Acoustics of the creaky phonations in Yateé Zapotec

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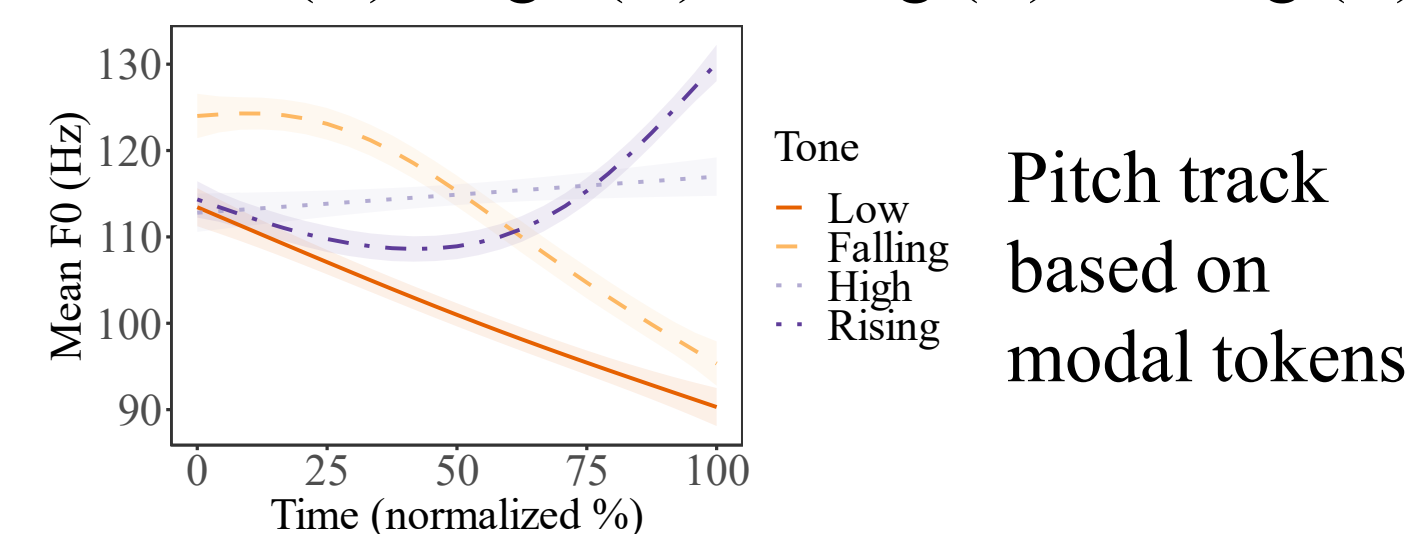
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Introduction

- Yateé Zapotec (YZ):
- Otomanguean:Northern Core Zapotec
- Spoken in San Francisco Yateé, Oaxaca, Mexico (~150 speakers), and by diaspora community in Los Angeles.
- Existing documentations are on the consonants of YZ [1,2]

- Four tones:
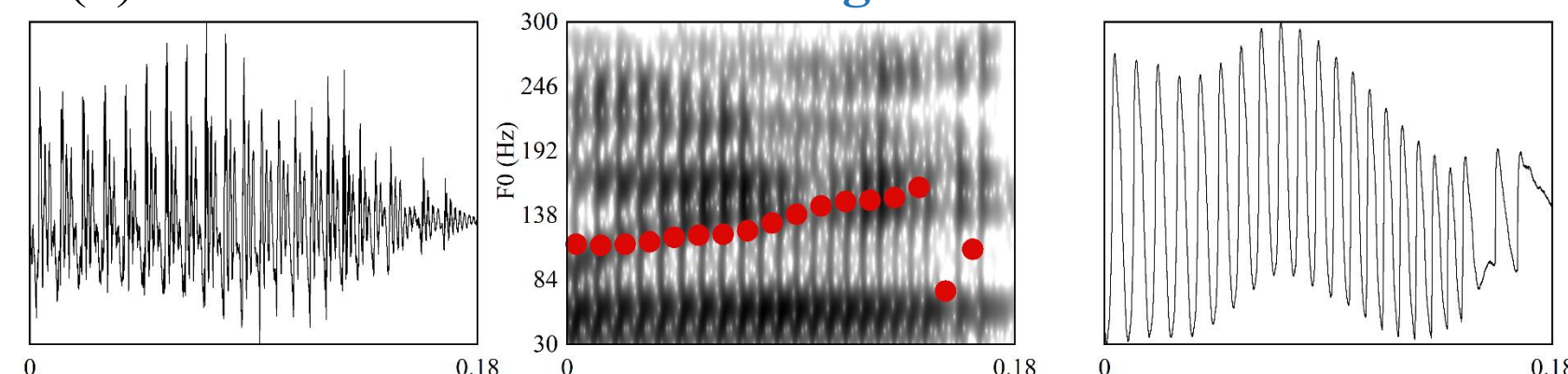 - Low (V̀), High (V́), Rising (V̌), Falling (V̂)

