the derivation is there any advantage to representing tone in Luganda other than as tone.

**5. A TONAL APPROACH TO LUGANDA TONE.** In this section we shall outline, and ultimately reject, a class of tonal analyses of Luganda that assume an underlying opposition of either H vs. L or H vs.  $\emptyset$ . Earlier analyses of Luganda tone such as Meeussen 1965 had recognized an underlying opposition among H, L, and (restrictively)  $\emptyset$ , as seen in 12a.<sup>12</sup>

- (12) a.  $\begin{array}{l} \grave{a}- \quad t\grave{u}- \quad -l\grave{a}gir- \quad -\grave{a} \\ b\acute{a}- \quad \quad -w\acute{u}lir- \end{array}$   
 b.  $\begin{array}{l} a- \quad tu- \quad -lagir- \quad -a \\ ba- \quad \quad -wulir- \\ H \qquad \qquad H \end{array}$

By comparison, the representations in 12b, from Hyman 1982, show only a binary underlying opposition between H and  $\emptyset$ . In 13 we list the lexical rules needed in the framework of Hyman 1982, as slightly amended in Hyman et al. 1987.<sup>13</sup> According to Meeussen's Rule (13a), which applies iteratively from right to left, any H that is immediately preceded by a H will become L. L tone insertion (13b) inserts a L tone just in case the last H tone of the word is preceded by a toneless mora or is initial within the word.<sup>14</sup> Note that MR and LTI introduce a L tone into the lexical phonology and thereby produce the ternary opposition among H, L, and  $\emptyset$ . Subsequently, L tone deletion (13c)

<sup>12</sup> According to Meeussen 1961, tone-bearing units occurring between the first and last stem vowels are underlyingly toneless, but copy the tone of the final vowel.

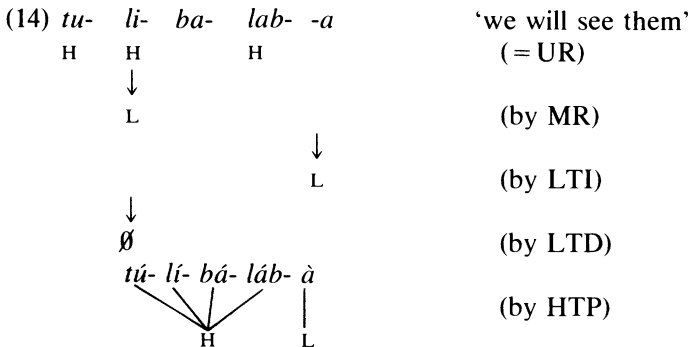
<sup>13</sup> MR and LTI are clearly lexical rules, since they apply only within the lexical word. LTD and HTP apply both within the word and within the postlexical tone group.

<sup>14</sup> Since MR results in the last tone of a word being L, and since it applies before LTI, the latter rule can be more simply formulated as inserting a L whenever a word ends in H on the tonal tier (cf. 31 below). By convention, the L would link to the leftmost toneless mora. If the H is on the final mora of the word, an additional mora is inserted to which the L may link (Hyman & Katamba 1990).

may apply, deleting any Ls that occur between Hs.<sup>15</sup> Finally, H tone plateauing (13d) converts contiguous Hs on the tonal tier into a single multiply-linked H, presumably motivated by the Obligatory Contour Principle (OCP).

- (13) a. MEEUSSEN'S RULE (MR):  $\begin{matrix} \mu & & \mu \\ | & & | \\ H \rightarrow L / H \text{ \_\_\_\_} \end{matrix}$
- b. L TONE INSERTION (LTI):  $\begin{matrix} & & \textcircled{\mu} & & \mu \\ & & | & & | \\ \emptyset \rightarrow L / & & H \text{ \_\_\_\_} & & ]_w \end{matrix}$
- c. L TONE DELETION (LTD):  $L_1 \rightarrow \emptyset / H \text{ \_\_\_\_} H$
- d. H TONE PLATEAUING (HTP):  $\begin{matrix} \mu & \mu_1 & \mu & \rightarrow & \mu & \mu_1 & \mu \\ | & | & | & & \diagdown & | & / \\ H & H & & & H & & \end{matrix}$

A sample derivation is presented in 14. First MR applies to the H of the general future prefix *lí-*, followed by LTI, which inserts a L on the final vowel *-a*. LTD then removes the L on *lí-*, which had been derived through MR, and HTP applies to derive the indicated output.<sup>16</sup> As can be observed, the rules in 13 conspire to produce at most one pitch drop per Luganda word.



The advantages of a purely tonal analysis consist largely of avoiding the pitfalls that, as we argued in §4, characterize the accentual analyses: there is no indeterminacy; there is no redundancy; tone is tone; and the theory is more restrictive. Concerning the third point, recall our objection that the putative accents have no consequence for features other than tone. In the tonal analysis there is no problem: other features may be no more sensitive to the H (or L) tones in this analysis than they can be in any tone system (i.e. whether accent-like or not). This seems to be the right prediction.

<sup>15</sup> More specifically, any sequence of Ls produced by MR will conflate as a single multiply-linked L which then may delete between Hs.

<sup>16</sup> While it may seem a bit roundabout to convert *lí-* to *li-* and then delete its L to yield H again (by HTP), this analysis is justified by the need for a LTD rule applying between phonological words within the tone group (see especially Hyman 1988). Although one could restrict MR so that it would target only the last sequence of Hs within a word, nothing is really gained by this.

Still, one might raise several objections to this tonal analysis. First, the presence of a lexical L tone feature potentially constitutes a violation of binarity. In this analysis we begin with an underlying binary opposition (H/∅) and arrive at a surface binary opposition (H/L). At an intermediate level, however, there is a ternary opposition among H, L, and ∅. If there is only one tone feature, say [upper], then we need [+upper], [−upper] and [0upper], hence a ternary opposition. As emphasized in Hyman 1982, the lexical L tones deriving from MR essentially function as ‘global traces’ of the underlying Hs from which they are derived.<sup>17</sup> These Ls cannot be avoided; MR must be stated as a change from H to L, rather than from H to ∅, in Luganda. To see why, consider the verb forms in 15.

- (15) a. *ba-li-lab-a* ‘they will see’      b. *a-ba-li-lab-a* ‘they who will see’
- |       |         |
|-------|---------|
| H H H | H H H H |
| ↓ ↓   | ↓ ↓ ↓   |
| L L   | L L L   |

In 15a the first three morphemes are underlyingly H, so there are two applications of MR. As shown, the final vowel remains toneless. By contrast, in the corresponding relative verb form in 15b, the final vowel morpheme is underlyingly H.<sup>18</sup> Consequently, there are three applications of MR and the verb ends in L. Now observe the realization of these two verbs in the phrasal context in 16.

- (16) a. *ba-li-lab-a e-bi-kopo* ‘they will see cups’ [bá-li-làb-á é-bí-kópò]
- |   |   |   |   |   |   |
|---|---|---|---|---|---|
|   |   |   |   |   |   |
| H | L | H | L | H | L |
- b. *a-ba-li-lab-a e-bi-kopo* ‘they who will see cups’ [à-bá-li-làb-à è-bì-kópò]
- |   |   |   |   |   |   |
|---|---|---|---|---|---|
|   |   |   |   |   |   |
| H | L | H | L | H | L |

In 16a we see that all of the toneless vowels that intervene between the two lexical HL sequences become H, while in 16b we see that they become L. The reason is that the phrase-level rule of leftward H tone spreading applies as a domain juncture rule, i.e. between phonological words, as in 17.

