1. Efik Nominal Tonal Alternations

- Two tones, H and L, which may combine to form contour tones HL and LH (Welmers 1968); also downstep ('H), analyzed as an H after a floating L
- In certain constructions (noun-noun compounds, adjective-noun phrases, genitive constructions), nouns exhibit tonal alternations:

  \[(1) \quad /úfɔ̀k ɛbwá/ \rightarrow [úfɔ̀k ɛbwà] \quad \text{house dog} \quad \text{‘dog house’}\]

- In (1), the underlyingly H-H noun /ébwá/ ‘dog’ is realized as H-L when it follows the underlyingly H-L noun /úfɔ̀k/ ‘house’ in a noun-noun compound
- The complete patterns of nominal tonal alternations in compounds are given in Table 1 (patterns reported by Welmers 1968 and Cook 1985 and confirmed with new data elicited from 6 native speakers)

<table>
<thead>
<tr>
<th>Underlying Tonal Shape of 1st Noun</th>
<th>Underlying Tonal Shape of 2nd Noun</th>
<th>Group 1</th>
<th>Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>H-H</td>
<td>H-HL</td>
</tr>
<tr>
<td>Alternation 1</td>
<td>H-H</td>
<td>H-L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>H-L</td>
<td>H-L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>L-L</td>
<td>H-L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>L-H</td>
<td>H-L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>H-H</td>
<td>H-L</td>
<td></td>
</tr>
<tr>
<td>Alternation 2</td>
<td>H-HL</td>
<td>L-L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>L-HL</td>
<td>L-L</td>
<td></td>
</tr>
</tbody>
</table>

- Groups 1 and 2 and Alternations 1 and 2 are classifications from Welmers 1968
- **Today’s talk:** I present two accounts of these tonal alternations and suggest that a phrasal morphology account is preferable to a phonological account

2. A Phonological Account in OT

- There have been previous phonological accounts of the nominal tonal alternations (Kim 1974, Welmers 1973), but only Cook’s (1985) is fully elaborated

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1. L-HL nouns actually preserve their final fall, surfacing as H'-HL and L-HL under Alternations 1 and 2, respectively.
• Cook 1985: A full rules-based phonological analysis of nominal tonal alternations, but uses seemingly arbitrary and ad hoc rules (see Appendix)
• What would a phonological analysis look like in a constraint-based framework?
• Compounds contain a construction marker /H L/ between the two nouns (cf. Cook 1985), which is compelled to surface by REALIZEMORPHEME
• The following constraint is also active:
  ➢ *HLH: Don’t have the tonal sequence HLH within a word.²
• *HLH has been proposed for a variety of languages (Cahill 2007, McPherson 2016), and there is independent evidence that it is active within the word in Efik:
  ➢ *HLH affects the surface tones of reduplicated verb forms (Glewwe 2016)
• The derivation of surface tones H-L (Group 1 Alternation 1):

<table>
<thead>
<tr>
<th>(2)</th>
<th>/úfɔ́k ébwá/</th>
<th>REALIZEMORPHEME</th>
<th>*HLH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>H L H L H H</td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>úfɔ́k ébwá</td>
<td>H L H L H H</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>úfɔ́k ébwá</td>
<td>H L H L H H</td>
<td>*!</td>
</tr>
<tr>
<td>c.</td>
<td>úfɔ́k ébwá</td>
<td>H L H L H H</td>
<td>*!</td>
</tr>
<tr>
<td>d.</td>
<td>úfɔ́k ébwá</td>
<td>H L H L H H</td>
<td>*!</td>
</tr>
</tbody>
</table>

• REALIZEMORPHEME must be defined as being satisfied only if both tones of the construction marker are associated; otherwise (2c) would be as good as (2a)
• *HLH rules out associating both tones of the construction marker to the first syllable of ebwa, so (2a) is optimal

2.1 How are the surface tones H-¹H (Group 2 Alternation 1) derived?
(e.g. /úsàn éjím/ → [úsàn éjím] ‘onion dish’)
• Nouns that surface as H-¹H differ from those that surface as H-L in that they contain an H after an L (the L is floating in H-¹H nouns)
• These nouns do exhibit the HL melody of the construction marker, but the L is suppressed, appearing only as downstep
• Proposal: an H following an L in the same word is preserved by a special positional faithfulness constraint

² The domain of *HLH must ultimately be more specific because surface HLH sequences are permitted within a word in, for instance, inflected verb forms like á-sàná ‘s/he is walking.’
PreserveHPostL: An H that follows an L within a word in the input must be associated in the output.

