Tone and Accent in Llogoori

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> For each [language], one can ask the question, "Is it a pitch-accent language or a tone language?" However, I think that that is a stupid question to ask, since ... various characteristics of pitch-accent systems and of tonal systems are to a fair extent independent of one another and ... there is no reason for squeezing the diversity of phonological systems discussed here into a simple dichotomy. (McCawley 1978, 127-28).

1. *Introduction*

Two themes that are carefully developed in James McCawley's work are the importance of studying accentual properties that may hide behind overt tonal behavior, and the importance of recognizing that two notions which are popularly taken as incompatible may not be incompatible at all. Oftentimes it is only our habits of lazy thinking in traditional categories which lead us to imagining that there are divisions in the phenomena being studied where none actually exist.[1]

The purpose of this note is to illustrate how the attempt to *distinguish* tone from accent languages can be misleading, by looking at two odd tonal patterns in Llogoori (a.k.a. Maragoli, Ragoli, Lugoli), a Bantu language spoken in Kenya near Lake Victoria, analyzed in detail by Elizabeth Leung 1986. These tone patterns are odd both from a comparative point of view, and from the point of view of the autosegmental models of tonal analysis which have been established in recent years to account for a wide range of tone assignment principles found in Eastern Bantu languages.[2] The particular conclusion we draw is that Llogoori has developed a quantity-sensitive accentual system quite similar to the familiar quantity-sensitive pattern found in Latin or in English, a pattern in which vowel length determines syllable weight. In some ways the result is similar to the analysis given in Selkirk 1986, in others rather different; in any event, the present analysis provides an account of the "missing link" between tone and traditional accent systems.

In section 2, we will review a number of the generalizations that Leung establishes for Llogoori, set against the background of what is known more generally about the well studied Lacustrine family (Bantu languages of the Lake Victoria region) in which the language is placed.

In section 3, we will turn to the surprising tone assignment patterns of the Present Continuous Future and the Middle Future tenses. After sketching the relevant facts, we will suggest that they can only be understood naturally as first stages in the development of a quantity-sensitive accent system.

Any linguistic discussion of this sort is motivated by the writer's belief that the set of data under discussion is of special interest either for theoretical reasons (the data cannot be simply and straightforwardly analyzed, given our present-day theoretical assumptions) or for comparative reasons (the observed forms are not expected, given our understanding of how other related languages work). We do not always find that both motivations come together to stimulate the same discussion, but that is the case here. From both a theoretical and a comparative point of view, the tone pattern in the Middle Future tense, discussed in section 3.2, is an oddity. For a tone language, the placement of a tense-specific tone on the third syllable of the stem requires a kind of counting that is quite unexpected, in light of our knowledge of tone-assignment rules; for a Lacustrine language, there is no obvious source of such a pattern historically, either. My goal is to shed some light on these two problems, together.

2. *Some Generalizations about Llogoori*

2.1 *Some initial facts about the tone system*

Llogoori has a tonal system with underlying High (H) and Low (L) tones, but morphemes may be underlyingly toneless as well. As a first approximation, we may say, following Leung (p. 12), that the syllable is the tone-bearing unit of the language, because while there are long and short voweled syllables, there is no contrast based on the *location* of tone (or anything else) within the syllable. There is, that is to say, nothing like a contrast between rising and falling tone, or anything of the sort that would distinguish the first and second mora within the syllable, except that there is a contrast established late in the phonology between high- and falling-toned long syllables. A surface syllable is of the form (C) V (V).

On the surface, Llogoori has familiar properties of tone languages, including long sequences of syllables pronounced on the same tone (here, pitch level), which may be either Low or High, with a downstepped High as a third possibility. In addition, falling tones are created, though late in the phonology. While most grammatical morphemes that are tonal are High in tone, some are Low. In short, Llogoori looks on the surface like a tone language, like its closely related neighboring Bantu languages.

One notable feature of the Llogoori system is the downstep that occurs between adjacent High tones. A High that is associated with two or more syllables, as in (1a), is pronounced across the two vowels on the same tone, but two distinct High tones are pronounced with a lowering of pitch (downstep) on the second High, as in (1b).

(1) a. V V b. V V
\ / | |
H H H

One can infer, when faced with a sequence of like-pitched High toned syllables, that a single High tone has associated with all of these syllables. This is especially useful because Llogoori, like a number of Bantu languages,[3] encourages a tone from a phrasal complement to spread leftward over all the toneless vowels at the end of a verb. By noting which spans of syllables at the end of a verb are at the same pitch as the first syllable of the following word, we can determine which syllables of the verb stem are toneless at the end of the word-level phonology.

2.2 *The structure of the derivation*

Developing a point that is perhaps tacit in Leung's account, we may divide the rules of Llogoori, and the tonological derivation of the verb, into three stages. In the first stage, a number of processes that are highly sensitive to morphological category assign tones to the certain vowels of the verb. Through these processes, which we may call the morphotonology, we produce a structure in which (a) each tone is associated with exactly one vowel, and (b) all vowels are associated with either no or one tone. Furthermore, no processes sensitive to phrase-level information have yet applied. When two morphotonological processes are independently formulated in such a way that they would attempt to associate distinct tones with a given vowel (High and Low), then one of them must have priority, for no contour tones arise in this process. This certainly sounds like a process of accent assignment, and indeed it is close to being just that.