- (17) HIGH TONE SPREADING (HTS):
- $$TP[ \dots PW[ \dots C_0 V_1 ] [ X V \dots ]_{PW} \dots ]$$
- |
- H

(TP = tonological phrase; PW = phonological word; V<sub>1</sub> must be toneless)

HTS applies in 16a, where the FV is toneless, but not in 16b, where it is L. Since the final L in 16b results from MR, it is clear that MR must be a rule

<sup>17</sup> The other source of lexical L is LTI. Note that in Hyman 1982 there was no LTI, but rather a corresponding rule that doubled the last H of a word if it were not directly preceded by a H. This rule of H tone doubling would then feed MR, and all lexical Ls would be traces of mutated Hs.

<sup>18</sup> Thus, compare /a-sib-a/ ‘he ties’ and /a-a-sib-á/ ‘he who ties’, realized respectively as [à-síb-á] (with final H% boundary tone) and [à-sib-á].

converting H to L. To avoid three values of the feature [upper], we can propose that the features for H and L are, respectively, [+upper] and [–raised]. Instead of changing [+upper] to [–upper], MR could be formulated to insert the feature [–raised], producing a [+upper, –raised] tone, whose [+upper] ultimately delinks.<sup>19</sup> Alternatively, MR might directly replace [+upper] with [–raised].

Either way, a second objection is that this last move produces a possible problem concerning the nature of tonal underspecification. In past work we have assumed that the default tone in Luganda is L, presumably [–raised]. If so, and if MR introduces [–raised], this would produce a violation of at least one version of Archangeli & Pulleyblank's 1986 Redundancy Rule Ordering Constraint (RROC), according to which a default value must be filled in as soon as a rule explicitly refers to that value. Since MR refers to [–raised], all toneless vowels would have to be filled in as [–raised], and we would lose the crucial distinction between L and Ø.<sup>20</sup> But if the default tone were [–upper, +raised], distinctness with L would be preserved. Although a full examination would take us beyond the scope of the present paper, this proposal may be workable. Consider, for example, words in which the last L is followed by one or more toneless moras. In ordinary declarative intonation, a form such as *a-bá-tà-li-làb-irir-a* 'they who will not look after' will be pronounced [à-bá-tà-li-làb-irir-á]. The subject prefix *à-* receives a phrase-initial %L boundary tone which, let us say, is [–upper, –raised]. The final three moras link to the final H% boundary tone, presumably [+upper]. However, if there were no boundary H%, but rather a default assignment of [–upper, +raised], this would also result in the tone of these moras being higher than preceding Ls (= [–upper, –raised]). In other words, we could say that such raised Ls are phonetically equivalent to lowered (e.g. downstepped) Hs. We shall assume that the underspecification problem is not insurmountable.<sup>21</sup>

A third theory-specific objection is that, since there are no underlying L tones in Luganda, MR and LTI violate structure preservation, a concept that has been developed in the framework of lexical phonology (e.g. Kiparsky 1982, 1985) and that is claimed to hold of the lexical (vs. the postlexical) phonology. Note that there is no motivation for any underlying L tones in Luganda—not

<sup>19</sup> This much is consistent with our view that MR was originally a downstep rule affecting successive Hs. Following a hypothesis with which Meeussen was in complete accord (A. E. Meeussen, personal communication, 1977), a H–H–H sequence would once have been pronounced H–<sup>1</sup>H–<sup>2</sup>H (where each 'H' represents a progressively lowered or downstepped H tone). Later, such sequences were simplified to H–L–L to yield the present-day shape of 'Meeussen's Rule'.

<sup>20</sup> The version of the RROC in Archangeli 1984, however, is compatible with the Luganda data, since Archangeli allows for the default value to be referred to in the OUTPUT of a rule without requiring that that value be filled in everywhere else.

<sup>21</sup> Another possibility would be for MR to delete the appropriate H features, but leave behind their tonal root nodes. This way there would still be a distinction between moras that have an empty tonal root node and moras that have no tonal root node. By using the empty tonal root nodes as 'traces', this solution captures the global nature of the problem. We would have to assume that the HTS rule in 17 would then target only moras that lack a tonal root node. Note that this redefines the binarity problem as well. The viability of such an approach depends on whether empty class nodes can in fact contrast with zero.

even to represent exceptional noun tones or idiosyncratic tonal properties of specific constructions.<sup>22</sup> In other words, instead of neutralizing two underlying morphophonemic feature complexes, as lexical rules are supposed to do, MR introduces a new opposition. In response to this objection, we shall assume Mohanan's 1986 distinction between two different inventories in the lexical phonology—the underlying alphabet vs. the lexical alphabet. The latter consists of the underlying alphabet plus a limited set of derived segments. Since L is always derived in Luganda, we can simply say that it is part of the allowed lexical alphabet but is not included in the underlying alphabet.

Having disposed of the above three general or theoretical objections, we now turn to objections that have more to do with Luganda itself. The fourth objection to the above tonal analysis concerns the need for the two separate rules MR and LTI. Both of these rules create pitch drops by introducing a L feature, and hence appear to be at least functionally related. In addition, they apply in complementary environments: MR applies if the last H is preceded by a H, as in 18a, while LTI applies if the last H is not preceded by a H, as in 18b.

- (18) a. *ba-lab-irir-a* 'they look after'      b. *a-lab-irir-a* 'he looks after'
- |                 |                |
|-----------------|----------------|
| H H (H%)        |                |
| ↓               | ↓              |
| L               | L              |
| (MR)            | (LTI)          |
| [bá-làb-írír-á] | [â-láb-írír-á] |

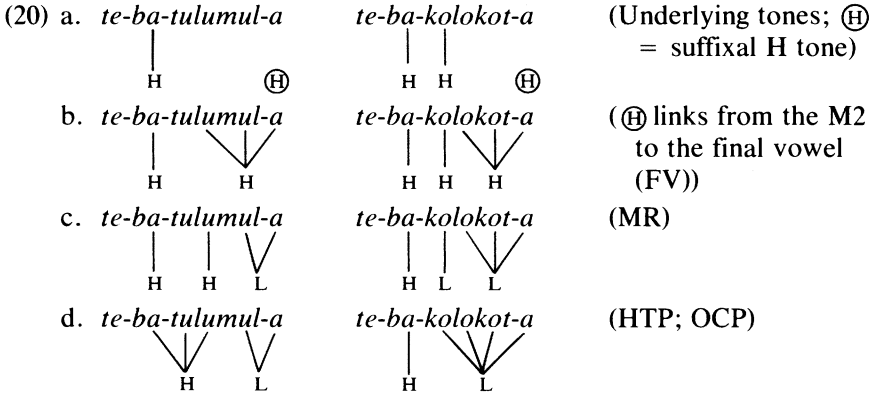
Note that one could not first introduce a L after the last H of a word and then apply MR, since this would incorrectly produce \**bá-làb-irir-á* in 18a after the linking of the boundary H% tone. Thus, the last H of a word will either undergo MR or trigger LTI, but not both. A comparison of the formulations of these rules in 13a–b shows that they do not stand in an 'elsewhere' relation, and hence their disjunctivity must be imposed by stipulating that MR precedes LTI. By failing to introduce all lexical Ls (and the ultimate word-level pitch drop) by a single rule, this analysis seems to be missing a generalization.

