WHAT SORT OF TONE LANGUAGE IS MENDE?*

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The claim has been made that Mende is a suprasegmental tone language requiring an independent representation of tonal and segmental information in the lexicon. Only in this way, it is claimed, can the true nature of Mende tone be understood: that the surface tonal patterns of Mende can be reduced to five basic underlying melodies (L, H, LL, LH, LLH). Arguments, both synchronic and diachronic, are presented in this paper which demonstrate that this analysis is incorrect and that Mende is not such a tonal language. Instead, an alternative "tension" model, based on an autosegmental model, has been proposed which demonstrates how the relevant facts of the language, both synchronic and diachronic, can be most adequately explained. The paper does not claim that suprasegmental languages do not exist, rather that Mende is not such a tone language, thereby refining the notion of what is a suprasegmental tone language.

1. Introduction

The question raised in the title of this paper is not asking simply for the specific inventory of tonal types and processes of the Mende grammar but rather the principles by which these inventories are shaped. Such principles, if they exist and when they are correctly identified, will not only lead to the answer of this taxonomical question "what sort of tone language is Mende?" but will also lead more directly to a descriptively adequate analysis of the language under consideration.

*This paper is a rewritten version of a manuscript originally presented to the Seventh annual conference on African linguistics (University of Florida, April, 1975) entitled "What is a supra-segmental tone language?" This latter version has profited from the comments from a number of scholars, but particularly from Herbert Stahlke and from William Leben.
One such answer to this question has been proposed by Leben [1973] who claims that some languages, including Mende, require a different type of lexical representation; one in which the phonological information is separated into two distinct and completely autonomous components. For Mende the tonal "melody" is stored in the "suprasegmental" component and the remaining phonological information in the segmental component. At some point in the derivation of the phonetic form of these morphemes, these tones are assigned to the tone-bearing segmental units according to a set of formal tone-mapping rules. After this mapping process, these languages function in the same way as others which do not have this "suprasegmental" lexical component, such as Thai and Chinese.

Thus while all tone languages are "segmental" in this sense, not all tone languages are "melodic". Implicit in this taxonomy is the claim that melodic tone languages require a more complex formalism because they exhibit properties which cannot be adequately explicated in "non-melodic" terms. Leben has repeatedly claimed for example that Mende is such a language requiring a melodic analysis and partially on the basis of this claim, he has made a case for the general validity of the melodic hypothesis. Yet there is evidence that Mende does not support these claims. In this paper, the predictions of the "melodic" proposal are compared against an alternative proposal which claims that the tones of Mende are never completely independent of the supporting segmental string.

2. Two Theories of Tone

2.1. The nature of the suprasegmental "melodic" claim. Specifically the suprasegmental proposal claims that the observed segmental patterns in Mende can be accounted for by positing five suprasegmental tonal melodies. These melodies (H, L, HL, LH, LHL) are termed suprasegmental because they describe the segmental tonal patterns of Mende morphemes regardless of number of syllables. At some point in the derivation, these tones are mapped onto the segments producing segmental tone patterns according to a set of specific tone-mapping principles. The following have been proposed by Leben [1973:65] for Mende:

(1) a. If the number of level tones in the pattern is equal to or less than the number of vowels in the word possessing the pattern, put
the first tone on the first vowel, the second on the second, and so on; any remaining vowels receive a copy of the last tone in the pattern.

b. If the number of level tones in the pattern is greater than the number of vowels in the word possessing the pattern, put the first tone on the first vowel, the second on the second, and so on; remaining tones are expressed as a sequence on the last vowel available.

(2) a. Tone Melody    Number of syllables in morpheme

<table>
<thead>
<tr>
<th></th>
<th>ONE</th>
<th>TWO</th>
<th>THREE</th>
<th>FOUR</th>
<th>% of basic vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>H H H etc.</td>
</tr>
<tr>
<td>b</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L L L etc.</td>
</tr>
<tr>
<td>c</td>
<td>HL</td>
<td>HL</td>
<td>H</td>
<td>L</td>
<td>H L L etc.</td>
</tr>
<tr>
<td>d</td>
<td>LH</td>
<td>LH</td>
<td>L</td>
<td>H</td>
<td>L H H etc.</td>
</tr>
<tr>
<td>e</td>
<td>LHL</td>
<td>LHL</td>
<td>L</td>
<td>HL</td>
<td>L H L etc.</td>
</tr>
<tr>
<td>f</td>
<td>*HLH</td>
<td>*HLH</td>
<td>H</td>
<td>L H</td>
<td>H L H etc.</td>
</tr>
<tr>
<td>g</td>
<td>*LHLH</td>
<td>LHLH</td>
<td>L</td>
<td>HLH</td>
<td>L H L etc.</td>
</tr>
<tr>
<td>h</td>
<td>*HLHL</td>
<td>HLHL</td>
<td>H</td>
<td>LHL</td>
<td>H L H etc.</td>
</tr>
<tr>
<td>i</td>
<td>?</td>
<td>(c)</td>
<td>H</td>
<td>HL</td>
<td>H H L etc.</td>
</tr>
<tr>
<td>j</td>
<td>?</td>
<td>(d)</td>
<td>L</td>
<td>LH</td>
<td>L L H etc.</td>
</tr>
</tbody>
</table>

b. a. H ngulu, nda  'tree', 'mouth'
    H H H
b. L bele, kpa      'trousers', 'debt'
    L L L
c. HL kenya, mbu    'uncle', 'owl'
    H L HL
d. LH nika, navo, mba  'cow', 'money', 'rice'
    L H L H LH
e. LHL nikili, nyaha, mba  'peanut', 'woman', 'companion'
    L H L L HL LHL

Given these procedures, the five Mende melodies will be mapped onto morphemes of various syllable length producing the segmental patterns a, b, c, d, and e of (2a). Examples from Mende of these tone patterns are given in (2b). According to the theory, segmental patterns f, g, and h will not be produced, because these tonal melodies do not exist in the language, and patterns i and j, while corresponding to the melodies HL and LH respectively,
cannot be derived by the existing tone mapping rules.

Given the formalism of the suprasegmental proposal, it is possible to make three specific predictions, (3), about the nature of Mende tonology which a corresponding segmental theory could not:

(3) a. that certain tone patterns do occur which are not likely to be predicted by segmental theories (see section 3.1);

b. that certain tone patterns do not occur in Mende because they reflect a constraint against an underlying tone melody (these non-occurring patterns are defined here as "structural gaps", see section 3.3);

c. that certain segmental tone patterns do not occur in Mende because they are expressly and intentionally forbidden by the way in which the theory was formulated (these proposed non-occurring patterns are defined as "formal gaps", see section 3.2).

These claims contrast with those of a less radical, non-melodic hypothesis of Mende tonology, an example of which is given in 2.2.

Because there are a variety of possible proposals for the representation of tone, both segmentally and suprasegmentally, I prefer to label this particular suprasegmental proposal by its principal characteristic, the melodic claim. Henceforward this theory shall be termed the "melodic" hypothesis.

2.2. The tension-based alternative. In contrast to the suprasegmental melodic hypothesis, I would like to put forward a competing hypothesis which asserts that the tonal information of a word is never completely disassociated from the segmental information of a word. This alternative proposal if correct does not claim that Mende is not a suprasegmental tone language, only that Mende is not a suprasegmental tone language of the type described in 2.1. As mentioned earlier, this alternative is not incompatible with other "suprasegmental" models such as that put forward by Goldsmith [1975, 1976] which claim a closer relationship between tone and segment. The essential aspect of this alternative claim, (4) is that the tonal patterns can only be understood in relation to the segmental string.

(4) In an underlying representation, any tone-bearing ([+ syllabic]) segment must be assigned at least one, but not more than two distinct tones.
Thus the possible tone patterns for any syllable are four, given in (5a).
Tone patterns specifically prohibited by this statement are given in (5b).

\[
\begin{align*}
(5) & \quad \text{a.} \quad \text{H} & & \text{L} & & \text{HL} & & \text{LH} \\
& \text{CV} & \text{CV} & \downarrow & \text{CV} & \downarrow & \text{CV} \\
\end{align*}
\]

Given this hypothesis, the number of tonal patterns of Mende words is a simple function of the number of syllables in the string. This means four possible monosyllabic tone patterns, sixteen possible disyllabic tone patterns and so on. Because this alternative is based on the permissable relationships between tones and tone-bearing segments, I have termed it the "tension" hypothesis.

3. The Suprasegmental Claim and the Data

This section compares evidence from the synchronic tone patterns of Mende in order to test the accuracy of the suprasegmental claim that all Mende tone patterns are attributable to five underlying tone melodies. On the basis of the evidence, it is shown that none of the predictions given in (3) can be sustained and therefore that the melodic hypothesis is likewise unsupportable.

3.1. Three tones on a single syllable. One of the predictions made by the suprasegmental tone hypothesis is that if a suprasegmental melody exists, it ought to be manifested on morphemes of any given syllable length. On the basis of disyllabic morphemes such as ngëfë 'pestle' and trisyllable words such as nîkîlî 'peanut' the melodic hypothesis would claim the existence of a LHL melody (see (2)). Furthermore, since this LHL melody is found on disyllabic and trisyllable morphemes, it ought to be found on monosyllabic morphemes as well. The alternative hypothesis (2.2), on the other hand, strictly prohibits three tones from occurring on a monosyllable (see 4b)). Thus the issue of a short vowel with a LHL tone pattern is of great importance in determining which of the two hypotheses under consideration here is an accurate reflection of the data.

Leben provides one example from Spears [1967] of a purported three-toned monosyllable: mbââ 'companion'. However, this example is contestable
for a number of reasons. First, the morpheme is transcribed by Spears with two vowels although Spears clearly states that the use of two vowels does not "necessarily" indicate length and that the use of two vowels is often used as an orthographical tone-marking device.

