Chapter 12

Meeussen's Rule

John Goldsmith

I would like to review some properties of a widespread rule in Eastern Bantu languages, a rule that I have elsewhere called Meeussen's Rule (Goldsmith (1982b)). The general effect of this rule is to reduce a sequence of consecutive accents—or perhaps in some cases, of High tones—to a single accent (or High tone). Virtually all the systems in question display characteristics of “displaced tone systems,” in which the tones induced by a given syllable or morphe appear superficially one or more syllables to the left or right. In the case of Ruri and Rimi, for example, the syllable bearing a High tone on the surface is typically one syllable to the right of the syllable triggering the High tone. For reasons discussed below, and in more detail in Goldsmith (1982a, b) and Clements and Goldsmith (1982), I shall indicate the syllable that triggers a High tone—indeed, independent of where the High tone surfaces—with an asterisk, and call it an accented syllable or vowel.

Meeussen's Rule can then be formulated as shown in (1a). Its effects are schematized in (1b), and its homologue, Anti-Meeussen's Rule (or a Right-handed Meeussen's Rule), is given in (2).

1.

a. \( \tilde{V}CV \rightarrow \tilde{V}CV \)

b. \( \tilde{V}CV\tilde{V}CV\tilde{V}CV\tilde{V}CV \rightarrow \tilde{V}CV\tilde{V}CV\tilde{V}CV\tilde{V}CV \)

2.

a. \( \tilde{V}CV \rightarrow CV \tilde{V} \)

b. \( \tilde{V}CV\tilde{V}CV\tilde{V}CV\tilde{V}CV \rightarrow CV\tilde{V}CV\tilde{V}CV\tilde{V}CV \)

Meeussen's Rule must be taken either to apply simultaneously or to be self-feeding (right to left for (1), Meeussen’s Rule, and left to right for (2), Anti-Meeussen's Rule).
Let us first look briefly at three cases of Meeussen's Rule and one case of Anti-Meeussen's Rule.

1. **Ruri**

In Ruri, as described by Massamba (1982a, b), an accented syllable is realized by the following principles.

(3)

a. An accent on a phrase-final vowel is realized as a Rise-Fall pattern spread over the last two syllables.

b. An accent on the penultimate vowel of a word is realized as a High tone on that syllable.

c. Elsewhere (i.e., prepenultimately or on the final vowel of a word followed by another word), an accent is realized as a High tone on the following syllable.

As is typically the case in Bantu systems, verb stems are either underlyingly unaccented, or underlyingly accented on the first vowel of the stem. Thus, Ruri has the following classes of infinitives:

(4)

a. **Unaccented**
   - oku *gur a* [oku gur á]
     - inf. buy Final Vowel
   - oku *sakir a* [oku sakir á]
     - inf. help FV
   - oku *sorotor a* [oku sòrotòr á]
     - inf. pull out FV

b. **Accented**
   - oku *tém a* [oku tém á]
     - inf. cut FV
   - oku *sûmik a* [oku sùmik á]
     - inf. tie FV
   - oku *sûrumur a* [oku sûrumúr á]
     - inf. untie FV

Object prefixes, which immediately precede the verb stem, are all accented. The infinitives in (4a), therefore, pick up a High tone on the first verb-stem vowel in (5), an accent while ti

(5) **Infinitive with**

a. **Unaccented**
   - oku *gù* inf. it (cl. 3)

b. **Accented**
   - oku *gù* inf. it (cl. 3)

The operative object accent,

(6)

oku *gù* inf. it (cl. 3)
oku *gù surumù*
oku *gù sûrum*

Massamba notes: stem, an oppo prefixes leads to:

(7)

oku *mù* inf. IO 3sg.
   a. * ok
   b. Correct: oki

Massamba pre jacent vowels, i

(8)

As expected, Other rules that continuous have ci exists a late acc.

vowel of the ve
vowel in (5), as expected. The accent stems in (4b), however, lose their own
accent while they bear the High tone provided to them by the object prefix.

(5)

Infinitive with one object prefix

a. Unaccented
oku gu  gur a  [oku gu gur a]
inf.  it (cl. 3) buy FV

b. Accented
oku gu  tem a  [oku gu tem a]
inf.  it (cl. 3) cut FV

The operative rule is Meeussen’s Rule, which deletes a stem accent after an
object accent, as in (6).