The fifth argument against the analysis in 13 is that unnecessarily complex derivations are needed, as well as a peculiar interpretation of MR. In order to see how this is so, consider the verb forms in 19, which require the assignment of a suffixal H tone:

- (19) a. *te-bá-gúl-â* 'they do not buy'  
*te-bá-sííg-â* 'they do not smear'  
*te-bá-lágír-à* 'they do not command'  
*te-bá-túlúmùl-à* 'they do not enrage'
- b. *te-bá-làb-à* 'they do not see'  
*te-bá-lèèt-à* 'they do not bring'  
*te-bá-wùlir-à* 'they do not hear'  
*te-bá-kòlòkòt-à* 'they do not scrape'

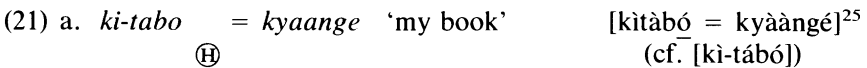
<sup>22</sup> This differs from the case of Kinande, which generally has underlying H vs.  $\emptyset$  (cf. Hyman & Valinande 1985), but where Mutaka 1990 has subsequently made a plausible case for at least some underlying L tones.

In 19a, where the verb roots are underlyingly toneless, the suffixal H results in a pitch drop after the (underlined) second mora (M2) of the verb stem. In 19b, where the verb roots have an underlying initial prelinked H, all tones are L following the subject prefix *-bá-* ‘they’. An important observation about this suffixal H tone pattern is that all moras following the last H are L (i.e. not toneless). We present sample derivations in 20.<sup>23</sup>



In 20a we see that the verb root *-tulumul-* ‘enrage’ is underlyingly toneless, while the verb root *-kólókot-* ‘scrape’ has a lexical H linked to its first mora. The suffixal tone is indicated by ⊕, which links to all of the vowels from the M2 to the final vowel (FV) of the verb stem in 20b. MR must apply in 20c, lowering all but the M2 H of *-tulúmúl-á* and all of the Hs of *-kólókót-á*. Finally, the two H features in 20c are fused by HTP in 20d.

While MR must apply as indicated in 20c, note that its formulation in 13a specifically seeks two separate and contiguous H tone features. As formulated in 13a, MR can lower the second (branching) H feature of *-kólókót-á* to derive the correct result, but it cannot apply to *-tulúmúl-á* at all, since this verb stem has only one (multiply linked) H tone feature.<sup>24</sup> The issue we face is that this analysis requires the H to spread to all vowels up to the stem M2, with MR then changing most of these H links to L. The examples in 21 show that this same procedure is required on underlyingly toneless nouns in the possessive enclitic (=) construction, where a suffixal H is also involved:



<sup>23</sup> With the assignment of the boundary H%, these will be pronounced [tè-bá-túlúmùl-á] and [tè-bá-kòlòkòt-á]. From this point on forms are cited in one of two manners: without phonetic brackets (with only lexical tones indicated, i.e. the Hs and Ls of the H to L pitch drop) or within phonetic brackets (with final H% and default L transcribed).

<sup>24</sup> Following Stevick 1969 and Hyman 1982, one could be tempted to follow Meeussen’s 1961 approach to this problem by assigning the suffixal H to the FV and then COPYING it onto all vowels back to the M2. As discussed in Hyman & Pulleyblank 1988, however, this move would not only constitute an OCP violation, but would also be an exception to the ‘assimilation as spreading’ hypothesis.

<sup>25</sup> The final H of the noun + possessive forms is due to the H% boundary tone. These nouns are underlyingly toneless, receiving the H% boundary tone on all but their first (= prefixal) mora

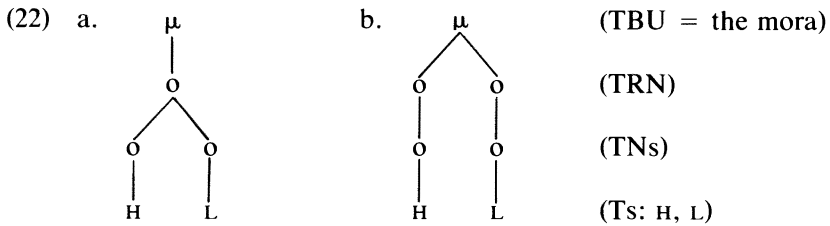
- b. *ki-tooke* = *kyaange* ‘my plantain tree’ [kì-tóókè = kyààngé]<sup>26</sup>  
Ⓜ (cf. [kì-tóóké])
- c. *ki-lagiro* = *kyaange* ‘my order’ [kì-làgírò = kyààngé]  
Ⓜ (cf. [kì-lágíró])
- d. *ki-sumuluzo* = *kyaange* ‘my key’ [kì-sùmúlùzò = kyààngé]  
Ⓜ (cf. [kì-súmúlúzó])

In 21d, for instance, we must first derive *ki-sumúlúzó* by linking the Ⓜ to all of the moras from the M2 to the FV of the noun stem. This then becomes *ki-sumúlùzò* by MR. The analysis thus has two unfortunate consequences: first, the complexity of the derivation (with Hs being linked to numerous tone-bearing units (TBUs) only to be changed to L); and second, the difficulties in formulating MR.

As a final and important objection, the property of ‘at most one drop from H to L’ is only indirectly captured. The accentual accounts we rejected were all designed in such a way that this ‘pitch-accent’ property bore a nonarbitrary relation to the underlying representations. In the tonal analysis, one arrives at the basic property in 1 only as the result of the interaction of several rules. The question here is whether such an indirect encoding of the HL melody is any less revealing than a direct one.

We conclude that at least the last three objections raised against the underlying H analysis are serious enough to cause concern. Given the shortcomings we have identified in the various accentual and tonal analyses considered thus far, the need for a new approach is quite clear. In the following section we present an analysis that avoids the pitfalls of its predecessors.

6. A NEW APPROACH TO LUGANDA TONE. The approach we shall now present continues to view tone as tone in Luganda, but with two important modifications. First, we argue that the M2 and the FV are ‘privileged positions’ in the verb stem, and we encode these by means of a grid mark. Second, we reinterpret underlying tonicity as a HL complex having the geometry in 22a.



by the procedure outlined in §2. For the sake of completeness note that the Ⓜ tone links to the final vowel when the possessed noun has a H of its own. Thus, *ki-sásiro* + Ⓜ + *kyaange* + H% ‘my garbage’ is realized as [kì-sásiró kyààngé]: Ⓜ links to the mora [ró], the L of [sí] deletes by LTD, and HTP.

<sup>26</sup> In this example, the M2 H of *-toóke* spreads to the preceding vowel so as to avoid a LH rising tone, which is not permitted in Luganda.



process, the final vowel morpheme will lengthen in M2 position specifically because it is accented.<sup>28</sup>

A fourth argument derives from the consonant mutation that takes place before the adjective-forming suffix *-y*. As seen in 26a, the final [l] or [d] of a verb labiodentalizes to [v], as do other consonants, before the suffix *-y*. However, as seen in 26b, this process is blocked if the [u] is the second stem vowel, i.e. if it is accented.<sup>29</sup>

- (26) a. *-lebel-* 'be loose' → *-lèbév-ù* 'loose' (*-lebèl-y*)  
*-soongol-* 'sharpen' → *-sóóngòv-ù* 'sharp' (*-soòngol-y*)  
*-goond-* 'be soft' → *-góónv-ù* 'soft' (*-goònd-y*)  
 b. *-kúl-* 'grow up' → *-kúl-ù* 'grown up' (*-kul-ÿ*)  
*-kál-* 'get dry' → *-kál-ù* 'dry' (*-kal-ÿ*)

As a fifth argument, we should note that every stem must have at least two moras (Hyman & Katamba 1990). We interpret this as meaning that the M2 accent is obligatory on all stems—and that a stem therefore cannot be underlying /CV/, i.e. monomoraic. As a result, nouns such as 'bell' in 27a have a stem with two vowel lengths, which are preserved before an enclitic in 27b.