A second reason for contesting the LHL claim for Mende monosyllables is the fact that Innes [1969] records the contested morpheme with a long vowel. This is not true only for 'companion' but for every example listed in Spears [1967] as cvV and which also appears in Innes [1969]. Furthermore, my own data agrees with Innes in this regard. Thus there is no clear evidence that this morpheme is short and some solid evidence to indicate that it is long.

Finally this form is cognate with Kpelle bârâŋ and was presumably present in Proto Southwestern Mande, also as *bârâŋ. The anticipated Mende reflex of this proto form should be *mbâlâ (based on the rules given in Dwyer [1974]). The loss of a medial I to produce mbââ (with a long vowel) is a common Mende rule (see Spears [1967]) and for that matter a common Western Mande rule (see Welmers [1975]). Were the loss of the medial I to become obligatory as is often the case, the Mende reflex of this morpheme would be mbââ (with a long vowel). Leben was aware of this problem as the following quote indicates:

"If the vowel is long, this still does not affect my argument insofar as the argument seeks to establish that the permissable and impermissable tone patterns are the same as for other words. If mba originates synchronically from a disyllable, then another instance of a monosyllable with a LHL would have to be sought." [Leben 1973:50]

Yet there appear to be no uncontestable examples of such morphemes in Mende, and, I would venture, no such examples in Mende.

3.2. Structural gaps. The claim that there are no HLH patterns in Mende is representative of the sort of restrictions that are sttable under a suprasegmental framework. This claim incorporates the segmental statements that the sequences HLH, H LH, do not exist in Mende, with the implication that these non-occurrences are the consequence of a single underlying structural gap. This claim could be successfully refuted by showing either that such tone melodies do occur, or that the particular gaps in question are a fortuitous collection of gaps which are the consequence of other events.
The non-melodic alternative explains the absence of a HLH pattern in a monosyllable as a consequence of the constraint against three different tones appearing on the same tone-bearing segment, the same constraint that prohibits LHL monosyllables. The alternative hypothesis, does not prohibit HLH sequences in trisyllabic morphemes, and ample evidence is available to support not only HLH patterns, but also HLHL patterns as is shown in (6) below.

(6) a. HLH patterns
   yámbuwú 'tree (sp)'  náfáltè 'raphia clothed clown'
   lánsàná proper name  njéngúlú 'tarantula'
   lènàá 'for now'  dùmbèékà 'star'

   b. HLHL patterns

In addition to the above clear-cut examples of the HLH and the HLHL tonal patterns, there are a number of other examples involving a downstepped high tone (marked here as 'H) which could be interpreted as counter-examples to the proposed HLH constraint because the surface downstepped high tone could have been derived from an underlying or historical HLH or HLHL melody. This argument is elaborated on in section 6.

A second possible source for the sequence of H'H is suggested by the morpheme vóônú 'last year' because this form is rendered in my transcriptions as vóônú with a long initial syllable. Spears [1967] has pointed out for Mende a rather common west African rule, called LOW RAISING by Hyman and Schuh [1974] which raises a low tone between two high tones to a downstepped high tone, e.g. vóônú → vóônú and gbúél → gbúél 'yesterday'.

3.3. Formal gaps. The prediction of formal gaps is a consequence of the form of the suprasegmental theory of tone representation. Specifically, formal gaps result from the condition that a given melody can be mapped onto a sequence of tone-bearing segments in only one way. Thus the claim that a language has only five possible suprasegmental tone melodies predicts that Mende monosyllabic morphemes will exhibit only five tonal patterns, that Mende disyllabic morphemes will exhibit only five tonal patterns and so on. The form of a particular pattern is a consequence of the particular melody it represents and the proposed mapping rules.
Patterns i and j of (2a) are formal gaps in Mende because they cannot be derived from the patterns HL and LH from the existing tone mapping rules. While it is possible to redefine the tone mapping rules in order to incorporate i and j, this redefinition of the mapping rules would automatically render tone patterns c and d of (2a) as formal gaps. This is, after all, the intent of the suprasegmental melodic theory.

The coexistence of two competing sets of tone patterns, in Mende either c and i or d and j, would contradict the predictions of a suprasegmental tone theory and force the conclusion that Mende is not amenable to this analysis. The following list of morphemes representing both c and i and d and j tonal types, based on Spears [1967], provides the apparent counterexamples to the claim that Mende is a suprasegmental tone language.

(7) pattern illustrated by c

<table>
<thead>
<tr>
<th>morpheme</th>
<th>meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>káli</td>
<td>'hoe'</td>
</tr>
<tr>
<td>ngílà</td>
<td>'dog'</td>
</tr>
<tr>
<td>ngámà</td>
<td>'eye'</td>
</tr>
<tr>
<td>kúsi</td>
<td>'cushion'</td>
</tr>
<tr>
<td>mbélà</td>
<td>'father', 'brother-in-law'</td>
</tr>
<tr>
<td>kpúlò</td>
<td>'bird (sp)'</td>
</tr>
<tr>
<td>kpówò</td>
<td>'shout'</td>
</tr>
<tr>
<td>félamà</td>
<td>'junction'</td>
</tr>
<tr>
<td>wòòmà</td>
<td>'back'</td>
</tr>
<tr>
<td>mólimbò</td>
<td>'Muslim'</td>
</tr>
<tr>
<td>kúhànù</td>
<td>'far away'</td>
</tr>
<tr>
<td>kóbàà</td>
<td>'northern rice'</td>
</tr>
<tr>
<td>hilìna</td>
<td>'that is so'</td>
</tr>
</tbody>
</table>

(pattern illustrated by i)

<table>
<thead>
<tr>
<th>morpheme</th>
<th>meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>kónyò</td>
<td>'friend'</td>
</tr>
<tr>
<td>hókpò</td>
<td>'navel'</td>
</tr>
<tr>
<td>mbémabè</td>
<td>'circle'</td>
</tr>
<tr>
<td>náhì</td>
<td>'so that'</td>
</tr>
<tr>
<td>pókò</td>
<td>'imitate'</td>
</tr>
<tr>
<td>tókplà</td>
<td>'anus'</td>
</tr>
<tr>
<td>ngóngô</td>
<td>'tooth'</td>
</tr>
<tr>
<td>sèwúlò</td>
<td>'rodent (sp)'</td>
</tr>
<tr>
<td>kókólì</td>
<td>'seek'</td>
</tr>
<tr>
<td>géoglobin</td>
<td>'absolutely nothing'</td>
</tr>
<tr>
<td>sífmbitì</td>
<td>'spider'</td>
</tr>
<tr>
<td>wúámà</td>
<td>'faint'</td>
</tr>
<tr>
<td>kpóngbònì</td>
<td>'palsy'</td>
</tr>
<tr>
<td>sífìbèntì</td>
<td>'cement'</td>
</tr>
<tr>
<td>lọ́ńlù</td>
<td>'five'</td>
</tr>
<tr>
<td>nááñì</td>
<td>'four'</td>
</tr>
</tbody>
</table>

(pattern illustrated by d)

<table>
<thead>
<tr>
<th>morpheme</th>
<th>meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>bòndó</td>
<td>'okra'</td>
</tr>
<tr>
<td>návó</td>
<td>'money'</td>
</tr>
<tr>
<td>gbèhè</td>
<td>'bench'</td>
</tr>
<tr>
<td>bèté</td>
<td>'plasas'</td>
</tr>
<tr>
<td>bùbù</td>
<td>'dashiki'</td>
</tr>
<tr>
<td>ndèndélì</td>
<td>'shade'</td>
</tr>
<tr>
<td>ndáyúlà</td>
<td>'sling'</td>
</tr>
<tr>
<td>bèêsì</td>
<td>'pig'</td>
</tr>
</tbody>
</table>

(pattern illustrated by j)

<table>
<thead>
<tr>
<th>morpheme</th>
<th>meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>nìkà</td>
<td>'cow'</td>
</tr>
<tr>
<td>pèlè</td>
<td>'path'</td>
</tr>
<tr>
<td>kàlí</td>
<td>'snake'</td>
</tr>
<tr>
<td>kpìtì</td>
<td>'grass'</td>
</tr>
<tr>
<td>màhà</td>
<td>'chief'</td>
</tr>
<tr>
<td>lèlématà</td>
<td>'praying mantis'</td>
</tr>
<tr>
<td>fààlè</td>
<td>a name</td>
</tr>
<tr>
<td>kólòbè</td>
<td>'none'</td>
</tr>
<tr>
<td>làsìmò</td>
<td>'amulet'</td>
</tr>
</tbody>
</table>
The underlying representations of the disyllabic patterns \( d \) and \( j \) in (7) above are considered by Leben to all represent pattern \( d \), e.g. LH and their different surface alternations are considered to be governed by a diacritic feature.

3.4. Possible suprasegmental explanations of the counterexamples. The data presented thus far have been termed "apparent counterexamples", because there are a number of arguments which could be used to resolve the contradictions. These include (1) faulty transcriptions, (2) morphological complexity, (3) borrowing, and (4) statistics.

3.4.1. Reanalysis. Leben has noted that words having a segmental tone pattern of the type LH H, e.g. bèsí 'swine', cannot be transcribed by the existing tonal rules, which would predict \( *bèsí \). However, the problem can be remedied if the initial vowel is treated as long, bèèsí. The LH tone melodies will be correctly mapped on to the segmental tone-bearing segments. To this Leben [1973:85] remarks, "It is not clear whether these vowels are phonetically short." Here Leben is referring to the fact that the rising tone of this morpheme is transcribed by Spears with two vowels but that this fact does not indicate that the rising tone is necessarily long. My own transcriptions show these rising tones to be long. This problem was also encountered in section 3.1. However, contesting the length of the vowel in these examples automatically weakens the claim of shortness in morphemes such as mbàà.