Pitch track based on modal tokens

- Three phonations:
  - Modal V, Rearticulated V?V, Checked V?

Modal V
No glottalization; long duration

Rearticulated V?V
Mid-phased glottalization; long duration

Checked V?
Late-phased glottalization short duration
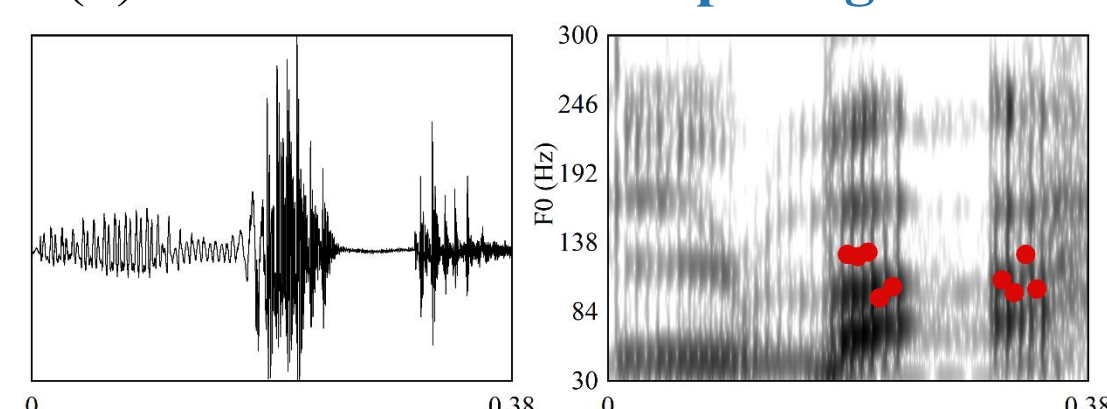
Variations