(6)
oku gu  sRubururir a  Underlying representation
inf.  it (cl. 3) untie for FV
oku gu sRubururir a  Meeussen’s Rule
[oku gu sRubururir a]  Surface pattern

Massamba also notes that when two accented objects precede a verb
stem, an opportunity for Meeussen’s Rule to apply between two object
prefixes leads to a surprising result. Instead of (7a), the correct form is (7b).

(7)
oku mu  gu  gur ir a
inf.  IO 3sg. DO buy applic. FV
a.  *  oku mu gu  gur ir a  [oku mu gu gur ir a]
b. Correct: oku mu  gu  gur ir å  [oku mu gu gur ir å]

Massamba proposes that when two pre-stem accents are found on ad-
jacent vowels, the second is shifted to the Final Vowel (FV), as in (8).

(8)

As expected, (8) precedes Meeussen’s Rule and bleeds its application.
Other rules that Massamba explores in the subjunctive and present con-
tinuous have complementary effects. In particular, in these tenses, there
exists a late accent shift rule that copies a Final Vowel accent onto the first
vowel of the verb stem. If this should be a verb stem preceded by exactly
one object prefix (the FV accent having arisen by a rule other than (8)), a representation with two contiguous accents will result, as in the form [a gu sorotor è]:

(9)  
\begin{align*}
\text{a gu sorotor } & \quad \text{Underlying representation} \\
\text{a gu sorotor } & \quad \text{(Early rule)} \\
\text{does not apply} & \\
\text{a gu sorotor } & \quad \text{Meeussen’s Rule} \\
[a \text{ gu sorot}or è] & \quad \text{Accent Copy-back Rule} \\
\text{‘he pulled it out’} & \quad \text{Surface pattern}
\end{align*}

2. Tonga

In Tonga, as in Digo (section 3), the tonal realization of accent in a two-accenct word differs radically from its realization in a one-accenct word. A verb with only a single accent is realized as all Low—exactly like a word with no accents, in fact. However, a verb with two accents is realized with High tones on all the syllables between the accents, though with Low tones on the accented vowels themselves. This is illustrated in (10); the derivation is shown in (11), where the central rule, (12), deletes an initial H tone from one of the two HL accenctual melodies.

(10)  
\begin{align*}
a. \text{tu la ku *lik a} & \quad [tū \text{ lā ku silik } â] \\
b. \text{bā la ku silik a} & \quad [bā \text{ lā ku silik } â]
\end{align*}

(11)  
\begin{align*}
a. \quad \text{tu la ku *lik a} \\
\begin{tikzpicture}
  \node (v1) at (0,0) [] {$\text{H}$};
  \node (v2) at (0,-1) [] {$\text{L}$};
  \draw (v1) -- (v2);
\end{tikzpicture} \\
b. \text{bā la ku silik a} \\
\begin{tikzpicture}
  \node (v1) at (0,0) [] {$\text{H}$};
  \node (v2) at (0,-1) [] {$\text{L}$};
  \node (v3) at (0,-2) [] {$\text{H}$};
  \draw (v1) -- (v2);
\end{tikzpicture}
\end{align*}

(12)  
\[ H \rightarrow \phi / \text{verb } \# \]

In Tonga as well, Meeussen’s Rule plays a crucial role. When consecutive accents arise in the verbal conjugation, all but the first delete, as in (13).

Meeussen’s Rule

(13)  
\begin{align*}
\text{bā } & \quad \text{they tense them} \\
\text{bā } & \quad \text{they tense them}
\end{align*}

As discussed in accents in (13) (1962) calls the act like a single of the following syllables a l accents, that of Under the assun sen’s Rule, we w prediction is coi.

In Tonga a set interesting light Kiparsky propo mutually inco properly include. That is, the mo description of ti then applies.

In Kiparsky’s disjunctivity we rule will not app the more specifi irrelevant. In ti consequences.