- (27) a. [kì-dé] 'bell' /-de<sup>˘</sup>/ b. [kì-déé = kí] 'which bell?'  
 [mà-tá] 'milk' /-ta<sup>˘</sup>/ [mà-táá = kí] 'which milk?'

We can account for this fact by saying that Luganda stems must minimally constitute a bimoraic foot, the second mora of which is accented.

The final argument is one that supports not only the M2 accent but also the FV accent treated below in §6.1.2. As is well known from studies such as Tucker 1962, Cole 1967, Katamba 1974, Clements 1986, and others, whenever two (or more) vowels come together across a morpheme boundary, the first vowel either becomes a glide or deletes, depending on its identity. In either case the second vowel undergoes compensatory lengthening. What has not been recognized in earlier studies is that within a stem such heteromorphemic sequences produce a long vowel ONLY if the second vowel is in an accented position. In 28a length is preserved because the vowel of the applicative suffix *-ir-/er-* 'for/at' is in M2 position:

- (28) a. *ku-gu-ir-á* → *ku-gw-iir-a* 'to fall for/at'  
*ku-tá-er-á* → *ku-t-éèr-a* 'to let go for/at'  
 b. *ku-sib-ÿ-agan-ÿ-á* → *ku-sib-y-ágan-y-aa* 'to cause each other to tie'  
*ku-lim-ÿ-agan-ÿ-á* → *ku-lim-y-ágan-y-aa* 'to cause each other to cultivate'  
 c. *ku-wá-èbu-agan-á* → *ku-w-éèbw-ágan-a* 'to be given (to) each other'

<sup>28</sup> Or, as Bruce Hayes has suggested to us (personal communication, 1990), there is a desire for the first part of the reduplication, if bisyllabic, to be an iamb.

<sup>29</sup> We must assume that the FV accent does not block mutation in 26a. Patrick Bennett (personal communication, 1989) has suggested an alternative interpretation according to which the adjective-forming suffix would be a nonmutating *-u* when it is directly attached to a CVC verb root. While a majority of CVC roots have this property, however, a few exceptions have been noted.

In 28b there are two occurrences of heteromorphic vowel sequences, both involving the causative suffix *-j-*. When the causative vowel glides to [y], the following vowel [a] of the reciprocal suffix *-agan-* appears as a short vowel (marked by  $\breve$ )— because the /a/ is not in M2 position (but rather is the third mora of the verb stem). By contrast, when the same *-j-* formative glides to [y] before the inflectional FV morpheme *-a*, the latter is realized long, providing the first evidence that the FV too is accented.<sup>30</sup> Finally, in 28c we also have two occurrences of vowels meeting across morphemes. Here, when the *a* of the verb root *-wá-* ‘give’ coalesces with the M2 *e* of the passive suffix *-ebu-*, the resulting length is preserved. When the *u* of the passive suffix is glided, however, the following *a* is not compensatorily lengthened, because it is not in M2 position (it is in fact the fourth mora of the verb stem, and hence is not accented).

There are doubtless alternative (unrelated) interpretations of one or more of the above facts. Our contention, however, is that it is not an accident that so many rules single out the M2 for special treatment. Taken together, these rules form a strong argument that there is an M2 stem accent that affects much more than tone.

**6.1.2. THE FV POSITION.** Our justification for recognizing the FV as a privileged position will be briefer. As is well known, the FV has properties unlike any other suffixal vowel. In terms of distribution, for instance, there is only a three-way vowel opposition /I, U, a/ on vowels that appear between the initial root vowel (RV) and the FV, where /I/ and /U/ show up as [i, u] or [e, o] depending on the identity of the preceding vowel.<sup>31</sup> The FV of verbs (and the corresponding last vowel of noun stems), like the RV, shows the full seven-vowel opposition of Proto-Bantu: \**j, i, e, y, u, o, a*. This observation has caused some scholars to see the FV as carrying a secondary accent (see e.g. Bennett 1978). We shall do the same. As we shall see, the grid mark that the FV carries will attract tone just in case tone cannot link to the M2.

**6.1.3. GRID MARKS.** We have shown that there are good reasons for designating the M2 and FV as privileged positions within the stem. As we shall further document in §6.2, these are the only positions to which tone may be assigned at the stem level. How then can the special character of these positions be encoded? In this section we briefly consider the following four alternatives:

(a) ACCENT. As we have just seen, we can provide special grid marks over these positions to indicate that they are prominent or ‘accented’. This has been proposed for other Bantu languages whose H tones show a special affinity for

<sup>30</sup> As previous studies have often pointed out, this length will surface only if the FV is followed by an appropriate enclitic, as in *ku-sib-y-ágan-y-aa = kô* ‘to cause each other to tie a little’. See Hyman & Katamba 1990 for a full account of final-vowel shortening.

<sup>31</sup> There are two exceptions to this distribution: The perfective suffix \**-id-* has a vowel that in many Bantu languages turns up invariably as [i]. Similarly, the causative suffix \**j* seems to be a uniform high vowel.



In 29b–d the two positions are distinct. The single HL suffixal tone (see §6.2) links up to the leftmost available gridded vowel, which is the M2 in all cases. In the absence of such grid marking, it would be difficult to explain why the suffixal HL does not link to the word-initial (= leftmost) mora in these nouns, or to the final mora of the noun stem, which immediately precedes the unlinked HL contour. With the grid marks in 29 there is in fact no need to refer explicitly to the internal stem structure of the possessed noun at all. Nor is there any need to spread the free H to all positions from the M2 to the FV, followed by multiple applications of Meeussen's Rule, as was done in 20 and 21. In short, we have considerably simplified the derivation by having the suffixal tone go directly to the M2 without having to hit all the intervening vowels. With these gridded positions, we can now also avoid the problem mentioned earlier concerning the formulation of MR: since the suffixal tone does not spread to a sequence of vowels, but rather goes directly to the M2, the H that undergoes MR will never be branching. Hence, a purely geometric characterization of MR is again possible, as we shall now see.

**6.2. UNDERLYING HL TONE.** From the preceding discussion we conclude that there is much to be gained if the M2 and FV are recognized as privileged, gridded positions. In this section we shall argue for the second part of our new approach by demonstrating the advantages to be gained from representing underlying tone as HL complexes.

First, recall from §5 the problem of capturing the relationship between MR and LTI in the tonal analysis with underlying H. We pointed out that these two rules apply in complementary environments, as shown in 30:

- (30) a.  $\underset{\text{H}}{ku-wulir-a} \rightarrow \underset{\text{H L}}{ku-wùlir-a}$  'to hear' (LTI)  
 b.  $\underset{\text{H H}}{ku-ba-wulir-a} \rightarrow \underset{\text{H L}}{ku-bá-wùlir-a}$  'to hear them' (MR)  
 c.  $\underset{\text{H H}}{ku-ba-wulir-a} \rightarrow \underset{\text{H HL}}{ku-ba-wulir-a} \rightarrow \underset{\text{H LL}}{*ku-bá-wùlir-a}$  (\*LTI and MR)

In 30a, LTI inserts a L tone if the last H of a word is not itself preceded by a H. When the last H of a word is directly preceded by at least one other H, as in 30b, MR applies instead, lowering all but the first of the H tone sequence. If we allow LTI to precede MR, as in 30c, we obtain the wrong result, i.e. with one more L tone than is warranted. In fact, if LTI is ordered after MR, its formulation is quite simple: a L tone is inserted whenever the last tone of a word is H, as in 31.