Scan QR code for sound files

Checked phonation
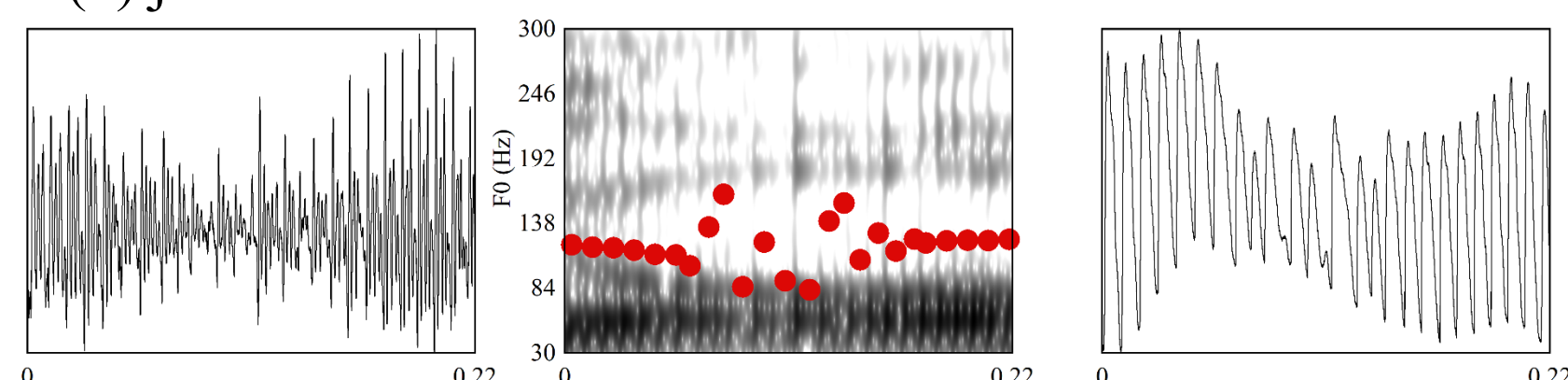(1) wě? "wound" → **Vowel-end glottalization**
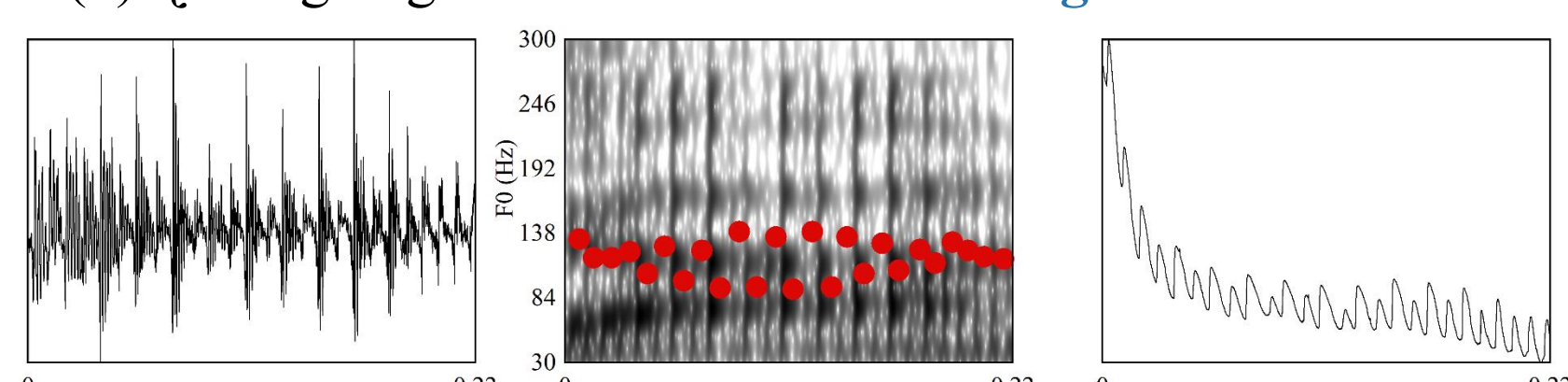

Rearticulated phonation
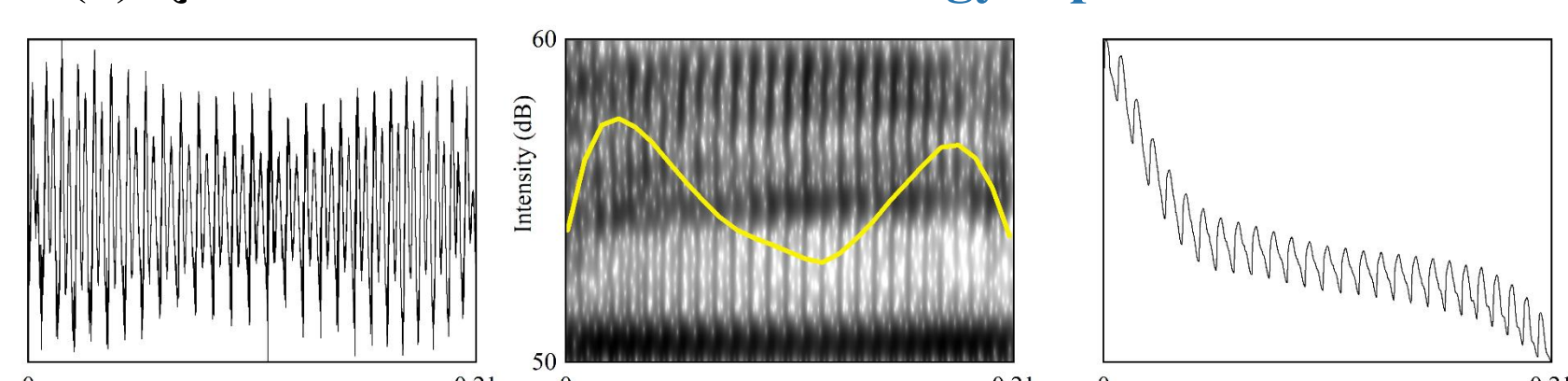(2) lbà?a "neck" → **Complete glottal stop in the middle**

