A NON-METRICAL THEORY OF SUKUMA TONE
R. Ruth Roberts
The Ohio State University

1. Introduction

This paper discusses the tonal system of the Bantu language Sukuma. The interest of Sukuma tone centers around a tone shift whereby a H tone generally shows up two syllables to the right of its underlying location. The example in (1a.i) demonstrate that the 2 sg. object prefix /ku/ has a L tone, as do the verb stem /sol/, the future tense prefix /ku/, and the 3 sg. subject prefix /a-/.

Example of H showing up two syllables to the right of its underlying location is seen in (1a.ii), where the underlying H tone of the 3 pl. subject prefix /bón/ is realized phonetically on the object prefix [kú]. Likewise, the verbal extension /anij/ has no underlying H as shown by (1b.i), but when that affix follows the underlyingly H toned verb stem /bón/, the H of /bón/ is phonetically realized on the affix [aníj] in (1b.ii), again appearing two syllables to the right of its underlying location. This tone shifting phenomenon also applies at the phrasal level, as seen in (1c): when the noun amahagala/ stands in isolation, or is preceded by the L toned verb /sol/, it bears no H tone. But when preceded by the H toned verb /bón/, a H tone appears on its initial vowel.

(1)

a. i. /a-ku-ku-sol-el-a/ → [a-ku-ku-sol-el-a] "he will choose for 2 sg."
   ii. /bá-ku-ku-sol-el-a/ → [ba-ku-kú-sol-el-a] "they will choose for 2 sg."

b. i. /ku-sol-anij-a/ → [ku-sol-anij-a] "to choose simultaneously"
   ii. /ku-bón-anij-a/ → [ku-bón-aníj-a] "to see simultaneously"

c. i. /akasola amahagala/ → [akabona amahagala] "he chose the tree forks"
   ii. /akabóna amahagala/ → [akabona ámahagala] "he saw the tree forks"

In each case, underlying H surfaces two syllables to the right of its underlying location.

Nonlinear analyses of Sukuma tone shift are presented in Goldsmith (1985) and Sietsema (1989). The problem with writing a rule to shift H two syllables is that the syllable with the surface H tone is not adjacent to the syllable with the underlying H. Under the theoretical tenets of linear phonology, one could construct a rule which explicitly marks off in parentheses the vowel that intervenes between the H toned vowel and the target of this tone shift, allowing the intervening vowel to be skipped:

(2)

```
H
V (V) V
```

However, it is a widely held tenet of current phonological theory that mechanisms such as parentheses are excessively powerful and undesirable.

Alternatively, one could simultaneously link H to 2 vowels, and subsequently delink all but the rightmost link to the H tone. This requires a counting mechanism which, it has been argued in the theoretical literature (c.f. McCarthy and Prince 1986) also should not be allowed. If a H can spread simultaneously to the next two TBU's as in (3), then that H tone has "access" to segments that are not adjacent. Furthermore, such a rule in inherently undesirable since it performs two actions, contrary to the goal of reducing the power of phonological rules so that only single operations can be performed by a rule.
R. Roberts

(3) Rightward Spread

\[
\begin{array}{c}
\text{V}_1 \ 	ext{V}_2 \ 	ext{V}_3 \\
\text{V}_1 \ 	ext{V}_2 \ \ & \\
\end{array}
\]

And it should be obvious that reformulating (3) to iteratively spread H one syllable to the right, applying that rule to successive syllables, would in fact shift H to the rightmost syllable of the phonological string. There would be no way to stipulate that the rule should cease application after two passes.

Thus, the mechanism for handling H tone shift in Sukuma is of theoretical interest. In this paper, I first review a metrical analysis of Sukuma tone proposed in Sietsema (1989), showing that there are serious theoretical and empirical problems with that analysis. An alternative is then proposed which avoids these problems and also obviates the need for abstract metrical structure.