3.4.2. Morphological complexity. To be sure, many of the examples found in the Mende lexicon are morphologically complex, though Spears [1967] made every effort to identify entries which were obviously morphologically complex, so that the remaining examples, if they are morphologically complex, are not completely convincing. For example, the word séwúlò 'cutting grass' (a rodent resembling a groundhog) represents a possible example of a morphologically complex word. While a convincing meaning cannot be identified for sé, wúlò might be identified as the morpheme 'little'. In support of this analysis is the observation that the tone pattern of this word is what would be anticipated were it a normal compound, e.g. sé+wúlò → séwúlò (in this paper, the two boundary symbols + and − are
used to mark compound divisions and affixes respectively). However, until convincing meanings can be established for each element of the compound, and the resultant meaning of the compound shown to be derivable from the individual constituent meanings, the tone patterns displayed by séwúìò and the like must be considered legitimate examples which must be reckoned with by any empirical based theory of tone.

A word such as kpóngbṑnì 'palsy' is also suspiciously complex, although I have been unable to identify any of the possible constituent morphemes. If we consider this word to be entered into the lexicon as morphologically complex, i.e. kpóngbó- nì, then it is possible to explain why this particular example is an exception to the predictions made by the suprasegmental hypothesis. Yet allowing any apparent counterexample to the suprasegmental hypothesis to be broken into smaller tonally acceptable constituents without the supportive evidence to suggest that these constituents are morphemes can only serve to weaken the suprasegmental position even further for it will no longer be possible to provide counterexamples to the theory which cannot be explained away through ad hoc morphologizing.

A related problem concerns reduplicated (or apparently reduplicated) morphemes such as ngóngò 'tooth'. Leben analyzes these as compounds, e.g. ngó+ngó → ngó+ngó. This analysis presents two problems. First, if this word is a true compound composed of two occurrences of the morpheme ngó, then the second occurrence of the morpheme ng ought to begin with a weak consonant, e.g. *ngówò. Secondly, morphemes referring to body parts do not undergo tonal changes when in compounds.

Historically, the development of a H HL disyllabic tone pattern appears to have been the result of the loss of a final vowel of a trisyllabic word, e.g. H H L → H HL ø. The body parts 'tooth' and 'nose', transcribed by Spears as ngóngò or ngóngóì and hókpò respectively, are transcribed by Innes as ngóngóù and hókpóù (and apparently represent a slightly different dialect). If indeed these H HL patterns represent reduced trisyllabic words, then the reduplication analysis is diachronically incorrect and in view of the other synchronic objections which have been raised against the analysis of these words as reduplicants, this analysis appears to be equally incorrect synchronically.
It will be recalled that the original intent of the reduplicative analysis of these words was to explain the occurrence of a tone pattern H HL which the suprasegmental hypothesis expressly excluded, and given that the reduplicative analysis is incorrect, then either a new explanation will have to be sought or the suprasegmental hypothesis abandoned. For example, the suprasegmental hypothesis could be maintained if the above examples were analyzed according to the supposed diachronic development, e.g. ngóngó-û, except that the deleted vowel is represented lexically as a floating low tone, e.g. ngóngó-û in the suprasegmental notation. A rule could be written which would assign a floating low tone to the preceding syllable and as such would provide an explanation why H HL surface tonal patterns are not true exceptions to the claims of the suprasegmental hypothesis.

The objections to the proposed analysis parallel those of the one based on reduplication: there is virtually no synchronic evidence in the dialect described by Spears to warrant words such as ngóngó as being morphologically complex. As mentioned above, this sort of morphologizing can serve only to weaken the suprasegmental claim, for as it permits the explaining away of any complex non-conforming tonal pattern, it loses its ability to explain why other non-conforming tonal patterns such as *H LH do not occur. Secondly, such an analysis must explain why other observed complex tonal patterns should not also be analyzed in this way, such as L HL being derived from L H-L and LHL being derived from LH-L, and for that matter ultimately from L-H-L. Because this alternative analysis presents more problems than it solves, it, too, must be abandoned leaving the suprasegmental hypothesis at a loss to explain certain complex tonal patterns that it predicts ought not to occur. Furthermore, if applied with equal rigor to all morphemes of three or more syllables, this extremely powerful and virtually unchecked type of morphologizing would eliminate practically all of the morphemes of three syllables in length or more (other than obvious borrowings) from consideration and reduce the number of trisyllabic and quadrasyllabic morphemes to such point that their tonal patterns, whatever they were, would be statistically insignificant. Thus, the impact of this kind of morphologizing is to reduce the domain of the suprasegmental melodies to monosyllabic and disyllabic morphemes,
principally those found in Proto Southwestern Mande. This Leben is willing to do:

"The corresponding prediction involving the pattern LH applied to words of three syllables is problematic since Innes [1969] gives a number of instances of words with the prohibited contour and I have been unable to find an adequate way of analyzing these." [Leben 1963:67]

The elimination of morphemes of more than two syllables reduces the predictive power of the suprasegmental claim severely, for the number of tonal combinations of H and L in one and two syllabled words is considerably less than that of a system also containing morphemes of three and four syllables and therefore much less distinct from the predictions of the alternative claim.

3.4.3. **Borrowing.** Although many of the tonal counterexamples to the suprasegmental theory can be dismissed through a plea to morphological complexity, this is not possible with borrowings. Borrowings such as s[mênt] 'cement' would not be treated as morphologically complex (even if they were) by the borrowing language. Yet, this morpheme cannot be assigned a tonal pattern by the existing mapping rules. To change the existing rules to permit HHL morphemes would as argued above automatically exclude certain morphemes with a HLL tone pattern. Thus, the tonal patterns displayed by borrowings, which parallel those of non-borrowings, provide incontrovertible evidence that the tonal patterns of Mende cannot be accomodated by only five underlying tonal melodies.

While it is tempting to preserve the suprasegmental claim by weakening it slightly by proposing that borrowings belong to a special class and are subject to different rules, such proposals are extremely unrevealing. For example, one might propose that these morphemes, because they are borrowings involve a different tonal mapping rule, possibly related to penultimate stress such that for English borrowings, high tones are assigned from left to right up to and including the penultimate syllable and a low tone is assigned to the ultimate. This rule seems applicable to a number of morphemes, (8a), but clear counterexamples also exist as well, (8b).
(8) a. kópà 'penny' símëntì 'cement' pláímínìsà 'prime minister'
    pénsù 'pencil' hóspítù 'hospital'
    lámbù 'lamp'

b. kòfì 'coffee' máìsì 'match'
    mìkì 'milk'
    sùkù

The absence of a consistent pattern among English, or other borrowings for that matter, makes the argument about borrowings belonging to a special class untenable.

3.4.4. A statistical argument. It is also possible to weaken the claim, as Leben is prepared to do [personal communication], that while the melodic hypothesis does not apply to 100% of the lexicon, it does account for roughly 90% of the Mende basic vocabulary and therefore the suprasegmental claim ought to have some validity.

In response to this, a number of comments are worth making. First, the 90% figure relates to the basic vocabulary only, reflecting what I claim in section 6 to be an historical fact. Were the entire lexicon to be included in the pattern/frequency count, the patterns described by the suprasegmental melodies would constitute a much lower percentage.

Secondly, and more importantly, this 90% claim is considerably weaker than the original claim since it is now impossible to provide counter examples to the proposal; it is only possible to quibble about the percentage of entries which fall within the melodic claim.

Thirdly, originally Leben established a dichotomy between segmental languages (those which do not have a suprasegmental melodic component) and suprasegmental languages (those which do). Now there appear to be languages which are only partly suprasegmental, having some lexical entries with suprasegmental tone and some lexical entries with segmental tone.

Finally, it is now unclear how this weakened suprasegmental melodic claim differs from the alternative tension-based claim, since both hypotheses assert that the tonal patterns in Mende are diverse. What does the melodic claim now reveal about the nature of Mende tone that the non-melodic claim does not? This issue will be taken up in section 7.
4. Implications of the Counterexamples

On the basis of the data presented in this section, a number of important conclusions can be drawn. First, it has been shown that the constraint against HLH melodies in Mende is false. Since the issue concerns the correctness of a constraint, it would hardly appear to be a serious criticism of the suprasegmental position, yet, upon further examination this is not the case.

First, the elimination of the constraint against HLH melodies creates a new problem for the suprasegmental position, for now there is no reason why a HLH melody cannot be mapped onto a morpheme of one syllable, yet there are no uncontested examples of any monosyllabic morphemes with more than two tones. From a suprasegmental standpoint, the lack of such examples, as well as the parallel lack of monosyllabic morphemes with a LHL melody, cannot be explained.

A second problem caused by the elimination of the constraint against the HLH melody arises from the fact that the *HLH constraint is the only substantial suprasegmental gap that could be found in Mende. Thus the loss of this constraint virtually eliminates the ability of the suprasegmental theory to make any true, relevant statements of structural tonological gaps in Mende. While it might be possible to make a claim against a LHLH or a HLHLHLH melody, the theory would be competing with a segmental theory in explaining why four to six tones could not appear on a single tone-bearing unit for mono- and disyllables on one hand and would take advantage of the paucity of morphemes of three or more syllables to explain gaps on the other. The fact that the theory can make no unique claims of structural gaps does not destroy that theory, but it does considerably weaken its descriptive value.

