Palatalization in Logoori
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ACAL 46 | 27 March 2015

1. Outline
• Velar palatalization (k, g → tʃ, dʒ) in Logoori
  ▪ Place in typology of Bantu velar palatalization
  ▪ Vowel length study to probe the (non-)derived status of [tʃ] and [dʒ]
  ▪ Distribution of postalveolar affricates
• Coronal palatalization (s → ʃ) in Logoori
  ▪ Previously undescribed process proposed to resolve rule ordering paradox

2. Language Background and Data Collection
• Logoori (Llogoori, Luragoli, Maragoli) is a Bantu language of western Kenya (JE41, Luyia) (Mould 1981, Bastin 2003)
• Data collected in a UCLA graduate field methods course in Fall 2014 and Winter 2015
• Consultant Mwabeni Indire:
  ▪ Male native speaker of Logoori in his early thirties
  ▪ Born in the U.S., grew up in Nairobi, spent time with extended family in Vihiga County in western Kenya
  ▪ Also speaks English and Swahili

3. Velar Palatalization
3.1 Logoori’s place in the typology
• Velar palatalization (k, g → tʃ, dʒ / {i, e}) common in Bantu (Hyman & Moxley 1996)
• Hyman & Moxley’s (1996) typology of Bantu velar palatalization:

<table>
<thead>
<tr>
<th>Type</th>
<th>Environments</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Across the board, including across morpheme boundaries</td>
</tr>
<tr>
<td>B</td>
<td>Everywhere morpheme-internally</td>
</tr>
<tr>
<td>C</td>
<td>Morpheme-initially only</td>
</tr>
<tr>
<td>D</td>
<td>Prefix-initially only</td>
</tr>
<tr>
<td>E</td>
<td>Only as the fusion of kj and gj</td>
</tr>
</tbody>
</table>

1 Many thanks to Mwabeni Indire, Hannah Sarvasy, Kie Zuraw, Jesse Zymet, and the UCLA Phonology Seminar audience for their contributions and helpful feedback.
• Synchronic velar palatalization in this Logoori dialect falls into Type E:

1. /N-handek-i/ 1sg-write-REC.PAST  [m-bandek-i] *[m-bandet[i]-i] (not Type A)
2. /eN-joke/2 CL9-bee [en-zoke] *[en-zot[e]] (not Type B)
3. /o-ken-a/ 2sg-play-IMP.SG [o-ken-a] *[o-t[en-a]] (not Type C)
4. /ke-baga/ CL7-cat [ke-baga] *[t[e-baga] (not Type D)

But:

5. /ke-ji-sing-aa/ CL7-REFL-wash-PRES  [t[f]-ii-sing-aa] (Type E)
   - Logoori has seven vowel phonemes: /i e a o u/
   - /i e o u/ glide before another vowel

6. Gliding (Front Vowels) (induces compensatory lengthening)
   \[
   \begin{align*}
   \{i\} & \quad V \to j 2 \, 2 \\
   \{e\} & \quad 1 \ 2
   \end{align*}
   \]

7. Consonant-Glide Reduction (Leung 1991)
   
   kj \to \text{t}[f] \\
   gj \to \text{d}[3]

8. /ke-ji-sing-aa/ CL7-REFL-wash-PRES
   ke-i-sing-aa \to j/-Deletion\textsuperscript{3}
   kj-ii-sing-aa Gliding
   t[f]-ii-sing-aa Consonant-Glide Reduction
   [t[f]-ii-sing-aa] it washes itself

• The dialect described by Leung (1991) falls into Type A:

9. Palatalization of Back Consonants (Leung 1991) (not active in this dialect)
   
   k \to \text{t}[f] / \_i \\
   g \to \text{d}[3] / \_i

10. /ko-handii-k-i/ 1pl-write-REC.PAST  [kohandiit[i]] (from Leung 1991)

\textsuperscript{2} The unusual dental glide /j/, described by Leung (1991), is never realized in our consultant’s dialect. On the surface, he only has the palatal glide [j]. We retain /j/, however, because nasals assimilate to it in place: /N-janz-aa/
‘1sg-like-PRES’ \to [ganzaa].

