Wug-testing a case of 'unnatural' labial palatalization in Xhosa

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Introduction to the pattern

1

- Xhosa bilabial palatalization:
  - /B/ + /-w/ → J-w
  - labial +labial → palatal (!) + labial
  - Normal pattern for passive verbs:
    - uku-fu^{n}d-a 'to study, read'
    - i-ja-fu^{n}d-a 'it is studying'
    - i-ja-fu^{n}d-w-a 'it is being studied' (passive = /-w/)
  - Palatalization:
    - uku-ɬa^{m}b-a 'to wash'
    - i-ja-ɬa^{n}dʒ-w-a 'it is being washed' (^{m}b → ^{n}dʒ)

→NOT *ijaɬa^{m}bwa

It's atypical for palatalization…

2

- Some apparent universals of palatalization:
  (from Bateman 2007, Kochetov 2011)
  1. If labials palatalize, then coronals/dorsals do too
  2. If back vocoids cause palatalization, then front vocoids do too
- …But that's not what we see with Xhosa:
  - In passive verbs, *only bilabials change*
    ijafu^{n}dwa ↛ *ijafu^{n}dʒwa
  - *Only* [w] *causes palatalization* (not [i] or [j])
    ijakx'oɓisa ↛ *ijakx'oc'isa ijaɓuja ↛ *ijac'uja

…It's also phonetically "unnatural"

3

- [w] involves nothing like a palatal constriction
  - Expectation: [w] is more likely to *reinforce* the labiality of labials than palatalize them (Ohala 1978)
- The passive suffix in Xhosa does appear as [-iw], with monosyllabic verb roots
  - But, there is no palatalization in this case:

uku-^{m}b-a 'dig' i-ja-^{m}b-iw-a 'it is being dug'

*i-ja-^{n}dʒ-iw-a

- → Why should palatalization occur (only) in the *absence* of anything like a palatal?

The puzzle and possibilities

4

- How does the pattern in Xhosa really work?
- One view: it's a phonological process
  - [LAB] → [COR, –ant] / __w (in various formulations)
  - (Stahlke 1976, Khumalo 1987, Gorecka 1989, Beckman 1993, Chen & Malambe 1998, Vondrasek 2001, Naidoo 2002, Bennett 2013/in press)
- Alternative view: it's really not phonology
  - It's a historical relic, and/or morphological in nature
  - (Louw 1975; Herbert 1977, 1990; Ohala 1978; Van der Spuy 2014; see also O'Bryan 1974, Anderson 1992)
- This talk presents some results from a new experimental study of the phenomenon

Structure of the talk

5

1. Background from the literature
2. About our study and methodology
3. Data and results
4. Analysis and discussion
5. Summary and conclusion

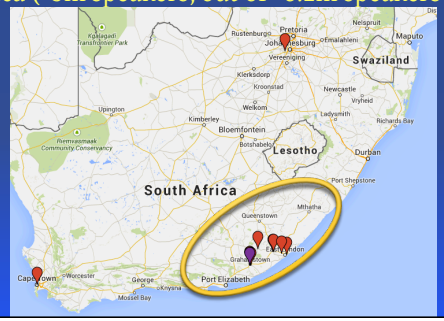
1. Background and context

6

About isiXhosa

7

- =Xhosa; Southern Bantu language, Nguni group
- Prototypically spoken in Eastern Cape in South Africa (≈5m speakers, out of ≈8.2m speakers total)



Labio-pal: some more details (1/2)

8

- The *what*: a constellation of changes

[p']	→ [tʃ']	*p*	→ *tsh*
[pʰ]	→ [tʃʰ]	*ph*	→ *tsh*
[ɓ]	→ [c']	*b*	→ *ty*
[bʱ]	→ [dʒ]	*bh*	→ *j*
[m]	→ [ɲ]	*m*	→ *ny*
[ᵐb]	→ [ⁿdʒ]	*mb*	→ *nj*

(Doke 1954)

- Generalization: labials shift to the nearest palatal equivalent (other features mostly stay the same)
- Related patterns are found in related languages, albeit with some minor differences

Labio-pal: some more details (2/2)

9

- The *where*: found in a few morphological contexts
  - Passive /-w/, locative suffix /-ini/, diminutive /-ana/
  - Also evident in historical changes:
    Proto-Bantu ᵐbwa > Xh. iⁿdʒa 'dog'
  - Sometimes long-distance
    seɓenza 'work' → sec'enzwa 'be worked'
  - Today we're only going to talk about passive verbs
- The *why*: previous literature gives a few different explanations

Explanation #1: phonology

10

- One family of accounts: a synchronic phonological process turns labials into palatals
- One approach: Labial dissimilation
  - Avoidance of two Labials; supported by absence of Bw elsewhere
  - (Doke 1954, Gorecka 1989, Beckman 1993, Selkirk 1993, Bennett 2013/in press)
- Another approach: a floating palatal feature, or assimilation to a covert /i/ or /j/
  - (Stahlke 1976, Khumalo 1987, Chen & Malambe 1998, Poulos & Msimang 1998, Jokweni 1999, Vondrasek 2001, Naidoo 2002)