A second criticism of the theory concerns what I believe to be the false prediction of three tones occurring on a single tone-bearing segment. While the existence of such a tone pattern would constitute a very strong supportive argument in favor of the suprasegmental position, the lack of such a tone pattern likewise weakens this position for now it is at a loss to explain this gap as anything but an accident unless it puts forward an additional constraint against more than two different tones being assigned to the same syllable thus incorporating the essence of the non-
melodic alternative. Were this to be done, two things would happen. First, the number of unique predictions of the melodic hypothesis would be reduced. Second, the melodic theory would have to become more complex and less distinct from the competing alternative model.

The final and most crucial criticism, however, concerns the formal gaps predicted by the suprasegmental theory. The theory was constructed in order to make the co-occurrence of certain tonal patterns such as HHH and HLL impossible (because only one of these segmental patterns can be derived from an underlying melody in a given language). The existence of both patterns in Mende is clear indication that the formalism of the suprasegmental theory excludes Mende as a suprasegmental tone language.

Clearly from this evidence, the claim that Mende is a language with five underlying melodies is unsubstantiated, and an alternative explanation to Mende tonal phenomena must be sought. In the next section, those aspects of Mende tone which are thought to be synchronically relevant are presented from a segmental point of view. The following section provides a diachronic explanation for those facts which are not considered to synchronically relevant.

5. The Tension Hypothesis and the Data

In this section, the predictions of the tension hypothesis are compared with the data. As pointed out in section 2.2, this hypothesis predicts four monosyllabic tone patterns, sixty-four trisyllabic tone patterns, etc.

5.1. Monosyllabic tone patterns. The tension hypothesis predicts four and only four monosyllabic tone patterns, specifically those given in (3a). Mende displays precisely these four monosyllabic tone patterns, (9). See section 3.1 for arguments against a possible fifth monosyllabic tone pattern.

(9) 
H nda 'mouth'
L kpa 'debt'
HL mbu 'owl'
LH mba 'rice'

While the complex tones of this series rarely appear on the surface as complex, reflecting a Mende constraint against surface-level complex tones,
both analyses agree that these complex tones do exist in these underly­ing representation. The basis for this claim is that these complex tones exhibit phonological alternations, which are given in (10a) with examples given in (10b).

(10) a. 1) utterance finally (before #)
   2) before a low-toned segment (before L)
   3) before a high-toned segment (before H)

   b. underlying surface surface surface
      representation before # before L before H
      H ndá ndá ndá-félé' ndé-í
      'mouth' 'two mouths' 'the mouth'
      L kpà kpà kpà-félé' kpè-í
      'debt' 'two debts' 'the debt'
      HL mbû mbû mbû-félé mbû-í
      'owl' 'two owls' 'the owl'
      LH njá njá njá-félé njè-í
      'water' 'two rivers' 'the water'

5.2. Disyllabic tone patterns. The non-melodic hypothesis predicts that if four tone patterns are possible on morphemes of one syllable, then sixteen tone patterns will occur on disyllabic morphemes. These patterns are given in (11), those which have been attested are circled.

(11) 1st syl 2nd syl H L HL LH

Clearly, there is a discrepancy between the observed and predicted tonal patterns. If a segmental analysis is to have any validity, it ought to provide a convincing explanation of these gaps. In the following analysis, these gaps are shown to be a consequence of two independent factors: (1) the uniqueness of the rising tone and (2) gaps caused by non-alternating complex tones. Temporarily setting aside the problem of the distribution of morphemes involving rising tones, let us turn our attention to the apparent lack of non-final falling tones. These tones have not been observed because were they to exist either underlyingly or historically,
they would be modified by the proposed tonal rules. Since these falling tones are in a non-final position, their environment is fixed and alternation is impossible. Were the following falling tones HL H, HL L, and HL HL to function like morpheme-final falling tones, their surface manifestation would be as follows: HL H would appear on the surface as H 'H; HL L would be indistinguishable from HL; HL HL would appear on the surface as H 'HL.

Words with these surface patterns do exist as evidenced by the morphemes tátó 'start' and gónë 'cat', providing evidence of more tonal patterns than those given in (11). With the addition of these entries, the 3x3 inner matrix of (11) is completed as shown in (12).

(12) 1st syl 2nd syl H L HL

<table>
<thead>
<tr>
<th></th>
<th>ngúlú</th>
<th>ngílà</th>
<th>ngǹng3</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>'tree'</td>
<td>'dog'</td>
<td>'tooth'</td>
</tr>
<tr>
<td>L</td>
<td>nàvó</td>
<td>bèlè</td>
<td>ngètë</td>
</tr>
<tr>
<td></td>
<td>'money'</td>
<td>'trousers'</td>
<td>'pestle'</td>
</tr>
<tr>
<td>HL</td>
<td>tátó</td>
<td>(same as gónë)</td>
<td>(same as gónë)</td>
</tr>
<tr>
<td></td>
<td>'start'</td>
<td>H L</td>
<td>'cat'</td>
</tr>
</tbody>
</table>

Therefore, with the exception of the rising tone, which is severely limited in its distribution, the number of disyllabic tonal patterns is a function of the number of possible syllabic tonal types (3) and the number of syllables.

5.3. **Trisyllabic tonal patterns.** Again setting aside the short-rising tone, a segmental analysis when applied to trisyllabic morphemes, would predict $3^3$ or 27 tonal types, save for six redundancies, listed in (13d), caused by the nature of the falling tone. However, because of the limited number of trisyllabic morphemes in the language, which are not apparent reduplicated morphemes or morphologically complex (possible compounds), it is difficult to find clear manifestations of each of these tonal patterns. Nevertheless, the search for trisyllabic tone patterns revealed that in addition to the five trisyllabic tonal patterns predicted by the suprasegmental theory, (13a), Mende has seven additional trisyllabic tonal patterns, (13b), which are not predicted by the suprasegmental tone theory but which are predicted by the segmental theory. Despite the nine unattested patterns, (13c), which must be viewed as accidental gaps, the
observed data is clearly more in line with the predictions of the segmental theory than with the suprasegmental theory.

(13) a. predicted by both the segmental and suprasegmental theories
   H H H  fónìngé  'young man'
   L L L  gòmòn  'slothful'
   H L L  félèmà  'junction'
   L H H  ndèndélfí  'shade'
   L H L  fàkáli  'pawpaw'

b. predicted by the segmental but not by the suprasegmental theory
   H L H  lànsàna  proper name  (structural gap in ss theory)
   H L HL kònùgù  'centipede'  (structural gap in ss theory)
   H HL H  múísì  'matches'  (structural gap in ss theory)
   L HL H  màátó  'add to'  (structural gap in ss theory)
   L L H  làsímó  'amulet'  (formal gap in ss theory)
   H H L  símítì  'spider'  (formal gap in ss theory)
   L L HL nòmblì  'statuette (sp)'  (formal gap in ss theory)

c. predicted by the segmental but not the suprasegmental theory
   L H HL  does not occur  L HL HL  does not occur
   HL H H  does not occur  HL H L  does not occur
   HL H HL  does not occur  HL HL H  does not occur
   HL HL HL  does not occur  H H HL  does not occur
   H HL HL  does not occur

d. redundant tone patterns
   H HL L  same as  H H L
   L HL L  same as  L H L
   HL HL L  same as  HL H L
   HL L H  same as  H L H
   HL L L  same as  H L L
   HL L HL  same as  H L HL

5.4. The distribution of the rising tone. From the data presented so far, it is clear that the distribution of the polarized (rising tone) is non-random. As originally pointed out by Spears [1967] this tone is always
preceded by a low tone, a fact which the segmental theory has failed to capture. There is a reason for this, although it is not synchronically relevant. In the next section, the peculiar distribution of the polarized tone is seen to be a simple consequence of the historical evolution of Western Mande.

6. The Historical Evolution of Southwestern Mande (SWM) Tone Classes

6.1. Tone classes. The tonal patterns described by Leben's five tonal melodies account for at least 90% of the modern Mende morphemes, and probably 98% of Proto Southwestern Mande, a fact which demands an explanation. However, in order to facilitate the discussion, I would like to reclassify the Mende tonal patterns given in (2) into the following tonal types:

(14) Tone Type Monosyllable  Disyllable  % of basic vocabulary
1  H ndá 'mouth'  H H ngúlú 'tree'  39
2  LH mbã 'rice'  L LH nìkà 'cow'  41
3  HL mbù 'owl'  L HL ngëtë 'pestle'  5
4  H L kálì 'hoe'  3
5  L kpà 'debt'  bële 'trousers'  2
6  L H nàvó 'money'  3
7  H HL hókpà 'navel'  3
8  HL H tátò 'start'  0
9  HL HL gòné 'cat'  0
10  H H L náánì 'four'  2

(At this stage in the discussion, the hacek found over type-two words is to be interpreted as a diacritic used to mark "polarized" tones. See text for details. Section 7 argues that this tone has an underlying short-rising tone.) The numbering of these tonal classes is not arbitrary; it represents their order of appearance in Mende. Tone classes 6 through 9 include the most recent additions to Mende; they show no consistent cognates with other SWM languages, even the near dialects, Bandi and Loko.

The remaining tone classes are more frequent than the others, comprising the bulk of the basic vocabulary of Mende and demonstrating a consistent
phonological correspondence in all the SWM languages. Therefore, these tone classes most likely comprised the tone patterns of Proto SWM. Examples of these correspondences are given in (15) below:

(15) Mende Kpelle & Tone Pattern Proto SWM Mende Loko Bandi Loma Gloss
1 H lá ndá ndá ndá ddá 'mouth'
   H H yúlú ngúlú ngúlú ngúlú ggúlú 'tree'
2 LH bá mbá mbá mbá bbá 'rice'
   L LH n̄nkā P n̄kā n̄kā n̄kā n̄kā 'cow'
3 HL bû mbû mbû mbû bbû 'owl'
   L HL n̄ntē P ngētē ngētē ngētē ggētē 'pestle'
4 H L kālî kālî kālî kālî kālî 'hoe'
5 L H bèlè bèlè bèlè bèlè bèlè ? 'trousers'

6.2. Class 5 morphemes. Welmers [1961] clearly demonstrated that class 5 nouns in Kpelle represent borrowings. His arguments cite both (1) phonological idiosyncracies (unlike classes 1 through 4, a large percentage of class 5 morphemes have non-mutating initial consonants) and (2) syntactic idiosyncracies (all class 5 morphemes are nouns). But class 5 nouns appear in all of the modern SWM languages, and what is more, they show the same medial consonant correspondence as do the first four noun classes, namely a Central SWM prenasalized medial consonant corresponding to a Kpelle medial nasal as shown in (16).