\textsuperscript{3} /j/-Deletion (Leung 1991): /j/ \to \emptyset / V + \_
3.2 Vowel Duration Study

- Leung (1991) posits underlying /t̃ʃ, d̃ʒ/ in addition to [tʃ], [dʒ] derived from /k, g/
- In this dialect, Consonant-Glide Reduction always fed by Gliding → Vowels following derived [tʃ] and [dʒ] should always be long
- Vowels following non-derived [tʃ] and [dʒ] should be short unless phonemically long or lengthened for independent reasons
- We measured vowel durations to see whether this was the case
- We first established baseline durations for long and short vowels:
  - Vowels elicited from near minimal pairs with underlying long and short vowels (as transcribed in Leung 1991)

### Table 2: Long and Short Vowels in Prominent Positions

<table>
<thead>
<tr>
<th>Vowel</th>
<th>Long (ms)</th>
<th>Short (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>/a/</td>
<td>202 (n=52)</td>
<td>121 (n=24)</td>
</tr>
<tr>
<td>/ɛ/, /e/</td>
<td>139 (n=24)</td>
<td>77 (n=24)</td>
</tr>
<tr>
<td>/i/</td>
<td>112 (n=38)</td>
<td>84 (n=32)</td>
</tr>
<tr>
<td>/ɔ/</td>
<td>213 (n=24)</td>
<td>89 (n=26)</td>
</tr>
<tr>
<td>/u/</td>
<td>142 (n=21)</td>
<td>84 (n=19)</td>
</tr>
<tr>
<td>All Vowels</td>
<td>165 (n=150)</td>
<td>91 (n=96)</td>
</tr>
</tbody>
</table>

### Table 3: Short Vowels in Non-Prominent Positions

<table>
<thead>
<tr>
<th>Vowel</th>
<th>Duration (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>/a/</td>
<td>97 (n=26)</td>
</tr>
<tr>
<td>/ɛ/, /e/</td>
<td>81 (n=22)</td>
</tr>
<tr>
<td>/i/</td>
<td>60 (n=28)</td>
</tr>
<tr>
<td>/ɔ/</td>
<td>96 (n=5)</td>
</tr>
<tr>
<td>/u/</td>
<td>47 (n=33)</td>
</tr>
<tr>
<td>All Vowels</td>
<td>71 (n=114)</td>
</tr>
</tbody>
</table>

- We then measured the duration of underlingly short /i/ in the following environments:
  - After derived [tʃ] or [dʒ] (e.g. [tʃ-i-sing-aa] from (8))
  - After non-derived [tʃ] or [dʒ] (as determined by lack of alternations or variation) (e.g. [e-dʒir-tʃi] cl9-bull)
  - Sufficient data obtained for prominent /i/ in derived and non-derived environments and for non-prominent /i/ in non-derived environments

### Table 4: Durations of /i/ After Derived and Non-Derived Affricates

<table>
<thead>
<tr>
<th>Duration (ms)</th>
<th>After Derived Affricate</th>
<th>After Non-Derived Affricate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prominent Position</td>
<td>140 (n=4)</td>
<td>107 (n=8)</td>
</tr>
<tr>
<td>Non-Prominent Position</td>
<td>61 (n=9)</td>
<td></td>
</tr>
</tbody>
</table>
Figure 1: Comparison of Baseline /i/ and /i/ After Affricates

- Durations in prominent position longer than we would expect for /i/, but significant ($p < 0.05$) difference between derived and non-derived environments emerges.
- Durations in non-prominent position after non-derived affricate consistent with duration of short /i/ in non-prominent position.
- A long vowel after a postalveolar affricate is not sufficient to show it is derived, but a short vowel after a postalveolar affricate is sufficient to show it is non-derived.
- Our results confirm the phonemicity of /tʃ/ and /dʒ/ reported in Leung 1991.

3.3 The Distribution of the Postalveolar Affricates in Logoori

- /tʃ/ and /dʒ/ seem to be rare phonemes, occurring in few roots and affixes:

<table>
<thead>
<tr>
<th></th>
<th>Affricate</th>
<th>CL4 concord</th>
<th>Surface</th>
<th>Underlying</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>/dʒi/-</td>
<td>[a-dʒi-ror-aa]</td>
<td>‘3sg- CL4.obj-see- PRES’</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>/dʒib/</td>
<td>‘answer’</td>
<td>[ke-dʒib-aa]</td>
<td>‘CL7-answer- PRES’</td>
</tr>
<tr>
<td>c.</td>
<td>/dʒiriʃi/</td>
<td>‘bull’</td>
<td>[e-dʒiriʃi]</td>
<td>‘CL9-bull’</td>
</tr>
<tr>
<td>d.</td>
<td>/tʃeere/</td>
<td>‘rice’</td>
<td>[m-tʃeere]</td>
<td>‘CL3-rice’</td>
</tr>
</tbody>
</table>

- Likely derived historically from velar stops before front vowels.
- Variation is further indication of limited distribution of underlying /tʃ/ and /dʒ/.
- Many words with surface [ʃ] can alternatively be produced with [kj], suggesting [ʃ] is not underlying:

<table>
<thead>
<tr>
<th></th>
<th>Affricate</th>
<th>CL4 concord</th>
<th>Surface</th>
<th>Underlying</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>/ke-ange/</td>
<td>‘CL7-my’</td>
<td>[kjaŋge]</td>
<td>[ʃjaŋge]</td>
</tr>
<tr>
<td>b.</td>
<td>/ko-ki-a/</td>
<td>‘CL15-dawn-FV’</td>
<td>[kokja]</td>
<td>[koʃ[ə]a]</td>
</tr>
<tr>
<td>c.</td>
<td>/e-kiova/</td>
<td>‘CL9-outside’</td>
<td>[ekjoova]</td>
<td>[etʃjoova]</td>
</tr>
</tbody>
</table>
This variation is not seen with [dʒ] and [gj], so we conclude [dʒ] is underlying here:

\[(13)\]
\[
a. [ke-dʒo] * [kegjo] \ ‘CL7-luggage’
b. [ri-dʒikoro] * [rigjikoro] \ ‘CL5-crow’
c. [ri-dʒoonŋgo] * [rigjoonŋgo] \ ‘CL5-rat’
\]

Asymmetry is puzzling: Perhaps phonemicization and restructuring is more complete for voiced [dʒ] than voiceless [ʃ]

4. Coronal Palatalization

4.1 Background

• One coronal palatalization process already active:

\[(14)\] Palatalization of Dental Consonants (Leung 1991)
\[
\begin{align*}
\hat{j} & \rightarrow j / \_ {i, u} \ (\text{not applicable to this dialect, which never has surface} \ [j]) \\
\hat{n} & \rightarrow \hat{n} / \_ {i, u}
\end{align*}
\]

• Otherwise, no coronal palatalization processes proposed for Logoori
• /h/ palatalizes and patterns with /k/ and /g/:

\[(15)\] Palatalization of Back Consonants (Leung 1991)
\[
\begin{align*}
k & \rightarrow \hat{ʃ} / \_ i \ (\text{not active in this dialect}) \\
g & \rightarrow dʒ / \_ i \ (\text{not active in this dialect}) \\
h & \rightarrow \hat{ʃ} / \_ i
\end{align*}
\]

\[(16)\] /a-hir-aa/ 3sg-ride-PRES [aʃiraα]

\[(17)\] Consonant-Glide Reduction (Leung 1991)
\[
\begin{align*}
jk & \rightarrow \hat{ʃ} \\
gj & \rightarrow dʒ \\
hj & \rightarrow \hat{ʃ}
\end{align*}
\]

\[(18)\] /ke-hia/ CL7-new [keʃa]

• Leung (1991) argues that [ʃ] is always derived from /h/ or /hV/, i.e. [ʃ] is not a phoneme
4.2 A Rule Ordering Paradox

• Some more rules:

(19) /h/-Plosivization: \( h \rightarrow b / [+\text{nas}] \) \[^{4}\]  

(20) Nasal Place Assimilation: \([+\text{nas}] \rightarrow [\alpha\text{ place}] / [\alpha\text{ place}] \)  

(21) Nasal Deletion: \([+\text{nas}] \rightarrow \emptyset / \_\_\_ \) (e.g. \( /N-\text{ōm-aa}/ \rightarrow [\text{sōm-aa}] \))

• Crucial ordering: \( /h/-\text{Plosivization} \) must bleed Consonant-Glide Assimilation:

(22) /eN-hia/ ‘cL9-new’ /ke-hia/ ‘cL7-new’
- eN-hja  ke-hja  Gliding
  eN-bja  -  /h/-Plosivization
  -  ke-fa  Consonant-Glide Reduction
  em-bja  -  Nasal Place Assimilation
    [embja]  [kefa]

• What about forms like [ʃɔɔmaa] ‘1sg-wail-PRES’ and [ʃoovaa] ‘1sg-throw out-PRES’? If Leung is right, they must come from /N-hiōm-aa/ and /N-hiov-aa/.

• But a paradox results:

(23) /eN-hia/ ‘cL9-new’ /N-hiov-aa/ ‘1sg-throw out-PRES’
- eN-hja\(^{5}\)  N-hjoov-aa  Gliding
  eN-bja  N-bjoov-aa  /h/-Plosivization
  -  -  Consonant-Glide Reduction
  -  -  Nasal Deletion
  em-bja  m-bjoov-aa  Nasal Place Assimilation
    [embja]  *[mbjoovaa]