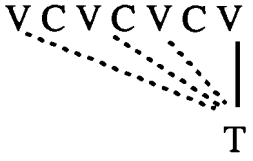
In the second stage, corresponding more clearly to our current conception of the lexical phonology, phonological rules may apply which continue to satisfy conditions (a) and (b) mentioned just above, and in which boundaries are mentioned. Here, however, inflectional categories are not mentioned. Thus, in the morphotonology, a tone may be assigned to the penultimate syllable specifically "in the Imperative form", e.g; such inflectional specifications are

not mentioned in rules in the second stage, which only recognizes such distinctions as *stem* versus *prefix*, and so forth. Put another way, in this second stage, syntagmatic rather than paradigmatic categories are recognized (this is an important difference to bear in mind when considering that certain phonological rules are morphologically conditioned). This component includes Meeussen's Rule, which lowers the High tone of the first syllable of the stem when preceded by a High toned Object Marker, for example.[4]

This second stage, the word-level phonology, is sensitive to syllable structure, and indeed it appears that the creation of syllable structure is the first process that takes place in this component, in Llogoori as in other languages.

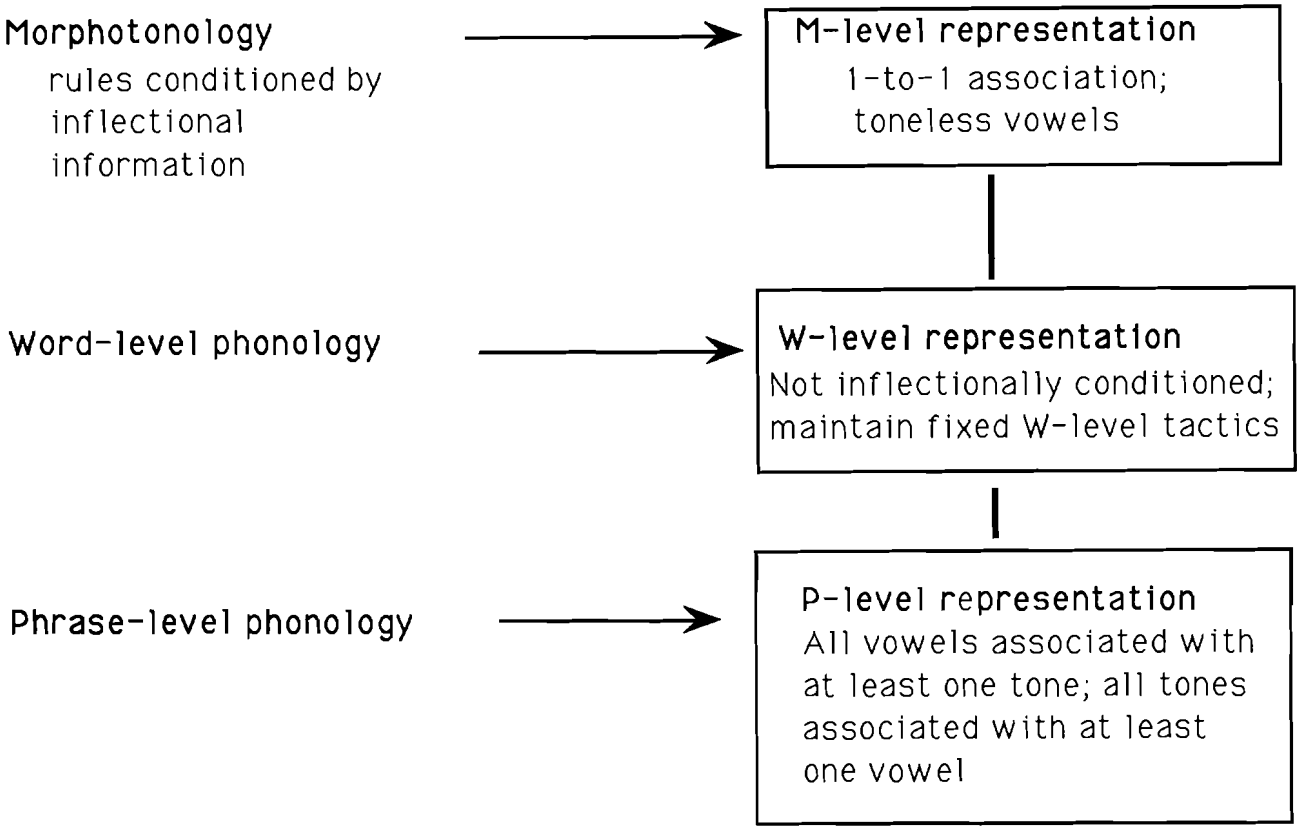
Finally, phrase-level rules apply. At this point, a process takes place that establishes a tonal association for all vowels: if a vowel is not associated with a tone, it associates with the tone of the nearest vowel on its right, as illustrated in (2), Leung's rule of Leftward Spread.

(2) "Leftward Spread"



We may schematically describe this situation, then, as in (3):

(3)



Our primary concern in this note is with the processes in the morphotonology, and in showing that the processes that are found there should be understood as involving a metrical accent system.