(16) Gloss Mende Kpelle
'trousers' bèlè bèrè
'hat' bōlō bōlō
'chisel' tōndō tōndō
'Sande' sāndē sāndē

Morphemes more recently borrowed do not show this medial consonant development, e.g. Mè lāmbò, Kp lāmpù 'lamp'. Furthermore, the arguments used by Welmers for Kpelle can be extended to include the Central SWM languages with the conclusion that class 5 nouns as a type were present in Proto-SWM, but represent the most recently acquired tonal class. This
hypothesis explains why this class is present in all of the SWM languages and why this class displays a medial consonant development which is consistent with the first four noun classes.

The lack of cognates between SWM class 5 nouns and Northern Mande nouns further suggests that this tonal class was acquired by Pre-Proto SWM after it separated from Northern-Western Mande. And if the nouns of class 5 are Pre-Proto SWM borrowings, then a number of the peculiar characteristics of this class become understandable, such as (1) why this class contains such a small percentage of the number of common SWM nouns, (because they are borrowings), (2) why only nouns belong to this class (borrowed words are always nouns) and (3) why words in this class begin with a stressed low tone (perhaps because they represent a new morphological class acquired through borrowing). It is also possible that since the establishment of class 5 nouns in Pre-proto-SWM that additional members of this class have been subsequently acquired through borrowing.

6.3. The mid tone. At some time after its divergence from Proto Western Mande and prior to the acquisition of class 5 nouns, Pre-Proto-SWM had only four tonal classes. At that time, the mid and low tones were in complementary distribution: low tones occurred following high tones and mid tones occurred elsewhere. The lower allotone may well have been the result of downdrift. Whatever the explanation, Pre-Proto-SWM was a language with only two contrastive phonemic tones while Kpelle has three, (17).

<table>
<thead>
<tr>
<th>Class</th>
<th>Pre-Proto SWM</th>
<th>Kpelle</th>
<th>Mende</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>*(H)H</td>
<td>(H)H</td>
<td>(H)H</td>
</tr>
<tr>
<td>2</td>
<td>*(L)L</td>
<td>(M)M</td>
<td>(L)LH</td>
</tr>
<tr>
<td>3</td>
<td>*(L)HL</td>
<td>(M)HL</td>
<td>(L)HL</td>
</tr>
<tr>
<td>4</td>
<td>* H L</td>
<td>H L</td>
<td>H L</td>
</tr>
<tr>
<td>5</td>
<td>---</td>
<td>L L</td>
<td>L L</td>
</tr>
</tbody>
</table>

At some point between Pre-Proto-SWM and modern Kpelle a mid tone developed, e.g. *(L)L > (M)M and *(L)HL > (M)HL. When this developed is unclear although it is undoubtedly a response to the acquisition of class 5 morphemes which have the same tonal pattern as class 2 morphemes. This
restructuring of central SWM of class 2 morphemes from LL to L LH may represent a parallel response.

6.4. Class 1 and 2 morphemes. Class 5 nouns are not the only tone class that fails to show any correlation with Northern Mande. In fact, all the cognates which have been established between these two sub-branches on segmental grounds consistently belong to SWM tone classes 1 and 2. Furthermore, their Northern Mande reflexes display the same consistent tonal patterns with similar but not identical tonal alternations.

(18) Gloss       Reconstructed Proto-SWM       Susu [Houis, 1963]
'medicine'      *sálé (1)          séř́
'tree'          *wúlú (1)          wúř́
'rat'           *nyíná (1)          nyëné
'root'          *sáŋké (1)          sãké
'cow'           *nǐnká (2)          nįgé
'chief'         *mānsā (2)          mŋgé
'monkey'        *kūlā (2)          kůlé
'chicken'       *tē.ē (2)          tēxé
'bird'          *yōntī (2)          xōń

Furthermore, it has been observed that these two tonal classes represent the predominant tonal classes in Western Mande. They comprise 80% of the basic vocabulary in Mende for example. For these reasons, Proto Western Mande, the ancestor of Mende and Southwestern Mande, appears to have been a language of two tonal classes: 1 and 2. While Class 1 morphemes can be characterized as having all high tones, the characterization of class 2 morphemes, because of its phonological alternation requires further discussion.

6.5. Class 2 morphemes. The alternation of morphemes of this class takes one of two basic forms as represented by Bambara and Mende. In both languages, the final tone is H before a following L and L before a following H (hence the term polarized), but in Bambara, the tone is L utterance finally, while in Mende and the other central SWM langauges the tone is H utterance finally.
These surface forms are given in (19) below:

(19) Bambara Mende

<table>
<thead>
<tr>
<th>Before</th>
<th>Bambara</th>
<th>Mende</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>L L-H</td>
<td>L H-L</td>
</tr>
<tr>
<td></td>
<td>L H-L</td>
<td>L H-L</td>
</tr>
<tr>
<td></td>
<td># L L#</td>
<td>L H#</td>
</tr>
<tr>
<td></td>
<td>L #</td>
<td>H #</td>
</tr>
</tbody>
</table>

Because polarization appears in each branch of Western Mande, there is good reason to suppose that polarization was a fact of Proto Western Mande. Furthermore, because both branches of Western Mande exhibit the Bambara type of alternation (Kpelle for SWM) there is good reason to believe that the Bambara type of alternation represented the type of alternation found in Proto Western Mande class 2 morphemes. Therefore, the Mende type of alternation, found in all SWM languages but Kpelle, represents the innovative form. From this information Proto Western Mande appears to have been a "partially free pitch-accent system", to use McCawley's [1967] terminology, of two tonal types: type one morphemes (consisting of all high tones) and type two morphemes (consisting of a string of zero or more low tones followed by a morpheme-final polarizable tone). Furthermore, it is an important historical fact that throughout the course of its development into SWM, this polarized tone has maintained its unique association with tone class (2) despite the acquisition of new tone classes. It is these factors that account for the highly restricted distribution of the polarized tone in all the SWM languages: the polarized tone appears (1) only morpheme finally and (2) only when preceded by a non-high tone. Thus, the highly restricted nature of the polarized tone has a very understandable historical explanation.

6.6. **Class 4 morphemes.** Because class 4 nouns also have no cognates in Northern Mande, because of low percentages (3% of the basic Mende vocabulary) of this class in Proto-SWM and because this tonal class shows no evidence of morphological complexity, this class, too, most likely consists of borrowed morphemes. The source of these borrowings has not been established.

6.7. **Class 3 morphemes.** Prior to the acquisition of class 4 nouns, the
tonal system of an earlier stage of Pre-SWM contained only three tonal classes. Class 3 nouns also have no cognates with Northern Mande nouns, but in this case, their acquisition by SWM may not have been due exclusively to borrowing. Class 3 nouns have the tonological appearance of nominal compounds which are composed of class 1 and/or class 2 monosyllabic constituents.

The tonal rules of Proto-SWM and modern Kpelle are such that any compound composed of any combination of class 1 and 2 monosyllabic nouns would produce a class 3 tonal pattern as is illustrated in (20).

(20) Class Proto-SWM Base Proto-SWM Surface
(1+1) L + H → L + HL
(1+2) H + L L + HL
(2+1) L + H L + HL
(2+2) L + L L + HL

If class 3 nouns are fossilized compounds constructed from class 1 and 2 nouns, then at this stage of development of Proto-Southwestern Mande, there are only two true tonal classes: class 1, (H)H, and class 2 (L)L. This conclusion ties in very neatly with the observation that only SWM tonal classes 1 and 2 have cognates in Northern Mande.

An objection to the hypothesis that class 3 nouns are fossilized compounds is the lack of convincing morphological evidence to back it up. What evidence there is is suggestive, but not totally convincing.

The Mende examples given in (21) suggest the possibility of being compounds although there is considerable inconsistency in the tones.

(21) ndòpo 'child' ndó + po 'child' + ?
nyáápo 'mistress' nyáhá + po 'woman' ?
hí índó 'male' hin + ndó 'male' 'child'
ndááyá 'spittle' ndá + yá 'mouth' 'water'
ngééndó 'morning' ngélè + ndá 'sky' 'mouth'
ngéwóló 'God' ngélè + wólé 'sky' 'big₁'
ndámbá 'crocodile' ndá + mbá 'mouth' 'big₂'
ngómbù 'fire' +ngón + bù 'fire' 'under'
nyáhá 'woman' nyá + há 'my' ? 'female'
nìkáhá 'cow' nìká + há 'cow' 'female'
njólaá 'potato leaf' njòwó + láwá 'potato' 'leaf'
Some of the class 3 nouns may not be true compounds but borrowings, but because they have the tonal configuration of a nominal compound, they represent an acceptable surface tonal pattern in Proto SWM and could, therefore, have been borrowed with that tonal pattern as a "pseudo" compound.

Whatever the explanation of the origin of class 3 nouns, they do not, as far as can be determined, have cognates in any of the northern Mande languages and therefore must have been acquired since Northern-Western Mande split into Southwestern and Northern Mande.

