Tone features revisited: evidence from Seenku (Mande, Burkina Faso)

Laura McPherson (Dartmouth College)†

1. Do tones have features?

1.1 Background on tonal features

- Segments are widely accepted to be made up of features encoding various phonetic parameters:
  - [voice], [cont], [labial], [dorsal], [sonorant], etc.
- What about tone?
  - From a phonetic perspective, it is really just a single dimension:
    - Pitch/f0 (barring secondary aspects like voice quality)
- Numerous feature systems have been proposed.

(1) Proposed feature systems (as summarized by Hyman 2011)

```
(=H) 5 4 3 2 1
(=M)  - - - - -
(=L)  - + + + +
```

<table>
<thead>
<tr>
<th>a. Halle and Stevens (1971)</th>
<th>STIFF</th>
<th>SLACK</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>b. Yip (1980)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UPPER</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>+</td>
</tr>
<tr>
<td>+</td>
</tr>
<tr>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>c. Clements (1983)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROW 1</td>
</tr>
<tr>
<td>h</td>
</tr>
<tr>
<td>h</td>
</tr>
<tr>
<td>l</td>
</tr>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>d. Bao (1999)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STIFF</td>
</tr>
<tr>
<td>+</td>
</tr>
<tr>
<td>+</td>
</tr>
<tr>
<td>-</td>
</tr>
<tr>
<td>-</td>
</tr>
</tbody>
</table>

# < 455 lgs. with n tone heights: 12 26 140 367

- I will be primarily focusing on and adopting Pulleyblank’s (1986) feature system, which follows that of Yip (1980) but replaces [high] with [raised].
  - These features allow for a four-level contrast, with two M tones:

(2) Four tone levels produced by Pulleyblank’s (1986) features

<table>
<thead>
<tr>
<th></th>
<th>H</th>
<th>M</th>
<th>M</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>[upper]</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>[raised]</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>

† I would like to thank Larry Hyman, Kie Zuraw, Abbie Hantgan, and audiences at Dartmouth College and Boston University for helpful discussion of pieces of this work. Many thanks to my consultants, Sy Clément Traoré, Gni Emma Traoré, and Gni Fatou Traoré for their help and their patience. I gratefully acknowledge the financial support of NSF grant BCS-1263150 (2013-16) and the Dartmouth College Burke Award.
1.2 Arguments against tonal features

- Hyman (2011) points out a number of problems with the featural approach, including the fact that there is no natural class for the two M tones (in a four-tone language) and the ambiguity of M tones (in a three-tone language).
- Clements et al. (2011) likewise argue that tone features lack the clear motivations found for segmental features.
  - No clear evidence for natural classes of tones as defined by features.
  - No clear cases of featural assimilation or dissimilation.
- For these reasons, both authors suggest (at least African) tone is better thought of in autosegmental terms, with simple levels (L, M, H, etc.).

1.3 Today’s talk

- This talk has two main goals:
  - Describe the relatively unknown tonal system of Southern Seenku.
  - Reopen the debate on the featural underpinnings of tone.
- Despite recent arguments that tone features should be abandoned (or viewed with suspicion), I will argue that [upper] and [raised] do aid the analysis of Seenku tone.
- Evidence is drawn from:
  - Plural formation (floating [+upper] morpheme)
  - Transitive/intransitive tonal neutralizations (affecting [+raised] verbs)
  - Argument-Head tonal alternations (possession, O+V)

2. Background on Seenku

- Northwestern Mande language of the Samogho subfamily spoken in southwest Burkina Faso.

- Two main dialects:
  - Northern Seenku (Timiku, 5000 speakers, Prost 1971)
  - Southern Seenku (Gbeneku, 12,000 speakers, my focus)
The only existing work on southern Seenku is a master’s thesis on aspects of the phonology (Congo 2013).
Primary data from recent fieldwork (5 weeks in Burkina Faso 2013, shorter sessions in Vienna and New York City), representing preliminary work in a large-scale descriptive project.

3. Sketch of the tone system

Prost (1971) counts four tone levels in his description of northern Seenku, but I have found three in my work.