Explanation #2: history

11

- Main alternative: a string of historical changes
  (Louw 1975; Herbert 1977, 1990; Ohala 1978; Bateman 2010; see also O'Bryan 1974, Anderson 1992, Van der Spuy 2014)

/p+jw/ → p̊jw → pʃw → tʃw → /tʃ/

  - Starting point: /-w/ used to have a front glide [j]
  - Voicelessness of [p] gets extended, devoices the [j]
  - Voiceless glide [j̊] misperceived as a fricative [ʃ]
  - Labial component of [pʃ] is reanalyzed as an coarticulatory effect of following [w]
- End result: active verb has /p/, passive has /tʃ/ (similar pathway for other bilabial sounds)

History → ¬Phonology

12

- For the historical account, palatalization is NOT necessarily an active part of phonology
  - Speakers learn active forms with labials, learn passive forms with palatals, switch them as needed
- Both good and bad sides to this story:
  - Phonological changes involved are weird; but the historical steps are very reasonable, and some intermediate steps are attested in dialect variation
  - Doesn't clearly explain forms where palatalization is long-distance, e.g. seɓenza ~ sec'enzwa

Recap: two competing hypotheses

13

- Phonological hypothesis: Palatalization is part of the phonology of the language; learned as a rule
- Lexical hypothesis: Palatalization is in the lexicon, not phonology; no rule for the change
- They make testably different predictions:
  - If palatalization is part of phonology, then speakers will apply the change in new words
  - If palatalization is just in the lexicon, speakers will ***NOT*** apply the change in new words
- A wug test (Berko 1958) should tease them apart

Previous experimental studies

14

- No previous work on Xhosa labial palatalization has taken an experimental approach
- Herbert (1990) reports an informal experiment on labio-pal in other Southern Bantu languages:
  - 2 Zulu speakers presented with 20 nonce nouns, asked to make diminutive forms
  - Palatalization in 6/20 and 10/20 trials (=avg. 40%)
  - NB: the generalizations are different for palatalization in diminutives; not systematic
- Naidoo (2002) intuits incomplete neutralization, and suggests experimentally testing for it

2. Our Experiment

15

Method: stimuli

16

- 40 nonce verb roots, all with CVC structure
  - Vowels were all either /a/ or /o/
  - Last consonant {mb, m, nj, ny} = [ᵐb m ᶮdʒ ɲ]
- 40 real verbs, used as fillers
- Stimuli shown to speakers on a laptop, in randomized order
- Participants saw 3 real verb examples in the instructions, and did 9 practice items first

Method: presentation and task

17

iyafamba → iya____wa

- Task: fill in the blank
  - Stimuli were presented in a morphological frame typical of active verbs (in Xhosa orthography)
  - Speakers were asked to read the active form, and then to make a passive form of the verb
- Participants were instructed that some words might be unfamiliar, and that they should take their best guess at what sounds most natural

Method: participants

18

- 10 native speakers of isiXhosa
  - 5 male, 5 female; Age range 21–42 (mean =26)
  - 9 from Eastern Cape; 8 grew up at least partly in Grahamstown
  - All 10 identified Xhosa as the language they spoke the most at home
  - Other lgs: English (everyone), Afrikaans, Zulu
- Participants also did 2 other experiments in the same session (order of tasks was counterbalanced)

Method: recordings and coding

19

- Speakers were recorded using a 'head'-mounted microphone, in the sound laboratory of the Rhodes University linguistics department
- Responses were coded for:
  - whether the target consonant was palatal
  - morphology added to the verb (usually –w)
- Analysis excluded forms with reading errors, and those that didn't add [-w] in the passive form

3. Data and results

20

Q1: Do speakers ever palatalize in nonce words?

21

- Key:
  pink= palatal
  green = not
- Average over all speakers: palatalize in ~60% of trials
- Answer: *Yes!*

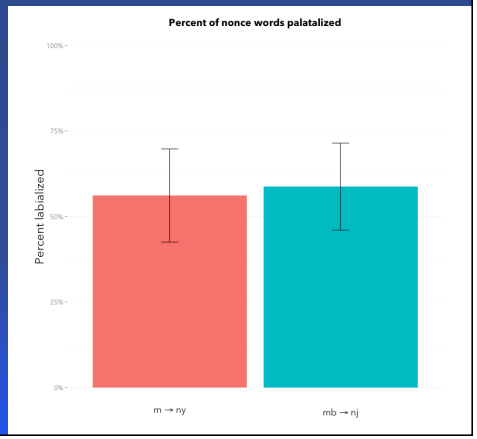
Binomial test: proportion of palatalized tokens (.575) is greater than expected (.5), $p < .05$ (1-sided)