2.3 *Some simple morphotonemic assignments*

In the Lacustrine Bantu languages, the stem has generally (though not universally) been taken to stretch from the radical through the extensions to the Final Vowel. Most analyses have excluded the Object Marker from the stem, in part because this would account for *why* the presence or absence of an Object Marker has no influence on the underlying stem tone pattern in most Lacustrine languages. However, some evidence that we will look at below suggests that the stem *does* include the Object Marker in Llogoori -- most significantly, the necessity of including the Object Marker in one's calculations in determining even the underlying stem tone pattern.[5]

(4) Llogoori verbal structure

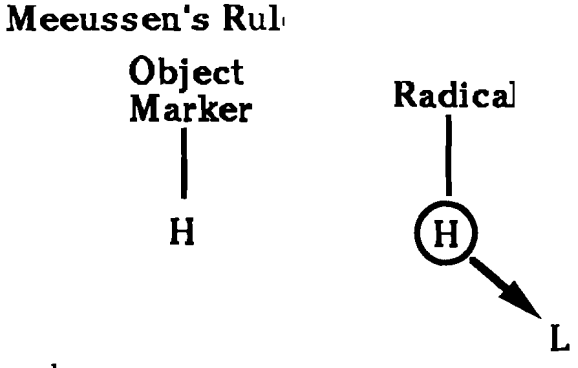
<-------base---------->
<---------- stem ---------->

Subject Marker	Tense Marker	Object Marker	Radical	Extensions	Final Vowel
kụ	rika	kị	rụm		i

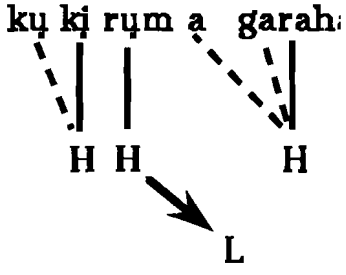
"we will bite it (Far Future)"

These forms undergo Meeussen's rule (5):

(5)



example:



"to bit it slowly" surface: kú kị rùm á gárâhà

It will be necessary to back up, at this point, and discuss a bit of what we know about the tone patterns of the languages of this area. From a comparative point of view, the Lacustrine languages divide their verbal stem tone patterns into three types (Goldsmith 1987a), summarized in (6d): (1) the Simple pattern, which has no suffixal tones; (2) the V_2 pattern, which has a suffixal

High tone, on the second mora of the stem when the radical is Low-toned; and (3) the Complex pattern, which has High tone surfacing on the final vowel of a stem built from a High toned radical, and on the second vowel of a Low toned (i.e., etymologically Low toned) stem. Each verbal tense selects for one of these patterns. These patterns are presented schematically in (6), which includes several reconstructed underlying High tones which lower to Low by Meeussen's Rule; the accents over the vowels represent the *reconstructed surface* forms.

Several tenses in present-day Llogoori are assigned tone according to simple principles, especially in light of these comparative remarks. In the Infinitive, the Near Future, the Perfect, the Far Future, and the Near Past tenses, the morphotonology assigns a Low tone to the Subject Marker, as well as a High tone to an Object Marker, if one is present. The Tense Marker may either be toneless, or have a Low tone assigned to its first vowel (Near Past). If the radical has a lexical High tone, then that tone is associated with the first vowel of the radical. As Leung notes, the general principle may be said to be that a tone is associated to the first vowel of the segmental material of its morpheme. These five tenses clearly correspond etymologically to the Simple pattern as reconstructed in (6a), which has no suffixal High tone.

(6) Stem tone patterns reconstructed for Lacustrine Bantu

Etymologically:

	Low tone radical	High tone radical
a. Simple Pattern	[CV CV CV CV CV | L	/ [CV CV CV CV CV | H
b. V_2 Pattern	/ [CV CV CV CV CV | | L H	/ [CV CV CV CV CV | | H H \ L
c. Complex Pattern	/ [CV CV CV CV CV | | | L H H \ L	/ / [CV CV CV CV CV | | | H H H \ L [by Meeussen's Rule]

d. Summary: Reconstructable pattern for verb stem:

Pattern name	Vowel of verb stem: First (V_1)	Second (V_2)	Final (V_f)
Simple			
Low tone radical	L	ø	ø
High tone radical	H	ø	ø
V_2			
Low tone radical	L	H	ø
High tone radical	H	L	ø
Complex			
Low tone radical	L	H	L
High tone radical	H	L	H

The V_2 pattern that we have reconstructed for Lacustrine gives rise to structures as in (6b), where a High tone surfaces on the second vowel of a stem with a Low tone. In contemporary Llogoori, etymological Low tone verbs are toneless, as we have noted, but we may still expect to find the reflex of this pattern. In most of the related languages, we find that the suffixal High tone of the V_2 pattern is itself deleted (or lowered to Low) when a lexical High tone precedes it, as in the second example in (6b). In a sense, then, this High is a bit abstract from a historical point of view, since generally it only surfaced when the radical was Low-toned. As we will see below, in Llogoori, the suffixal High tone is, however, *not* deleted by the radical High tone -- quite the opposite obtains (as we shall see, it is the radical's High tone that deletes). In any event, summarizing, we may say that the V_2 pattern looks like the Simple pattern as far as High tone stems are concerned, but it is distinct where Low toned stems are concerned.

Finally, the Complex stem pattern (6c) reconstructed for Lacustrine gives rise to a pattern in which a High tone appears on the second vowel of a lexically Low toned verb, and on the final vowel of a stem with a lexically High toned verb; thus, it looks like the V_2 pattern for Low toned stems, but quite different for High toned stems. When we turn to the remaining tenses in Llogoori which have suffixal tones, we shall find that they appear to have been restructured out of fragments of the V_2 pattern and the Complex pattern, modified in such a way as to fit within the confines of a quantity-sensitive accentual system, rather than a mora-sensitive tone-assignment system.