2. Sietsema (1989): A Metrical Account of Sukuma Tone

Metrical theory has a device for grouping syllables into units of two, namely the binary foot. Sietsema (1989) claims that tone shifting over two syllables is to be explained in terms of feet. The primary task of the metrical account becomes assignment of the correct metrical structure, which allows H tone shift to be stated as a purely local rule referring to no non-adjacent elements. In general, maximally binary feet are built starting at any point in the string where a H tone is located. Once the proper metrical structure is constructed, a rule of High Tone Spread (HTS) applies. The rule, as Sietsema states it, is intended to spread H to the right as far as possible, up to a vowel at the left edge of the foot.

(4) High Tone Spread

\[
\begin{array}{c}
\text{X} \ldots \text{X} \\
\text{H} \\
\end{array} \rightarrow \begin{array}{c}
\text{X} \ldots \text{X} \\
\text{H} \\
\end{array}
\]

This works for the forms in (5) below:

(5) a. \((\ast \ast)(\ast \ast)\)

/\text{ba ku sól a}/ \rightarrow [\text{ba-ku-sół-a}] \quad \text{"they will choose"}

b. \((\ast \ast)(\ast \ast)(\ast)\)

/\text{a ka bón el a}/ \rightarrow [\text{a-ka-bón-el-á}] \quad \text{"he looked for"}

The surface forms show that the H spreads, but then shows up only on the last of the syllables which it has spread to. All but the rightmost association line of a multi-attached H are deleted by (6).

(6) Delinking

\[
\begin{array}{c}
\text{X} \ldots \text{X} \\
\text{H} \\
\end{array} \rightarrow \begin{array}{c}
\text{X} \ldots \text{X} \\
\text{H} \\
\end{array}
\]

Example (7) shows that the requirement for putting H tones at the left edge of the foot overrides the otherwise left-to-right binary foot grouping.
Without the special provision that underlyingly H toned syllables must stand at the left edge of the foot, we would incorrectly predict under the metrical account that H tone would spread one syllable to the right if it stands in an even-numbered syllable and would spread two to the right otherwise.

When two H-toned elements are adjacent in the UR, as in (8), the H of the object prefix [ba] is blocked from spreading by the H tone associated with [bon]:

(8) /ba-ku-ba-bon-el-a/ → [bakubabonelá] “they will find them”

The H of the OP /bá/ should therefore simply surface on the OP [bá], and we should get *bakubabonela*. The question is, then, what has become of the leftmost H on the left of a pair of adjacent underlying H’s? Sietsema suggests a rule of Tone Fusion, where adjacent, underlying H’s fuse into one and, due to delinking, only the rightmost syllable realizes this H.

(9) a. Tone Fusion

\[
\begin{align*}
\text{V} & \quad \text{V} \\
\downarrow & \quad \downarrow \\
\text{H} & \quad \text{H} & \quad \text{→} & \quad \text{V} & \quad \text{V} \\
& \quad \downarrow & \quad \downarrow \\
\text{H} & \quad \text{H} & \quad \text{H}
\end{align*}
\]

b. UR

/bá-ku-bá-bón-el-a/ “they will find them”

\[
\begin{align*}
\text{H} & \quad \text{H} & \quad \text{H} \\
\text{TF} & \quad (*)(*)(*)(*)(*) \\
\text{bá-ku-bá-bón-el-a} & \quad \downarrow \\
\text{H} & \quad \text{H}
\end{align*}
\]

HTS

bákubábónelá

\[
\begin{align*}
\text{H} & \quad \text{H}
\end{align*}
\]

DL

bákubabonelá

Some nouns at the phrasal level require special treatment. Compare [akabona ámahagala] with [akabona mahágala]: as it stands, the phrase [akabona mahágala] is not derived correctly.
In (10a) the H correctly shows up two syllables after the underlying H tone. In (10b), it shows up one syllable further in the word than expected: this happens when there is only one prefix.

In order for the stem-initial syllable of the noun to receive a H, it must be leftmost in its foot. To get this result, the first syllable of nouns and adjectives is marked extrametrical. Therefore, that first syllable is not included in the metrical system: it projects no metrical grid position, and is therefore ineligible to bear tone.

