Investigating vowel harmony in Ihanzu

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1. Introduction

This talk

- My goal in this talk is to provide a brief initial description of what kind of system of vowel harmony (VH) exists in Ihanzu (F31B; Tanzania)
- The analysis involves both impressionistic judgements and empirical measurements
- First, a little bit of background…

Typological perspective: VH in Bantu

- Most Bantu languages have either a five- or seven-vowel system (Maddieson & Sands 2019):
  - 5V: /i, u, e, o, a/ or /i, u, **ɛ**, **ɔ**, a/
  - 7V: /i, u, e, o, **ɛ**, **ɔ**, a/, /i, u, **ɪ**, **ʊ**, **ɛ**, **ɔ**, a/ or /i, u, **ɪ**, **ʊ**, e, o, a/
- VH of one kind or other is extremely widespread in the family (se e.g. Clements 1991, Hyman 1999: §2, Odden 2015: §1, Nichols 2021: ch. 2, Kula in press inter alia)

Typological perspective: VH in Bantu

- In 5V languages, VH typically manifests itself as the lowering of high /i, u/ to mid [e~**ɛ**, o~**ɔ**] after mid /e~**ɛ**, o~**ɔ**/
  - E.g. Bemba (M42; Zambia) or Swahili (G42; East Africa)
- In 7V languages, a similar system is also usually found involving alternations between the second and third highest pairs of vowels (degrees 2 and 3)
  - E.g. Rangi (F33; Tanzania) or Kikuyu (E51; Kenya)

Typological perspective: VH in Bantu

- In addition, in most languages, VH displays some sort of asymmetry w.r.t. the behaviour of front and back vowels
- It also usually fails to effect changes in final verbal or derivational vowels
- Typical systems (such as that of Swahili, Rangi and Kikuyu) are progressive, proceeding rightwards from the beginning of a root/stem

Typological perspective: VH in Bantu

- Swahili:

-zib-i-a ‘stop up for’	-zib-u-a ‘unblock’
-fung-i-a ‘shut for’	-fung-u-a ‘open’
-t**e**-g-**e**-a ‘set a trap for’	-te-g-u-a ‘disassemble a trap’
-ch**o**m-**e**-a ‘stab for’	-ch**o**m-**o**-a ‘pull out’
-pang-i-a ‘arrange for’	-pang-u-a ‘disarrange’

(Kirkeby 2000; Awde 2002; Ngonyani & Ngowa 2016)

Typological perspective: VH in Bantu

- Rangi:

-tɕuuŋg-**ɪ**r-a ‘tie at/for’

-**ɪ**m-**ɪ**r-a ‘start’

-f**ʊ**r-**ɪ**r-a ‘wash (clothes) at/for’

-k**ɛ**r-**ɛ**r-a ‘cut at/for’

-b**ɔ**k-**ɛ**r-a ‘dig at/for’

-hak-**ɪ**r-a ‘smear at/for’

-tɕuuŋg-**ʊ**l-a ‘untie’

-h**ɪɪ**nd-**ʊ**k-a ‘return (intr.)’

-s**ʊ**l-**ʊ**l-a ‘bleed’

-b**ɛ**nd-**ʊ**l-a ‘break off’

-h**ɔ**n-**ɔ**l-a ‘wipe off’

-hal-**ʊ**l-a ‘strip off’

(Stegen 2002)

Typological perspective: VH in Bantu

- Kikuyu:

-ti**ɣ**-er-ek-a ‘abandon, be left over’

-tum-er-ek-a ‘join, intrude’

-**ɣ**er-er-ek-a ‘have fetched for’

-hoð-er-ek-a ‘be used’

-t**ɛ**m-**ɛ**r-**ɛ**k-a ‘cut into shapes’

-**β**ɔj-**ɛ**r-**ɛ**k-a ‘cut for/at’

-**β**að-er-ek-a ‘become rich’

-it-or-a ‘undo the act of strangling’

-**ʃ**uuk-or-a ‘undo the act of slandering’

-et-or-a ‘undo the act of calling’

-tom-or-a ‘undo the act of sending’

-**ɣɛ**t-or-a ‘undo the act of tightening’

-**β****ɔ**k-**ɔ**r-a ‘undo the act of restraining’

-tah-or-a ‘undo the act of scooping’

(Peng 2000)

Typological perspective: VH in Bantu

- There also 7V languages in which VH can be seen to act regressively between roots/stems and prefixes
  - E.g. with noun class prefixes
- Certain 7V languages may also show harmony of low /a/
  - E.g. with the final inflectional vowel in verbs

Typological perspective: VH in Bantu

- Koyo (C24; Congo):

e-símu ‘scream’	i-yis-a ‘to hide’
e-túsi ‘shoulder’	i-kund-a ‘to plant’
e-bémbo ‘debt’	i-yeg-a ‘to learn’
e-kóró ‘skin’	i-wog-a ‘to hear’
ɛ-s**ɛ**g**ɛ** ‘hoe’	i-dz**ɛ**g-**ɛ** ‘to laugh’
ɛ-b**ɔ**g**ɔ** ‘arm’	i-l**ɔ**g-**ɔ** to bewitch’
e-lagá ‘promise’	i-lamb-a ‘to cook’

