Neutralization in Xhosa’s ‘unnatural’ labial palatalization

Aaron Braver
Texas Tech University
LSA 2019

Neutralization

• Neutralization is when a contrast is reduced

• Complete neutralization: two contrasting segments become exactly identical

• Incomplete neutralization: contrast is reduced, but a trace of the underlying contrast remains

Incomplete neutralization

• Classic example: German final devoicing
  • Rad ‘wheel’ vs. Rat ‘advice’ or ‘council’
  • Early view: they’re homophones
  • But: they are acoustically distinct
    • Duration of preceding vowel, closure duration, voicing in closure, among other differences (Port and O'Dell 1985)

American English flapping (Braver 2014)

• (Cheese) grater vs. (exam) grader
• Longer preceding vowel duration in /d/-flaps

Fig. 2. Mean pre-flap vowel duration by underlying voicing status.
Selected other proposed incomplete neutralizations

- Final devoicing: Russian (Dmitrieva 2005), Polish (Jassem and Richter 1989), Dutch (Warner 2004), Catalan (Dinnsen and Charles-Luce 1984)
- Monomoraic vowel lengthening in Japanese (Braver 2019, Braver and Kawahara 2016)
- S-aspiration in Eastern Andalusian Spanish (Gerfen 2002, Bishop 2007)
- Intrusive stop in English (Ohala 1974, Kilpatrick et al 2007)
- Cantonese tone (Yu 2007)

Complete neutralization

- Most contrasts subjected to acoustic analysis appear to be incomplete
- Dinnsen (1985) calls complete neutralization “not well established” and “problematic”
- One counterexample: Korean manner neutralization (Kim and Jongman 1996)

Question:
Are some processes more likely to result in incomplete neutralization than others?

- Phonetically “natural” vs. “unnatural”?
  - Unnatural processes may be less likely to refer directly to phonetic specifications
Question:

Are some processes more likely to result in incomplete neutralization than others?

• Based on the feature being neutralized?
  • Incomplete neutralization is frequently reported in final devoicing (German, Dutch, Polish, Russian, Catalan…)

In this talk, I will…

• Describe Xhosa’s “unnatural” labial palatalization
• Show that some, but not all, speakers represent this pattern as a part of regular phonology
• Propose labial palatalization as a potential case of complete neutralization
• Suggest that “unnatural” processes may be no more likely to be incompletely neutralized

Labial palatalization in Xhosa

(isi-)Xhosa

• [isi]-ǁɔsà
• Southern Bantu (Nguni)
• South Africa: mainly in Eastern Cape, but also in most urban centers around South Africa
Labial palatalization

- Labials shift to their nearest palatal counterpart, with some additional disparities, e.g. aspiration (McLaren 1942, Doke 1954)

<table>
<thead>
<tr>
<th>Phoneme</th>
<th>Palatalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>[pʰ] → [tʃ]</td>
<td>p → tʃh</td>
</tr>
<tr>
<td>[pʰ] → [tʃʰ]</td>
<td>ph → tʃh</td>
</tr>
<tr>
<td>ɓ → [c']</td>
<td>b → ty</td>
</tr>
<tr>
<td>[m] → [ɲ]</td>
<td>m → ny</td>
</tr>
<tr>
<td>[mb] → [n̂dʒ]</td>
<td>mb → nj</td>
</tr>
</tbody>
</table>

Labial palatalization

- Triggered by [-w-] passive suffix

<table>
<thead>
<tr>
<th>Passive formation with -w- (non-labials)</th>
</tr>
</thead>
<tbody>
<tr>
<td>uku-fuⁿ-d-a</td>
</tr>
<tr>
<td>inf-study-fv</td>
</tr>
</tbody>
</table>

- Passive with labial palatalization (m̂b → ɲdʒ)

<table>
<thead>
<tr>
<th>Passive with labial palatalization (m̂b → ɲdʒ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>uku-4aⁿⁿb-a</td>
</tr>
<tr>
<td>inf-wash-fv</td>
</tr>
</tbody>
</table>

“Natural” palatalization: typological tendencies

- Triggered by high front vocoids
- Applies to coronals (and/or dorsals) but not labials
“Unnatural” palatalization in Xhosa

- Triggered by [-w-], but not by high front vocoids ([i])
  uku-kX'o6-is-a (≠uku-kX'oe'-is-a)
  inf-peep-caus-fv

- Applies to labials, but not to coronals
  uku-bon-w-a (≠uku-bon-w-a)
  inf-see-caus-fv

Representation of unnatural patterns

Two possible views:

- Unnatural patterns can be learned as a regular, productive part of phonology (e.g., Reiss 2017).