At the time of this split, then, there were two tone classes: class 1, *(H)H, and class 2, *(L)L (with the final polarizing tone). The development of the third tonal class is closely linked to the tonal patterns of nominal compounds. Either the class 3 tonal patterns, *(L)HL, represent fossilized compounds, or the tonal patterns of nominal compounds may have broken the constraint that morphemes are all high or all low, thereby paving the way for class 4 words, *HL, and class 5 words, *LL, with true low tones. The development of the five SWM tone classes from Proto-Northern-Western Mande is summarized in (22) below with the percentages of representation of the first 5 types in the Mende basic vocabulary.

(22)

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Proto-Northern-Western Mande</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Pre-SWM</td>
<td></td>
</tr>
<tr>
<td>1. *(H)H</td>
<td>39%</td>
</tr>
<tr>
<td>2. *(L)L</td>
<td>41%</td>
</tr>
<tr>
<td>3. *(L)HL</td>
<td>5%</td>
</tr>
<tr>
<td>Late Pre-SWM</td>
<td></td>
</tr>
<tr>
<td>4. *HL</td>
<td>3%</td>
</tr>
<tr>
<td>5. *LL</td>
<td>2%</td>
</tr>
<tr>
<td>Proto-SWM</td>
<td></td>
</tr>
</tbody>
</table>

This analysis does not include the development of morphemes of more than two syllables for the reason that no consistent cognates either within SWM or between the two branches of Western Mande have been identified. Thus, it is reasonable to conclude that trisyllabic morphemes largely, if
not completely, comprise borrowings, a fact supported by their relatively small numbers in these languages (4% in the basic vocabulary).

Yet although the tonal patterns Leben claims for Modern Mende are incomplete, they appear to be a more accurate description of the tone patterns thought to exist in Proto SWM and seem to be a consequence of the break-down of a suprasegmental tone system of the type classified by McCawley [1967] as a partially-free tone-accent system. And since Proto SWM accurately conforms to Leben's five melody hypothesis, it provides a test for the suprasegmental claim. If Proto SWM is on its way to being a true (segmental) tone language, then the descendants of Proto SWM such Mende would be expected to continue this trend and fill the structural and formal gaps predicted by the suprasegmental theory. On the other, if Proto SWM is a suprasegmental tone language, then the constraints ought to hold, and we should expect new acquisitions by Mende to "fit" into existing categories. In the next section, evidence is presented to test this hypothesis.

From a historical point of view, the tone patterns of SWM appear to be the result of the breakdown of a two-toned partially-free pitch-accent system. Proto-SWM appears to be a language which could be described by a five melody suprasegmental phonology of the type envisioned by Leben for Mende. This raises the question: Is the fact that the tonal patterns of Proto-SWM can be characterized by the five tonal melodies a significant synchronic tonal fact, or is it a vestage of the diachronic development of this language? If this is a synchronic fact, then it ought to have some significance, that is, it ought to act as a constraint against new tonal patterns appearing in the language. Thus, one would expect if this constraint were true, that new forms would have to adjust their tonal patterns to meet the demands of the constraint in the same way that most borrowings conform to the structural conditions of a language. By this reasoning, accidental gaps would be filled, structural gaps would not be filled and formal gaps could not be filled without a total restructuring of the theory. Because Mende no longer reflects the limited tonal patterning of Proto-SWM, we must conclude either that conditions predicted by a suprasegmental theory of phonology did not exist in
Proto-SWM, or that they did, but had very little effect on the future development of the language. At this time it is very difficult to understand the meaning of an extant, albeit ineffectual, constraint as being significantly different from a claim that no constraint exists.

7. Rule Evidence for the Melodic Hypothesis?

The melodic hypothesis has been offered as an explanation of the tonal patterns of modern Mende. As such, it has offered a tonal typology for the world's tonal languages: those which are segmental and those which are also suprasegmental, i.e. those which have a premapping component. If this scheme is designed only to account for the patterning of a language's tonal types, something which it does not do very convincingly for Mende, it has very little merit. If, on the other hand, this classification offers new insights into the nature of Mende tone beyond that already discussed and beyond that of a non-melodic hypothesis, the utility of the melodic hypothesis would be substantiated.

There are three areas in which the melodic hypothesis could make unique predictions concerning the tonal properties of Mende: first, if there is a rule which can best be stated at a pre-mapping level; second, if there is a rule at the post-mapping level but which requires the tonal patterns generated by the mapping rules; third, if there are diachronic processes which can best be stated using a premapping rule. In this section, the melodic hypothesis is examined with respect to each of these areas.

7.1. A premapping tone rule? A premapping tone rule, called "LOW SPREADING" by Leben [1973], was tentatively put forward and subsequently rejected because of its failure to accurately predict the facts. Consequently, as we shall see, the rule was demoted to a post-mapping rule.

The context in which the apparent melodic tone rule appears involves the common Western Mande phenomenon of polarization, mentioned in 6.4 above. Both the melodic and tension approaches agree that class 2 monosyllables are best analyzed having in the underlying segmental representation a short-rising tone, e.g. LH as in njè, with the melodic view making the additional claim that this segmental representation was derived from an
underlying rising, LH tonal melody via the tonal mapping rules given in
(la) and (lb). With respect to the underlying segmental representation
(post mapping) of class 2 disyllables, however, these two views do not
agree: the tension view proposing a L LH underlying segmental represen-
tation, e.g. pêlê 'path', and the melodic view claiming a L H segmental
representation, e.g. pêlê 'path', following the mapping of a LH tonal
melody on to the disyllabic morpheme.

Each of these segmental representations follow logically from within
the context of their respective theoretical views with the key point of
difference being the differing interpretations of the concept of distinc-
tiveness [Chomsky and Halle, 1965]. The concept states that segments
having identical surface manifestations must have identical underlying
representations. Thus, if two segments show the same surface tonal al-
ternation, they must have the same underlying tonal representation.

From this standpoint, the tension-based argument is clear. If the
final syllable of class 2 monosyllables exhibits a specific tonal alter-
tation and is analyzed as having an underlying short-rising tone, then
the final syllable of class 2 disyllables which exhibits the same type of
alternation must also have a short-rising tone. Thus the underlying repre-
sentation of class 2 disyllables must be L LH.

The melodic viewpoint also uses the distinctiveness argument to sup-
port its position, claiming that distinctiveness can also apply to tonal
patterns prior to their being assigned to specific segments. From this
perspective, if both monosyllabic and disyllabic morphemes display the
same tonal alternation then they must have the same underlying melody.
Because monosyllables have a rising suprasegmental tonal melody, disyl-
lables exhibiting the same tonal alternation must also have the same
rising suprasegmental melody. Given this suprasegmental rising melody
and the tonal mapping rules (la) and (lb) class 2 morphemes must have an
underlying segmental tone pattern of L H. While it is possible to revise
the suprasegmental mapping rules (la) and (lb) so that an underlying LH
melody could be mapped onto a disyllabic morpheme to produce the same L LH
segmental pattern claimed by the tension view, this revision cannot be
done without destroying the simplicity of the mapping system.
Given these underlying representations, the task of the phonological rules is to eliminate the H of the L LH melody when it is followed by another H in the subsequent morpheme. Interestingly, Leben [1973] initially attempted to formulate this rule, called LOW SPREADING, but found that it would not work at this level. The argument runs as follows:

(23) LOW SPREADING
\[ H \rightarrow \phi / \text{L} \quad \text{___} +H \]

\[
\begin{array}{c|c|c}
\text{e.g.} & \text{UNDERLYING} & \text{LH_nike-H} \mid \text{LH_nika} \\
\text{LOW SPREAD} & \text{Lnika-H} \mid \text{Lnika} & \text{(not applicable)} \\
\text{MAPPING} & \text{nìkà-í} & \text{nìkà} \\
\text{SURFACE} & \text{nìkè-í} & \text{nìkà} \\
\text{Gloss} & \text{‘the cow’} & \text{‘a cow’}
\end{array}
\]

As a premapping rule, LOW SPREADING provides an explanation for the observation that polarization only occurs in morphemes with a surface (L)\textsuperscript{H} tonal pattern since this group of words all have an underlying LH melody and it is to this melody that LOW SPREADING applies.

However, as a premapping rule, LOW SPREADING makes an incorrect prediction about the tonal alternations of tri-syllabic morphemes which are claimed to have a LH melody. According to this prediction, such morphemes, e.g. \text{nìdèndè}lì 'shadow', ought to have a definite singular tonal pattern in which the high tone has been displaced two syllables, i.e. \text{nìdèndèlì-í}, as the following derivation illustrates:

(24) Underlying \[ LH_{nìdèndèlì-í} \quad LH_{nìdèndèlì#} \]
LOW SPREADING \[ nìdèndèlì-í \quad nìdèndèlì# \]
MAPPING \[ nìdèndèlì-í \quad nìdèndèlì# \]
Predicted surface \[ *nìdèndèlì-í \quad nìdèndèlì# \]
Observed surface \[ nìdèndèlì-í \quad nìdèndèlì# \]

There is no evidence that a high tone is ever displaced more than one syllable in this context and in fact, no evidence that this rule can work at a premapping level, and consequently there is no evidence of a pre-mapping rule.
7.2. **LOW SPREADING as a post-mapping rule?** Although LOW SPREADING has been demoted to a post-mapping rule, if correct, it is still supportive of the melodic hypothesis because it requires the tonal patterns generated by the current mapping rules as input. Yet even at the post-mapping level, the LOW SPREADING rule is less explanatory, more complex and inaccurate. The rule is less explanatory for it fails to explain why only morphemes with a (L) H tone pattern undergo polarization. To show the relative complexity and inaccuracy, the LOW SPREADING must be contrasted with a competing analysis, one based on phonological tension.