(Gazania 1972 in Hyman 1999: 244)

Ihanzu: Previous observations

- Ihanzu has been described as a 7V language (Beletskiy & Diyammi 2019, Harvey 2021)
- However, there are no firm, explicit statements in the literature regarding VH
- Harvey (2021) speculates that regressive VH may exist between prefixes and roots/stems
- Beletskiy & Diyammi (2019) do not explicitly mention VH, though progressive VH is implicit in the use of the allomorphs *-ik-/-ek-* for the stative verbal extension
- It seems that not all verbal suffixes containing non-low vowels alternate, however
  - E.g. the perfective *-ile/-iye* is invariably transcribed with the same vowels
  - Similarly, the final verbal vowels *-a/-e/-i* are invariably transcribed as such

Research questions

1. If Ihanzu exhibits VH, which vowels are targets and which triggers?
2. Are there any front–back asymmetries?
3. Is VH progressive or regressive? If both, do they behave similarly?
4. In what prosodic or morphological environments do we find VH?

- For the sake of concision, I concentrate on non-low vowels as potential targets

2. Methodology

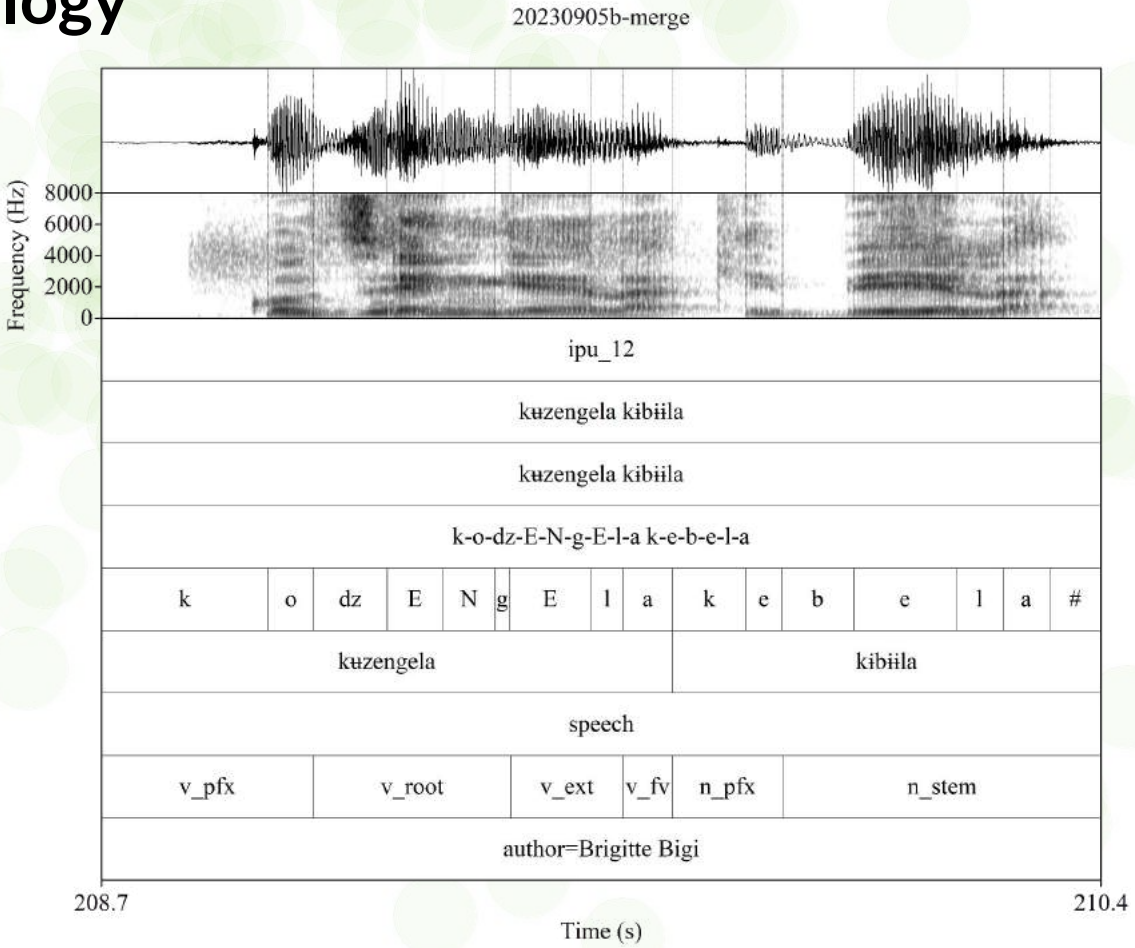
Methodology

- Data ~3 hours of elicitation across 5 sessions
  - Examples from elsewhere is marked with a following *
- My focus in elicitations, were verbs (applicatives, statives, perfectives, imperatives, “reversives”) both in isolation and embedded in sentences
- I undertook both impressionistic auditory and empirical acoustic analysis of vowel quality

Methodology

- Utterances for analysis (N = 594) were chunked and transcribed in a TextGrid in Praat (Boersma & Weenink 2023)
- This was then fed into the forced-aligner SPPAS (Bigi 2015), for which I compiled custom resources for Ihanzu
- The segmentation of each vowel token (N = 3,358+) was manually corrected
- An extra tier with manual morphological segmentation was added

