Neutralization in an Unnatural Process

Labial palatalization in Xhosa

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Introduction

One claim: Incomplete neutralization (IN) is at least partly outside of phonological grammar proper [1,2]. "Truly phonological" processes demonstrating IN go against this hypothesis; thus, we should examine "unnatural" processes for IN.

Xhosa (Bantu) has "unnatural" palatalization [3,4]:

- [p'] → [tʃ] [ɓ] → [c'] [m] → [ɲ]
  [pʰ] → [tʃʰ] [b] → [dʒ] [ᵐb] → [ⁿdʒ]
- Triggered by [w], but not by [i, j]
- Applies to labials, but not to coronals:
  - uku-fuⁿd-a (INF-study-FV) uku-fuⁿd-w-a (INF-study-PASS-FV)
  - uku-lum-a (inf-bite-FV) uku-lun-w-a (inf-bite-PASS-FV)

Are derived vs. underlying palatals completely or incompletely neutralized?

Participants and Stimuli

18 native speakers of Xhosa from Eastern Cape, South Africa. 40 nonce words: 20 ending in palatalization undergoers [m, ᵐb] and 20 ending in underlying palatals [ɲ, ⁿdʒ], plus 40 real fillers.

Undergoers		*Underlying*	
iyahlama	[ija-ɬam-a]	iyaxhanja	[ija-ǁʰaⁿdʒ-a]
iyanoma	[ija-nom-a]	iyasonja	[ija-soⁿdʒ-a]
iyasamba	[ija-sa-ᵐba]	iyatshonya	[ija-tʃoɲ-a]
iyacomba	[ija-ǀo-ᵐba]	iyabanya	[ija-ɓaɲ-a]

Experiment

Wug-type task [5], active verb → passive verb:

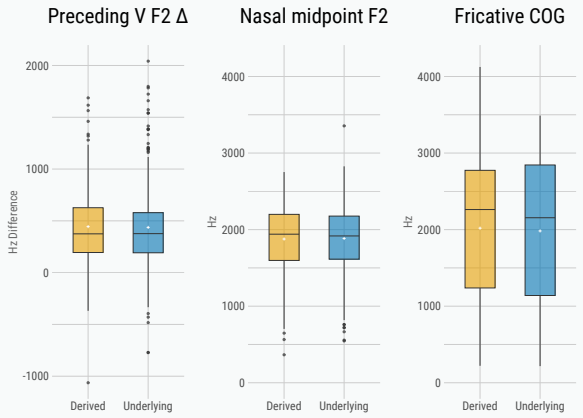
active		passive
ukwenza		ukwenziwa
iyafamba	→	iya_____wa

Acoustic measures: F2 Δ (preceding V), F2 at nasal portion midpoint, COG in fricative portion of [ᵐdʒ].

Results

No significant differences were detected between derived and underlying segments on any acoustic measure.

Measure	Mean diff.	t	p (adj.)
Preceding vowel F2 change	36.53 Hz	-0.27	0.99
Nasal portion midpoint F2	7.54 Hz	-0.05	0.96
COG of fricative portion in [ⁿdʒ] tokens	65.06 Hz	-1.03	0.91



Discussion

Verified examples of *complete* neutralization are rare [6]. If substantiated, this case would add to the small repertoire of processes demonstrating complete neutralization.

Are processes more likely to show IN if they are "natural" or "unnatural"? Arguments on both sides:

- "Natural" processes are motivated by phonetic pressures that might be realized gradiently
- "Unnatural" processes are motivated only by phonology, and lack phonetic pressure to keep neutralization complete

We need to examine existing cases of neutralization to determine whether (in)completeness of neutralization corresponds to phonetic naturalness.

References

[1] Fourakis, M. & G. Iverson. 1984. On the `Incomplete neutralization' of German final obstruents. *Phonetica* 41. 140–149.
[2] Warner, Natasha, Erin Good, Allard Jongman & Joan Sereno. 2006. Orthographic vs. Morphological incomplete neutralization effects. *J. Phon.* 34(2). 285–293.
[3] Doke, C. M. 1954. *The Southern Bantu Languages*. London, Oxford University Press.
[4] Kochetov, A. 2011. Palatalization. In M. van Oostendorp et al.(eds.), *The Blackwell Companion to Phonology*, 1–25. Oxford, UK: John Wiley & Sons, Ltd.
[5] Berko, J. 1958. The child's learning of English morphology. *Word* 14. 150–177.
[6] Kim, Hyunsoon & Allard Jongman. 1996. Acoustic and perceptual evidence for complete neutralization of manner of articulation in Korean. *J. Phon.* 24(3). 295–312.

Sample stimuli (roots + -w-)

(a) Underlyingly palatal:
iya-bany-w-a [ija-ɓaɲ-w-a]
iya-xhanj-w-a [ija-ǁʰaⁿdʒ-w-a]

(b) Labial → palatal:
iya-hlam-w-a /ija-ɬam-w-a/. → [ija-ɬaɲ-w-a] (m→ɲ)
iya-comb-w-a /ija-|oᵐb-w-a/. → [ija-|oⁿdʒ-w-a] (ᵐb→ⁿdʒ)

Statistical analysis

Linear mixed models were run with each of the three measures above as dependent variables, derived/underlying status and segments ([ᵐb] vs. [ⁿdʒ]) as fixed effects, and random intercepts for speaker and item. (Random slopes in all models, and segments in the fricative CoG model, were excluded as they were not justified by backward model selection.) In all three models, derived/underlying status failed to reach significance, even when p-values were adjusted for multiple comparisons by an anticonservative method (Benjamini and Hochberg 1995), or indeed even with no such adjustment.

	β	95% CI	t	df	p (unadj.)	p (adj.)
F2 change						
intercept	337.90	[235.63, 440.17]	6.64	47.91	< 0.001	< 0.001
derived	**-14.57**	**[-124.03, 94.88]**	**-0.27**	**39.69**	**0.79**	**0.99**
segments	232.40	[123.63, 341.18]	4.32	38.13	< 0.001	< 0.001
Nasal F2						
intercept	1722.08	[1604.26, 1839.90]	29.44	44.76	< 0.001	< 0.001
derived	**-2.72**	**[-107.49, 102.04]**	**-0.05**	**39.47**	**0.96**	**0.96**
segments	336.39	[232.92, 439.87]	6.59	36.51	< 0.001	< 0.001
Fricative COG						
intercept	2061.95	[1682.27, 2441.63]	11.33	19.90	< 0.001	< 0.001
derived	**-81.20**	**[-235.86, 73.46]**	**-1.03**	**263.79**	**0.30**	**0.91**