3. *The development of accent*

3.1 *Present Continuous*

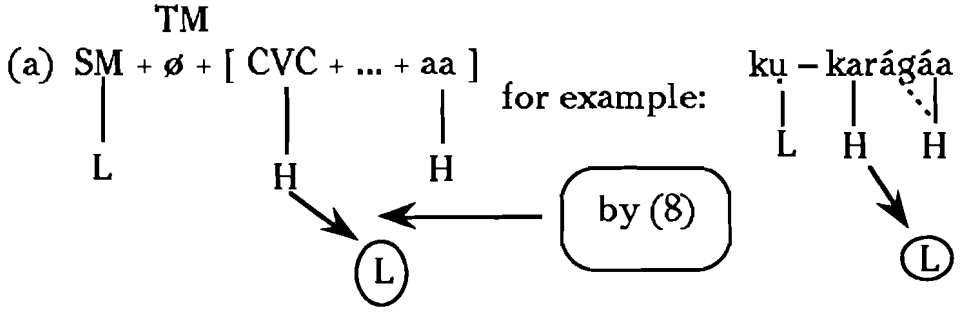
Things become interesting when we turn to complications arising in such tenses as the Present Continuous in Llogoori. The data in (7) concerning the Present Continuous presents a pattern which quite obviously had its origin in the Complex stem pattern. The facts are summarized in the first table in (7). The appearance of a High on the second syllable (V_2) just in case the first syllable is short, and on the first syllable when that syllable is long, is synchronically a statement of quantity-sensitivity, but with our brief historical overview, it is clear that it finds its origins in the search that a tone may have for the second vowel position of the verb stem (that is, when a suffixal tone is assigned to the second vowel of a stem, that will be within the first syllable just in case that first syllable contains two moras; Pulleyblank 1986 makes a similar point regarding Tonga). The brackets indicate the limits of the verb *stem*. A suffixal High associates with the final vowel of a High toned stem (7a) (actually producing a falling tone, because of the insertion later of a Low tone which we will ignore here); it associates with the second syllable of a toneless stem if the first syllable is short (7b), and with the first syllable if it is long (7c). The reader will note that there is a lowering rule, given in (8) below, which creates some of the observed Low tones from the underlying High tones given in the table at the beginning of (7). In this table, σ marks syllables; σ_1 indicates the first syllable of the radical, σ_2 the following syllable, and σ_f the final syllable of the stem.

(7) Tone in the Present Continuous

Underlying tone of syllables in the Present Continuous:

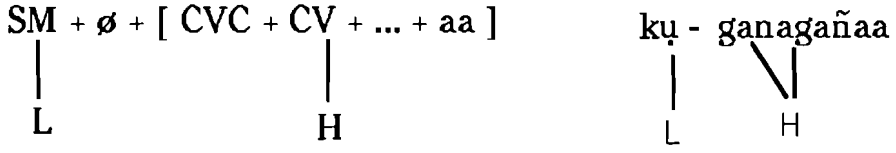
	No Object Marker			With Object Marker			
Tone of radical	σ_1	σ_2	σ_f	OM	σ_1	σ_2	σ_f
Toneless							
1st syllable:							
short	ø	H	ø	H	ø	H	ø
long	H	ø	ø	H	H	ø	ø
High							
1st syllable:							
short	H	ø	H	H	H	ø	H
long	H	ø	H	H	H	ø	H

a. High tone stem, no Object Marker: "we are cutting"

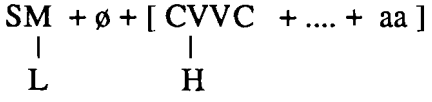


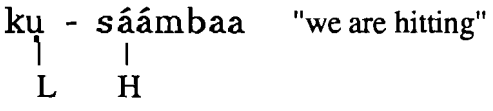
or "we are cutting for" ku karágíráa

b. Toneless stem, short first syllable, no Object Marker: "we are thinking"

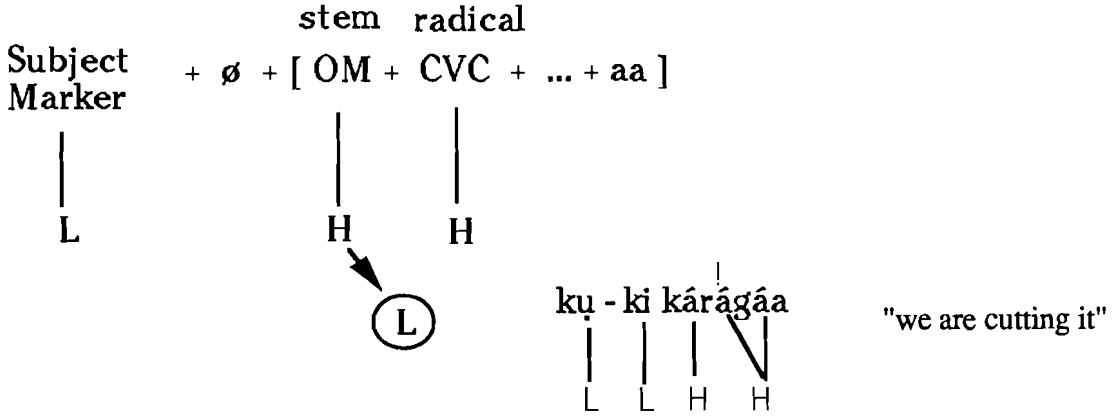


c. Toneless stem, long first syllable, no Object Marker:





d. High tone stem, with Object Marker.



The High of the radical becomes Low in (7a) by a rule as in (8), roughly as in Leung's analysis. That the radical's High is present underlyingly is supported by the fact that when an Object Marker precedes the radical, it is the Object Marker which surfaces with a Low tone, not the radical, which keeps its lexical High tone in that case, as we see in (7d). We may generalize this rule to all tenses with a grammatical High tone suffix, following Leung, considering the rule to be phonological, then. As I indicated already in (4), I will assume that the material consisting of the stem plus the preceding Object Marker is a phonological domain, the stem:

(8) [H X $H_{suffixal}$]

The rule in (8), then, lowers the first H of the stem when the tense has a suffixal High tone. This "first H" will be either that of an Object Marker, if there is one, or the radical, if there is no Object Marker.