Methodology



Methodology

- Measurements (F1, F2, F3, duration) and labels (word, vowel, morphology etc.) were extracted for each vowel with a custom Praat script
- Final analysis and visualisation of the resulting acoustic data were carried out in R (R Core Team 2022)

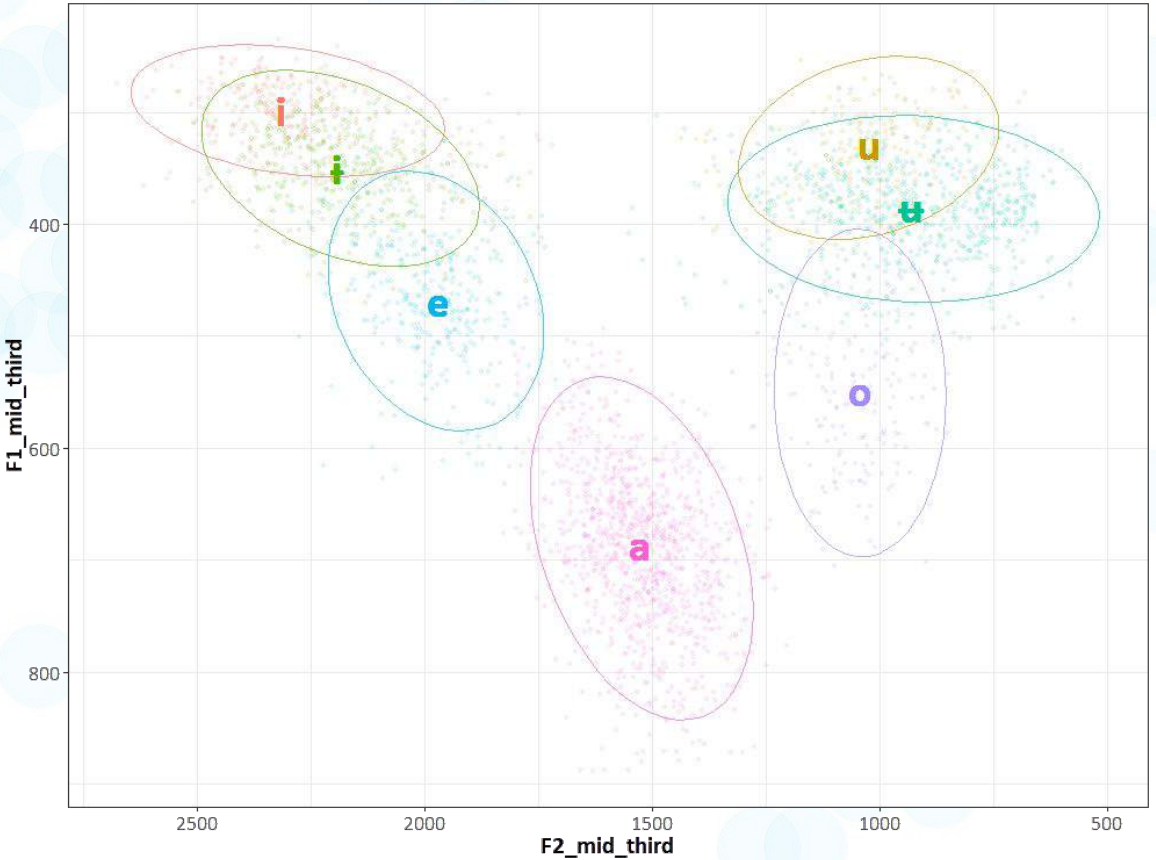
3. The vowel system

The vowel system

- It is uncontroversial to say that Ihanzu has seven phonemic vowel qualities
  - In the practical orthography: <i, u, **ɨ**, **ʉ**, e, o, a>
- There is agreement that <i, u, e, o, a> are [i, u, **ɛ**, **ɔ**, a]
- However, the exact qualities of <**ɨ**, **ʉ**> are seemingly not so clear
  - Harvey (2021) transcribes these as [**ɪ**, **ʊ**] (as does Masele 2001)
  - But Beletskiy & Diyammi (2019) favour [e, o]
- This disagreement is perhaps not surprising as distinguishing [**ɪ**, **ʊ**] and [e, o] is notoriously fraught with difficulty (see e.g. Casali 2008: §4.2)

The vowel system

- My impression is that <ɨ> is more often [e] than [ɪ] – though both can be heard
- Conversely, I have opposite impression for <ʉ>, i.e. [ʊ] seems to be more frequent than [o]
- Further investigation required! (CoG, B1, A1, A2? [Starwalt 2008]; statistics using e.g. PCA)
- I opt to use orthography rather than committing to a transcription