The strong red vowel to the righ (14a) the unace object marker -l

(14)  
\begin{align*}
a. \text{ndi } & \quad \text{ba } \\
\text{I tense that} & \\
b. \text{ndi } & \quad \text{mu } \\
\text{I tense him} & \\
\end{align*}

This rule may be
Meeussen's Rule

(13)

\[ ḅ̈ä̤ \quad ḅ̈ä̤ \quad sīḷḳ \quad a \quad \rightarrow \quad ḅ̈ä̤ \quad ḅ̈ä̤ \quad sīḷḳ \quad a \quad \rightarrow \quad [ḅ̈ä̤ \quad ḅ̈ä̤ \quad sīḷḳ \quad a] \]

they tense them treat FV

As discussed in Goldsmith (1982a), there is further evidence that the circled accents in (13) delete. A sandhi rule in Tonga operates in what Carter (1962) calls the “strong” constructions, where the verb and the object noun act like a single phonological word. In such constructions, the first syllable of the following object noun is always accented. Under such conditions, the syllables \( ḅ̈ä̤ \quad sīḷḳ \quad a \) in (13) find themselves sandwiched between two accents, that of the initial subject marker \( ḅ̈a \) and that of the object noun. Under the assumption that the circled accents have been deleted by Meeussen's Rule, we would expect these vowels to become High in tone, and that prediction is correct.

In Tonga a second rule interacts with Meeussen's Rule in a way that sheds interesting light on Kiparsky's (1973) Elsewhere Condition. Recall that Kiparsky proposed that if the outputs of two adjacently ordered rules are mutually inconsistent, and if the set of forms to which one rule can apply properly includes the other, then the two are in a disjunctive relationship. That is, the more general rule will not apply to the strings that meet the description of the more specific rule and to which the more specific rule then applies.

In Kiparsky's examples, the same result would have been obtained if disjunctivity were defined in a slightly weaker fashion: the more general rule will not apply to any substring that meets the structural description of the more specific rule. Whether the more specific rule actually applies is irrelevant. In the case at hand, this minor difference has significant consequences.

The strong recent past in Tonga involves a rule that shifts an accent one vowel to the right following the accented tense marker \(-a\). For example, in (14a) the unaccented stem \(-laŋ\) receives an accent from the preceding object marker \(-ḅ̈a\). In (14b) \(-mu\) is unaccented, so no shift occurs.

(14)

\[
\begin{align*}
\text{a. } & \quad \text{ndi} \quad \text{ḅ̈a} \quad \text{laŋ} \quad \text{a} \quad \rightarrow \quad [\text{nda} \quad \text{ḅ̈a} \quad \text{laŋ} \quad \text{a}] \\
& \quad \text{tense them looked at FV}
\end{align*}
\]

\[
\begin{align*}
\text{b. } & \quad \text{ndi} \quad \text{mu} \quad \text{laŋ} \quad \text{a} \quad \rightarrow \quad [\text{nda} \quad \text{mu} \quad \text{laŋ} \quad \text{a}] \\
& \quad \text{tense him looked at FV}
\end{align*}
\]

This rule may be formulated as follows.
(15) 
\( \ddot{a}^{\dddot{a}} \rightarrow \dddot{V} \quad \text{(strong recent past only)} \)

However, despite the fact that this rule is morphologically conditioned, and despite the fact that it is more specific in its application than Meeussen's Rule (which also applies to forms with accents in consecutive syllables), we can determine that it must be linearly ordered after Meeussen's Rule. In (16), where the two consecutive accents on the first two syllables are subject to Meeussen's Rule but not to (15), Meeussen's Rule applies to delete the second. This deletion of \( a \)-'s accent bleeds the application of (15); in other words, Meeussen's Rule precedes (12). This is illustrated in (16).

(16) 
\[
\begin{align*}
\text{bá \ a \ bá \ lang \ a} & \quad \text{Underlying representation} \\
\text{bá \ a \ bá \ lang \ a} & \quad \text{Meeussen's Rule} \\
\text{does not apply} & \quad (15) \\
\text{bá \ a \ bá \ lang \ a} & \quad \text{Surface pattern}
\end{align*}
\]

The crucial point is that the Elsewhere Condition blocks the application of Meeussen's Rule to the sequence \( \ddot{a}^{\dddot{a}} \) in (16) precisely because that sequence fits the description at the point in the derivation of the more specific rule in the disjunctive block (1) and (15).

3. Digo

Kisseberth (1982) presents a wide range of data and analysis for Digo, an Eastern Bantu language. My analysis rests heavily on Kisseberth's material, though differing from it in certain central respects.