- (31)  $\emptyset \rightarrow L / H \text{ \_\_\_\_ } ]_w$

The two rules thus constitute a 'conspiracy' to produce a H to L pitch drop. In the H tone approach, the two separate rules applying in complementary environments could conceivably have been unrelated. With underlying HL this conspiracy is directly captured, as in 32. In 32a we begin with the underlying HL linked to the first mora of the verb stem. By an independently motivated

rule of contour simplification (33),<sup>34</sup> the L is delinked from this mora, and it then relinks to the next mora (which is the gridded M2). The result is a H to L pitch drop from the M1 to the M2.

- (32) a.  $ku-wulir-\grave{a} \rightarrow ku-wulir-\grave{a}$  'to hear' ( $ku-wulir-a$ )  
 $\begin{array}{c} \wedge \\ HL \end{array}$        $\begin{array}{c} || \\ HL \end{array}$
- b.  $ku-ba-wulir-\grave{a} \rightarrow ku-ba-wulir-\grave{a}$  'to hear them' ( $ku-ba-wulir-a$ )  
 $\begin{array}{c} \wedge \quad \wedge \\ HL \quad HL \end{array}$        $\begin{array}{c} \wedge \quad | \\ HL \quad L \end{array}$

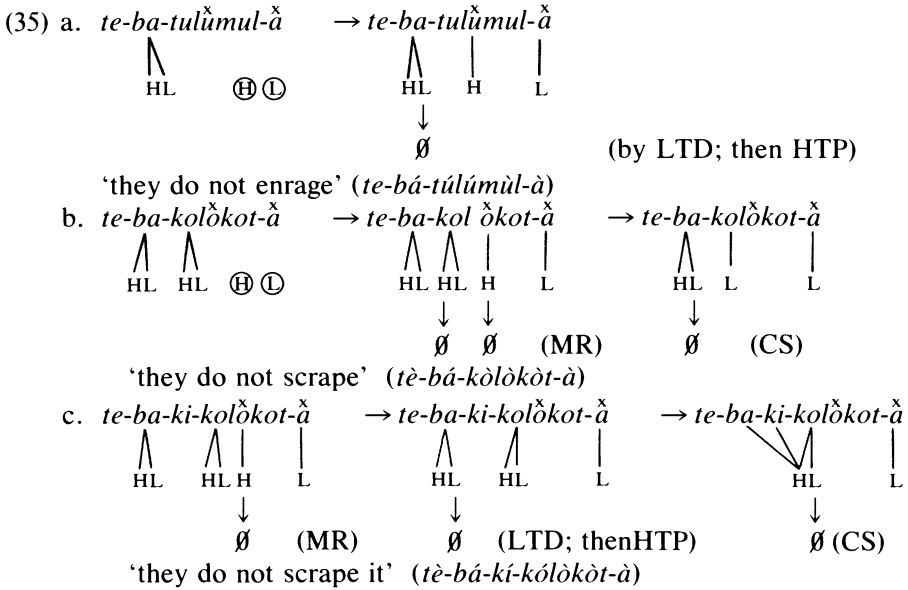
- (33) CONTOUR SIMPLIFICATION (CS):  $\begin{array}{c} \mu \quad \mu \\ \wedge \\ H \quad L \end{array}$

In 32b there are two underlying HL contours—one on the first mora of the verb stem, one on the preceding object marker. As a result, in this case MR applies; we reformulate MR in 34. In this reanalysis MR is a rule that deletes a H when it is directly preceded by a L. When the H is co-linked to its mora with the L of the HL contour, the L naturally remains behind. Also, when there are more than two HL contours on successive TBUs, MR will apply more than once, leaving L tones in the affected positions, as justified in §5.

- (34) MEEUSSEN'S RULE (MR):  $\begin{array}{c} \mu \quad \mu \\ | \quad | \\ L \quad H \\ \downarrow \\ \emptyset \end{array}$

With the above apparatus, we are now in a position to account for the M2 pattern on verbs that we saw above in 19. Our reanalysis is shown in 35. As we have established, both the M2 and the FV of the verb stem are gridded. We know that the M2 stem tone pattern requires a suffixal tone (a H tone in the previous analysis). While all of the prelinked tones were said to be HL contours having the tonal geometry in 22a, we suggest that, in the M2 pattern, the two components of the HL contour are not linked together at the TRN. Instead, they occur as two TNs that link separately to the gridded positions. While either left-to-right or edge-in association works here, we propose, following Mutaka's similar analysis of Kinande (1990), that these tones link in the following fashion: if the domain does not have a tone, then the leftmost unlinked tone links to the leftmost TBU (with gridded positions taking precedence over nongridded ones); if the domain does have a tone, then the rightmost unlinked tone links to the rightmost (gridded) TBU. Thus, in 35a, where the verb root is toneless, the unlinked H links to the M2 and the unlinked L to the FV. In 35b, where the verb root has a linked HL, the unlinked L first links to the FV, and then the preceding unlinked H links to the the M2.

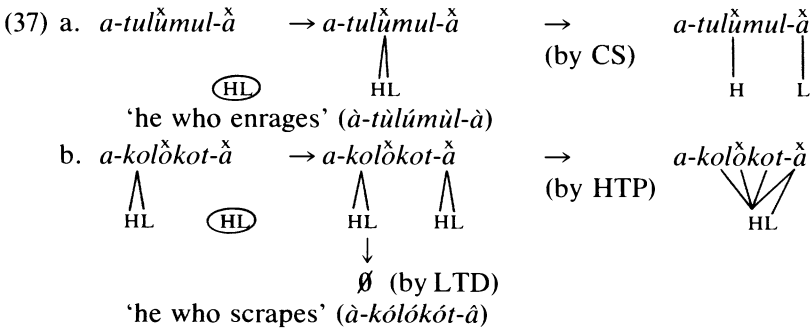
<sup>34</sup> A single mora with HL falling tone is possible only before pause in Luganda. The rule of CS is thus independently needed to account for the realization of *o-mu-ti* 'tree' in examples such as [ð-mù-tí mù-néné] 'the tree is big' and [ð-mù-tí 'gú-gw-à] 'a tree is falling'. (The freed L causes a downstep in this last example.)



In addition to the M2 pattern, there also is a ‘mixed’ M2/FV pattern on verbs.<sup>35</sup> In tenses characterized by this pattern, toneless verbs show the same M2 H tone as before, illustrated in 36a, while H tone verbs of at least three moras show a HL pitch drop on their FV, as in 36b.

- (36) a.  $a-gul-\grave{a}$  ‘he who buys’    b.  $a-l\acute{a}b-\grave{a}$  ‘he who sees’  
 $a-si\acute{i}g-\grave{a}$ <sup>36</sup> ‘he who smears’     $a-l\acute{e}t-\grave{a}$  ‘he who brings’  
 $a-lag\acute{i}r-\grave{a}$  ‘he who commands’     $a-w\acute{u}l\acute{i}r-\grave{a}$  ‘he who hears’  
 $a-tul\acute{u}mul-\grave{a}$  ‘he who enrages’     $a-k\acute{o}l\acute{o}k\acute{o}t-\grave{a}$  ‘he who scrapes’

In order to account for the M2/FV pattern, we assume the same analysis, though in this case we start with a suffixal HL co-linked to a single TRN. When the verb stem is toneless, as in 37a, the HL suffixal tone links to the M2 mora by left-dominant edge-in association.