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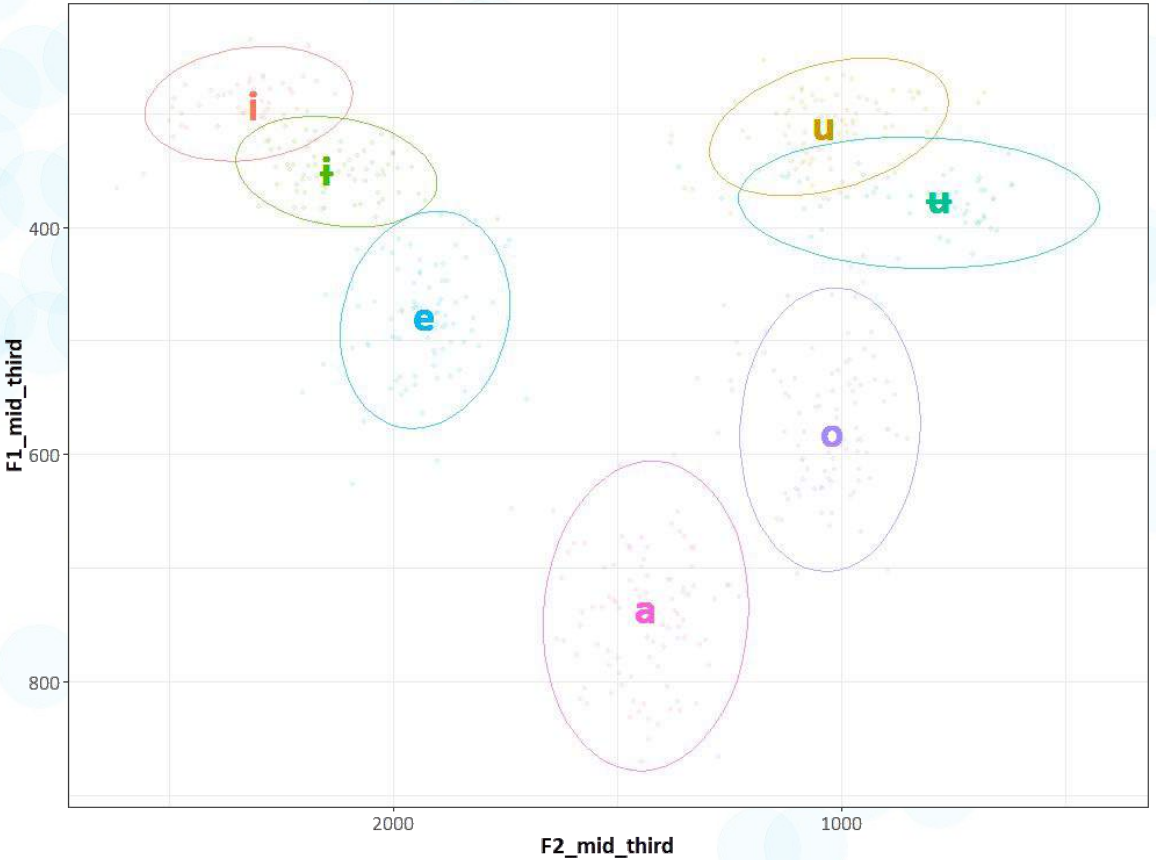

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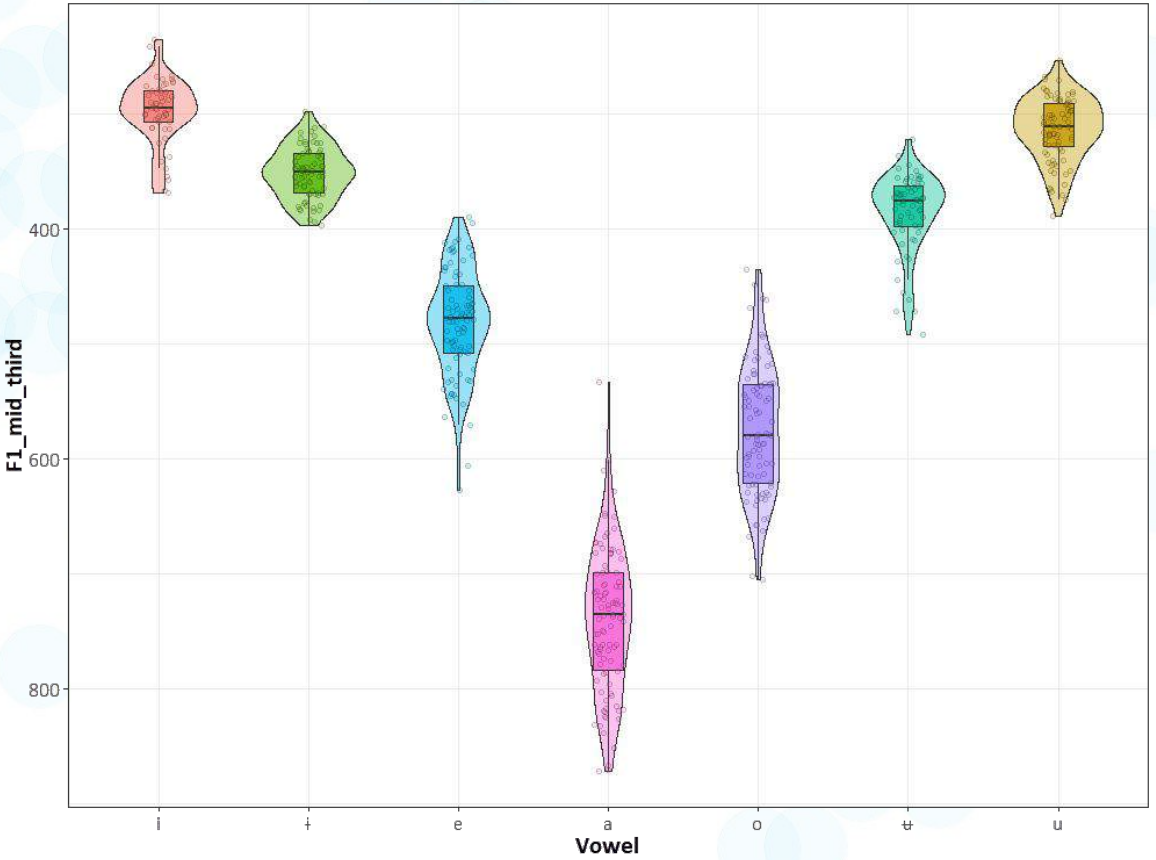