Let us return to the nature of the assignment procedure responsible for associating the suffixal High tone within the stem of the Present Continuous. Now, the assignment of a High tone to the second syllable of the stem when the first is short, and to the first when it is long, as we see in (7b,c), is neither surprising nor problematic, from a comparative point of view -- it results from the assignment of the suffixal High tone to the second tone-bearing unit of the stem. In a language such as Luganda, also in this group, assignment of a tone to the second mora of a long

vowel is phonologically distinct from assignment of High tone to the first mora of that vowel, for the former gives rise to a phonetic level high tone, while the latter gives rise to a phonetic falling tone -- rising tones being excluded on the surface. If the constituent to which tone associates in Llogoori is the syllable, however, then there is no natural way to state the generalization synchronically.

I would suggest that the assignment of the suffixal High tone is the work of an accentual system that is quantity-sensitive, one which assigns a quantity-sensitive right-dominant (i.e., iambic) foot at the beginning of the stem, as in (9). The suffixal High tone is then assigned to the accented vowel by means of a process linked to a condition which I have referred to elsewhere as the *Tone-Accent Attraction Condition* given in (10) (Goldsmith 1987b; see also Peterson 1987). What I have indicated here as the *foot* row has also been called *Row 1* marking; the next level up, Row 2 marking, indicates a higher degree of prosodic prominence, which we will return to below.

(9) assignment of quantity-sensitive foot to left-hand end of stem

a.
```
Row 1                 x
Row 0            xx   x
          [   CVV   CV ...
          stem
```

b.
```
Row 1                 x
Row 0              x  x
          [   CV  CV ...
          stem
```

(10) Tone-Accent Attraction Condition

A tone-to-grid structure is well-formed if and only if there is no tone-bearing syllable which has a lower level of accent than a toneless syllable. [Thus, if a syllable σ has a tone, all syllables with a greater level of accent than σ must also bear a tone.]

We understand the condition in (10) as governing a rule that simply associates a tone to a syllable in a context-free fashion; this rule applies if and only if its application improves a structure's well-formedness, as defined by (10). This notion is discussed at further length in Goldsmith 1987b, and this type of rule application is discussed in Goldsmith (1990, chapter 6), as well as in Goldsmith (in press, to appear).

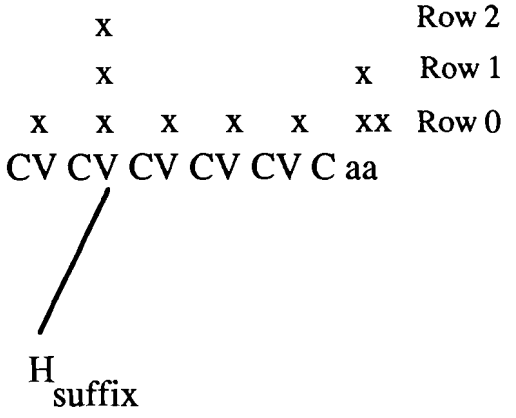
Focusing for a moment on the cases in (9), which involve the toneless radicals, whether something remarkable has been done at this point by translating the V_2 into grid notation depends on one's view of how a simple quantity sensitive iambic foot is established. This quantity sensitivity involves an interaction with what Prince 1983 calls the rule of Perfect Grid, the rule assigning stress (i.e., Row 1 grid marks) to alternate syllables. One view (which is Prince's, in fact) is that when quantity-sensitivity interrupts this alternating pattern, it is because a separate process has independently assigned a foot-level grid mark to a bimoraic syllable. Under such a view, Llogoori's accentual reanalysis of the way in which a High tone is assigned to the first syllable of a toneless stem when it is heavy, and to the second syllable otherwise, is truly remarkable, for the two stages of the language (tonal in the ancestral form, accentual in the current) have nothing to do with one another. The alternative view is that Perfect Grid assigns foot-level grid marks to alternating moras rather than syllables, though when this would mean assigning a grid mark to the second mora of a syllable, the mark is shifted to the dominant, i.e., the first, mora of the syllable. On this view (see Goldsmith (1990, chapter 4)), the historical shift is not so great; in both the tonal and the accentual system, the grammatically conditioned element -- whether it is tone or grid mark -- searches for the second mora, and does its best to land there.

In short, then, a metrical rule assigns a Row 1 grid mark to the second mora of the stem, as in (9). While grid theory generally calls this rule "Perfect Grid", and assumes that it lays down an unbounded stream of Row 1 grid marks on every other mora, I shall assume that Perfect Grid can be limited in such a way as to apply just once, to create a single, bounded, quantity-sensitive foot at a particular end of the stem.[6]

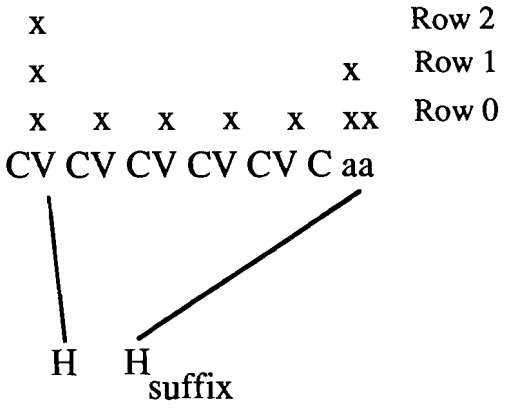
If a grid is then established for the toneless stems, how does it serve to assign the tones? Via the Tone-Accent Association Condition. And how do the High-toned stems interact with this grid?