Effect of final consonant

22

- /mb/ vs. /m/: no significant effect
- Speakers didn't treat the different labial consonants differently

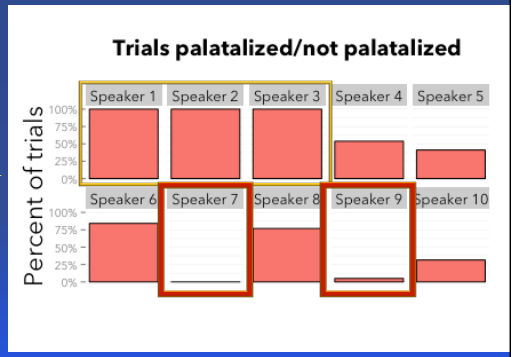
Two-sample proportions test: proportion of /m/ tokens palatalized (.791) is not significantly different from proportion of /mb/ tokens palatalized (.793)



Cross speaker differences

23

- Differences between speakers are extreme
- Rate of palatalization ranges from 100%...
- ...to 0%



Long-distance productivity?

24

- Is palatalization also productive in long-distance cases?
- Some speakers added the suffix /-is/ into passive forms; this separates the [-w] from the root

  iyakhoma → iya___wa 'iyakhonyiswa'
- Speaker 4 palatalized ~50% of time overall
  - 14/20 labial forms had something added before /-w/
  - 7 of those had palatalization, 7 did not
  - ~50% palatalization rate in long-distance cases
- Tentative answer: yes?

Q2: Are underlying and derived palatals identical?

24

- Preliminary data from 2 speakers
- Linear Mixed Model:
  - F2 regressed against underlying/derived as a fixed factor, and with speaker as a random factor

Q2: Are underlying and derived palatals identical?

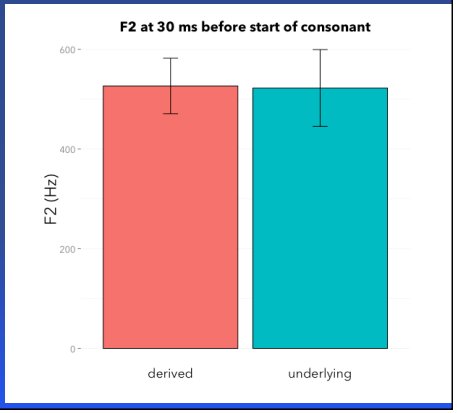
24

- F2 at start of consonant
- No significant differences between derived (358.75 Hz) and underlying palatals (376.26 Hz) (t=.437, ns)

Q2: Are underlying and derived palatals identical?

24

- F2 at 30 ms before start of consonant
- No significant differences between derived (526.34 Hz) and underlying palatals (522.28 Hz) (t=.087, ns)



25

4. Interpretation and discussion

Which hypothesis is right?

26

- The phonological hypothesis predicts speakers ***WILL*** apply palatalization to nonce words
  - Speakers 1, 2, 3 bear this out: 100% palatalization
  - Speakers 6 & 8 are close too: ≥70% palatalization
- The lexical hypothesis predicts that speakers will ***NOT*** apply palatalization to nonce words
  - Speaker 7 bears this out: 0% palatalization of labials
  - Speakers 9 & 10 are similar: ≤30% palatalization

What does it mean?

27

- For some speakers, palatalization is phonological
  - Nonce words are unfamiliar: speakers couldn't have memorized palatalized forms for them
  - So, speakers who systematically palatalize nonce words must be applying a general phonological rule
- For other speakers, palatalization is lexical
  - 'Non-palatalizing' speakers DID still palatalize in at least some of the real-word practice and filler items
  - So, they DO use palatalization (to at least some extent), but apparently only in words that they know
  - This fits with palatalized forms being lexically stored

Analogy

27

- Speakers who palatalize ~100% → phonological
- Speakers who palatalize ~0% → morphological

- Speakers in the middle → analogy strategy?
  - Don't have a clear phonological rule
  - Don't just have palatalization lexically stored
  - Palatalize nonce words by analogy with words they already know, but not categorically

5. Summary and conclusions

28

Summary

29

- We've wug-tested labial palatalization
  - It's productive for some speakers, not others
  - This suggests that it's a genuine phonological pattern for some speakers, but not for others
- The different accounts of palatalization proposed in previous work are both right for some speakers, but not for all of them
- This variation does not appear to correlate with any of the sociolinguistic factors we asked about

Broader implications

30

- A single linguistic pattern can be learned/analyzed very differently by different speakers
- Xhosa labial palatalization is typologically unusual. But the reason for this weirdness ISN'T that it's really a morphological pattern.
  - It's genuinely phonological for at least some speakers
  - This means that even 'phonetically unnatural' patterns can be learned as real phonology

Siyabulela!

32

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