7.2.1. **A tension-based interpretation.** The tension-based interpretation emphasizes the relationship between the number of distinct tones and the tone-bearing units of the phonological string. In section 2, the number of possible underlying tonal patterns was claimed to be a function of principle (4) which stated that underlingly, no more than two different tones may be associated with a single tone-bearing segment. The surface tone patterns and alternations can be shown to be the consequence of a parallel surface-level constraint:

(25) At the surface level, only one tone may be associated with a single tone-bearing unit. The only exception is utterance finally where a falling tone may remain.

The rules needed to derive this surface alternation function to resolve the contradiction between surface level and underlying constraints; that is, complex underlying tones have to undergo "tension releasing" processes.

In the case of the polarized tone, these processes are as follows:

(26) **HIGH TONE ABSORPTION**

\[
\begin{align*}
\text{LH} & \rightarrow \text{L} / \quad \text{H} \\
\text{LH} & \rightarrow \text{L} \\
\end{align*}
\]

\[\text{e.g. } \text{mba} \rightarrow \text{mba} \]

(27) **LOW LOSS**

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

\[\text{e.g. } \text{mba} \rightarrow \text{mba} \]
Interestingly, the falling tone undergoes a similar alternation and is subject to a parallel set of rules LOW TONE ABSORPTION and LOW LOSS:

(28) LOW TONE ABSORPTION

\[ HL \rightarrow H / \_ \_ L \]

\[ e.g. \text{mbu-ngaa} \rightarrow \text{mbu-ngaa} \]

(29) LOW LOSS

\[ HL' \rightarrow H \text{ (except finally)} \]

\[ e.g. \text{mbu-i} \rightarrow \text{mbu-i} \]

The parallel nature of these two sets of rules suggests a broader generalization: that these rules can be integrated to produce a simpler rule set and a neater generalization. These rules are ALPHA TONE ABSORPTION and SIMPLIFICATION:

(30) ALPHA TONE ABSORPTION

\[ \alpha H - \alpha H \rightarrow \alpha H / \_ \_ - \alpha H \]

(31) SIMPLIFICATION

\[ L \rightarrow \phi / \left\{ \begin{array}{c} \_ \_ H \\ H \_ \_ \text{ except finally} \end{array} \right\} \]

7.2.2. A comparison of the two analyses. The two analyses differ with respect to only one rule. This difference stems from a difference in the underlying representation of class 2 disyllabic words. It will be recalled that class 2 disyllabic morphemes are represented as c\_c\_ by the melodic analysis and as c\_c\_ by the tension analysis hypothesis. These differences of representation necessitate different rules. The alternation of class 2 disyllables cannot be handled by HIGH TONE ABSORPTION since the final syllable does not contain a complex tone. Consequently a new rule, LOW TONE SPREADING is required:
(32) LOW SPREADING

\[ H \rightarrow L / L \quad \text{\#H} \]

Each of these rules produces a slightly different set of derivations, given in (33):

(33) Based on the Melodic Hypothesis

a. underlying \mba-\text{\#} \quad \mba-\text{\#} \quad \text{p\`el\`e-\#} \quad \text{p\`el\`e-\#} \\
   LOW SPREADING \mba-\text{\#} \quad \text{p\`el\`e-\#} \\
   SIMPLIFICATION \mba-\text{\#} \\
   surface mb\`e-\text{\#} \quad \mba \quad \text{p\`el\`e-\#} \quad \text{p\`el\`e} \\
   gloss 'the rice' 'rice' 'the path' 'path'

b. Based on the Non-melodic Hypothesis

underlying \mba-\text{\#} \quad \mba-\text{\#} \quad \text{p\`el\`e-\#} \quad \text{p\`el\`e-\#} \\
   ABSORPTION \mba-\text{\#} \quad \text{p\`el\`e-\#} \\
   SIMPLIFICATION \mba-\text{\#} \quad \text{p\`el\`e-\#} \\
   surface mb\`e-\text{\#} \quad \mba-\text{\#} \quad \text{p\`el\`e-\#} \quad \text{p\`el\`e-\#} \\
   gloss 'the rice' 'rice' 'the path' 'path'

7.2.3. Criticisms of LOW SPREADING. While LOW SPREADING is a possible rule for either system, it is more complex from the perspective of the tension model. For to choose LOW SPREADING over HIGH TONE ABSORPTION
means, first, selecting a rule which does not conform to the surface constraint and second, to breaking the symmetry of the ALPHA TONE ABSORPTION rule. Thus, the selection of the optimal rule is a choice dependent upon the form of the underlying representation of disyllabic class 2 words which, as we have seen, is in turn a consequence of the underlying assumptions about the nature of Mende tone. Inversely, the empirical adequacy of each rule is therefore a reflection of the adequacy of the supporting hypothesis. In this regard, LOW SPREADING has some serious difficulties which further detract from the potential value of the melodic hypothesis.

First, the melodic hypothesis makes wrong predictions. As the rule is now formulated, it predicts that some trisyllabic morphemes ought to undergo a tonal alternation:

\[(34) \quad \text{L L H-H LOW SPR} \rightarrow \text{L L L-H} \]
\[\text{H L H-H LOW SPR} \rightarrow \text{H L L-H} \]

While morphemes of this type have been shown to exist in Mende (section 3) these morphemes do not alternate as predicted by the melodic hypothesis. While the lack of alternation on these forms can be explained by a rule-blocking diacritic, such an ad hoc explanation competes poorly with that of the tension analysis which does not predict these aberrant alternations in the first place. Since these tonal patterns do not represent complex tones, the tension hypothesis does not predict a tonal alternation.

Secondly, the LOW SPREADING rule fails to provide an explanation as to why disyllabic morphemes with an underlying L H tone pattern do not alternate. In addition to the disyllabic morphemes which display tonal polarization Mende (class 2) also has another set of disyllabic morphemes with a L H tonal pattern (class 6) which do not display tonal polarization.

Both analyses agree that the underlying tonal representation of class 6 morphemes must be L H. This representation causes no difficulties for the tension-based analysis because class 2 and class 6 are
phonemically distinct (L LH and L H respectively). However, the melodic hypothesis does not represent these two types of morphemes as tonally distinct and consequently is forced to distinguish between these two tonal alternations using a diacritic feature. Because class 6 is numerically smaller than class 2, Leben [1973] has suggested that class 6 morphemes be marked with the diacritic feature.

Customarily diacritic features have been used to distinguish one class of morphemes from another which would otherwise have the same underlying representation but which display different surface realizations. The use of such diacritic features marks an "unnatural" period of development of a language such as borrowing. Thus the use of a diacritic feature in this case would suggest something such as the following: that all class 6 morphemes are borrowed while all class 2 morphemes are not. While the evidence does show that all class 6 morphemes appear to be recent acquisitions, many class 2 morphemes also appear to be recent borrowings. This being so, the meaning of this diacritic feature is unclear.

One of the indicators of a recent borrowing in Mende is the initial consonant. The comparative evidence, given in Dwyer [1974], shows that recent Mende borrowings begin with one of the following consonants: b, d, g, gb, v, s, while native Mende morphemes do not. The fact that class 2 morphemes can be found which begin with one of the above consonants, as given in (35) below, indicates that tone class 2 includes recent borrowings and consequently that the proposed diacritic feature does not distinguish native words from borrowings.

(35) native                 borrowed (polarized)         borrowed (nonpolarized)
    pele  LP 'path'           vanja  LP 'loincloth'          bondo  LH 'okra'
    kali  LP 'snake'          bole   LP 'clown'              gbɛhe  LH 'bench'
    sama                    'important  
                           person'

And while an explanation other than borrowing might be found to explain the use of the proposed diacritic feature, no such explanation has been offered nor appears likely. But the diacritic feature analysis also suffers from a second major difficulty. Unlike natural segmental features, diacritic
features are suprasegmental (morpheme level) features which are mapped onto each segment in the morpheme. The intent behind this Chomsky and Halle [1968] formalism was not only to distinguish diacritic features from natural features, but to make it possible to generalize about a series of otherwise unrelatable events. For example, borrowings frequently fail to undergo a series of unrelated rules or frequently display a special set of word-forming properties. These facts which are ungeneralizable using natural segmental features can be shown to be related through the use of a single diacritic feature. Thus, one of the ways of arguing in support of the use of a particular diacritic feature is to show that its use relates at least two independent facts.

The diacritic feature proposed for Mende to distinguish class 2 and class 6 morphemes has the weakness that it does not relate any such facts, its usage is in the strictest sense of the term "ad hoc" for it only marks the exceptionality of type 6 morphemes with respect to the polarization rule (LOW SPREADING). Many of the morphemes identified as borrowings on the basis of their initial consonant or their membership in tone class 6 (see above) are not exceptions to the other phonological rules in Mende such as FRONTING, CONSONANT MUTATION, and HIGH TONE COPYING (these rules are discussed in detail in Dwyer [1973]). In each of these cases, the question of whether a borrowing undergoes a rule or not can be answered by referring to the specific rule's structural description. Thus no independent evidence can be found to support the existence of the proposed diacritic.

7.2.4. Criticisms of the tension analysis. Despite what appear to be clear advantages of the tension analysis it has been subject to criticism, however. Part of Leben's reason for choosing a suprasegmental analysis instead of a tension based (rising-tone) analysis of polarization was due to four apparent weaknesses which he found in the segmental analysis which are summarized below (from Leben [1973:63]).

(36) i. This argument ignored the fact that although regular phonological features were being employed ... they were being employed diacritically, in the sense of Kiparsky [1968].

   ii. That the distinction is used solely to permit the grammar to
predict which nouns would and which nouns would not undergo tone deletion (i.e. ABSORPTION).

iii. This analysis had no account of the fact that words like navo (LH) are extremely rare, while words like nika (LP) are common.

iv. Finally, the analysis failed to observe that the abstract rising sequences posited for nouns like nika were always preceded in the same word by an L on the first syllable.