Kisseberth demonstrates a general principle in Digo verbs whereby if a single accent is underlingly present, it will be shifted to the end of the word. A precise formulation of the principles determining whether this shifted accent surfaces as a Rise-Fall pattern, as in Ruri, or as a High tone on the penultimate syllable would require considerable discussion. The basic principles involved are given in (17).

(17)
\[
\begin{align*}
\text{a. End-Run} \\
[\dddot{V} \ldots \dddot{V}] \\
\text{b. } V [\dddot{C} \ldots \dddot{V}] \\
\text{voiced} \\
\text{obstructed}
\end{align*}
\]

End-Run (17a) position. If the back one syllable is realized as a R tone the position that rule followed by Final Vowel's a.

Kisseberth ill accent that is u marker (19), or

(18)
\[
\begin{align*}
a. \text{ ku } ârîk â \\
\text{ ku bêmôr â} \\
\text{ ku tûkâtâ} \\
\text{b. ku } âmbîr â \\
\text{ ku chângâmi} \\
\text{ ku dêzêk â}
\end{align*}
\]

(19)
\[
\begin{align*}
\text{ ku vugurîr a} \\
\text{ ku ni vugurîr a} \\
\text{ ku ku vugurîr a} \\
\text{ ku } â \text{ vugurîr a} \\
\text{ ku } â \text{ vugurîr a}
\end{align*}
\]

(20)
\[
\begin{align*}
\text{ ku togor a} \\
\text{ ni na togor a} \\
\text{ u na togor a} \\
\text{ â na togor a} \\
\text{ tu na togor a} \\
\text{ mu na togor a} \\
\text{ mà na togor a}
\end{align*}
\]

In each case, the asterisk, to word. As in Tonga, rather different: 
migrates to the l
End-Run (17a) shifts the first accent of any word to the Final Vowel position. If the preceding consonant is a voiced obstruent, the accent hops back one syllable and is realized as a High tone on the penult. Otherwise, it is realized as a Rise-Fall. (Kisseberth actually gives good reason to support the position that the shift in (17b) should be divided into a leftward copying rule followed by a postcyclic version of Meeussen's Rule, eliminating the Final Vowel's accent.)

Kisseberth illustrates the ways in which End-Run can apply either to an accent that is underlingly on the verb stem (18a), or on a plural object marker (19), or on a third person subject marker (20).

18.
   a. ku āriük ā 'to begin'
      ku bōmōr ā 'to demolish'
      ku ēruükūtā 'to move about restlessly'
   b. ku āmbr ā 'to tell'
      ku chāngāmuk ā 'to be cheerful'
      ku dēzēk ā 'to spoil (someone)'

19.
   ku vugūr ā 'to untie for'
   ku ni vugūr ā 'to untie for me'
   ku ku vugūr ā 'to untie for you'
   ku mu vugūr ā 'to untie for him/her'
   ku āvugūr ā 'to untie for us'
   ku ēvugūr ā 'to untie for you(pl.) or them'

20.
   ku togor ā 'to praise'
   ni na togor ā 'I am praising'
   u na togor ā 'you are praising'
   ā na togor ā 'he/she is praising'
   tu na togor ā 'we are praising'
   mu na togor ā 'you(pl.) are praising'
   mā na togor ā 'they are praising'

In each case, the accent moves from its underlying position, marked by the asterisk, to word-final position.

As in Tonga, when two nonadjacent accents are found underlingly, a rather different surface tone pattern appears. In Digo, the first accent still migrates to the Final Vowel, but now a string of High tones runs from the
remaining, unshifted accent, all the way down to the Final Vowel with a Falling tone:

(21)
\[
\begin{align*}
\text{á na púpút á} & \quad \text{Underlying representation} \\
\text{a na púpút á} & \quad \text{End-Run} \\
\text{[a na púpút á]} & \quad \text{Surface pattern} \\
\text{‘he is beating’}
\end{align*}
\]

If, however, the two accents are underlyingly adjacent, the surface does not show a string of Highs running from the second down to the Final Vowel; in fact, what happens is that Meeussen’s Rule applies first, leaving only one accent to undergo End-Run:

(22)
\[
\begin{align*}
\text{ku ū púpút á} & \quad \text{Underlying representation} \\
\text{ku ū púpút á} & \quad \text{Meeussen’s Rule} \\
\text{ku u púpút á} & \quad \text{End-Run} \\
\text{[ku u púpút á]} & \quad \text{Surface pattern} \\
\text{‘to beat us’}
\end{align*}
\]

4. Rimi

Finally, I would like to review certain features of Rimi, a Tanzanian Bantu language studied by Olson (1964) and analyzed further by Schadeberg (1978, 1979). Like Run, Rimi is a tone displacement system, in which most High tones appear superficially on syllable to the right of their underlying (accentual) position. Furthermore, as Schadeberg demonstrates, there is a large class of nonmobile accents (realized as a High tone without shifting syllable) that is the modern reflex of Proto-Bantu High tone on a long vowel. Thus the shift of tone, or accent, to the right was organized by moras, not syllables, and thus High tone, occurring on the first mora of a long vowel, did not shift out of the syllable. In modern Rimi, where there is no basic vowel length contrast, the modern reflex of vowel length is the refusal of an accent to shift to the right, a shift that all other accents undergo. (This evolution is reminiscent of the situation in Baltic.)

Verbal suffixes are toneless, as (23a) shows, but become High after a normal (accent-shifting) verb stem (23b).

(23)
\[
\begin{align*}
a. \text{u tend á a} & \quad \text{‘to do’} \\
u \text{ tend e a} & \quad \text{applied}
\end{align*}
\]

Meeussen’s Rule
\[
\begin{align*}
u \text{ tend a a} & \quad \text{u tend ek} \\
u \text{ tung á} & \quad \text{u tung i a} \\
u \text{ tung á a} & \quad \text{u tung i k} :
\end{align*}
\]

Just as (15 unaccented, v classes), as ar but u-ya-hâng its High tone.

When two Rule (2) applies turn shifts one and (25), for e

(24)
\[
\begin{align*}
a. \text{a qa (she tells} \\
b. \text{a qa qi kî} \\
c. \text{ja qa qi kî} & \quad \text{‘he opened’}
\end{align*}
\]

(25)
\[
\begin{align*}
a. \text{ña qu va} * \\
& \quad \text{I tense the} \\
b. \text{ña qu va i thi} \\
c. \text{ñ gú va i tu ‘I will serve}
\end{align*}
\]

Since certain their etymology Anti-Meeussen’s /u- mi-súc-ye/, displacement, st deleted the non-

In this case, t determined, Mee

grammars— a te
Mecussen's Rule

u tend a a  habitual
u tend ek a  stative
b. u tung á  "to tie"
   u tung i a  applied
   u tung á a  habitual
   u tung ik a  stative

Just as (19) showed for Digo, in Rimi singular object markers are unaccented, whereas plural object markers are accented (in the human classes), as are most other object markers. Thus, we find utange 'to get', but u-ya-hang-a 'to get them (cl.6)'. Here ya, underlyingly accented, places its High tone on the following syllable.

When two or more accents appear consecutively, the Anti-Mecussen’s Rule (2) applies, deleting all but the rightmost of these accents, which in turn shifts one syllable to the right to be realized as a High tone. See (24) and (25), for example.

(24)
a. a qa qi kí kunuku a  Underlying representation
   (s)he tense it open  FV
b. a qa qi kí kunuku a  Anti-Mecussen's Rule
   (s)he opened it (cl.7)
c. [a qa qi kunuku a]  Surface pattern

(25)
a. ñ qu va i tum i a  Underlying representation
   I tense them reflex. serve applic. FV
b. ñ qu va i tum i a  Anti-Mecussen's Rule
   I will serve them

c. [n gú va i tum i a]  Surface pattern

Since certain accents do not undergo rightward displacement because of their etymological source in long vowels, it can be determined that the Anti-Mecussen's Rule must apply before this shifting. That is, forms like /u-mi-súc-iyel/, in which the accent on súc never undergoes rightward displacement, surface as [u mi súciye]; hence, the accent on the i must have deleted the nonshifting accent on súc, before shifting in turn to the right.