- L, M, H

I represent these as numeric superscripts, given the presence of multiple contours (making diacritics hard to distinguish).

- L=1, M=2, H=3

Most words are monosyllabic, where we find a three-way level tone distinction:

(3) **Level tones on monosyllables**

<table>
<thead>
<tr>
<th>Tone</th>
<th>Example</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>jwe₁</td>
<td>‘one’</td>
</tr>
<tr>
<td>M</td>
<td>nɔ₂</td>
<td>‘five’</td>
</tr>
<tr>
<td>H</td>
<td>fi³</td>
<td>‘two’</td>
</tr>
</tbody>
</table>

- Common lexical contour tones are ML and LH, which can occur on both light and heavy syllables:

(4) **Main contours**

<table>
<thead>
<tr>
<th>Contour</th>
<th>Example</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML</td>
<td>bi²¹</td>
<td>‘goat’</td>
</tr>
<tr>
<td>LH</td>
<td>na¹³</td>
<td>FUT</td>
</tr>
<tr>
<td></td>
<td>kpeː²¹</td>
<td>‘knife’</td>
</tr>
<tr>
<td></td>
<td>gɔː¹³</td>
<td>‘dry’</td>
</tr>
</tbody>
</table>

- MH and HL can be derived, but I have no clear evidence of underlying cases.
- Occasional three-tone contours (though the exact identity is unclear)

(5) **Three-tone contours**

<table>
<thead>
<tr>
<th>Contour</th>
<th>Example</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>LML</td>
<td>ku¹ nu₁²¹</td>
<td>‘stone’</td>
</tr>
<tr>
<td>LHL</td>
<td>pɛɲ¹³¹</td>
<td>‘donkey’</td>
</tr>
</tbody>
</table>

- Tones rules:
  - Downstep (triggered by intervening L)
  - Upstep (between certain M tones)
  - Contour tone simplifications
4. Evidence for features

- I propose that Seenku tones are characterized by the following features:

\[
\begin{array}{c|cccc}
\text{H} & (\text{MD}) & \text{ML} & \text{L} \\
\text{[upper]} & + & + & - & - \\
\text{[raised]} & + & - & + & - \\
\end{array}
\]

- Claim: Lexical (=underlying) ML tone is [-upper,+raised], but [+upper,-raised] can be derived by grammatical tone features.
- Can we find any evidence distinguishing the two?

4.1 Plural

- We find a tonal chain shift in plural formation (along with vocalic changes I will not discuss here):

\[
\begin{align*}
\text{L} & \rightarrow \text{MD} \quad \text{be:}^1 \rightarrow \text{be:}^2 \quad \text{‘pig(s)’} \\
\text{ML}(L) & \rightarrow \text{H} \quad \text{bi}^{21} \rightarrow \text{bi}^3 \quad \text{‘goat(s)’} \\
\text{H} & \rightarrow \text{H} \quad \text{fu}^3 \rightarrow \text{fwi}^3 \quad \text{‘hare(s)’} \\
\end{align*}
\]

  - [-upper,-raised] + [+upper] \rightarrow [+upper,-raised] (L \rightarrow \text{MD})
  - [-upper,+raised] + [+upper] \rightarrow [+upper,+raised] (\text{ML} \rightarrow \text{H})
  - [+upper,+raised] + [+upper] \rightarrow [+upper,+raised] (\text{H} \rightarrow \text{H}, \text{no change})

- Evidence for the M distinction (ML vs. MD) can be found in phonotactics.
  - ML is not allowed in word-final position.
- We see this in a gap in singular tone melodies:

\[
\begin{align*}
\text{Sg.} & \quad \text{Pl.} & \quad \text{Gloss} \\
\text{L} & \quad \text{be:}^1 & \quad \text{be:}^2 & \quad \text{‘pig(s)’} \\
\text{ML} & \quad --- & \quad \text{be:}^2 & \quad \text{‘pig(s)’} \\
\text{H} & \quad \text{fu}^3 & \quad \text{fwi}^3 & \quad \text{‘hare(s)’} \\
\end{align*}
\]