This extrametricality of noun- and adjective-initial syllables is quite general, and therefore should be assigned by a rule which makes the first syllable of every noun or adjective extrametrical. Note that in (10a), the first syllable of the noun may accept a H tone, and, therefore, cannot be extrametrical. Preprefixes are therefore marked as exceptions to the rule assigning extrametricality.

Another problem of Sukuma tone is the distribution of extra-low, or XL tones. The presence of this XL is correlated with a H tone attached to the final vowel of a word. It should be noted that the data in Richardson (1959, 1971) are not always accurate in marking final XL. In fact, it is words with two final XL's that Richardson incorrectly marks as having two regular L's. Batibo (1985) is an important source of data for marking these final XL tones. Since Sietsema (1989) is based on Richardson (1959, 1971) alone, his analysis generates incorrect forms where Richardson's data are incorrect. The following words from Richardson (1959:23) exemplify the motivation for two rules of H tone lowering:
Sukuma Tone

(12) a. /ba-temi/ [bate mi] ([batemǐ]) “chiefs”
    \[H\]

b. /ba-dugu/ [badugu] ([badugǔ]) “relatives”
    \[H\]

Sietsema proposes two rules to lower a phrase-final H. The first of these, Final Lowering (FL), lowers a H linked only to the final vowel of a phrase to an XL.

(13) Final Lowering \[H \rightarrow XL / V V]\_utterance

The second rule is Final High Modification (FHM). This lowers a H linked to the penultimate and final vowel to a “regular” Low tone. Unlike FL, however, this rule has no restrictions on the number of vowels the H may be linked to.

(14) Final High Modification \[H \rightarrow L / V]\_utterance

In Sietsema’s account, FL must precede FHM, and bleed the latter rule.

(15) UR /badugu/ /batemǐ/
    \[H\]
    \[FL \rightarrow XL \rightarrow N/A\]
    \[FHM \rightarrow N/A \rightarrow \text{batemǐ}\]

The ordering of rules is moot, since [batemǐ] has two XL tones and undergoes the same rule as [badugu]; there is no rule of FHM. Section 4 unites these processes into a single generalization.


There are significant problems with the metrical account of Sukuma tone, both theoretical and empirical. Consider Sietsema’s delinking rule repeated as (16) below.

(16) Delinking \[(X)...(X)...X\]
    \[H\]

The first X and the last X are not adjacent, hence the rule is not a local rule; but this rule property was supposedly avoided in the metrical account. Furthermore, the rule requires use of parentheses to indicate that the H tone may be linked to two or three vowels. In fact, given the rule of tone fusion, even this formulation is inadequate since the H could be linked to four vowels.
However, DL could be reformulated as an iterative, syllable-to-syllable delinking rule and would avoid these criticisms.

A more fundamental problem is the statement of the spreading rule. This rule too has the problem that the leftmost and rightmost association lines are not adjacent, and it uses ellipsis which is equivalent to the linear phonology expression \( (C_0V_0) \). If we compare Sietsema’s HTS rule from (4) to Rightward Spread in (3) which he rejected, we see that the metrical formulation of the rule has exactly the defects which the simultaneous rule suffered from. To avoid these problems, we could try to reformulate the rule as a local rule, as in (18a) which spreads H to an immediately skeletal position which is the head of a metrical foot; Alternatively, we might spread to any syllable as in (18c):

(18)

a. \( (* \) \( (* \) \( (* \) \( (* \) \( X \ X \ H \ H \) \( \text{"to see simultaneously"} \) \( \text{-- rule applies to end of string} \) \( \text{-- rule N/A} \) \( \text{-- rule applies to end of string} \) \( [\text{kubonaniija}] \) \)

b. \( (* \) \( (* \) \( (* \) \( (*) \) \( X \ X \ H \ H \) \( \text{-- rule applies to end of string} \) \( \text{-- rule applies to end of string} \) \( \text{-- rule applies to end of string} \) \( [\text{kubonaniija}] \) \)