In this case, then, as in the others, when ordering relationships can be determined, Mecussen’s Rule appears to be ordered early in the synchronic grammars—a testimony, perhaps, to its early diachronic status, as the rule
that crucially led to the institution of the mobile accent systems in these Eastern Bantu languages.

5. Discussion

Where would a rule such as Meeussen’s Rule come from? Two sorts of answers are possible: historical and theoretical. Let us consider these in turn.

From a historical point of view, we know that the original two-way tonal contrast in Proto-Bantu gave rise to four tonal patterns on bisyllabic nouns: HH, HL, LH, and LL. As Guthrie (1967) observes, a large portion of the Bantu systems in the east of Africa lost the contrast between HL and HH in nouns. Going past Guthrie’s observations on contrasts per se, we can note that the direction of neutralization is one by which the HH is treated like the HL, and not vice versa. The resultant pattern is one in which, in one- and two-syllable nouns, only one High tone appears, and this system is easily amenable to an accentual reinterpretation. *HL (and earlier *HH) is reinterpreted as bearing stem-initial accent, *LH bears accent on the second syllable, and *LL forms bear no accent at all.

Thus, historical High tones became interpreted as accents, and if there was a rule in the grammar that shifted H to L after H (H → L, H), its reinterpreted form would be one in which an accent was deleted immediately following another accent—that is, the familiar form of Meeussen’s Rule (1). It appears, then, that the central active rule in the verbal morphology of the various languages considered here is in fact the historical remains of the Big Bang that must have occurred, occasioning the shift from a tonal system to an accentual one.

But from a theoretical point of view, there remains more to be said. Why was the HH pattern unstable (in the sense that it was shifted into the HL category by synchronic rules)? Whatever the answer turns out to be, it is clearly related to the issue that has been discussed in the literature under the rubric of the “Obligatory Contour Principle” (OCP) in the framework of autosegmental phonology.

In Goldsmith (1976, 36), the earliest theoretical position on this question, due to Leben (1973), is discussed. Leben posited a constraint on underlying melodies:

(26)

\[ \text{Obligatory Contour Principle (Morphophonological Constraint)} \]

At the melodic level of the grammar, any two adjacent tonemes must be distinct. Thus, simplifies to H. According to apply even be patterns would.

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While this pattern is to be note that the direction of neutralization is one by which the HH is treated like the HL, and not vice versa. The resultant pattern is one in which, in one- and two-syllable nouns, only one High tone appears, and this system is easily amenable to an accentual reinterpretation. *HL (and earlier *HH) is reinterpreted as bearing stem-initial accent, *LH bears accent on the second syllable, and *LL forms bear no accent at all.

Thus, historical High tones became interpreted as accents, and if there was a rule in the grammar that shifted H to L after H (H → L, H), its reinterpreted form would be one in which an accent was deleted immediately following another accent—that is, the familiar form of Meeussen’s Rule (1). It appears, then, that the central active rule in the verbal morphology of the various languages considered here is in fact the historical remains of the Big Bang that must have occurred, occasioning the shift from a tonal system to an accentual one.

But from a theoretical point of view, there remains more to be said. Why was the HH pattern unstable (in the sense that it was shifted into the HL category by synchronic rules)? Whatever the answer turns out to be, it is clearly related to the issue that has been discussed in the literature under the rubric of the “Obligatory Contour Principle” (OCP) in the framework of autosegmental phonology.

In Goldsmith (1976, 36), the earliest theoretical position on this question, due to Leben (1973), is discussed. Leben posited a constraint on underlying melodies:

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Meessen's Rule

distinct. Thus, HHL is not a possible melodic pattern; it automatically simplifies to HL.

According to Leben's formulation, this automatic simplification could apply even before the initial association of tonal melodies. Thus, HH patterns would simplify to H, as would HHH, etc.

While this places strong constraints on possible underlying melodies, and removes many potential ambiguities concerning how a surface tone pattern is to be analyzed, it is surely too strong a position, as is argued in Goldsmith (1976) and elsewhere. In Goldsmith (1976, 163), a revised version of the Obligatory Contour Principle is suggested.

(27)

Obligatory Contour Principle (Phonetic Constraint)

At the phonetic level, any contiguous identical segments must be collapsed into each other.