<sup>35</sup> This has been documented in a number of other Bantu languages as well (Hyman & Byarushengo 1984, Goldsmith 1987, Mutaka 1990).

<sup>36</sup> This form is realized [à-síí-g-à], since LH rising tones are not allowed in Luganda.

When the stem is HL tone, as in 37b, the HL suffixal tone links to the FV by the edge-in procedure described above.<sup>37</sup> In this latter case LTD applies, followed by HTP.<sup>38</sup> In order to obtain the correct output in 37a, CS (Contour Simplification) must apply, delinking the one L tone, which then relinks to the accented FV. As seen in 38, this same output is required independent of the length of the verb stem, further demonstrating that, in reduplications, the first stem is embedded inside the second:<sup>39</sup>

- (38) a. *a-tulùmùl-à-tùlùmùl-à* 'he who enrages again and again'
- b. *a-kòlòkòt-à-kòlòkòt-à* 'he who scrapes again and again'

The derivation of 38a is thus as shown in 39. In order to obtain this result, we propose that the relinking of L following CS takes place as follows: if the TBU of the HL tone is gridded, the delinked L relinks to the rightmost gridded position, as in the output of 39. If the TBU of the HL is not gridded, the delinked L relinks to the following TBU (whether gridded or not), as in 40.<sup>40</sup>

- (39)  $a-[ [ \text{tulùmùl-}^{\check{x}} ] \text{tulumul}^{\check{x}} ] \rightarrow a-[ [ \text{tulùmùl-}^{\check{x}} ] \text{tulumul}^{\check{x}} ]$
- 
- (40) a.  $ba\text{-}tulùmùl\text{-}^{\check{x}} \rightarrow ba\text{-}tulùmùl\text{-}^{\check{x}}$  'they enrage' (*bá-tùlumul-a*)
  - b.  $a\text{-}ki\text{-}kòlòkòt\text{-}^{\check{x}} \rightarrow a\text{-}ki\text{-}kòlòkòt\text{-}^{\check{x}}$  'he scrapes it' (*a-ki-kòlòkòt-a*)
- 

This M2/FV pattern is quite pervasive in the language; it represents the assignment of a suffixal tone at a later stage than the M2 pattern. We have already seen an M2 H tone on nontonic nouns in the possessive construction in 29. Since both the M2 and the M2/FV patterns show the same result with nontonic stems, it is only tonic stems such as those in 41a that tell us that the possessive construction in fact utilizes the M2/FV pattern. As seen in the rep-

<sup>37</sup> Although our edge-in algorithm accounts for the M2/FV pattern, one might alternatively consider that the HL suffixal contour cannot link to the M2 in these and analogous examples because this would create HL contours on two successive TBUs (the initial root vowel and the M2). In this case HL–HL would be considered an OCP violation, while HL–H (from the M2 pattern) would not be.

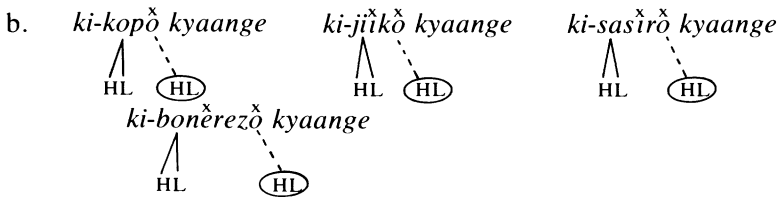
<sup>38</sup> The form *à-láb-à* 'he who sees' in 36b shows that, if the verb stem has only two moras, it will be realized as H–L. This is obtained by allowing the HL to link to the FV, followed by the application of MR.

<sup>39</sup> We know that this internal structure is needed, because the first part of a reduplicated verb stem undergoes final vowel shortening (Hyman & Katamba 1990), thus requiring the internal right bracket seen in 39.

<sup>40</sup> If we assume that the (nongridded) moras that appear between the M2 and the FV are not TBUs, we can generalize and say that a delinked L always relinks to the next TBU. Within the stem the L will correctly go to the M2 (if it came from the RV) or to the FV (if it came from the M2). Assuming that all pre-stem moras are (potential) TBUs, a freed L will relink to the immediately following mora. The one open question is why the freed L in 40a does not relink to the M2. Here we must assume that the RV is at this stage a TBU and thus available as a tone landing site.

representations in 41b, the suffixal HL tone will be assigned to the FV of each tonic noun according to the edge-in procedure proposed above. This completes the basic outline of our proposal.

- (41) a. *ki-kópò* 'cup'                      *ki-kópò kyàànge* 'my cup'  
*ki-jũko* 'spoon'                      *ki-jũkó kyààngè* 'my spoon'  
*ki-sásiro* 'rubbish'                      *ki-sásiró kyàànge* 'my rubbish'  
*ki-bónèrezo* 'punishment'                      *ki-bónèrészó kyàànge* 'my punishment'



7. FURTHER APPLICATIONS OF THE ANALYSIS. In this section we briefly consider certain additional aspects of Luganda tonology that have not received adequate treatment in the literature. We demonstrate that some of the more problematic features of Luganda tone can be insightfully described once one accepts the representations we have just proposed. As we shall see, these all have to do with cases where the H of a HL contour is attracted to a preceding grid mark.

7.1. THE THIRD MORAL RULE. We begin by considering tonal alternations involving the presence vs. the absence of the augment or 'initial vowel' (IV) on nouns such as those in 42.

- (42) a. *ki-sikí* / *e-ki-síkí* 'log'  
*mu-walâ* / *o-mu-wálâ* 'girl'  
 b.<sup>41</sup> *lu-gaándà* / *o-lu-gáàndà* 'Luganda'  
*bu-lúúngì* / *o-bu-lúúngì* 'beauty'  
 c. *mu-manyífù* / *o-mu-mányifù* 'well-known (person)'  
*ki-lebévù* / *e-ki-lébèvù* 'loose (thing)'  
 d. *mu-manyílivù* / *o-mu-mányilivù* 'expert'  
*mu-tamüvù* / *o-mu-támüivù* 'drunkard'

The forms on the left consist of a CV- noun-class prefix followed by a noun stem realized with a H on its M2 and a L on its FV (as one would naturally obtain through either the M2 or the M2/FV pattern discussed in §6.2). The corresponding nouns to the right begin with the IV morpheme; their H tone is realized one mora to the left of where it occurs on forms without an IV. The result is that the H stays on the third mora of the noun.

