“Tonal exchange rules in Khoekhoe: The role of defective nodes and prosodic subcategorization”

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1 Proposal

(1) In Khoekhoe, causative morphology triggers an exchange rule:
   - It adds a mid tone (M) to a stem if it lacks one (e.g. L→LM)
   - It deletes a M if the stem already has one (e.g. LM→L)

(2) Core of analysis:
   - A floating M is associated to a defective tonal root node
   - This defective root node subcategorizes as outside the stem { }
   - Exchange via representation – An auxiliary process not required

2 Background on exchange rules

(3) Exchange rules (a.k.a. ‘toggling’, ‘reversals’, or simply ‘polarity’)
   (Anderson & Browne 1973, Baerman 2007, de Lacy 2012, Wunderlich 2012, i.a.)

(4) Morphological patterns where in the exact same context
   - Input with segment or feature [-F] become [+F]
   - Input with segment or feature [+F] become [-F]

(5) Itunyoso Triqui [lɛq] (DiCanio, Martínez Cruz, Cruz Martínez, & Martínez Cruz 2020)

<table>
<thead>
<tr>
<th>Adjective</th>
<th>Nominalized form</th>
<th>[Note: Tone omitted]</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. nga</td>
<td>nga</td>
<td>‘one’</td>
</tr>
<tr>
<td></td>
<td>a2nga</td>
<td>‘one (of them)’</td>
</tr>
<tr>
<td>b. ñuñuñ</td>
<td>ñuñuñ</td>
<td>‘five (of them)’</td>
</tr>
<tr>
<td></td>
<td>b2ñuñuñ</td>
<td>‘six (of them)’</td>
</tr>
<tr>
<td>c. ββiβ</td>
<td>ββiβ</td>
<td>‘two (of them)’</td>
</tr>
<tr>
<td></td>
<td>aneβ</td>
<td>‘half (of them)’</td>
</tr>
</tbody>
</table>

(6) Generalization for these morphological contexts (word-final ending):
   - {Ø,?] → h
   - {h} → Ø


<table>
<thead>
<tr>
<th></th>
<th>/ŋgo/</th>
<th>/ŋgo+h/</th>
<th>/ββiβ/</th>
<th>/ββiβ+h/</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concatenation</td>
<td>ŋgo</td>
<td>ŋgo</td>
<td>ββiβ</td>
<td>ββiβ+h</td>
</tr>
<tr>
<td>Lengthening</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Epenthesis</td>
<td>-</td>
<td>-</td>
<td>ββiβ</td>
<td>-</td>
</tr>
<tr>
<td>h-Deletion-1</td>
<td>-</td>
<td>-</td>
<td>ββiβ</td>
<td>-</td>
</tr>
<tr>
<td>Merger</td>
<td>-</td>
<td>-</td>
<td>ββiβ</td>
<td>-</td>
</tr>
<tr>
<td>h-Deletion-2</td>
<td>-</td>
<td>-</td>
<td>ββiβ</td>
<td>-</td>
</tr>
<tr>
<td>Surface</td>
<td>[ŋgo]</td>
<td>[ŋgo]</td>
<td>[ββiβ]</td>
<td>[ββiβ]</td>
</tr>
</tbody>
</table>

(8) Item-based approach: A suffix /-h/ (de Lacy 2020)

(9) Generalized Nonlinear Affixation (GNLA) (Bermúdez-Otero 2012, i.a.)
   - “[GNLA] strives to derive all instances of non-concatenative morphology without any additional assumptions simply from affixation of nonlinear phonological representations that are independently motivated” (Zimmermann 2013:2)

(10) Surprisingly, tone has played only a marginal role in the exchange rule literature, with few exceptions (e.g. Yue-Hashimoto 1986 for Chinese dialects)

3 Core Khoekhoe data

   - Largest “Khoisan” language, spoken primarily in Namibia


(13) Consensus on the tone system:
   - Involves four pitch heights, forming six primary melodies
   - Distributed across a bimoraic stem (“Khoisan” canonical shape)
(14) Melody minimal pair (4 = highest pitch, 1 = lowest) (Haacke 2008:158)
   - ‘Double-High’ [43 ō] ‘fist’
   - ‘High-Rising’ [24 ō] ‘pollard’
   - ‘High’ [32 ō] ‘coagulate’
   - ‘Low’ [22 ō] ‘force out’
   - ‘Double-Low’ [12 ō] ‘push’
   - ‘Low-Rising’ [13 ō] ‘udder’
(15) Other logically possible stem melodies: Marginal or unattested
(16) These melodies are systematically altered in three contexts:
   - ‘Strong Flip Flop’ (SFF): Conditioned by causative morphology
   - ‘Weak Flip Flop’ (WFF): Conditioned by various morphology
   - ‘Tone Sandhi’: Conditioned by position in phrase (non-initial)