This version has been argued to be correct by Odden (1982) as a condition holding at all levels of representation after the underlying form. Such an "everywhere" interpretation, too, appears to be too strong. However, the weakest position sketched to date is probably too weak: the one proposed by McCarthy (1981, 384), according to whom "a grammar is less highly valued to the extent that it contains representations in which there are adjacent identical elements on any autosegmental tier." As pointed out in Goldsmith (1976, chapter 4), this result follows from the Phonetic Constraint version of the OCP; but something stronger may be needed to account for the introduction of rules into the tonal system of Bantu that change HH either to a single H or to HL, at an early stage of the tonological derivation.

There is a logical connection between the Phonetic Constraint OCP and the presence of a rule in the grammar collapsing identical segments. In fact, the OCP in most cases motivates such a rule. If derivations in a given language produce surface patterns such as (28a), then a rule such as (29) will be needed to create (28b), given the Phonetic Constraint OCP.

(28)

\[
\begin{align*}
&\text{a. } V_1 \quad V_2 \\
&H \quad H
\end{align*}
\]

(29)

\[
T_1 \quad T_2 \rightarrow T_{1,2}
\]

under the condition that \(T_1\) and \(T_2\) are identical.
How early will this rule be ordered? Certainly there is evidence that it tends to be ordered early, evidence that might otherwise be taken in support of Odden's "everywhere" version of the OCP.

Consider, for example, the phenomenon that Hyman and Schuh (1974) refer to as Tone Absorption. A typical example can be seen in the rules that simplify Falling tones in Kikuyu (Clements 1982):

\[(30)\]
\[
\begin{array}{cc}
\text{a.} & V & V \\
& H & L \\
\rightarrow & & V & V \\
& H & L
\end{array}
\]

Here. Falling tones simplify to High before Low, and to Low elsewhere. Why is this sort of context-dependent simplification extremely common, as contrasted, say, to the rarer simplification of Falling to Low before Low?

One approach to this problem is to analyze (30a) as being composed of two steps, of which (29) is the first. (29) would apply to (31) to create (32); and (32) would in turn become (33) by deletion of a single association line.

\[(31)\]
\[
\begin{array}{cc}
V & V \\
H & L
\end{array}
\]

\[(32)\]
\[
\begin{array}{cc}
V & V \\
H & L
\end{array}
\]

\[(33)\]
\[
\begin{array}{cc}
V & V \\
H & L
\end{array}
\]

A natural hypothesis that I would like to suggest is that (32) represents a more complex phonological state than (33) precisely in not displaying a one-to-one association. While many-to-one and many-to-many associations are not uncommon, there is nonetheless something unusual about them. Let us make this precise by defining a notion of the *autosegmental tension* \(T\) of a representation.

\[(34)\]

The *autosegmental tension* \(T\) of the vowel tier of a representation is the number of vowels with two association lines, plus twice the number of
Meeussen's Rule

vowels with three association lines, etc. Similarly, we define the autosegmen-
tal tension $T_T$ as the number of "doubly associated" tones (tones with
two association lines), plus twice the number of tones with three associ-
ation lines, etc.

Informally speaking, the larger the tension index $T$, the more the represen-
tation departs from a one-to-one structure. Thus, by (34) the autosegmen-
tal tensions of the following representations are as noted:

\[(35) \quad \begin{array}{l} V \\ \ \ \ V \\ \ \ \ V \\ T \quad T \quad T \end{array} \quad (T_v, T_T) = (0, 0)\]

\[(36) \quad \begin{array}{l} V \\ \ \ V \quad V \quad V \\ T \ \ T \quad T \quad T \end{array} \quad (T_v, T_T) = (0, 2)\]

\[(37) \quad \begin{array}{l} V \ \ \ \ V \quad V \quad V \\ T \ \ T \quad T \quad T \end{array} \quad (T_v, T_T) = (1, 1)\]

Intuitively, we may think of the tension as representing the "energy state" of the system. (Pursuing that analogy, one might wish to define the contribution of an unassociated vowel, or tone, as being proportionately much greater: (34) leaves this question open, a point to which we will return briefly below.) This notion is clearly a useful one for autosegmental theory. It allows, for example, a satisfying account of the symmetrical one-to-one association principle described in language after language (see for instance Williams (1976), Leben (1973), Goldsmith (1976), Clements and Ford (1979), Haraguchi (1977)). As noted in Goldsmith (1974), tone languages differ from accent languages in that tone languages have initial association rules that are sensitive only to boundaries; typically, they associate the first vowel of a word with the first tone of the tonal melody, as in (36a). Accent systems (Goldsmith (1982a)) initially associate accented vowel with ac-
cented tone, as in (36b) (for a different view, see Clements and Ford (1979)).