To obtain this retraction of the H tone, we propose that the M2 assignment rule applies twice in a derivation, assuming the model of lexical phonology, as

<sup>41</sup> In the nouns [lù-gáàndà] and [bù-lúúngì], the M2 H of *-gaándà* and *-luúngì* spreads to the preceding vowel so as to avoid a LH rising tone, which is not permitted in the language.

applied to tone in Pulleyblank 1986. First, as part of stratum 1 (stem) phonology, an accent is assigned to the M2 of a stem. Then, at stratum 2 (i.e. word phonology), the first mora of a word is marked off as extrametrical and accent is reassigned to the M2 of the remainder. A sample derivation is shown in 43. Note that the IV of such words is marked off as extrametrical. The M2 accent assignment rule then reapplies, effectively shifting the grid mark one mora to the left. The H then spreads to the new gridded position and delinks from the old M2, which is no longer accented.<sup>42</sup>

$$(43) [sik\acute{x}] \rightarrow e-ki-si\acute{k}\acute{x} \rightarrow (e-)ki-sik\acute{x} \rightarrow (e-)ki-s\acute{x}ki \rightarrow (e-)ki-s\acute{x}ki$$

The data in 44 show that the same alternations take place in the verb paradigm:

- (44) a. *a-gul-â* 'he who buys'                      *a-bi-gúl-à* 'he who buys them'  
           *a-sib-â* 'he who ties'                        *a-tu-sib-à* 'he who ties us'
- b. *a-siíg-à*<sup>43</sup> 'he who smears'                *a-bi-siíg-à* 'he who smears them'  
           *a-yaám-b-à*<sup>43</sup> 'he who helps'              *a-tu-yaám-b-à* 'he who helps us'
- c. *a-lagír-à* 'he who commands'              *a-tu-lágir-à* 'he who commands us'  
           *a-sib-ír-à* 'he who ties for'                *a-tu-sib-ír-à* 'he who ties for us'

The relative affirmative present tense, illustrated in 44, requires the M2/FV 'mixed' pattern illustrated in §6.2. Since all of the verb roots in 44 are underlyingly toneless, the HL tone is assigned to the M2, as clearly seen in the forms on the left. In the forms on the right, however, where an object prefix is added, the H is realized one mora to the left. As shown in 45, the suffixal HL first links to the stem M2 (which is the FV in this example). At the word level, we again propose that the first mora (here, the subject prefix *a-*) is extrametrical and that M2 accent assignment reapplies to the remainder.<sup>44</sup> This is followed by attraction of the H to the new M2 position, and its delinking from the original M2.

$$(45) [gul-\acute{x}] \rightarrow [gul-\acute{x}] \rightarrow a-bi-gul-\acute{x} \rightarrow (a-)bi-g\acute{x}l-a \rightarrow a-bi-g\acute{x}l-a$$

There is an important constraint on the reapplication of the M2 assignment rule: the moras that precede the stem M2 must be toneless, as illustrated in

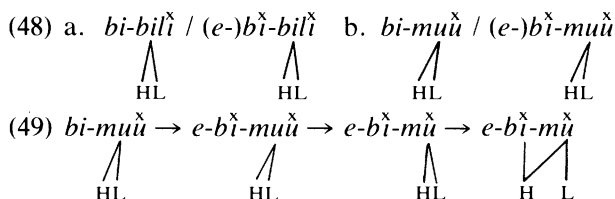
<sup>42</sup> The second or word-level application of M2 accent assignment will apply vacuously to words lacking an IV. After the first mora is marked off as extrametrical, the M2 of the 'remainder' is still the stem M2.

<sup>43</sup> As before, the M2 H assigned to the second V of a CVV syllable spreads to the preceding V to create a (long) level H tone, i.e. [à-sííg-à], [à-yaám-b-à].

<sup>44</sup> It can actually be argued that *a-* combines both the class 1 (human singular) subject prefix and a preceding IV *a-* of the same shape; cf. the sequence *a-bá-* 'they who' in the corresponding plural forms in (46).



differ from those in 47a only in that they are monosyllabic. Taking advantage of this fact, we propose the derivation in 49.



Ex. 49 shows that, when the IV is present, a grid mark appears on the numeral prefix. This is followed by an application of final vowel shortening. Since the grid mark represents a metrical prominence, rather than a diacritic, the remaining vowel now becomes the head of the monosyllabic constituent. In the final stage of the derivation, the H of the monosyllabic stem spreads to the preceding gridded mora. What we claim is that a H that spreads to a preceding prominence will not delink from its own mora IF IT IS GRIDDED. Further evidence of this will be seen in §§7.3–7.4.

Before we move on, however, note in 50 that the same alternations characterize the two monosyllabic possessive pronouns in Luganda (second and third person singular):

- (50) a.  $bi-by-\acute{o} / e-b\acute{i}-by-\acute{o}$  ‘yours (sg.)’ (<  $bi-o$ )  
 b.  $bi-by-\acute{e} / e-b\acute{i}-by-\acute{e}$  ‘his/hers’ (<  $bi-e$ )

Again, we would assign a grid mark to the  $bi-$  prefix when these pronouns are preceded by the IV.

As illustrated in 51, the retraction of H in numerals and possessive pronouns has quite different properties from the retraction of H in the nouns and verbs in §7.1:

- (51) a.  $na = b\acute{i}-bil\acute{i}$  ‘with two’    vs.  $na = ki-sik\acute{i}$  ‘with a log’  
 $na = b\acute{i}-m\acute{u}$  ‘with some’  
 $na = b\acute{i}-by-\acute{e}$  ‘with his/hers’
- b.  $n\acute{e}-\acute{e} = b\acute{i}-bil\acute{i}$  ‘with two’    vs.  $n\acute{e}-\acute{e} = k\acute{i}-s\acute{i}k\acute{i}$  ‘with a log’  
 $n\acute{e}-\acute{e} = b\acute{i}-m\acute{u}$  ‘with some’  
 $n\acute{e}-\acute{e} = b\acute{i}-by-\acute{e}$  ‘with his/hers’

First, 51a shows that these numerals and possessive pronouns acquire a grid mark on their prefix when preceded by a proclitic such as  $na =$  ‘with’, whereas nouns (and verbs) don’t. This suggests that the reapplication of the M2 on nouns (and verbs) is a word-level rule only. Second, unlike the reapplication of the M2 rule in §7.1, the proposed gridding of numeral and possessive prefixes in 51b is not blocked by a preceding H tone (which the IV has when preceded by a proclitic; see Hyman & Katamba 1990–91). Thus, while both retractions are sensitive to grid marking, these are clearly two distinct phenomena.

**7.3. PENULTIMATE H NOUN STEMS.** Further evidence for the morphologically conditioned grid-assignment rules can be seen in the tonal alternations in 52.

- (52) a. *b-bàkùli* 'bowl' pl. *ma-bákùli* (< Sw. *bakuli*)  
*g-gùnyà* 'sack' pl. *ma-gúnyà* (< Sw. *gunia*)  
*n-dègèyè* 'bird (sp.)' dim. *ka-légèyè* (< Sw. *ndege*)
- b. *k-kálààmù* 'pen, pencil' pl. *ma-kálààmù* (< Sw. *kalamu*)  
*t-tipóòtà* 'teapot' pl. *ma-típóòtà* (< Eng. *teapot*)  
*m-bálààsi* 'horse' dim. *ka-bálààsi* (< Sw. *farasi*)

Nouns that are borrowed from Swahili and English generally show a tonal prominence on the syllable that bears stress in the source language, generally the penult. In 52a there is a surface H on the short penultimate vowel, while in 52b there is a HL fall realized over the long penultimate vowel. The trisyllabic stems in 52, however, show the following alternation: when preceded by a 'monophone' prefix (either the homorganic nasal marking class 9/10 or the first half of a geminate marking class 5), the root-initial vowel is lexically toneless (here transcribed with a default L tone). When the same roots are preceded by a CV- prefix (e.g. plural class 6 *ma-* or diminutive class 12 *ka-*), the RV is realized with a H tone. To account for these facts, we first propose that these nouns have a grid mark on the head mora of their penultimate syllable which overrides the assignment of M2 and FV accents. In addition, a rule of allomorphy assigns a grid to the RV of such noun stems just in case they are preceded by a CV- prefix, as in 53. As before, the H of the HL contour will spread to the preceding gridded vowel and, since the penult is itself gridded, will not delink from its original position.<sup>46</sup>