- Instead, we see a large number of ML contours, and these become H in the plural (i.e. they fill in that step of the chain shift):

---

1 For a featural analysis of the vocalic changes, see the slides from BU available on my website, www.dartmouth.edu/~mcpherson.
5

\( (9) \) \textit{ML singular nouns} \\

<table>
<thead>
<tr>
<th>Sg.</th>
<th>Pl.</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>bi(^{21})</td>
<td>bi(^{3})</td>
<td>‘goat(s)’</td>
</tr>
<tr>
<td>ka(^{21})</td>
<td>ke(^{3})</td>
<td>‘yam(s)’</td>
</tr>
<tr>
<td>sa(^{21})</td>
<td>se(^{3})</td>
<td>‘rabbit(s)’</td>
</tr>
<tr>
<td>go(^{21})</td>
<td>gα(^{3})</td>
<td>‘wood(s)’</td>
</tr>
</tbody>
</table>

- Anytime lexical \( M_L \) finds itself in word-final position, a \( L \) tone is epenthized as a repair. Morphology occurs before phonology, and addition of [+upper] alleviates the need for \( L \):

\( (10) \) \( /M_L/ \) singular and plural \\

<table>
<thead>
<tr>
<th>UR</th>
<th>/bi(^{2})/SG</th>
<th>/bi(^{2})/PL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphology</td>
<td>---</td>
<td>bi(^{3}) (addition of [+upper])</td>
</tr>
<tr>
<td>Phonotactics</td>
<td>bi(^{21})</td>
<td>---</td>
</tr>
<tr>
<td>SR</td>
<td>[bi(^{21})]</td>
<td>[bi(^{3})]</td>
</tr>
</tbody>
</table>

- All M-toned plurals are level tones:

\( (11) \) Derived \( M_D \) plurals \\

- Recall that M-toned plurals are featurally [+upper,-raised] (\( M_D \)), so it appears that there is no phonotactic ban on \( M_D \) in word-final position.
- \textbf{Upshot:} Phonotactics give us evidence that both M tone specifications can be represented in a three-tone language.

4.2 Transitive/intransitive verbal tone \\

- The three-way tonal contrast is neutralized to a two-way tonal contrast on verb stems on the surface (we find evidence for the three underlying tones elsewhere; see §4.3).
- For transitive verbs, \( H \) and \( M_L \) are neutralized to \( H \):
(12) **Transitive verb stems**

<table>
<thead>
<tr>
<th>Underlying tone</th>
<th>Surface form</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. L</td>
<td>sâ³¹</td>
<td>‘buy’</td>
</tr>
<tr>
<td></td>
<td>gyɔ³¹</td>
<td>‘grill’</td>
</tr>
<tr>
<td></td>
<td>fɔ¹</td>
<td>‘uproot’</td>
</tr>
<tr>
<td>b. M₉</td>
<td>kwɔ³³</td>
<td>‘bite’</td>
</tr>
<tr>
<td></td>
<td>sɔ:³³</td>
<td>‘sell’</td>
</tr>
<tr>
<td></td>
<td>ga:³³</td>
<td>‘pull’</td>
</tr>
<tr>
<td>c. H</td>
<td>bã³³</td>
<td>‘hit’</td>
</tr>
<tr>
<td></td>
<td>dzi³³</td>
<td>‘put’</td>
</tr>
<tr>
<td></td>
<td>jɔ³³</td>
<td>‘eat’</td>
</tr>
</tbody>
</table>

- For intransitive verbs, H and M₉ are neutralized to M₉.
  - Because the distinction between H and M₉ is only visible in constructions with objects, we mostly cannot tell whether an intransitive stem is underlyingly H or M₉.
  - I give only surface forms here.