4. Progressive harmony!

Progressive harmony!

- Progressive harmony similar to that in Rangi and Kikuyu was found in derivational suffixes (though note semantic relationships are not always straightforward)
  - Applicative, stative, “intensive”:

k**ʉ**-pih-a ‘to hide sth’	k**ʉ**-pih-**ɨ**sh-a ‘to hide sth well’
k**ʉ**-lug-a ‘to cook’	k**ʉ**-lug-**ɨ**l-a ‘to cook for’
k**ʉ**-d**ɨ**m-a ‘to herd, tend (animals)’	k**ʉ**-d**ɨ**m-**ɨ**sh-a ‘to herd for a long time’
k**ʉ**-**ʉ**g-a ‘to winnow’	k**ʉ**-**ʉ**g-**ɨ**ly-a ‘to winnow for’
k**ʉ**-zeng-a ‘to build’	k**ʉ**-z**e**ng-**e**sh-a ‘to build a lot’
k**ʉ**-hom-a ‘to stab’	k**ʉ**-h**o**m-**e**l-a ‘to stab with’
k**ʉ**-lah-a ‘to hunt’	k**ʉ**-lah-**ɨ**l-a ‘to hunt with’

Progressive harmony!

- Progressive harmony similar to that in Rangi and Kikuyu was found in derivational suffixes (though note semantic relationships are not always straightforward)
  - ""Reversive/separative"" (big caveats here):

k**ʉ**-ki-**ɨ**l-a 'to close sth'	k**ʉ**-ki-**ʉ**l-a 'to open sth'
k**ʉ**-tug-al-a 'to wear'	k**ʉ**-tug-**ʉ**l-a 'to take off (clothes)'
—	k**ʉ**-p**ɨ**-**ʉ**l-a 'to turn sth around'
—	k**ʉ**-h**ɨ**nd-**ʉ**g**ʉ**l-a 'to turn sth upside down'
—	k**ʉ**-tyem-**ʉ**l-a 'to sneeze'
—	k**ʉ**-k**o**nd-**o**g**o**l-a 'to remove corn from the cob'
—	k**ʉ**-tam-**ʉ**l-a 'to tear sth'

Progressive harmony!

- However, the “attenuative” suffix *-is-* invariant:

k**ʉ**-pih-a ‘to hide sth’	k**ɨ**-pih-is-a ‘to hide badly’
k**ʉ**-lug-a ‘to cook’	k**ɨ**-lug-is-a ‘to cook slowly/not enough food’
k**ʉ**-d**ɨ**m-a ‘to herd, tend (animals)’	k**ɨ**-d**ɨ**m-is-a ‘to herd for a short time’
k**ʉ**-**ʉ**g-a ‘to winnow’	k**ɨ**-**ʉ**g-is-a ‘to winnow slowly/little’
k**ʉ**-zeng-a ‘to build’	k**ɨ**-zeng-is-a ‘to build little/badly’
k**ʉ**-hom-a ‘to stab’	k**ɨ**-hom-is-a ‘to stab slowly/but barely pierce’
k**ʉ**-lah-a ‘to hunt’	k**ɨ**-lah-is-a ‘to hunt badly’

