Using root shape to choose among prefixes in Xhosa

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Introduction

- Bantu languages are famous their complex noun class systems
- Q: How do speakers learn noun class membership?
- Q: How do speakers choose among noun class prefix allomorphs?

Xhosa [ǁʰɔsa]

- Bantu (Nguni)
- South Africa's Eastern Cape and surroundings
- Approximately 8.2 million speakers

Noun classes in Xhosa

Singular	Plural	Class	Gloss
um-nt'u	aβa-nt'u	1/2	person
u-mama	oo-mama	1a/2a	mama
um-lambo	imi-lambo	3/4	river
i-gama	ama-gama	5/6	name
isi-ca	izi-ca	7/8	dish
i-ŋk'omo	ii-ŋk'omo	9/10	cow
ulu-su		11	stomach

Noun class membership and root phonotactics in Xhosa

Homophonous prefixes

- With long (2+ syllable) nouns, classes 5 and 9 can both be [i-]:

i-kʰaya	ama-kʰaya	5/6	'home'
i-gama	ama-gama	5/6	'name'
i-moto	ii-moto	9/10	'car'
i-ŋkʼomo	ii-ŋkʼomo	9/10	'cow'

Disambiguating classes 5 and 9

- Short (1 syllable) nouns:

ili-fu	ama-fu	5/6	'cloud'
ili-ce	ama-ce	5/6	'stone'
i-ndʒa	izi-ndʒa	9/10	'dog'
i-ntʼo	izi-ntʼo	9/10	'thing'

The history of classes 5 and 9

- Class 5: *li > i(li)
- Class 9: *ni > i(n) (Doke 1954)

- Class 9 nouns often retain the nasal:
  - i-ndʒa 'dog', i-ŋkʼomo 'cow', etc
  - But not all words have the nasal in the prefix:
    - i-moto 'car'
    - i-cuwa 'salt'
    - i-!ʰilika 'traditional honey beer'

Post-nasal alternations

- When the class 9 adjectival prefix (en-) is added to roots:
  - de-aspiration (-kʰulu 'big' > eŋ-k'ulu 'cl.9-big')
  - hardening (-ɬe 'good' > en-tɬ'e 'cl.9-good')
- This doesn't happen with class 5
  - ∴ unaspirated and 'hard' initial Cs may signal class 9

Historical change leads to synchronic phonotactics

- *-kʰaja 'home'
  - i-ŋ-k'aja → *i-kaja
  - i-li-kʰaja → i-kʰaja (5)

~~If –kʰaja takes the class 9 prefix with a nasal, deaspiration occurs and the modern version surfaces as -kaja.~~

If –kʰaja takes the class 5 prefix with no nasal, deaspiration doesn't occur and the modern version surfaces as –kʰaja

Historical change leads to synchronic phonotactics

If –komo takes the class 9 prefix with a nasal, historical aspiration fails to apply and the modern version surfaces as -komo

~~If -komo takes the class 5 prefix with no nasal, historical aspiration applies and the modern version surfaces as -kʰomo~~

- *-komo 'cow'
  - i-ŋ-k'omo → i-ŋk'omo (9)
  - i-li-kʰomo → *i-kʰomo

Historical change leads to synchronic phonotactics

- Class 9 nouns historically lost initial aspirated and non-hardened Cs
- Class 5 nouns didn't go through this process and so may surface with aspirated and non-hardened Cs

The prediction

- Ambiguous i-C_1VC_2V nouns:
  - If C_1 is a sound that would *result from* a post-nasal consonant change (i.e. unaspirated or hard), it's likely to be class 9
  - If C_1 is a sound that would *undergo* a post-nasal consonant change (i.e. aspirated or non-hard), it's likely to be class 5

Testing the prediction

- Wug task
  - Nonce items don't have any semantic clues to noun class

THIS IS A WUG

Experiment 1

Stimuli

- 20 nonce nouns
  - 10 with shape i-CV (short)
  - 10 with shape i-CVCV (long)
- First C is either:
  - An undergoer of post-nasal changes, or
  - A result of post-nasal changes
  - Five of each, for each noun shape (=20 total)

Method: on each trial…

singular (isinye)	plural (isininzi)
ikhelu →	_____

- Shown a singular nonce noun
- Speakers read the singular form, then produced a plural form