(13) **Intransitive verbs**

<table>
<thead>
<tr>
<th>Surface form</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. L</td>
<td>ka¹</td>
</tr>
<tr>
<td></td>
<td>na¹</td>
</tr>
<tr>
<td></td>
<td>ki¹</td>
</tr>
<tr>
<td></td>
<td>kwa:¹</td>
</tr>
<tr>
<td>b. M₉</td>
<td>sɔ²¹</td>
</tr>
<tr>
<td></td>
<td>tɔ²¹</td>
</tr>
<tr>
<td></td>
<td>jũ²¹</td>
</tr>
<tr>
<td></td>
<td>gyɔ²¹</td>
</tr>
</tbody>
</table>

- As in singular nouns, [-upper,+raised] is not allowed in word-final position, so L is epenthesized.
- This active neutralization process can be seen with an ambivalent stem, *gira* ‘spill’, which is H transitively (*gira³*) and ML intransitively (*gira²¹*).
- I analyze these patterns as feature neutralization:
  - All [+raised] verb stems default to [+upper] in the transitive and [-upper] in the intransitive.
- **Upshot:** This is a case of natural classes being affected by a rule: all [+raised] stems are involved.
4.3 Explaining alternations

- More tentatively, features might help explain unexpected tonal alternations found between pronouns and a following possessed noun or verb (Poss+N, O+V).
- The alternations, summarized:

(14) a. L-toned verb/noun

<table>
<thead>
<tr>
<th>Case</th>
<th>Tonic</th>
<th>1pl mi² (H)</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>1sg mo² (M)</td>
<td>H</td>
<td>1pl mi² (H)</td>
<td>H</td>
</tr>
<tr>
<td>2sg a² (M)</td>
<td>H</td>
<td>2pl i² (M)</td>
<td>H</td>
</tr>
<tr>
<td>3sg a¹ (L)</td>
<td>L</td>
<td>3pl i¹ (L)</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3pl kwe³ (H)</td>
<td>H</td>
</tr>
</tbody>
</table>

b. M-toned verb/noun

<table>
<thead>
<tr>
<th>Case</th>
<th>Tonic</th>
<th>1pl mi² (H)</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>1sg mo² (M)</td>
<td>L</td>
<td>1pl mi² (H)</td>
<td>H</td>
</tr>
<tr>
<td>2sg a² (M)</td>
<td>L</td>
<td>2pl i² (M)</td>
<td>L</td>
</tr>
<tr>
<td>3sg a¹ (L)</td>
<td>L</td>
<td>3pl i¹ (L)</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3pl kwe³ (H)</td>
<td>H</td>
</tr>
</tbody>
</table>

c. H-toned verb/noun

<table>
<thead>
<tr>
<th>Case</th>
<th>Tonic</th>
<th>1pl mi² (H)</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>1sg mo² (M)</td>
<td>L</td>
<td>1pl mi² (H)</td>
<td>H</td>
</tr>
<tr>
<td>2sg a² (M)</td>
<td>L</td>
<td>2pl i² (M)</td>
<td>L</td>
</tr>
<tr>
<td>3sg a¹ (L)</td>
<td>M</td>
<td>3pl i¹ (L)</td>
<td>M</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3pl kwe³ (H)</td>
<td>H</td>
</tr>
</tbody>
</table>

- Observations:
  - Always H after H (thick outlined cells)
  - Always lowering after L (L → L, H → M)
  - Polarity of L and H (L → H, H → L) and lowering of M (M → L) after M
- How do features help explain these results?
- First, as background, noun/verb tone is always neutralized after a noun:

(15) a. bêː¹ sã¹ (L-toned verb)  b. bêː¹ soː¹ (M-toned verb)

pig   buy  pig   sell
‘buy a pig!’  ‘sell a pig!’

c. bêː¹ bâ¹ (H-toned verb)

pig   hit
‘hit a pig!’

- Proposal: complete spreading/neutralization only occurs after fully specified tones.
• H-toned pronouns are [+upper,+raised], and thus fully specified.
• L-toned pronouns are only [-raised] and M-toned pronouns are only [+raised] ([-upper] filled in by default).²
• Effects after L-toned pronouns come from **assimilation** to [-raised].