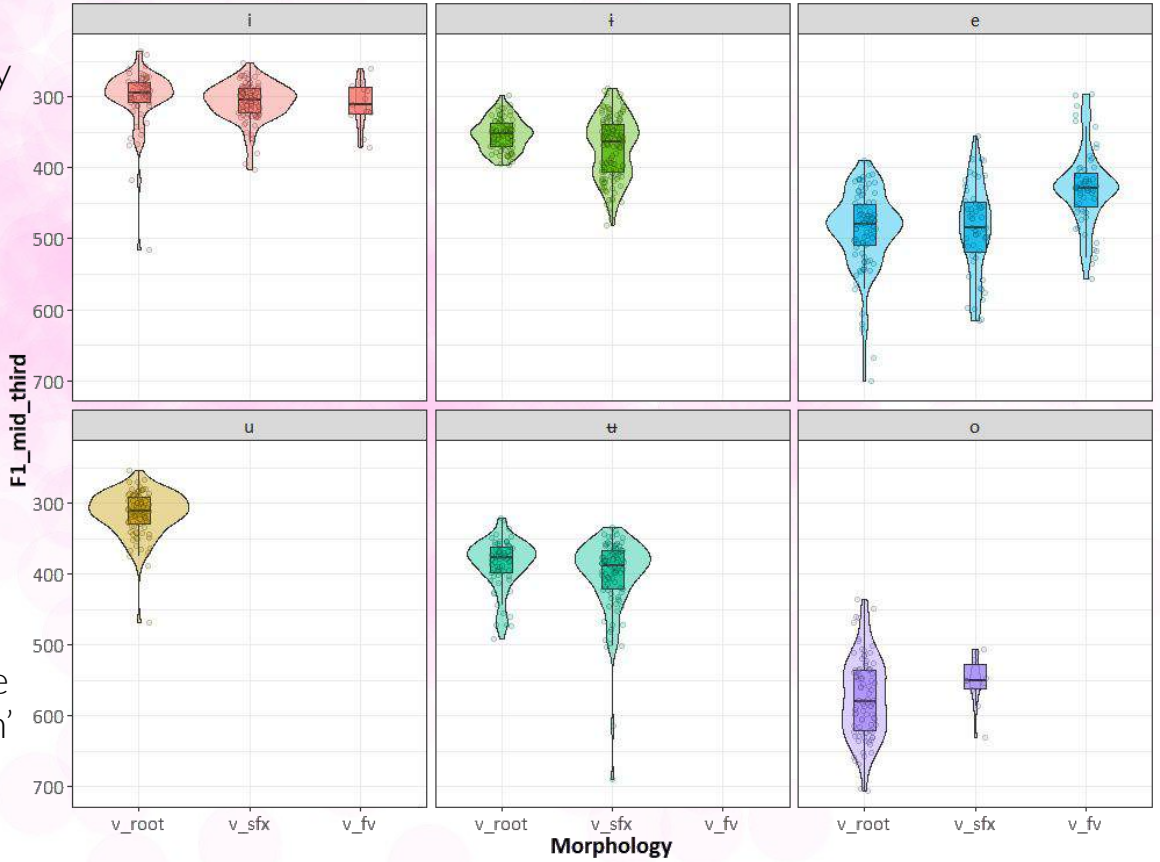
Progressive harmony!

- Similarly, the perfective suffix and final inflectional vowels are invariant

-pih-ile ‘I hid (it)’	kiny-i ‘stab! (pl.)’
-dug-ile ‘cooked’	lug-i ‘cook! (pl.)’
-dɨm-ile ‘herded, tended (animals)’	dɨm-i ‘herd! (pl.)’
-ʉg-ile ‘winnowed’	ʉg-i ‘winnow! (pl.)’
-zeng-ile ‘built’	zeng-i ‘build! (pl.)’
-ho-ile* ‘took’	hom-i ‘stab! (pl.)’
-dah-ile ‘hunted’	lah-i ‘hunt! (pl.)’

Progressive harmony!

- Transcriptions borne out by acoustic (F1) results
- Preceding vowel: perhaps some additional gradient effects
- But overall support for the proposed categorical alternations
- Some raising of *-e* after <i> – a lot of data there thanks to perfective forms
- Tokens of <e> after <a> are from *azamp**e**we* 'I was given' where verb root is *-p-*



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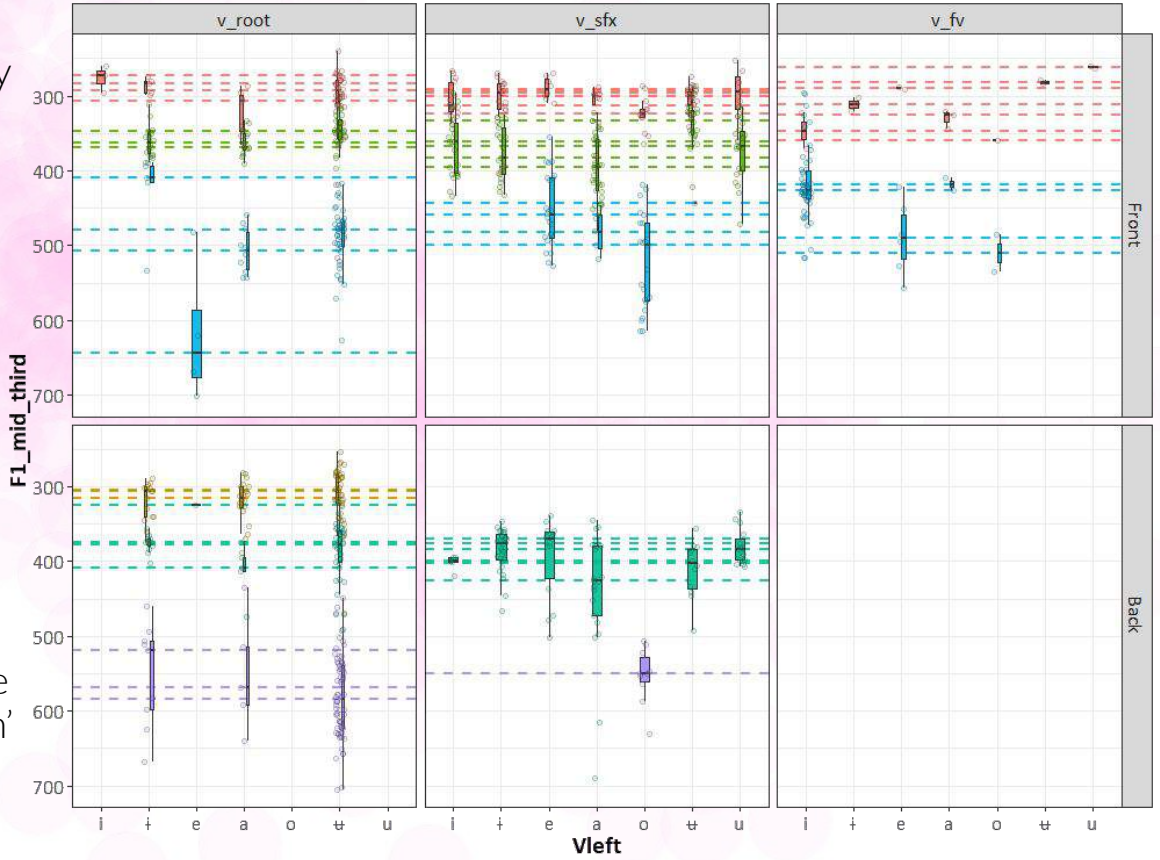