If reference is made to metrical structure as in (18a), the rule would not in fact be applicable in (18b) since the structural description is not met, given that \( bo \) is not adjacent to the foot head \( ni \). If no reference is made to metrical structure, the rule applies to the end of the string in (18d), since there is no condition for stopping. A final possibility is that the rule is a foot-domain rule, that is, it applies only to elements within the same metrical foot. Under that interpretation, HTS would spread H from \( bo \) to \( na \), but not to \( ni \), since \( na \) and \( ni \) are not in the same metrical foot. None of these interpretations of the rule will result in the correct form \( [\text{kubonaniija}] \).

Sietsema’s analysis of \( [\text{akabona mahágala}] \) also relies on a dubious assumption. The skipping of the prefix \( [ma] \) was handled by rendering the prefix syllable extraprosodic. The fundamental problem with this analysis is that it crucially depends on violating a basic constraint of extrametricality, namely the Peripherality Condition, which states that extrametricality may be assigned only at the edge of a domain. The extrametrical syllable from (11) falls directly in the center of a domain, not at the edge:

(19)

\( (* \) \( (*) \) \( (*) \) \( (*) \) \( [a-ka-bon-a <ma>-há ga la] \) \)

Accepting the metrical analysis of Sukuma tone entails rejecting an important constraint on phonological theory, and such an analysis should be adopted only if there is no viable alternative: such an alternative will be presented in section 4.

Besides these theoretical problems, there are empirical problems which justify pursuing a non-metrical reanalysis of Sukuma. These problems will be encountered in the following section: we will see that there is direct evidence against the rule of Tone Fusion, and that there
Sukuma Tone

is no possible ordering between the rules H Tone Shift and Final Lowering: HTS appears to precede (feed) Final Lowering in forms where no syllable is skipped by HTS, but Final Lowering appears to precede (counterfeed) HTS when one syllable is skipped by HTS.

4. A Non-Metrical Account of Sukuma Tone

The fundamental problem with the metrical account of Sukuma tone shift -- indeed a problem with all previous accounts of Sukuma, is the assumption that there is a single tone shifting rule which moves H two syllables to the right.

4.1 Spreading Rules and Delinking

The alternative analysis of Sukuma presented here is constructed around a core of three rules, Initial Spreading (IS), Secondary Spreading (SS), Delinking (DL), and Phrasal Spreading (PS). We begin with the first three rules. Initial Spreading (IS), spreads a H tone to an adjacent TBU:

(20) Initial Spreading X X X' H

One condition which must be put on this rule is that the rule does not spread H to a syllable that is itself followed by H. In addition, this rule applies strictly within words.

The second rule, Secondary Spreading spreads H to the right. This rule applies within and between words, and is therefore a postlexical rule. Furthermore, this rule is not blocked from applying by a following H tone.

(21) Secondary Spreading X X H

The third rule is the delinking rule, which delinks a left branch of a multiply-linked H tone:

(22) Delinking X X H

The DL rule applies iteratively to delink a H from a TBU on the left if it is associated with a TBU on the right. A derivation illustrating the application of these rules is given in (23).

(23) UR /akabonela/

IS akabonela H

SS akabonelá H

DL akabonelá
R. Roberts

It might seem undesirable to posit two spreading rules which, in effect, perform the same task. But there is good evidence that the two rules are, in fact, different. We will see that IS only applies within the domain of the word, but SS applies across word boundaries and within words. Additionally, IS has a restriction that it cannot spread a H tone if that would result in two adjacent H tones. SS is not restricted in this way. Finally, there are two rules which apply between IS and SS, directly showing that there are in fact two separate rules.