- However: If only one tone of the construction marker is associated in the winner, the winner violates RealizeMorpheme.
- In that case, shouldn’t the candidate in which none of the tones of the construction marker are associated win, since this candidate also violates RealizeMorpheme and is more faithful?
- A workaround: Allow RealizeMorpheme to count units of the morpheme (in this case tones), so that its evaluation is no longer binary.

Derivation of surface tones H-L (Group 2 Alternation 1) shown in (3) for [ùsàn éjim] ‘onion dish’

<table>
<thead>
<tr>
<th></th>
<th>/ùsàn éjim/</th>
<th>PreserveHPostL</th>
<th>*HLH</th>
<th>RealizeMorpheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>L L H L L H</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>L L H L L H</td>
<td></td>
<td>**!</td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>L L H L L H</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td>L L H L L H</td>
<td></td>
<td>*!</td>
<td></td>
</tr>
</tbody>
</table>

2.2 How are the surface tones L-L (Group 1 Alternation 2) derived?
(e.g. /ìkwá ébwá/ → [ìkwá èbwà] ‘dog knife’)

- Nouns surface as L-L instead of H-L when the preceding noun ends in HL—why?
  - The HL#H (falling # high) sequence seems to be bad, but this structure doesn’t violate *HLH because it’s not within a word
  - Some other markedness constraint must be devised to penalize this structure
- *HLH<3: Don’t have the tonal sequence HLH on fewer than 3 syllables (must be fewer than 3 syllables because of compounds like [ùf5k èbwà])
- Realizing the H of the construction marker on the first syllable of the second noun when the first noun ends in the contour tone HL would violate *HLH<3, so the H of the construction marker changes to L
- Derivation of surface tones L-L (Group 2 Alternation 1) shown in (4) for [ìkwá èbwá] ‘dog knife’

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3 This constraint must also be restricted to some domain, since HLH sequences on fewer than 3 syllables can arise elsewhere, e.g. on a subject prefix and following verb in ñ-tjé-yé-tjé 1SG-sit-NEG~FOC ‘I’m not sitting.’ See also 2.4.
### 2.3 How are the surface tones L-H (Group 2 Alternation 2) derived?

(e.g. /íkwâ ínwén/ → [íkwâ inwén] ‘bird knife’)

- A combination of the effects of PRESERVEHPST and *HLH<3

### 2.4 Drawbacks of the phonological account

- Requires REALIZEMORPHEME to allow non-binary evaluation, opening the door to all sorts of complications
  - Should the delinked tones of the second noun of a compound also incur violations of REALIZEMORPHEME? If not, why not?
- Requires *HLH<3 in addition to *HLH
  - *HLH seems well-motivated for Efik
  - *HLH<3 seems to duplicate *HLH but must specify a domain of 2 TBU's or less while also being allowed to apply across word boundaries
  - There is no independent motivation for *HLH<3, and it would have to be restricted to compounds because HL#H sequences are permitted elsewhere:

  (5) Genitive construction: [àwâ éjìn] cat child ‘the child’s cat’

  (6) Double object construction: m’-má ń-nô àwâ fi ják
      1SG-PAST.AUX 1SG-give cat fish
      ‘I gave the cat a fish.’

- So we might consider an alternative to a purely phonological account…
3. A Phrasal Morphology Account

- Couched in McPherson’s (2014) morphological framework whereby lexicalized constructional schemas expressing idiosyncratic phrasal phonology are implemented as constraints
- In specific syntactic constructions, certain word classes impose tonal overlays on other words
- In Efik noun-noun compounds, the first (head) noun imposes a tonal overlay on the second (non-head) noun
- Proposal: The constructional schema for Efik noun-noun compounds specifies two allomorphs of the tonal overlay, and the interaction of the constructional schema constraint and phonological constraints gives rise to the full range of surface tones
- The constructional schema is given in (7):

\[
\begin{align*}
\text{PHON} & \leftrightarrow \text{NP} \\
\omega_i & \omega_j & \omega_i & \omega_j & N \\
\mid & \mid & \mid & \mid & \mid \\
\ldots \mu & [ ] & \ldots \mu & [ ] & N_i & N_j \\
\wedge & \mid & \mid & \mid \\
H & L & \{L\} & T & \{HL\}
\end{align*}
\]