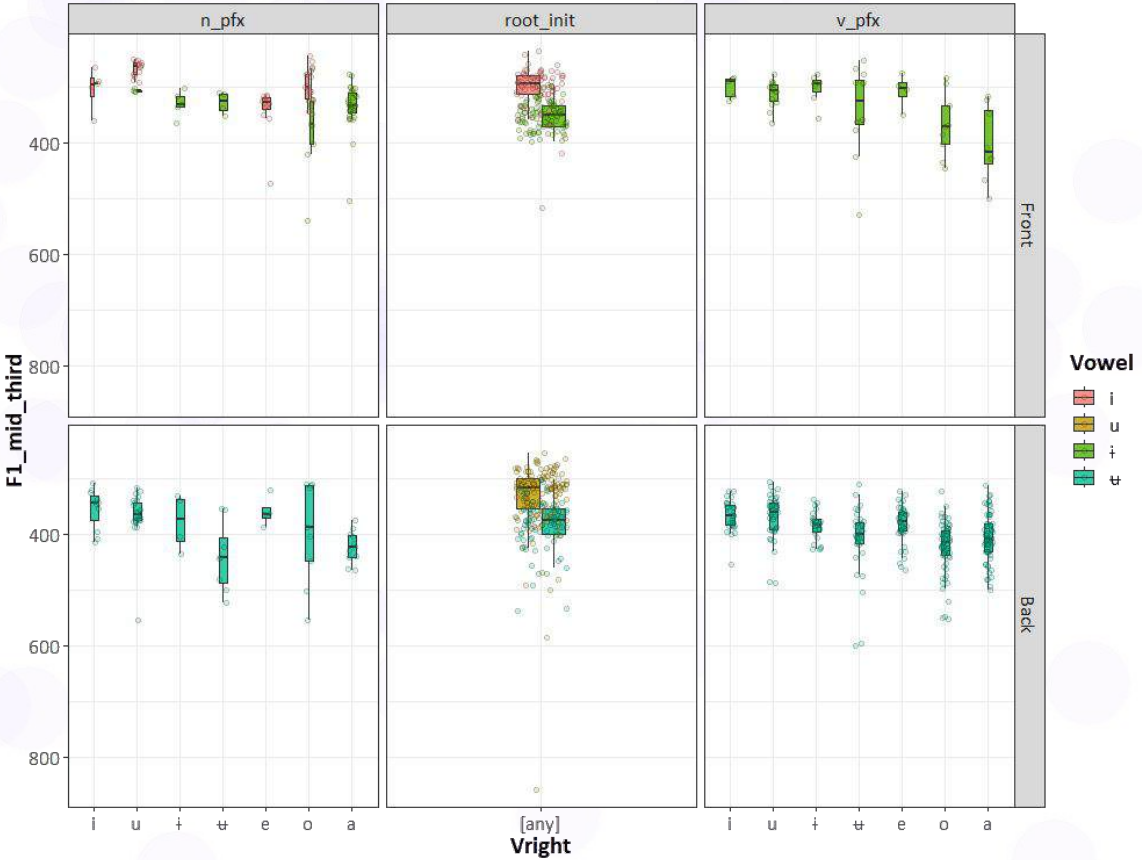
5. Regressive harmony?

Regressive harmony?

- Regressive harmony could potentially exist:
  a. Between a prefix and following root/stem, e.g. *k**ɨ**-t**i**nde* ‘a piece of firewood which has already burnt’ *k**ʉ**-l**u**g-a* ‘to cook’
  b. Between root/stem and following suffix, e.g. *n-d**ɨ**m-**i**le* ‘I herded’, *z**e**ng-**i*** ‘build! (pl.)’
  c. Within stems, e.g. *m**ʉ**t**e**m**i** ‘chief’, *nz**o**g**u*** ‘elephant’
- However, I have not yet found strong evidence of patterns of this kind
- But my data here were less targeted and coverage was poor (especially for c.)