We suggest the following: the final vowel in this, as in all tenses, is accented. In toneless stems, the first or second syllable also receives an accent, by the process just sketched. The first syllable of a High tone stem is *always* accented (on this, see below), and another rule assigns higher level prominence to the leftmost of the accents assigned to the stem (a rule formalized as End Rule (Initial, Row 2) in grid theoretic parlance). This leaves us with the picture in (11a) for a toneless stem as in (7c), where the only High tone is the grammatical High tone, and (11b) for the case of a High toned radical, where there is both a lexical High tone and a suffixal High tone.

(11)a.



b.



As we have noted, the first syllable of a stem with a High tone must always be marked as accented (11)b), and a stem without a High tone will not have that property. This effect -- of the presence of a tone conferring "honorary" syllable weight -- has been discussed elsewhere (see Hayes 1981, Goldsmith, Peterson, and Drogo (in press), and the discussion in the next section).

3.2 Middle Future

The situation becomes even more complex when we turn to the behavior of the Middle Future tense, formed with the prefix *na-*, and in fact it is this complexity, as we noted earlier, that motivated this exploration. The tone pattern found here appears to depend on whether or not an Object Marker precedes the stem, a quite odd characteristic from a comparative point of view, by comparison with the other closely related languages of this area.

(12) Middle Future

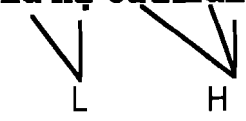
Underlying tone of syllables in the Middle Future

	No Object Marker				With Object Marker				
Tone of radical	σ_1	σ_2	σ_3	σ_f	OM	σ_1	σ_2	σ_3	σ_f
Toneless									
2nd syllable:									
short	ø	ø	H	ø	H	ø	H	ø	L?
long	ø	H	ø	ø	H	H	ø	ø	L?
High									
2nd syllable:									
short	ø	ø	H	ø	H	H	ø	ø	L?
long	ø	H	ø	ø	H	H	ø	ø	L?

(13) a. High tone stem, no Object Marker

TM SM stem

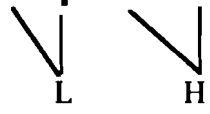
na kụ cúúmáñị̀r "we will stir for"



b.

TM SM stem

na kụ háándííkị̀ı "we will write for"



c. Toneless stem: *same* pattern as High tone stem in (a).

d. with Object Marker, High tone stem

TM SM OM Base

na kụ kị kárag "we will cut it"

e. With Object Marker, Toneless stem

TM SM OM Base

na - kụ - kị - gúrîzị "we will sell it"

L L H L

TM SM OM Base

na - kụ - kị - yáánzịrị "we will love for it"

L L H L

In (13a,b),where there is no Object Marker, tone assignment is independent of the lexical tone of the radical, but as the chart in (12) indicates, the assignment is dependent on the vowel

length of the second syllable. How can we state the generalization that is involved? For the practicing accentologist, (even if he or she had not already seen the pattern of the Present Continuous tense discussed in the previous section), the pattern is a clear one: it is the Latin stress rule, viewed through a mirror. Scanning rightward from the beginning, rather than leftward from the end as in Latin, we skip the first syllable, and then assign an accent to the next syllable (the second) if it is heavy, and skip it if it is light, assigning accent to the following syllable (I have given only two examples from Leung's work, which contains many). Such a pattern is extremely common across accent systems, and, contrariwise, makes no sense from the point of view of tonal systems. Metrical theory informs us that the proper statement is: (1) assign extrametrical status to the first syllable; (2) assign a Q-sensitive iambic foot to the left end of the stem, i.e., as we did for the Present Continuous tense in 3.1.

When we consider the forms *with* Object Markers, as illustrated in (13d,e), we find yet a different pattern, but one which suggests how the principles that led to the pattern in (12) may have developed, for what is most puzzling about the pattern in (13a) is why tone should *ever* be assigned to the third syllable of any stem in a Lacustrine system. No etymologically recognized pattern places a High tone on the third syllable of a stem, and we must not lose sight of our long-standing recognition that prosodic systems cannot count to three.[7] It is, in fact, the puzzling assignment of a High to the third syllable in these cases that was the impetus for this study.

As we have noted, two factors specifically suggest that the Object Marker in Llogoori forms a unit, the stem, along with the base (which begins with radical; cf. (4) above): (a) the considerations raised above involving the proper formulation of rule (8), and (b) the fact that the morphotonologically assigned stem tone patterns may differ depending on whether there is an Object Marker or not.[8] This suggests that we should interpret the domain of the stem in Llogoori as *including* the Object Marker, and from a prosodic point of view, then, we would line up the syllables of (12) and (13) as follows:

(14) Middle Future

a. No Object Marker: [[(σ) σ σ
stem base

b. Object Marker : [(σ) [σ σ
stem OM base

1 2 3

Let us remind ourselves as to what the generalizations are here, because it is quite easy to lose track. In (14a), the second syllable receives the High tone if it has a long vowel, else the third syllable gets the High tone. In (14b), the same holds (for the toneless radicals!), only the "second syllable" must be understood clearly as the second syllable of the stem, hence the first syllable of the radical. The second syllable gets the High tone if it is long, and otherwise the third syllable of the stem (i.e., the one following the radical) receives the High tone. And yet, in (14b), if the radical is High toned, the High must fall there, regardless of vowel length.