The restriction that Initial Spreading only applies word internally can be seen by comparing (24a) with (24b):

(24) UR a. /kupa amahagala/ b. /akabona amahagala/

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H</td>
</tr>
<tr>
<td>H</td>
<td></td>
</tr>
</tbody>
</table>

IS N/A akabona amahagala

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SS kupá ámahagala akabóná ámahagala

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>v</td>
<td>H</td>
</tr>
<tr>
<td>H</td>
<td></td>
</tr>
</tbody>
</table>

DL kupa ámahagala akabona ámahagala

In (24b), both IS and SS apply. We expect both to apply in (24a), but only one spreading rule does. Since SS applies across a word boundary in (24b), we conclude that it is IS which is a lexical rule, that is, it may only apply word-internally. Under the metrical account of tone shift, we incorrectly predict the form *kupa amahagala.

The fact that the metrical rule HTS cannot spread the H from /bá/ to the H-toned syllable /bón/ in (25) points to a problem with the assumption that there is a single spreading rule. H cannot spread to /bón/ because /bón/ is already linked to a H tone. HTS, like the other spreading rules presented here, spreads H only to a toneless vowel. It is a standard assumption that a given string either meets the structural description of a rule, which is then applicable, or it doesn't. HTS cannot apply to [bakúbonanija] since the string beginning with /bá/ in [bakúbonanija] does not meet the structural description of the rule, insofar as the foot-initial vowel is H toned.

(25) UR /bakúbonanija/

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>H</td>
</tr>
</tbody>
</table>

MSA (* *)(* *)(* *)(* *)

bá-ku-bón-a nij-a

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>v</td>
<td>H</td>
</tr>
<tr>
<td>H</td>
<td></td>
</tr>
</tbody>
</table>

HTS (* *)(* *)(* *)(* *)

bá-kú-bón-a níj-a

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>v</td>
<td>H</td>
</tr>
<tr>
<td>H</td>
<td></td>
</tr>
</tbody>
</table>

In fact, the rule applies anyway to the one free syllable in the foot and the H shows up on [kú], the adjacent syllable in the same foot. This provides further evidence that there is not a single
Sukuma Tone

rule, but several rules, which spreads H tone in Sukuma. Failure of one spreading rule does not entail failure of all spreading rules.

4.2 Phrasal Spreading

We have previously seen that there are times when the H shifts three syllables. This happens only when H has spread from one word into a following noun or adjective. Thus, we find shifts of three syllables in [akabona mahágala], but shifting of only two syllables in [akubonanija].

(26) a. /a-ka-bó-n-a mahágala/ → [akabona mahágala] “he saw tree forks”
b. /a-ka-bó-n-anij-a/ → [akabonanija] “he saw simultaneously”

The rule responsible for this phenomenon is Phrasal Spreading (PS). The data available suggest that whenever a nominal prefix has a H tone and stands immediately before the stem, that prefixal H moves one further syllable to the right. The nominal prefix will only bear H tone when the H tone has spread there from the preceding word, which as we know can only happen by applying the rule SS.

(27) Phrasal Spreading
nominal [X ~-/~ X
      \                      /
        H                     

The contrast between [akabona ma-hágala] and [akabona á-ma-hágala] is the motivation for restricting PS to only spread a H to a stem vowel. In (28a), after applying IS and SS, the H stands before a stem syllable, so PS spreads the H to the following stem vowel. In (28b), PS cannot apply because the H is not before a prefix vowel.

(28) a. /akabóna ma-hágala/ → akabóna má-hágala → [akabona ma-hágala]
b. /akabóna a-ma-hágala/ → [akabona á-ma-hágala]

The derivation for [akabona ma-hágala] is seen in (29):

(29) IS akabóna ma-hágala
   \     H
   SS akabóna má-hágala
   \     H
   PS akabóna má-hágala
   \     H
   DL akabona ma-hágala

To summarize, there is a considerable degree of variation as to how many syllables a H tone may spread. If H spreads three syllables, IS, SS, and PS have applied. If H spreads two syllables, only IS and SS have applied. If H spreads one syllable, either IS or SS has applied.
4.3 Final Lowering

We now consider a phrase-final phenomenon whereby H tone gets lowered to XL. In the first case, a single final syllable is underlyingly attached to a H tone, as in (30a-b).