- Phonological patterns are restricted by phonetic naturalness (e.g., Ohala 1990, Steriade 1997, 2008). Apparently unnatural patterns may be lexically stored and less productive.

Is labial palatalization productive in Xhosa?

Assessing productivity

- A wug test (Berko 1958) can detect productivity since nonce words cannot have lexically stored passive/palatalized forms.

- Predictions of hypotheses:
  - Productive phonology: speakers will palatalize both real and nonce words productively.
  - Lexical: speakers will palatalize real words, but not productively with nonce words.
Stimuli

• 40 nonce verb roots with CVC structure
• Final C:
  • Half: palatalization targets (mb [mb] or m [m])
  • Half: underlying palatal (nj [ndʒ] or ny [ɲ])
• 40 filler real verb roots

Method

• Each root was shown in the frame iy’a-____-o (sm.9 pres) in Xhosa orthography
• Participants read this form, then were asked to fill in the frame iy’a-____-w-a (sm.9 pass) aloud

<table>
<thead>
<tr>
<th>active</th>
<th>passive</th>
</tr>
</thead>
<tbody>
<tr>
<td>akwenza</td>
<td>akwenzwa</td>
</tr>
</tbody>
</table>

iyafamba → iy’a____wa

• 24 participants
Distribution of speaker palatalization rates

Derived vs. underlying palatalizations

- Is the labial palatalization process completely or incompletely neutralizing?

<table>
<thead>
<tr>
<th>Speaker</th>
<th>% nonce words palatalized</th>
<th>Proposed representation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100</td>
<td>Phonological</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
<td>Phonological</td>
</tr>
<tr>
<td>3</td>
<td>100</td>
<td>Phonological</td>
</tr>
<tr>
<td>4</td>
<td>54</td>
<td>Lexical</td>
</tr>
<tr>
<td>5</td>
<td>41</td>
<td>Lexical</td>
</tr>
<tr>
<td>6</td>
<td>84</td>
<td>Lexical</td>
</tr>
</tbody>
</table>
Acoustic measurements

- 6 time points
- V1: midpoint, 10ms before offset, offset
- V2: onset, 10ms after onset, midpoint
- Key acoustic cue: F2 as a cue to palatal-ness

Results (pooled)

<table>
<thead>
<tr>
<th>Time point</th>
<th>Derived F2 mean</th>
<th>Underlying F2 mean</th>
<th>Coefficient of derived/underlying</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1 midpoint</td>
<td>2140.03</td>
<td>1993.39</td>
<td>-148.81</td>
<td>-1.07</td>
<td>ns</td>
</tr>
<tr>
<td>V1 offset - 10</td>
<td>1804.64</td>
<td>1810.38</td>
<td>2.28</td>
<td>0.04</td>
<td>ns</td>
</tr>
<tr>
<td>V1 offset</td>
<td>1820.11</td>
<td>1861.66</td>
<td>19.86</td>
<td>0.36</td>
<td>ns</td>
</tr>
<tr>
<td>V2 onset</td>
<td>1727.35</td>
<td>1780.28</td>
<td>11.28</td>
<td>0.15</td>
<td>ns</td>
</tr>
<tr>
<td>V2 onset + 10</td>
<td>1550.21</td>
<td>1447.45</td>
<td>127.32</td>
<td>1.34</td>
<td>ns</td>
</tr>
<tr>
<td>V2 midpoint</td>
<td>2192.39</td>
<td>2227.48</td>
<td>-37.631</td>
<td>-0.64</td>
<td>ns</td>
</tr>
</tbody>
</table>

- Separate linear mixed models for each time point
- Fixed factors: derived/underlying, consonant, vowel
- Random intercepts for speaker and item
Discussion

• No apparent difference in F2 in derived vs. underlying palatals in pooled or individual results
• Appears to be a completely neutralized contrast
• Speakers’ complete vs. incomplete neutralization is not conditioned by degree of palatalization productivity

Discussion

• Despite ling 101 canon, complete neutralization is rarely found acoustically
• “Unnatural” patterns can, apparently, be completely neutralized
• Loci of neutralization may play a role in complete/incomplete
  • Voicing contrasts tend to incomplete
  • Korean manner neutralization is complete (Kim and Jongman 1996)

Thank you

Thanks to Will Bennett, Brian Smith, and the audience of AMP 2018 for helpful discussion of this project.