Actually, having lined up the first three syllables, we observe that the rules governing whether syllable #2 or syllable #3 is assigned a High tone in (14a,b) are similar but not *quite* identical. The first syllable in the (14a) case is extrametrical, and has no chance for a High tone. In (14b), it *always* gets a H-tone (this High tone surfaces here as a Low, due to the offices of rule (8)). The second syllable in both cases *may* receive the accent (and thus a High tone). In case (14a), where the second syllable is segmentally a suffix to the radical, the determination of whether the syllable is heavy or light is based on the familiar phonological property of whether the vowel is long or short; syllables with a long vowel are treated as heavy, and receive the High tone. In (14b), where the second syllable is the verb radical, the determination of whether that syllable is heavy or light is based on the same factor determined in section 3.1: a radical of a High toned stem is always heavy, while a radical of a toneless stem is heavy just in case it really is heavy from a phonological point of view, i.e., has a long vowel. Thus tonedness is the factor determining whether the syllable is accented: a High tone makes a syllable heavy.

It may appear that we have only compounded the mystery at this point. The problem, we will recall, is, first, that there is a High tone assigned to the third syllable in cases such as the first in (12a) (why the third?); second, that tone assignment is quantity-sensitive (here, sensitive to the quantity of the second syllable of the stem); and third, that tone assignment in this tense depends on the presence or absence of the Object Marker (a very odd aspect, from a comparative point of view). But we suggest that the oddity begins to clarify itself if we focus first on the structure *with*

the Object Marker, and offer an account for it, and then, loosely speaking, offer it as a basis for analogy for the form *without* Object Marker.

How did the Middle Future tone pattern arise, then? On our view, the sequence of events is likely to have been essentially the following. Let us suppose that the integration of the Object Marker into the verb stem occurred first. Then, once that had occurred, its inherent High tone would assign it an accentual grid mark automatically. Assuming that the rule that assigns accentual grid marks to every second mora can be specified to operate so as to lay down just one grid mark per application (cf. note 6), then when it operated in this fashion, scanning from left to right, it could then assign the following grid marks for toneless stems.

(15) Toneless stems:

short -vowel radicals long-vowel radicals

A Row 1 grid mark on the second mora of a syllable shifts back to the first, as indicated in the diagram above, in syllable-based grid systems (this is referred to as *weak mora correction* in Goldsmith (1990, 200)), though we do not need to make this assumption here actively.

Stems built from High-toned stems were simply as in (16), so that in either case the first syllable was, simply by construction, the most prominent. (The assignment of metrical prominence to a High-tone bearing syllable in Bantu is discussed further in Goldsmith, Peterson, and Drogo.)

(16) High toned stems:

short -vowel radicals long-vowel radicals

We need only assume that at this point (i) the stem existed as a prosodic unit, including the prefix; (ii) metrical prominence was assigned to alternate moras, and (iii) High-toned syllables were marked as prosodically prominent. And then a major change occurred in the language: it shifted from being mora-oriented to being syllable-oriented, which is to say, that the Row 0 elements of the metrical grid were now associated with syllables rather than moras (and the same went for tones as well). In order to maintain the distinction of tone-*placement* based on length, the

grid-accent assignment principles had to be now quantity-sensitive, and under such a reorganization, the grammar would retain the grid placement of (15). The tone-grid associations are given essentially as in (17).

```
(17)          x
              x         x
              x      x  x  x  x  x
         [stem CV [base CV CV CV CV CV

              H      H
```

If the same constellation of three principles were applied to stems *without* Object Markers, we would get not the observed pattern of prominence of the Middle Future without Object Marker, but rather the pattern observed for the Present Continuous. That is, these principles stipulate when there is no Object Marker (and thus that the stem is the same as the base), High toned stems will have a High on their first syllable, and toneless stems would have a High on their first or second syllable. The crucial step that took place at this point, we suggest, is that the first syllable of the stem was marked as extrametrical in the Middle Future tense, so that the lexical High tone can *never* be associated to the first syllable by the Tone-Accent Attraction Condition (10); that, in effect, is what we see in the pattern expressed in the bottom half of (12), on the left for the forms without Object Marker. Why this happened in the Middle Future, and not in the Present Continuous (rather than, say, the other way around), remains entirely unclear.

4. Conclusion.

The goal of this paper has been to show how a small corner of the morphotonology of Llogoori makes sense only when we approach deep tone assignment from the point of view of a two part process involving a metrical grid.[9] First a metrical grid is established over the stem, designating one or two of the syllables as especially prominent; second, these prosodically prominent syllables are used as the anchor points for the assignment of tone, which may be lexical, grammatical, or both, depending on the tense.

One of the curious properties of this two step process is that while the accentual grid is used in the second half to determine tone placement, part of the process of grid assignment in the first part is based on the location of lexical tone. While this is not circular in a logical sense, it

certainly has a surprising character to it, because we cannot give a simple answer to the question as to which is more basic in Llogoori, tone or accent. Each is dependent on the other, in a perfectly clear way. Nonetheless, efforts to establish an overly simple contrast between tone and accent languages along the lines mentioned at the beginning of this paper would never lead us to what I believe the correct account is, the one we have seen here. This kind of mutual reliance of phonological factors is by no means unparalleled. In closing, I will mention another example of a very similiar sort, involving a different prosodic system.

Chimwiini is a Bantu language studied in Goodman 1967 and Kisseberth and Abasheikh 1974, and discussed a number of times in the literature since. Vowel length is underlyingly contrastive in Chimwiini, but long vowels surface only under restricted circumstances. In traditional generative terms, and in the terms generally used in the literature, we may say that there are three shortening rules in the language, applying at the level of the phonological phrase, a unit larger than the word whose precise definition need not concern us here. Long vowels are shortened phrase-finally; they are shortened when three or more syllables follow in the phrase (i.e., when in pre-antepenultimate position); they shorten when immediately followed by a long vowel. This method of describing the facts obscures the main point, however. As Selkirk 1986 has shown, the correct way of describing the situation is this: there are only two positions in which a long vowel may appear (though this principle does not *create* the long vowels): the penult and the antepenult, and if the penult is long, the antepenult may not be long. In short, as Selkirk points out, what we have here is again simply the Latin stress rule, where a position of prominence is assigned on the basis of (more or less underlying) length. The final syllable is ignored; if the penult is long, it is the position of prominence. If the penult is short, then the antepenult is the position of prominence. This prominence, however, does not surface as any particular phonetic effect, at least not directly. However, every syllable which is *not* in the position of prominence is shortened; no such syllable may have a long vowel. Only a prominent vowel may be long.