If the tension analysis is correct, it ought to be able to provide answers to each of the criticisms raised against it.

Absolute neutralization is not to be confused with abstractness, a similar but quite distinct phenomenon. Whereas the principle of absolute neutralization argues against using a phonological feature for diacritic purposes, it does not claim that an underlying representation of a phoneme must be one of the observed surface level allophones. In this regard, the melodic hypothesis admits to an abstract representation of type 2 monosyllables for the underlying short-rising tone which appears on the surface as either a low tone or a high tone, but never a rising tone. Thus the issue is not that of abstractness but rather that of absolute neutralization. Furthermore, the use of an underlying short-rising tone as part of monosyllabic or disyllabic morphemes does not violate Kiparsky's condition of absolute neutralization. Kiparsky introduced the condition to prevent the use of phonological features to set up "underlying distinctions for the sole purpose of classifying segments which do and those which do not meet the structural analysis of a rule" [Kiparsky, 1968:9]. Kiparsky gives the following example:

(37) A → B / ___ C
    D → C (everywhere)

Kiparsky referred to a rule such as D → C as a case of "absolute neutralization". His claim was that by eliminating absolute neutralization, it would be possible to eliminate the diacritic use of phonological features. Kiparsky by no means implied that the use of phonological features should not be used to describe what he called "contextual neutralization", for this is the kind of neutralization which results in what is often called morphophonemic alternation. He cites several examples of contextual neutralization including the classic English write writer,
and the German bunt bunde as examples warranting phonological rather than diacritic analyses.

To contrast the tension analysis proposed above, which does not make a diacritic use of a phonological feature, the following analysis, which does, is offered:

(38) 1. Polarized tones are high tones that appear on voiceless vowels, e.g. nìkà, nonpolarized tones are high tones that appear on voiced vowels, e.g. bòndó.

2. Low spreading applies only to high tones on voiceless vowels.

3. After, which, all voiceless vowels become voiced.

The objection raised in (36ii), which questioned the lack of independent motivation for the rising tones, is also wrong, for the motivation of the underlying rising tone was well established for monosyllables [Dwyer, 1971], a conclusion which both the melodic and tension-based analyses agree with.

And, as was argued above (7.2) on the basis of the segmental viewpoint and the concept of distinctiveness, that the postulation of a short-rising tone on the second syllable of class 2 morphemes follows directly from the conclusion that the final syllable of monosyllables having a short-rising tone exhibits the same tonal alternation.

The third criticism (36iii) argues that the grammar provides no account of the fact that morphemes of the type bòndó are extremely rare in Mende, even though they are segmentally simpler. While it is true that the tension-based analysis does not provide a synchronic explanation of this fact, it claims that this observation is not relevant to a synchronic grammar. It was shown in (13) that class 6 words (bòndó, nàvó) all appear to be relatively recent borrowings, but it is not clear that this historical information could be gathered by a native speaker of Mende from the synchronic data at hand. And if it cannot, then how can this kind of information be included in a synchronic grammar of Mende?

The fourth claim (36iv) that ABSORPTION analysis fails to explain why polarized tones are always preceded by low tones is correct. It is also true, as pointed out above, that the melodic hypothesis cannot explain this fact either. However, as argued above, this fact is of historical relevance only and would not be considered to be synchronically meaningful to a Mende speaker.
Although the segmental synchronic analysis would not attempt to include the kind of information raised in (36iii) and (36iv), its diachronic counterpart would predict that on the basis of simplicity, more class 6 morphemes L H will be acquired through borrowing in the future than morphemes of the type L LH, thereby increasing the ratio of L H morphemes to L LH in the language. It would also predict that more morphemes like kpúkpúa will be acquired and that the apparent constraint against high tones preceding a polarized tone will be lost.

7.3. Premapping diachronic rules? A third prediction that the melodic hypothesis could make concerns the types of possible diachronic tone changes. Since the specific tonal patterns of a language are determined by the types of possible underlying tonal melodies and mapping rules, then some types of diachronic tonal developments ought to be characterizable in terms of these elements. For example, were a melody to restructure, then the surface tonal patterns of monosyllabic, disyllabic, trisyllabic morphemes which have this melody would be affected. Alternatively, if a given mapping rule were altered, then the location of the existing tonal "notes" would be likewise altered.

Importantly, however, the noted diachronic Southwestern Mande tonal changes do not reflect any melodic principles at work, rather they reflect events that are better understood using a tension-based model. Two such diachronic developments in SWM will serve to illustrate this point. The first is the restructuring of class 4 tonal patterns in Mende and the second is the restructuring of class 3 and class 4 tonal patterns in Bandi.

These developments can be detected by examining the tonal correspondences given in (16) of section 6.1.

7.3.1. Mende class 4 restructuring. The development of H HL to HL in Mende (see Dwyer [1977] for details) cannot be characterized as a change in melody, for in this development, the melody remains the same. Therefore, the development would have to be characterized as a change in mapping rules. However, to change the mapping rule to produce the right tonal patterns on class 4 morphemes would inadvertently produce the wrong tonal pattern on the remaining tone classes (unless of course two
different sets of mapping rules are used, a move which undermines the original simplicity of the melodic hypothesis).

As pointed out in Dwyer (1977), this development when viewed from the perspective of a tension-based hypothesis can be seen as a variety of ABSORPTION rule, one in which the tones are preserved, but the tension in the morpheme is reduced.

7.3.2. Bandi tonal class restructuring. A second Southwestern Mande tonal development involves the restructuring of Bandi morpheme-final falling tones to simple high tones. This development affected tonal classes 3 and 4 as is shown in the following comparison of Bandi and Loko (39) (Loko being used to represent the earlier state of Bandi before the tonal restructuring).

<table>
<thead>
<tr>
<th>(39) Class</th>
<th>Loko</th>
<th>Bandi</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ngúlú</td>
<td>ngúlú</td>
<td>(no change)</td>
</tr>
<tr>
<td>2</td>
<td>nìkã</td>
<td>nìkã</td>
<td>(no change)</td>
</tr>
<tr>
<td>3</td>
<td>ngètè</td>
<td>ngètè</td>
<td>'pestle'</td>
</tr>
<tr>
<td>4</td>
<td>kálį</td>
<td>kálį</td>
<td>'hoe'</td>
</tr>
<tr>
<td>5</td>
<td>bòlò</td>
<td>bòlò</td>
<td>'trousers' (no change)</td>
</tr>
</tbody>
</table>

Since this change involves the loss of a note, it cannot be characterized as a change in mapping rules and it must be seen as change in melody. Importantly, from a melodic standpoint, this development affects only those LHL morphemes which are of one and two syllables in length only. Morphemes of three syllables or more in length with a LHL pattern remain unaffected. This diachronic development cannot be stated using premapping tone values.

From the perspective of the tension-based hypothesis, this change is a perfectly natural development, following along the same lines as SIMPLIFICATION (31). What appears to be happening here is that the surface-level constraint (25) is becoming an underlying constraint.

Thus, an examination of two diachronic tonal developments in Southwestern Mande has revealed events which at best are only awkwardly described by a melodic hypothesis and which are easily understood given a tension-based perspective. Again then the melodic hypothesis has failed to reveal any new insightful comments about the nature and development of Mende tone,
and the tension-based analysis has shown these developments to be within its range of prediction.

7.3.3. More support for the short-rising analysis. Interestingly, when classes 3 and 4 restructured, the surface patterns class 4 (H HL > H H) became tonally indistinguishable from class 1, reflecting the fact that these two tonal classes have merged and have developed the same underlying tonal representations. When class 3 restructured (L HL > L H) it did not merge with tone class 2.

If class 2 disyllabic morphemes are represented as L H, e.g. nìká 'cow', as proposed by the melodic analysis, then the simplification of class 3 disyllabic morphemes to L H, e.g. ngètè 'pestle', ought to result in a merger of these two classes. If on the other hand, class 2 disyllabic morphemes are represented as L LH as proposed by the tension-based analysis, then the simplification of class 3 disyllabic morphemes ought not to result in a merger of these two classes. The fact that these two classes do not merge supports the low-rising analysis of the tension-based analysis. The non-distinctness of Bandi classes 1 and 4 and the distinctness of classes 2 and 3 are shown in (40):

(40) class 1 class 2 class 3 class 4
    ndàmbá-ngí nìkà-í nyànhà-í ngìlá-í noun + 'the'
    ndàmbá+níñá nìkà+níñá nyànhà+níñá ngìlá+níñá noun + 'new'
    'crocodile' 'cow' 'woman' 'dog'

8. Conclusion: What Sort of a Tone Language is Mende?

The conclusion of this paper is clear: Mende is not a melodic tone language of the type envisioned by Leben [1973]. The original claim that Mende tonal patterns could be explained by positing just five underlying tonal melodies and a mapping rule were shown to be inadequate because of a significant number of counterexamples. Furthermore, the melodic claim was examined further to see if there were other types of generalizations that could be made at the premapping
level or which required the tonal patterns generated by the proposed
tonal melodies and mapping rules. The evidence, both synchronic and
diachronic, again demonstrated the inutility of the melodic hypothesis.

If Mende is not a melodic tone language then the question remains,
"What sort of tone language is it?" In answer to this question a
tension-based hypothesis was advanced which claimed that the tonal
phenomena of Mende could only be understood by reference to the rela-
tionship between tonal and segmental units, specifically the number of
permissible tonal units assignable to a given tone-bearing segment.
In both the case of Mende tonal patterns and Mende tonal processes,
both synchronic and diachronic, this tension-based model provided a
principled interpretation as to why Mende functions tonally the way it
does and thereby answers the question raised in this paper.

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