- (53) a. *b-bakùli* vs. *ma-bàkùli*      b. *t-tipóòta* vs. *ma-típóòta*
- 

**7.4. ALL H NOUN STEMS.** The last set of forms we shall consider comprises nouns whose stems are H tone throughout, except for the last syllable, which contains a H to L falling tone:

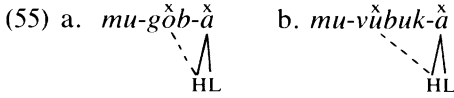
- (54) a. *mu-gób-â* 'driver' < *ku-gob-a* 'to drive away'  
*mu-sík-â* 'heir' < *ku-sik-a* 'to inherit'  
*bu-wáz-ê* 'force' < *ku-waz-a* 'to make an effort'
- b. *mu-vúbúk-â* 'adolescent' < *ku-vubuk-a* 'to reach puberty'  
*mu-sírís-ê* 'silent person' < *ku-sirik-a* 'to be silent'

The nouns in 54 are all derived from toneless verb roots. We therefore assume that the H on the RV of the corresponding stems must get there by rule.<sup>47</sup> In order to get a H throughout the stem, therefore, the representations in 55 are needed. As in the case of the penultimate H tone noun stems, these nouns have a grid pattern specific to them that overrides the general M2 and FV accent assignment rules. Both the RV and the derivational suffix *-a* (or *-e*) are gridded,

<sup>46</sup> For further discussion of these alternations, see Cole 1967 and Kalema 1977.

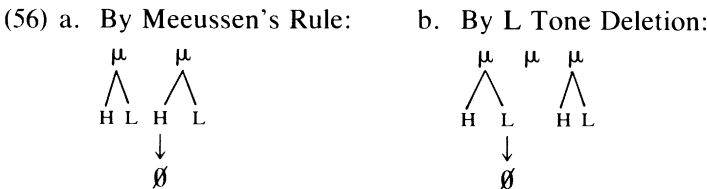
<sup>47</sup> There is another reason not to start with a HL contour on the root-initial vowel: If *mu-gób-â* had two successive HL contours, the second H should delete by MR. Well aware of this problem, Stevick (1969) proposed that the second 'tonic mark' floated after the *-a*, i.e. (using his underlines) *mu-gób-a\_*.

and the latter has a HL contour prelinked to it. As we also saw in the derivations in 49 and 53, the H of the suffix spreads to the preceding gridded mora (and does not delink from its own).



**8. CONCLUSION.** In the preceding sections we have presented an approach to Luganda tone that departs from previous analyses in two significant ways: we have suggested that all underlying marks of tonality consist of a H to L pitch drop, in most cases a HL contour either prelinked or assigned by rule to a specific mora; and we have presented a range of evidence in favor of M2 and FV accents at the stem level, which, however, can be overridden by lexical grid marks on specific stems. A number of advantages were seen to result from this departure from previous accentual and tonal interpretations of the Luganda tone system. First, being a tonal analysis, it has none of the drawbacks of earlier accounts that rely solely on underlying diacritic, metrical, categorial, or dynamic accents (§3). Specifically, since HL contours are not accents in any sense, we have no trouble explaining why only tone rules refer to them—and not, say, rules that alter consonants or vowels. Second, although it is a tonal analysis, it escapes most of the drawbacks of earlier tonal accounts (§4). In order to see how this is so, let us briefly consider the three Luganda-specific objections we raised in §5 to Hyman’s 1982 tonal analysis.

The first objection was that an analysis with an underlying H/∅ opposition only indirectly captured the basic property of at most one H to L pitch drop per Luganda word. The HL analysis, by contrast, starts with the notion of a pitch drop as basic. The intuition is that every underlying mark of tonality is a potential pitch drop—as opposed to a potential H tone. In the earlier tonal analysis, the change of a H–H sequence to H–L seemed to be just an arbitrary fact of Luganda. But the corresponding HL–HL sequence in the new analysis is affected by MR, as in 56a. The second H is deleted so that there will not be a second pitch drop in the same word. In other words, MR is part of the same ‘conspiracy’ as the rule of LTD: in 56b, when HL contours occur on noncontiguous moras within a word, instead of MR deleting the second H, LTD deletes the first L. This is followed by H plateauing from the first to the second H, thus again avoiding a form with two H to L pitch drops. We suggest that there is a nonarbitrary relation between our choice of underlying HL and the surface HL melody of Luganda words that have lexical tone.



A second (related) objection was that the earlier tonal analysis provided two rules, MR and L tone insertion (LTI), which had the same effect of creating

a drop from H to L and which applied in complementary environments. In the HL reanalysis there is no LTI rule. Instead, if MR fails to apply to the last HL of a word, the drop is already present in the representation. In this case the L will delink by the general rule of contour simplification and relink to the next tone-bearing unit, as we have seen.

The third objection concerned the means by which a suffixal tone was assigned to the stem M2 in both nouns and verbs. The suffixal H had to link to all moras from the M2 to the FV. This was followed by the application of MR, which changed all but the first of the successive H moras to L. This complexity was compounded by the fact that MR had to apply identically to moras that had their own H feature and to successive moras linked to the same H. In the HL analysis, the H feature links to the M2 and the L to the FV. Hence, there is no need to make moras H and then convert them to L—nor are there any branching Hs to which MR may apply.

In other words, we believe that this new approach captures all of the insights of the accentual approach without having any of its shortcomings. It is in a sense an 'integrative' solution that at once recognizes the importance of the pitch drop, of accentual prominence, and of tonal semi-autonomy. We are particularly struck by the way in which this analysis bears on some of the typological conclusions reached in the 1970s. Hyman & Schuh 1974 claimed—other things being equal—that tone spreading tends to be perseverative rather than anticipatory. In Luganda, H tones clearly move from right to left. As we have seen, however, this anticipatory spreading is triggered by an accent. As noted already in the 1970s (Hyman 1978), there is a tendency for tone to be attracted to an accentually prominent position, something that is much better understood as a result of more recent work on the interaction between tone and metrical structure (e.g. Goldsmith et al. 1989, Kenstowicz 1989, Kisseberth 1989, Rice 1987).

Finally, we must comment on the issue of indeterminacy that we leveled against the accentual approaches and ask how we know whether a given tone system—even limiting our attention to Bantu—is to be analyzed with underlying H or HL. It appears to us that a HL approach will work at least as well in Tonga as Goldsmith's 1984 asterisk analysis and Pulleyblank's 1986 reanalysis with underlying H, and that a corresponding LH contour can work as well as Batibo's 1976, 1985 and Goldsmith's 1985 analyses of Sukuma. In fact, our contour analysis is quite similar in spirit to proposals of Goldsmith (1984, 1985), who posited underlying LH sequences for Sukuma and inserted a HL sequence for every asterisk in Tonga that survives MR. While the analysis works out neatly for Luganda if we assume that the HL complex is a tonal contour having the geometry in 22a, a somewhat more complex analysis is possible within which the H and L are separate tones. At this stage it is not clear how many different tonal geometries are needed to provide explanatory accounts of the tonal properties of different languages. Whether a contour, a cluster, or a sequence, a HL analysis faithfully reflects the centrality of the H to L pitch drop within the Luganda tone system. In our study of Luganda we have attempted, first, to demonstrate that a tonal analysis is superior to a nontonal one, and

second, that a complex HL representation is justified over a single tone feature H. And third, we have attempted to show that an independently motivated grid system interacts in significant ways with the realization of tone in Luganda. The facts presented in this study provide further evidence that lexical tone and metrical accent can coexist in the same prosodic system.

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