Thus length in Chimwiini determines metrical prominence (i.e., Row 1 grid mark), and this in turn determines surface vowel length. But, again as in Llogoori, the metrical prominence is used more to show where prosodic attributes *may* appear (length here, tone in Llogoori) then where they *must* appear.

In sum, then, metrical grids and their accent patterns help us to understand complex patterns by simplifying their component complexities. Nowhere is this more clearly demonstratedthan in the intricacies of the Bantu prosodic systems.

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Abbreviations used here are:
OM Object Marker
SM Subject Marker
TM Tense Marker

I depart from Leung's notation in using a mark underneath a vowel to indicate a phonological distinction among the high vowels which Leung indicates with capitalization. I have chosen to use a diacritic in order to make the tone markings more visible.

[2]Clements and Goldsmith 1984 includes a range of Bantu tonal studies. See also Goldsmith 1989, and Odden 1989a as well.

[3]See Goldsmith 1984a on Tonga, for example.

[4]See Goldsmith 1984b.

[5]David Odden has explored a number of Bantu languages in which the Object Marker must be counted in the assignment of tonal patterns to the verb; these seem generally to be best accounted for with metrical systems as well. Cf. for example Odden 1989b.

[6] This assumption is not necessary here, under the present analysis, since the presence of Row 1 grid marks do not make any tone *necessary*. Row 1 grid marks are positions to which tones may associate, via the Tone-Accent Association Condition, but they need not, if the tones are not present. That is, the accents present here do not have the sort of accentual property discussed in Goldsmith 1982, i.e., which bring their own tone with them, so to speak. The grid serves to organize tone, in the present sort of system; it does not create the tone. This notion differs from the account given in Goldsmith 1982, as well as from that in McCawley 1978. Skepticism regarding the possibility of assigning accent at only the edge of a word is expressed in Halle 1989, and a number of arguments in favor of both positions have been offered in the most recent literature.

[7] Sauzet 1989 presents an not entirely unrelated analysis of tone and accent in Ancient Greek, also appealing to the importance of the principle of the inability of prosodic theory to count above two.

[8] In those Bantu cases where evidence of rhythmic structure can be established, this includes the Object Marker; for a discussion of KiRundi and Kinyarwanda, see Goldsmith 1987.

[9] An anonymouse referee offered the following reasonable but unsympathetic remark: perhaps this paper merely suggests that Llogoori "exhibits something in its tonal system that seems anomalous when compared with closely related languages. *Maybe* this what's going on synchronically, and *maybe* this is how it came about historically. If it [the account, that is] does come down to this, then the result is a personal exercise for the author rather than a contribution to the field." In study such as this one, it is important to show the utmost delicacy in making the case neither stronger nor weaker than it ought to be, and it is possible that I have not strongly enough emphasized the degree to which the surface tone patterns of the Present Continuous and Middle Future are anomalous from a comparative point of view. In the context of a paper such as this one -- limited in length, and hoping to be reasonably accessible to the phonologist not claiming to be a specialist in Bantu tonology -- it is difficult, if not impossible, to *argue* this point; I can only point to (as I have) the outlines of the three familiar stem tone patterns (as in Goldsmith 1987b), and assure the reader that as one turns to language after language in this linguistic area, the tonal patterns found rarely if ever depart radically from these outlines. When we find that Llogoori does, but just in a small corner of its tonal grammar (that is, in just these two tenses, out of a much larger number which are not odd from a comparative point of view), then an explanation of some sort is called for. The only other synchronic account that has been offered, that of Leung, offers a purely tonal account that requires a number of complexities which I have not delved into in the text: the counting of moras in an otherwise regularly syllable-oriented language, and the establishment of disjunctions in the formulation of tense-specific tone-assignment rules. I have declined to criticize Leung's account directly, because it makes no effort to provide anything but descriptive adequacy for these difficult cases (and it does not, in fact, note the synchronic and diachronic oddity of these tense-specific patterns), and because popular opinion to the contrary, providing criticism of another position is *not* tantamount to providing support for one's own. I have, however, tried to demonstrate that the utilization of *very* simple grid-theoretic machinery provides a simple synchronic account of these two troublesome tenses, and I have then suggested a way in which this pattern could have naturally arisen diachronically. In the final analysis, I am not certain whether we should take the referee's comment to mean that the degree of empirical support should be greater (without which, the account remains an exercise), or that the range of consequences should be greater (without which, the account would only interest the author). If the former, I am sorry to say that there is no

more relevant evidence, to my knowledge, within this particular range of verbal forms, but for the reasons I have indicated, this is material which must be taken seriously, in view of the extent that is already known about Lacustrine Bantu; if the latter, then I beg to differ: the present analysis adds to a growing body of literature that supports the position that metrical structure plays a role in the organization of language in a large number of cases in which there is no phonetic evidence of alternating stress or overt rhythm. If this is correct, as I am convinced that it is, it is more appropriate to say that metrical structure arises not when the data of a language permits it, but rather when the data of the language does not forbid it. But carrying home the consequences of such a statement is a task best left for another day.