\[(36) \quad \begin{array}{l} V \quad V \quad \# \quad \# \\ T \quad T \quad \# \quad \# \end{array} \]

However, after this initial single-vowel to single-tone link, both systems associate as in (37a), not as in (37b).
(37)

\[a. \quad \begin{array}{c}
Y \\
T
\end{array} \quad \begin{array}{c}
Y \\
T
\end{array} \quad \begin{array}{c}
Y \\
T
\end{array} \quad \begin{array}{c}
Y \\
T
\end{array} \quad \begin{array}{c}
Y \\
T
\end{array} \\
\]

\[b. \quad \begin{array}{c}
*Y \\
T
\end{array} \quad \begin{array}{c}
Y \\
T
\end{array} \quad \begin{array}{c}
Y \\
T
\end{array} \quad \begin{array}{c}
Y \\
T
\end{array} \quad \begin{array}{c}
Y \\
T
\end{array} \]

We may now characterize this difference between (37a) and (37b) by noting that the dotted association lines added by the Well-formedness Condition in (37a), though not those in (37b), satisfy the Tension Condition (38).

(38)

Tension Condition

Minimize autosegmental tension in the neighborhood of a bound element (where the bound elements in (37) are those already created by (36)).

Summarizing, then, we take (36a, b) to be the principal initial tone association rules and the Tension Condition to be the primary principle governing the application of the Well-formedness Condition. It ensures that one-to-one association will be maximized in the vicinity of earlier bound elements.

In fact, if we accept the suggestion made above that unassociated elements contribute heavily to the autosegmental tension T, we may merge the Tension Condition with the Well-formedness Condition in (40).

(39)

Well-formedness Condition

a. All vowels are associated with (at least) one toneme.

b. All tonemes are associated with (at least) one vowel.

c. Association lines do not cross.

(40)

Minimize autosegmental tension T.

The minimization of autosegmental tension and the Phonetic Constraint OCP are principles that may conflict, in the sense that a rule motivated by the OCP may increase the tension T. A rule such as the precursor of Meeussen's Rule applying to (41a) to derive (41b) is motivated by the OCP, while it increases T from (0,0) to (0,2). The rule applying to (41b) to derive (41c) is motivated by the Tension Condition, in that it in turn lowers T to (0,1). These appear to be considerations directly relevant, then, to the origin and development of Meeussen's Rule (1) in Eastern Bantu.

6. Summary

In this paper, I have analyzed historical merge of "LH and this reanalysis results in a revised form, accept which is an accent which synchronically preshifts phonologically leftward. The change ft rapid increase in the largely restricts maintain the to with accents be Digo. The specif however, is motivated by the
**Phonetic Constraint**

A rule motivated by the precursor of the OCP, (41) to derive T to relevant, then, to the eastern Bantu.

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6. Summary

In this paper, I have reviewed some well-known facts and some that are less well known, and have suggested certain revisions of autosegmental theory along lines that link tonal phenomena in certain ways. I have illustrated the historical merger of *HH* and *HL* noun classes along with the preservation of *LH* and *LL* classes in a large Bantu subfamily; I have shown that this reanalysis results in a stage in which originally tonal information is specifically located along the linear string of vowels; this stage I refer to as an accent system. The historical process changing HH to HL is synchronically present in three of the four languages considered here in the revised form, according to which an accent deletes immediately following an accent (or, equivalently, as suggested in Goldsmith (1982b), an accent shifts leftward onto an immediately preceding accent).

The change from a tonal to an accentual system is accompanied by a rapid increase in the number of accent shift rules, for while tone rules are largely restricted to rules that add and delete association lines (and thus maintain the tone melody's stability), accent systems are highly mobile, with accents being shifted over potentially unbounded distances, as in Digo. The specific tonological rule that triggered the change (HH → HL), however, is motivated by the Obligatory Contour Principle and a proposed measure of the "autosegmental tension" of a representation.