Method: expectations

- If C1 is a post-nasal change *undergoer* (fricative, aspirate, implosive, /l/), speakers should the word as class 5/6 and give plural forms with ama-
- If C1 is the *result* of a post-nasal change (voiced, unaspirated, nasal), speakers should treat the word as class 9 and give plural forms with ii(N)- or izi(N)-

Method

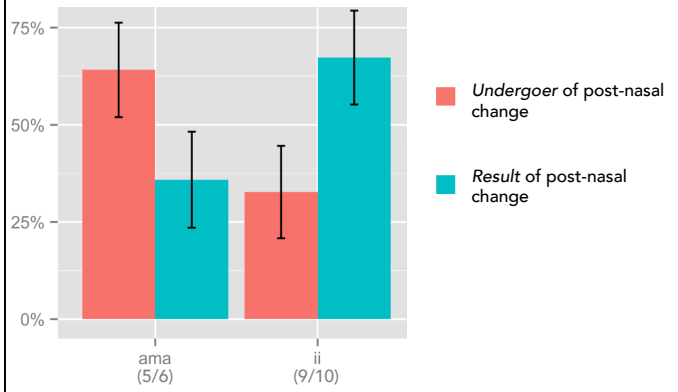
- Stimuli presented on a laptop in random order
- Participants saw 3 real-noun sg/pl examples in the instructions, then did 14 practice items

Participants

- 10 native speakers of isiXhosa
  - 5 male, 5 female
  - Age
    - Range: 21–42
    - Mean: 26
  - Other languages
    - English (≈all)
    - Afrikaans (2)
    - Zulu (2)
    - Sotho (2)

Results

Results



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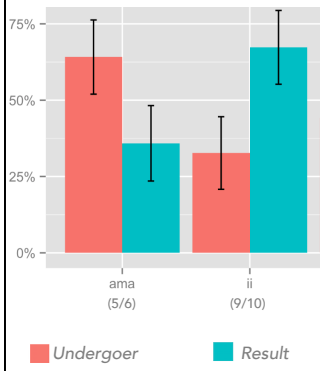

- Speakers choose class 5/6 (ama) when initial C is an *undergoer*, and 9/10 (ii) when C is a *result*

Interim Summary and Discussion

Summary

- Speakers have intuitions about nonce words' noun class membership
- The status of initial consonants as *results* or *undergoers* of post-nasal changes influences speakers' decisions
  - *Undergoers* are likely to be class 5/6, while *results* are likely to be class 9/10

Discussion

- Synchronic phonotactics can come from historical patterns
- Speakers make use of phonotactic clues in determining noun class
- Noun classes aren't simply semantic or arbitrary—phonology plays a role

Length-based allomorphy in Xhosa noun class prefixes

Background

- Xhosa noun class prefixes alternate based on the length of the following root
- Are these alternations synchronically productive, or just the vestiges of historical change?
- We argue that these alternations are part of speakers' synchronic grammars

Length-based allomorphy in class 10

- Class 10:
  - izi(N)- before 1-syllable roots
  - ii(N)- elsewhere

Singular (9)	Plural (10)	Gloss
in-t'o	izin-t'o	'thing(s)'
in-dʒu	izin-dʒu	'house(s)'
in-dʒela	iin-dʒela	'road(s)'

Length-based allomorphy in class 5

- Class 5:
  - ili- before 1-syllable roots
  - i- elsewhere

Singular (5)	Plural (6)	Gloss
ili-fu	ama-fu	'cloud(s)'
ili-ce	ama-ce	'stone(s)'
i-|ep^{h}e	ama-|ep^{h}e	'spoon(s)'

Length-based allomorphy in class 11

- Class 11:
  - ulu- before 1-syllable roots
  - u- elsewhere

Singular (11)	Plural	Gloss
ulu-vo	izim-vo	'opinion(s)'
ulu-su	izin-ts'u	'skin(s)'
u-p^{h}ondo	iim-p'ondo	'horn(s)'

Possible representations

a. Remnant of a historical process; only in the lexicon (learned for each word)

b. Synchronic phonological pattern; active in the grammar (learned as a rule)

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a. Remnant of a historical process; only in the lexicon (learned for each word)
   - ↳ Speakers *shouldn't* apply the pattern to novel words or nonce items

b. Synchronic phonological pattern; active in the grammar (learned as a rule)
   - ↳ Speakers *should* apply the pattern to novel words or nonce items

Experiment 2

Experiment design

- Wug task (Berko 1958)
  - Nonce items aren't stored lexically, so any alternation must be a synchronic pattern
  - Singular ↔ Plural