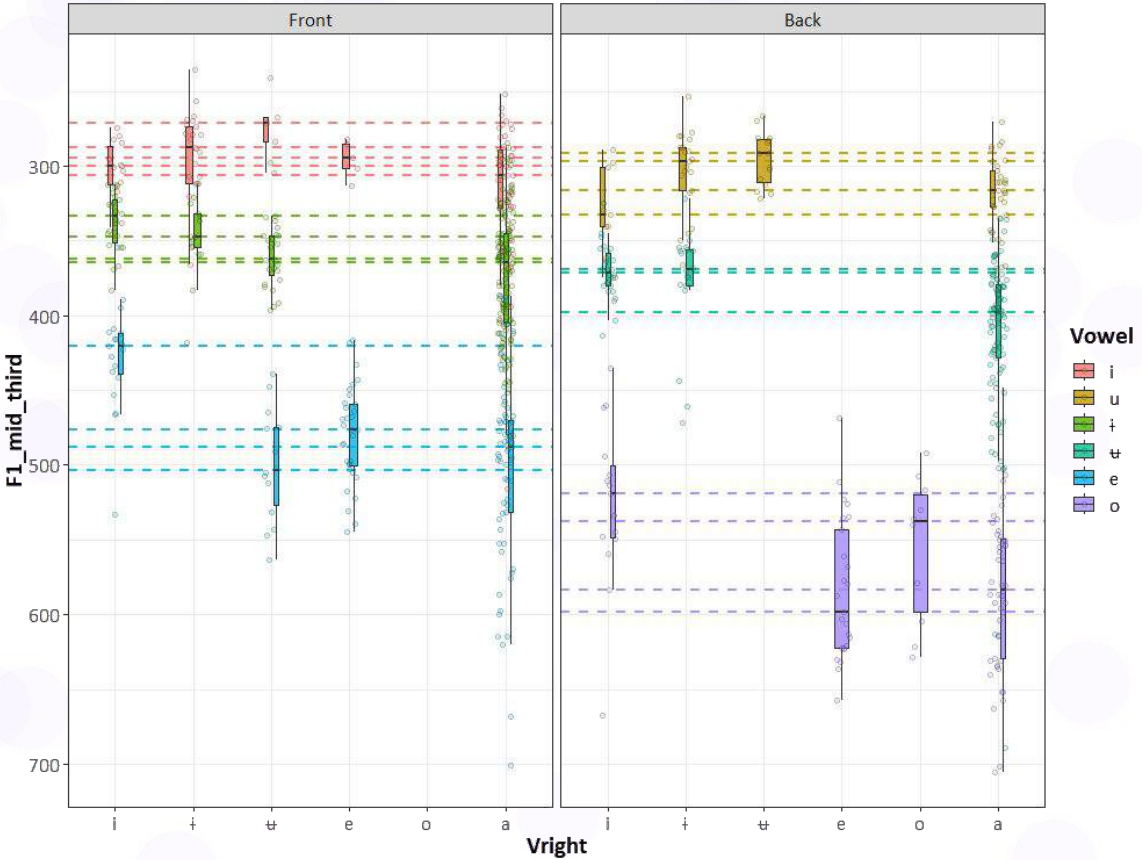
Regressive harmony?

- Mid vowels are not general found in prefixes (at least in my data – those few tokens I did have have been omitted)
- Perhaps some raising of <ɨ> in noun prefixes before <i, u>?
- <ɨ> in verbs is generally quite high
- Conditional raising, vowel reduction or transcription errors?



Regressive harmony?

- Within stems and their suffixes, there is little structured variation
- One exception though seems to be raising of <e, o> before <i>
- Cf. raising of /**ɛ**, **ɔ**/ to [e, o] before i, u in e.g. Venda, Zulu and Xhosa (Kula 1997, Poulos & Msimang 1998, Jokweni & Thipa 1996)



6. Discussion

Discussion

- This is certainly not the last word on vowel harmony in Ihanzu
- The recordings, though by no means exceedingly “dirty” still have some degree of background noise etc.
- All data gathered from a single older male speaker
  - There is always the possibility for variation
  - This might especially be the case with younger speakers!

Discussion

- This is only acoustics – what about articulation?
  - The role of the tongue root/pharyngeal expansion is particularly interesting given the harmony system and potential front–back asymmetry
- Whether through acoustics or articulation, more precisely determining the true nature of <**i̱**, **ʉ̟**> is crucial to any formal analysis of the system
  - E.g. is there agreement for [±ATR] or [±high]?
  - Are front and back VH the same or separate systems?
- It does though seem to be the case that only <**i̱**, **ʉ̟**> and <e, o> are involved in (progressive) alternations and that these are found only within the verb stem
- What static generalisations can we make?

7. Summary

Summary

- Ihanzu exhibits a form of progressive VH which is typical of 7V Bantu languages
- In verbal extensions (lexalicalised or not), <**ɨ**> is lowered to <e> after <e, o> and <**ʉ**> is lowered to <o> only after <o>
- Suffixes containing <i> (i.e. “attenuative” and perfective) and final inflectional vowels in general show no categorical alternations
- Little to no convincing evidence of regressive harmony
  - Potential exception: tensing of <e, o> before <i>

Sóngeli!

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