<table>
<thead>
<tr>
<th>Label</th>
<th>Isolation</th>
<th>SFF</th>
<th>WFF</th>
<th>Sandhi</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Double-High’</td>
<td>[43 ō]</td>
<td>[24 ō]</td>
<td>[24 ō]</td>
<td>[32 ō]</td>
</tr>
<tr>
<td>‘High-Rising’</td>
<td>[24 ō]</td>
<td>[43 ō]</td>
<td>[24 ō]</td>
<td>[22 ō]</td>
</tr>
<tr>
<td>‘High’</td>
<td>[32 ō]</td>
<td>[22 ō]</td>
<td>[22 ō]</td>
<td>[21 ō]</td>
</tr>
<tr>
<td>‘Low’</td>
<td>[22 ō]</td>
<td>[32 ō]</td>
<td>[22 ō]</td>
<td>[22 ō]</td>
</tr>
<tr>
<td>‘Double-Low’</td>
<td>[12 ō]</td>
<td>[13 ō]</td>
<td>[13 ō]</td>
<td>[21 ō]</td>
</tr>
<tr>
<td>‘Low-Rising’</td>
<td>[13 ō]</td>
<td>[12 ō]</td>
<td>[13 ō]</td>
<td>[13 ō]</td>
</tr>
</tbody>
</table>
(17) Weak Flip Flop: Six melodies neutralized to three, forming pairs
   - Triggered, *inter alia*, by applicative -bā (Haacke 1999:142)
   - Pair 1: {[24], [43]} → [24]
     !nārī ‘steal’ → !nārī-bā ‘steal for’
     kūrū ‘make’ → kūrū-bā ‘make for’
   - Pair 2: {[22], [32]} → [22]
     sārī ‘visit’ → sārī-bā ‘visit for’
     őā ‘return’ → őā-bā ‘return to’
   - Pair 3: {[13], [12]} → [13]
     ūrī ‘jump’ → ūrī-bā ‘jump for’
     !nārī ‘drive’ → !nārī-bā ‘drive for’
(18) Strong Flip Flop: The three pairs exchange their tone values
   - Triggered by causative reduplication -bā (Brugman 2009:164)
   - Pair 1: [43] → [24] & [24] → [43]
     [nōn] ‘smile’ → [nōn]-[nōm] ‘make smile’
     [ōō] ‘measure’ → [ōō]-[ōō] ‘estimate’
   - Pair 2: [22] → [32] & [32] → [22]
     [kōn] ‘move’ → [kōn]-kōn] ‘move to and fro’
     [sōm] ‘shade’ → [sōm]-sōm] ‘make shady’
     [nām] ‘love’ → [nām]-[nām] ‘inspire to love’
     [nūb] ‘short’ → [nūb]-[nūb] ‘shorten’

4 PHONOLOGICAL ANALYSIS

4.1 Part 1: Underlying tone contrasts

(19) Our phonological analysis builds on simpler representations
     proposed for language family (Brugman 2009, Kusmer 2020; Nakagawa 2006 on G|ui)
     - There are three tonemes H, M, and L which may combine to form
       ‘one-step’ rising contours (i.e. LM and MH)
     - Only the two contours with sharp rises decompose to two tonemes
     - Central innovation: ‘High’ [32] is tonally unspecified, i.e. Ø
(20) Phonological analysis paired with average pitch schema (Haacke 1999:97)
4.3 Part 3: Strong Flip Flop as a subcategorizing defective \( \mathbb{M} \)

(25) In Strong Flip Flop with causative reduplication, a floating \( \mathbb{M} \) is associated to a deficient TRN (represented as \( \circ \))
- Defective \( \circ \) is qualitatively distinct from non-defective \( \bullet \)
- Not simply under- or over-specified (cf. Bye & Svenonius 2012, Trommer 2015)

(26) Defective node \( \circ \) prosodically subcategorizes as being external to a prosodic stem, i.e. \( \{ \} \circ / \) (Inkelas 1990, Bennett et al. 2018; Downing & Kadenge 2020)

(27) Components of analysis for stems with \( \mathbb{M} \)
- A toneme must associate to a non-defective TRN (i.e. \( \bullet \))
- When a stem \( \mathbb{M} \) is present, then \( \mathbb{M} \circ \) coalesces with it
- Unlike with WFF, coalescence occurs outside the stem to satisfy the prosodic subcategorization frame \( \{ \} \circ \) of the defective \( \circ \)
- Resultant floating \( \mathbb{M} \circ \) is unincorporated, deletes at later cycle

\[
\begin{array}{c|c|c}
\text{Part 2: Weak Flip Flop as a floating } \mathbb{M} \\
\hline
(23) All tonemes are associated to a tonal root node (TRN, \( \bullet \)) (Snider 1999)
(24) Contexts which trigger Weak Flip Flop sponsor a floating \( \mathbb{M} \) which is pre-associated to a standard TRN (i.e. non-deficient)
- Floating \( \mathbb{M} \circ \) coalesces with a \( \mathbb{M} \) if one is present in stem \( \{ \} \)
- \( \mathbb{M} \circ \) is added to stems without \( \mathbb{M} \) (subject to contour tonotactics)
\end{array}
\]
- If stem has M, the floating $\hat{m}$ pulls it out of stem and coalesces.
- If stem does not have M, non-defective node $\bullet$ is epenthesised.

**Ramifications:**
- Exchange rules can be accounted for by a unique representation — no specialized auxiliary process is required.
- Extreme process morphology can be handled by representations, supporting Generalized Nonlinear Affixation (Bermúdez-Otero 2012, i.a.)

**Next steps:** Comparison of process- vs. item-based model.
- Flip Flop blocked if the triggering context (e.g. a suffix) is not directly adjacent to stem, e.g. with $\{\mu\mu\}$-bases (Haacke 1999).

**References**