(16) a. ə¹ sə³

`‘buy it!’`

[+raised] + [-upper, -raised] \rightarrow \text{no change}

b. ə¹ sɔ:³

`‘sell it!’`

[-raised] + [-upper, +raised] \rightarrow (-upper) [-raised] -raised

c. ə¹ bə²

`‘hit it!’`

[-raised] + [+upper, +raised] \rightarrow (-upper) [+upper, -raised]

• Trickiest case is with M-toned pronouns; one potential explanation combines assimilation, dissimilation, and a ban on adjacent M tones (*MM):

(17) a. mo² sə³

[+raised] + [-upper, -raised] \rightarrow (-upper) [+raised] [+raised] \rightarrow

[(-upper) [+raised] [+raised] [+upper] [+raised]]

Assimilation, *MM

b. mo² sɔ:¹

[+raised] + [-upper, +raised] \rightarrow (-upper) [+raised] [+raised] \rightarrow

[(-upper) [+raised] [+raised] [+upper] [+raised]]

Dissimilation

c. mo² bə¹

[+raised] + [+upper, +raised] \rightarrow (-upper) [+raised] [+raised] \rightarrow

[(-upper) [+raised] [+raised] [+upper] [+raised]]

Dissimilation, *MM

• It seems (17a) would have to involve feature spreading, otherwise we have an opaque situation (if dissimilation is driven by *[+raised][+raised])

---
² Another possibility is that [-upper] is not an active feature in Seeku; differences between neutralization and tonal interactions would have to be derived in another way (other than underspecification).
• **Upshot:** These alternations are still under investigation, but we may find cases of featural assimilation and dissimilation here.

### 5. Problems with alternative analyses

• If we wanted to uphold Hyman’s (2011) and Clements et al.’s (2011) arguments against tone features, how could we analyze the Seenku data?

#### 5.1 Tonal primitives (L, M, H)

• Tones are just tones (like autosegments).
• Transitive/intransitive tone neutralization comes from simple phonotactics/reduced inventories (§4.2).
• This approach has many issues:
  o How do we explain the chain shift in the plural (§4.1)?
    ▪ Possibility: plural is a H tone that coalesces with the singular tone, but this is unlikely since the language allows contour tones.
  o How do we distinguish the two M tones (§4.1)?
    ▪ Possibility: Seenku actually has four tonal elements, but then we would need to find a way to derive M\(_L\) and M\(_D\).
  o How do we explain tonal alternations (§4.3)?
    ▪ Some complicated series of stipulated tone rules.

#### 5.2 Scalar tone

• We could propose a scale for Seenku tone:

\[(18)\] Seenku tone scale

\[
\begin{array}{ccc}
L & M & H \\
1 & 2 & 3
\end{array}
\]

• Plurals would be formed by a [+1] rule.
• L-toned objects/possessors would trigger [-1] on the following noun/verb; H-toned would trigger H spreading.
• Issues:
  o How can we distinguish the two M tones in terms of tonotactics (§4.1)?
  o How do we characterize the natural classes of M and H in verb formation (§4.2)?
  o How do we get the tonal effects after M-toned objects/possessors (§4.3)?
6. Conclusions

- Tone features have been rejected, based in part on the following criticisms:
  1. No evidence for tonal natural classes.
  2. No evidence for clear assimilation/dissimilation patterns.
  4. Everyone employs them differently (no accepted standard).

- Overall, a featural account of Seenku tone allows us to posit featural affixes.
  - Plural = [+upper]
  - Perfective = [-raised]

- In response to criticism 1, Seenku shows natural classes defined by [+raised] in verb tone.
  - Transitive [+raised] defaults to [+upper]
  - Intransitive [+raised] defaults to [-upper]

- In response to criticism 2, Seenku pronoun+noun/verb alternations may provide evidence of assimilation and dissimilation.
  - L-toned pronouns trigger [-raised] assimilation; M-toned pronouns trigger [+raised] dissimilation of underlying [+raised] and assimilation of underlying [-raised].

- In response to criticism 3, Seenku provides evidence for both [-upper, +raised] and [+upper, -raised] M tones, which behave differently in terms of tonotactics.

- In response to criticism 4, either we have simply not examined enough languages from the standpoint of features to find a consensus, or as Odden (2011) argues, feature systems are not phonetically grounded and universal, but rather deduced by speakers from the learning data.
  - Either way, let’s not close the book on tone features just yet.

References