(30) a. /kupá/ \rightarrow [kupá] “to give”
    b. /badugú/ \rightarrow [badugú] “relatives”

The second case, in (31), shows underlyingly that a H attached to the penultimate syllable of the phrase is realized as an XL tone on the last two syllables. This is exemplified in (31a-b):

(31) a. /akabóná/ \rightarrow [akabóná] “he saw”
    b. /babítí/ \rightarrow [babítí] “passers-by”

Final Lowering (FL) changes H attached to the phrase-final TBU to XL.

(32) Final Lowering

X | phrase boundary
| H
---|---|---
H | XL

The next question is the ordering of FL with respect to the spreading rules presented. The present analysis holds that IS and SS are separate rules; to support this claim, it was noted that there are rules which intervene between IS and SS. Final Lowering is one of those rules. When we look at the derivation of [akabóná] compared to [akabonelá], it is clear that FL is ordered between these two rules: FL can apply to either underlyingly final H or to H which stands on the final syllable by application of Initial Spreading, but not to H made final by Secondary Spreading.

(33) UR

| a. /akabóna/ | b. /akabónela/ |
| H | H |
| IS | akabóná | akabónelá |
| | H | H |
| FL | akabóná | N/A -since H not attached to final vowel |
| | XL |
| SS | N/A -since there is no vowel for H to spread to |
| | akabónélá |
| DL | N/A | akabonelá |

We can now see a fundamental problem with Sietsema’s analysis. If there were only one rule of High tone spread, we would expect [akabóná] and [akabonelá] to behave the same way. If FL were to apply before HTS, we would generate *[akabóná] and [akabonelá]; if FL were to apply after HTS, we would generate [akabóná] and *[akabónélá]. Either FL would apply to both forms or to neither, depending on rule ordering. The fact that FL applies in (33a)
Sukuma Tone

[akabonà] and not in (33b) [akabonelà] presents a paradox. FL must be ordered after HTS to generate the correct form in (34a), but before HTS to generate (34b).

(34) MSA a. (*)(*) (*) a-ka-bôn-a
     H
     HTS (* *)(*) FL
     a-ka-bôn-à
     H
     NIA

   b. (*) (*)(*) a-ka-bôn-el-a
     H
     FL N/A --since H not attached to final vowel
     HTS (* *)(*)
     a-ka-bôn-él-a
     H
     NIA

     DL N/A

No ordering is possible between FL and a single rule of HTS. There is no problem if there is more than one rule of tone spread. The fact that FL is ordered between these rules further supports the existence of more than one spreading rule in Sukuma.

4.4 Meeussen’s Rule

One final rule is needed. We would predict that when there are two underlying adjacent displacing H tones, tone spreading cannot apply and the leftmost H should surface. However, this is not the case. The first H does not show up at all.

(35) a. /batemi bakusola/ → [batemi bakusólà]
    H H

   b. /a-ku-ba-bôn-el-a/ → [akubabonelà]
      H
      H

One explanation for the fate of the leftmost H tone, suggested in Sietsema, is that the two H’s are fused into a single H, and delinking applies to the leftmost H-toned syllable. The correct explanation is that the H tone has been deleted directly by Meeussen’s Rule.

Before considering the MR solution, I first show why tone fusion (TF) is wrong. Sietsema rejects a deletion analysis on the grounds that no matter where delinking is ordered, incorrect forms result. This argument against tone deletion is irrelevant, since it is grounded on the assumption that there is a single rule shifting H tone. The correct ordering of MR with respect to the other rules of the grammar will be given here, showing that there is no ordering paradox involved with Meeussen’s Rule. It is claimed that TF explains both how the H of the object prefix [ba] blocks spreading of H from the subject prefix [ba], and how the correct delinkings are generated. In order for TF to work it must be ordered prior to HTS.

TF is able to handle the mapping from /akubábônélà/ to [akubabonelà], but cannot handle certain data. The prediction of the tone fusion analysis is that two underlyingly adjacent distinct H’s become the same H. Therefore, whatever happens to one of the H’s will happen to the other. The Final Lowering rule provides us with a diagnostic for seeing if underlying adjacent
R. Roberts

H's really do merge. The evidence from FL is that the tones do not merge: they do not surface with the same tones.