- Block 1: ii(n) ~ izi(n) (class 10 plurals)
- Block 2: i- ~ ili- (class 5 singulars)

Block 1 (class 9/sg. → 10/pl.): Stimuli

- Singular class 9 → plural class 10
  - 10 monosyllabic roots
  - 10 disyllabic roots

  - 20 filler/distractor items (part of a separate experiment)
    - 10 monosyllabic, 10 disyllabic

Block 1: Task

- Block 1 (9/sg. → 10/pl.)
  - On each trial, speakers see a singular nonce noun with the class 9 prefix i(N)-
  - Speakers produce the plural of that nonce noun, with one of the two class 10 allomorphs, izi(N)- or ii(N)-

Block 1 (9/sg. → 10/pl.): Examples

- into → izint'o or iint'o
- indlu → izindɮu or iindɮu
- indlela → izindɮela or iindɮela
- intombi → izint'ombi or iint'ombi

Block 2 (class 6/pl. → 5/sg.): Stimuli

- Plural class 6 → singular class 5
  - 10 monosyllabic roots
  - 10 disyllabic roots
  - distinct from block 1
  - 20 filler/distractor items (part of a separate experiment)
    - 10 monosyllabic, 10 disyllabic
    - distinct from block 1

Block 2: Task

- Block 2 (6/pl. → 5/sg.)
  - On each trial, speakers see a plural nonce noun with the class 6 prefix ama-
  - Speakers produce the singular of that nonce noun, with one of the two class 5 allomorphs, ili- or i-

Block 2 (6/pl. → 5/sg.): Examples

- amafu → ilifu or ifu
- amace → ilice or ice
- amacephe → ili|ep^{h}e or i|ep^{h}e
- amadada → ilidada or idada

Participants

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Data capture

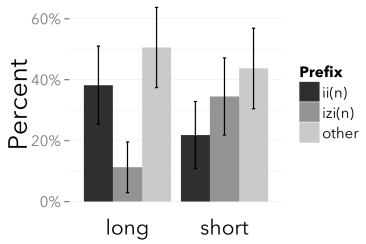
- Stimuli presented on a laptop in random order
- Participants saw 3 real-noun sg/pl examples in the instructions, then did 14 practice items
- Audio recorded, responses coded for class prefix added

Results

- In both blocks, speakers' knowledge of length-based prefix alternations extends to novel words

Results: Block 1 (9/sg. → 10/pl.)

- Speakers were more likely to use izi(N)- with short roots and ii(N) with long roots

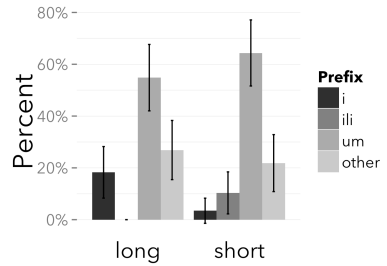


The "other" category

- Real class prefixes, but not izi(n)- or ii(n)-
- Most common: ama- (class 6 pl.)
- Two likely reasons for ama- responses
  - i-CVCV forms may be ambiguous between class 5 i(li)- and class 9 i(n)-
  - Some common nouns in class 9 have class 6 plurals (a 9/sg.~6/pl. paradigm exists)
    ex: in-doda → ama-doda 'man' / 'men'

Results: Block 2 (6/pl. → 5/sg.)

- Speakers were more likely to use ili- with short roots and i- with long roots



um-

- "Other": responses other than i- and ili-
- Most common responses:
  - um- (class 1 or 3)
  - u- (class 1a or 11)
- A likely explanation for um-s:
  - Most clan names and other ethnonyms follow an irregular 1/sg. → 6/pl. paradigm
  - ex: um-Xhosa → ama-Xhosa
    'Xhosa person/people'

Interim summary

Summary

- Xhosa speakers use root length to decide between class prefix allomorphs
- This alternation is represented in speakers' synchronic grammars

Summary

- Length-based alternations are not just a historical vestige
  - Speakers have some linguistic awareness of length as the basis for the allomorphy
  - They can extend that knowledge to the treatment of novel words; it's not lexicalized
- Consistent with other phonological evidence for bisyllabic minimal stem

Conclusion

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- Speakers demonstrate multiple levels of awareness of phonotactic patterns across root-prefix combinations
  - Segmental co-occurrence patterns: nasality, aspiration
  - Metrical structure: length, minimality
- Laboratory phonology methods reveal new insights in unders