(24) /eN-hia/ ‘cL9-new’ /N-hiov-aa/ ‘1sg-throw out-PRES’
- eN-hja  N-hjoov-aa  Gliding
  eN-fa  N-foov-aa  Consonant-Glide Reduction
  -  -  /h/-Plosivization
  e-fa  foov-aa  Nasal Deletion\(^{6}\)
  -  -  Nasal Place Assimilation
    *[eʃa]  [ʃoovaa]

\[^{4}\] This synchronic rule has a historical explanation: Maragoli /h/ came from *p, which lenited to /h/ everywhere except after nasals (Hyman 2003).
\[^{5}\] Gliding-induced compensatory lengthening is blocked word-finally (Leung 1991).
\[^{6}\] Here the environment of Nasal Deletion is provisionally extended to \( \_\_\_\_\_\_\_\_ \). See below for further discussion.
• [embja] ‘CL9-new’ requires /h/-Plosivization before Consonant-Glide Reduction while
[jooava] ‘1sg-throw out-PRES’ requires Consonant-Glide Reduction before /h/-
Plosivization
• Only /h/-Plosivization before Consonant-Glide Reduction produces [bj] ~ [ʃ] alternations,
which exist (e.g. (22)), so it seems to be the correct order
• Two options:
  ▪ /ʃ/ is a phoneme of Logoori (root of ‘throw out’ is /ʃo/)
  ▪ [ʃ] can be derived from something other than /h/ and /hV/

4.3 Coronal Palatalization
• We propose [ʃ] can also be derived from [sj]:

(25) **Coronal Palatalization**: sj → ʃ

• Evidence from intra-speaker variation:

(26) a. [ʃɔɔmaa] b. [ʃjɔɔmaa] ‘1sg-wail-PRES’
c. [ʃoɔaa] d. [ʃjooovaa] ‘1sg-throw out-PRES’
e. [ʃjaanje] f. [ʃʃjaanje] g. [ʃkjaanje] ‘CL7-my’

  ▪ Occasional presence of [ʃ] (26b, d, f, g) suggests underlying /CV/ sequence,
occasional lack of palatalization (26b, g) reveals underlying C ([s] not [ʃ])

• Evidence from ‘to grind’
  ▪ Our consultant: [koʃja] – if UR still has /s/ → Coronal Palatalization
  ▪ Dialect-internal reasons to think root ‘grind’ begins with /s/:

(27) a. [koʃa] to burn d. [koʃa] to grind
    b. [mbɛzaa] I’m burning e. [ʃɛɛzaa] I’m grinding
    c. [ahezaa] he’s burning f. [aʃʃɛɛzaa] he’s grinding

Paradigms suggests UR of ‘burn’ is /h/-initial, UR of ‘grind’ /s/-initial
• In the absence of surface [ʃ] ~ [s] alternations in paradigms like that of ‘grind,’ claiming
that [ʃ] derives from /sV/ requires accepting that speakers store an abstract UR for which
they have little evidence
  ▪ Advantage 1: Analytical economy, no unnecessary expansion of phoneme
inventory
• Advantage 2: Simpler formulation of Nasal Deletion ((21) above)

(28) /N-siov-aa/ ‘1sg-throw out-PRES’
 N-sjoov-aa Gliding
 sjoov-aa Nasal Deletion
 ċjoov-aa Coronal Palatalization
 [čjoovaa]

If root ‘throw out’ were /ʃov/, environment of Nasal Deletion would have to be expanded to include __ʃ

4.4 But Is Phonemicization of [ʃ] in Progress?
• Some evidence of paradigm leveling:

(29) a. [koʃokera] to haunt
 b. [mbjokera]/[ʃokera] I’m haunting
 c. [oʃokeraa] you’re haunting
 d. [aʃokeraa] he’s haunting

 e. [koʃoga] to hurry
 f. [mbjogaa]/[ʃogaa] I’m hurrying
 g. [oʃogaa] you’re hurrying
 h. [aʃogaa] he’s hurrying

• 1sg forms with [mbj] were the first offered, on later occasions 1sg forms with [ʃ] always given, consultant eventually suggested forms with [mbj] were “less formal”
• [mbj] 1sg forms suggest roots are /hiok/ and /hiog/
• [ʃ] 1sg forms suggest roots in the process of being restructured—to /ʃok/ and /ʃog/? Or to /ʃok/ and /ʃog/?
  ▪ Consultant indicated that [koʃokera] could also be said [kosjokera]
• Preliminary vowel duration measurements suggest [ʃ] often followed by a short vowel → like /ʃ/, /ʃ/. /ʃ/ would have to be a phoneme

5. Conclusion
• This dialect of Logoori has been shown to fall into Type E of Hyman & Moxley’s (1996) typology of Bantu velar palatalization
• Vowel duration measurements confirm the existence of underlying /ʃ/ and /ʃ/.
• We proposed a coronal palatalization process (ʃ → ŋ) for Logoori that had not previously been reported in the literature
Abbreviations

CL: noun class
FV: final vowel
IMP.SG: singular imperative
PRES: present
REC.PAST: recent past
REFL: reflexive

References