- The schema in (7) states that in a noun-noun compound, if the first noun ends in HL, the tonal overlay \(\{L\}\) is imposed on the second noun, and if the first noun ends in an H or an L, the tonal overlay \(\{HL\}\) is imposed on the second noun
- The schema is enforced with the single constructional schema constraint \(N N^{(H)L}\), which is satisfied when the correct allomorph of the tonal overlay is imposed on the second noun of a compound
- \(N N^{(H)L}\) counts one violation for each associated tone in the output that does not match the overlay (we will see later why its evaluation is not binary)
- \(\text{FAITH}(T)\) is binary: It is violated when the tones of the output do not match the tones of the input

\[
\begin{array}{|c|c|c|c|}
\hline
\text{/úfɔ́k ɛbwá/} & *HLH & N N^{(H)L} & \text{FAITH}(T) \\
\hline
\text{a. úfɔ́k ɛbwá} & *HLH & N N^{(H)L} & * \\
\mid & \mid & \mid & \mid \\
H & L & H_1 & H_2 \\
\hline
\text{b. úfɔ́k ɛbwá} & *! & \mid & \mid & \mid \\
\mid & \mid & \mid & \mid \\
H & L & H_1 & L \\
\hline
\text{c. úfɔ́k ɛbwá} & *! & * & * \\
\mid & \mid & \mid & \mid \\
H & L & H_1 & H_2 \\
\hline
\end{array}
\]
• (8) shows the derivation of the surface tones H-L:
   ➢ /úfɔ̀k/ ends in L, so it seeks to impose the overlay \{HL\} on /ébwá/
   ➢ N N^{(H)L} is violated if the overlay is not exhaustively imposed
   ➢ N N^{(H)L} >> FAITH(T), so the winner is [úfɔ̀k ébwá^{HL}] (superscripts indicate that a
tonal overlay has been imposed, whether partially or fully)

• (9) shows the derivation of the surface tones L-L:
   ➢ /íkwá/ ends in HL, so it seeks to impose the overlay \{L\} on /ébwá/
   ➢ N N^{(H)L} is violated if the overlay is not exhaustively imposed
   ➢ N N^{(H)L} >> FAITH(T), so the winner is [íkwá èbwá^{L}]

<table>
<thead>
<tr>
<th></th>
<th>/íkwá èbwá/</th>
<th>N N^{(H)L}</th>
<th>FAITH(T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>íkwá èbwá^{L}</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>b.</td>
<td>íkwá èbwá</td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>íkwá èbwá^{L}</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

What about the surface melodies H-^H and L-H (Group 2 Alternations 1 and 2)?

• Again, Group 2 nouns differ from Group 1 nouns in having an H after an L, so I use
  PRESERVEHPOSTL

• (10) shows the derivation of the surface tones L-H with [íkwá ínwén] ‘bird knife’:
   ➢ /íkwá/ ends in HL, so it seeks to impose the overlay \{L\} on /ínwén/
   ➢ PRESERVEHPOSTL outranks N N^{(H)L} and prevents exhaustive realization of the
   overlay
   ➢ But because N N^{(H)L} counts the number of tones that do not match the overlay, non-
   exhaustive realization is still better than no realization, so the winner is [íkwá ínwén^{L}]

<table>
<thead>
<tr>
<th></th>
<th>/íkwá ínwén/</th>
<th>PRESERVEHPOSTL</th>
<th>N N^{(H)L}</th>
<th>FAITH(T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>íkwá ínwén^{L}</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>íkwá ínwén</td>
<td>**!</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>íkwá ínwén^{L}</td>
<td>*!</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>
• The final surface melody is H-^1H (Group 2 Alternation 1)
• If the overlay {HL} is realized on a Group 2 noun while the H after the L is preserved, the result violates *HLH, so the L delinks, yielding H-^1H
• (11) shows the derivation of the surface tones H-^1H with [úsàn é'jím] ‘onion dish’:
  ➢ /úsàn/ ends in L, so it seeks to impose the overlay {HL} on /éjím/
  ➢ preserveHPOSTL prevents exhaustive realization of the overlay by preserving the underlying H of /éjím/
  ➢ Realizing the overlay {HL} on a single syllable is not only non-exhaustive but fatally violates *HLH
  ➢ The winner, [úsàn é'jím], delinks the L to avoid violating *HLH but still realizes the {HL} overlay better than the faithful candidate