(36) UR  a. /kubápá/  
|  |  |
H H  

b. /kubábóna/
|  |  |
H H  

TF  kubápá  kubábóna
|  |  |
H H  

HTS  N/A  kubábóna
|  |
H  

FL  * kubápá  * kubábóna

The tone fusion analysis does not generate the correct results: the actual forms are [kubápá] and [kubábóna]. A tone deletion rule can be formulated to account for the data. The rule I propose is a version of Meeussen's rule (MR) (Goldsmith (1984: 2)):

(37) Meeussen's Rule

X X

This rule iterates from left to right to delete the leftmost H tone in a pair of H tones. It is important to note how Meeussen's Rule fits in with the rule ordering already discussed. This rule will be ordered after IS, but prior to the other rules of the grammar. The evidence of (35a), [batemi bakusóla], shows that MR is also a post-lexical rule. Note too that the underlying form /bákubónelá/ undergoes SS, but not MR, and surfaces as [bakúbonelá], which shows that MR does not apply to the output of SS. Were MR ordered after SS, the intermediate form bakúbonelá would incorrectly undergo MR becoming bakúbonelá (eventually *[bakúbonelá] by DL). Finally, underlying /batémí bákusóla/ undergoes IS giving intermediate batémí bákusóla, which feeds MR giving batémí bákusóla (eventually [batemi bakusóla] by SS and DL. These ordering facts are completely consistent with the ordering (38):

(38) Lexical rules:
1. Initial Spreading

Phrasal/Post-lexical rules:
2. Meeussen's Rule
3. Final Lowering
4. Secondary Spreading
5. Phrasal Spreading
6. Delinking
Sukuma Tone

Below are the correct derivations of [kubapə] and [kubabōnə]:

(39) UR  a. /kubapə/  b. /kubabōnə/
    H H
    IS N/A kubabōnə
data
    MR kubapə kubabōnə
data
    FL kubapə kubabōnə

Derivation (40a) shows that IS may not spread a H to a syllable which is immediately followed by a H-toned syllable. Were IS not so constrained, the H would be deleted by MR and the wrong form, *[bakubabonela], would be generated. (40b) gives an example of IS applying, since the syllable it spreads to is not followed by a H-toned syllable.

(40) IS  a. bákubabōnēla  b. bákusōla
    H H H
    MR bákubabōnēla N/A
    SS,DL bakubabonelá bakusūla

The data of (41a) and (41b) demonstrate that, unlike IS, both SS and PS may apply to spread a H tone to a syllable that is adjacent to another H-toned syllable.

(41) UR  a. /akabōnə batēmī bataale/  b. /akabōnə badugū bataale/
    H H
    IS akabōnə batēmī bataale akabōnə badugū bataale
    SS akabōnə bātēmī bātāale akabōnə bādugū bātāale
    PS akabōnə bātēmī bātāale akabōnə bādugū bātāale
    DL akabona batemi bataale akabona badugu bataale

Again, the fact that H tone blockage only holds of one of the three spreading rules further supports the claim that there are in fact three separate rules of H-tone spread in Sukuma.
5. Conclusion

This paper has presented a non-metrical account of Sukuma tonology. I have examined the metrical analysis presented in Sietsema (1989), which suffered from problems in the formalism, such as requiring simultaneous spreading to multiple vowels and domain-internal extrametricality, as well as empirical problems. I have shown that a metrical account of Sukuma tonology is not necessary. There is substantial evidence to support the claim that there are several spreading rules in Sukuma. The data support the claim that there are three spreading rules. And finally, the non-metrical analysis predicts the facts of Sukuma, where the metrical analysis failed. Although there is evidence for a metrical level of structure to explain aspects of phonology in many languages, Sukuma does not present a convincing case for a metrical theory of tone.

NOTES

* I would like to thank Herman Batibo for providing data crucial to this paper.

REFERENCES