<table>
<thead>
<tr>
<th>(11)</th>
<th>/úsàn é'jím/</th>
<th>preserveHPOSTL</th>
<th>*HLH</th>
<th>N N(H)L</th>
<th>Faith(T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Úsàn é'jímHL</td>
<td></td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>Úsàn éjim</td>
<td></td>
<td></td>
<td>**!</td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>Úsàn é'jímHL</td>
<td></td>
<td>!</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td>Úsàn é'jímHL</td>
<td></td>
<td>!</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

4. Comparing the Phonological and Phrasal Morphology Approaches
• The phonological account posits a construction marker /H L/ between the two nouns of a compound
• The phrasal morphology account stipulates two allomorphs of a tonal overlay for compounds: {L} after nouns ending in HL and {HL} after other nouns
• The phonological account is appealing in not requiring the added apparatus of constructional schemas
• The phrasal morphology account is appealing in capturing the output-orientedness of the patterns: nouns should simply have a certain tonal shape in compounds
  ➢ McPherson (2014) speculates that many cases of phrasal morphology are hidden in the literature because they have been analyzed phonologically
• The two constraint-based analyses are quite similar:
  ➢ Both use preserveHPOSTL to capture the difference between Group 1 and 2 nouns
  ➢ The phonological account requires REALIZEMORPH to allow non-binary evaluation, but the phrasal morphology account requires the same of the constructional schema constraint N N(H)L, a departure from McPherson 2014
• However:
  - The non-binary evaluation of $N N^{(H)\text{L}}$ is well defined (one violation per associated tone that doesn’t match the overlay) while that of REALIZE\textsc{MORPHEME} opens a can of worms
  - The phonological account requires the additional constraint *HLH<3, which seems ad hoc and is not well motivated for Efik
• For these reasons, I favor the phrasal morphology account over the phonological account
• That said, many of the types of evidence McPherson uses to argue for the phrasal morphology account in Dogon languages are not available in Efik (long-distance imposition of overlays, competition between two words seeking to impose an overlay on an intervening word, etc.)
• Further investigation of Efik nominal tonal alternations, particularly in longer phrases, may yield evidence for one account over the other

Appendix

Cook’s (1985) Phonological Analysis

• A construction marker /H L/ (no segmental material) occurs between two nouns in a compound
• The following ordered rules are crucial to deriving tonal alternations in compounds:

  (12) **L Copying** (P-28): The L of an initial-type prefix copies onto a following open transition when preceded by a word boundary and a floating tone.\(^4\)

  (13) **Assimilation to Floating L** (P-29): Following a floating L, all tones of a continuous string of Hs become Ls.

  (14) **Assimilation to Floating H** (P-30): Following a floating H, an L becomes H. (iterative)

• The derivation of [úf̥ɔ̀k ébwà] ‘dog house’ (Group 1 Alternation 1) is shown in (15):

  (15) /ú-f̥ɔ̀k ̀̀è-bwà/  
      _-  
      ú-f̥ɔ̀k ̀è-bwà  Assimilation to Floating L
      ú-f̥ɔ̀k ̀è-bwà  Assimilation to Floating H
      ú-f̥ɔ̀k ̀è-bwà  Assimilation to Floating H
      ú-f̥ɔ̀k é-bwà  (absorption of floating tones)
      [úf̥ɔ̀k ébwà] ‘dog house’

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\(^4\)“Initial-type prefix” and “open transition” are units specific to Cook’s phonological analysis of Efik. For Cook, most Efik nouns have the structure V-CVC, where the first V is an initial-type prefix and the - is an open transition, a segmental phoneme that is not audible but can bear a tone.
• The derivation of [ùsàn éˈjim] ‘onion dish’ (Group 2 Alternation 1) is shown in (16):

(16) /ù-sànˈ́ è-jím/ dish onion
ù-sànˈ́ è-jím L Copying
– Assimilation to Floating L
ù-sànˈ́ è-jím Assimilation to Floating H
ù-sànˈ́ è-jím Assimilation to Floating H
ù-sàn é-jím (absorption of floating tones)
[ùsàn éˈjim] ‘onion dish’

• Cook’s analysis accounts for all the tonal alternations in Table 1.
• However, his rules seem arbitrary:
  ➢ Why does a floating L affect a whole string of following Hs while a floating H affects only a single following L but can apply iteratively?
  ➢ Why do floating tones but not associated tones trigger these assimilations?
  ➢ L Copying is particularly ad hoc: the two assimilation rules have some application outside nominal constructions, but L Copying’s sole purpose is to get tonal alternations in nominal constructions to come out right.

Acknowledgments

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References