(3) jò?ó "limestone" → **Modal + Glottalization + Modal**

(4) tʂá?a "going" → **Glottalization throughout**

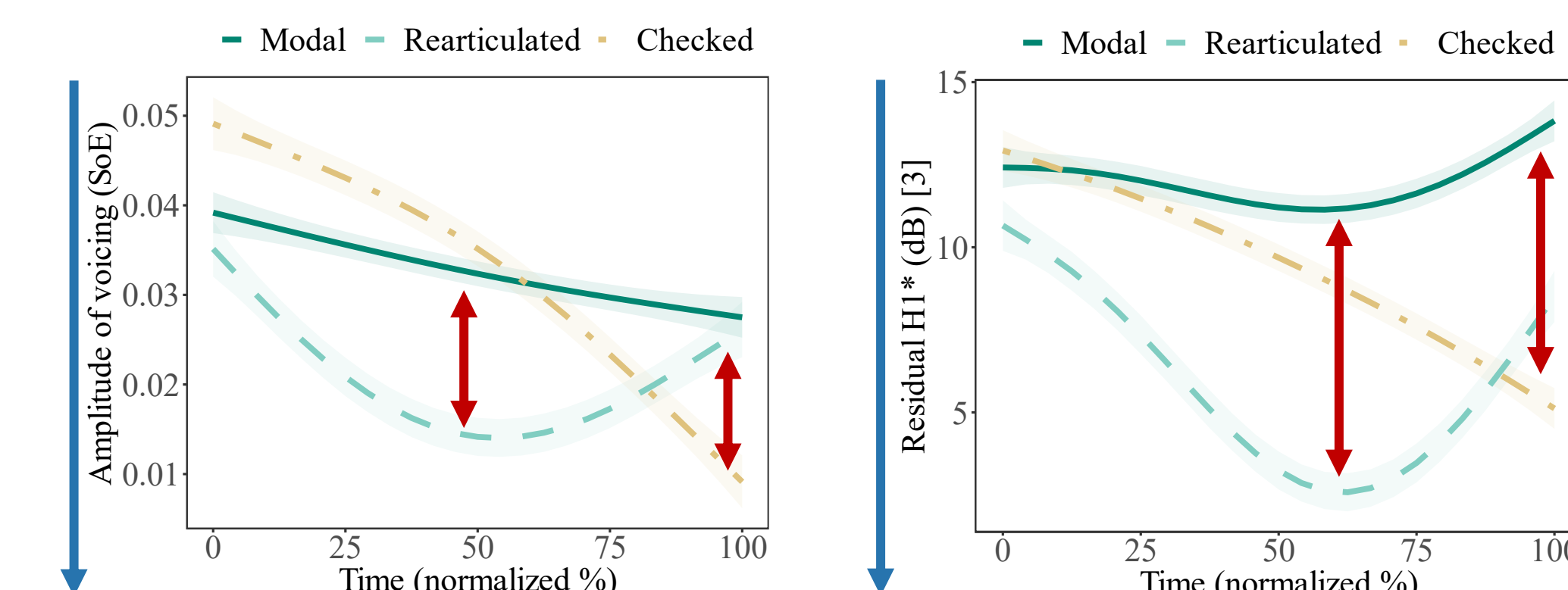(5) tʂi?í "voice" → **Modal with energy dip in middle**

Acoustics
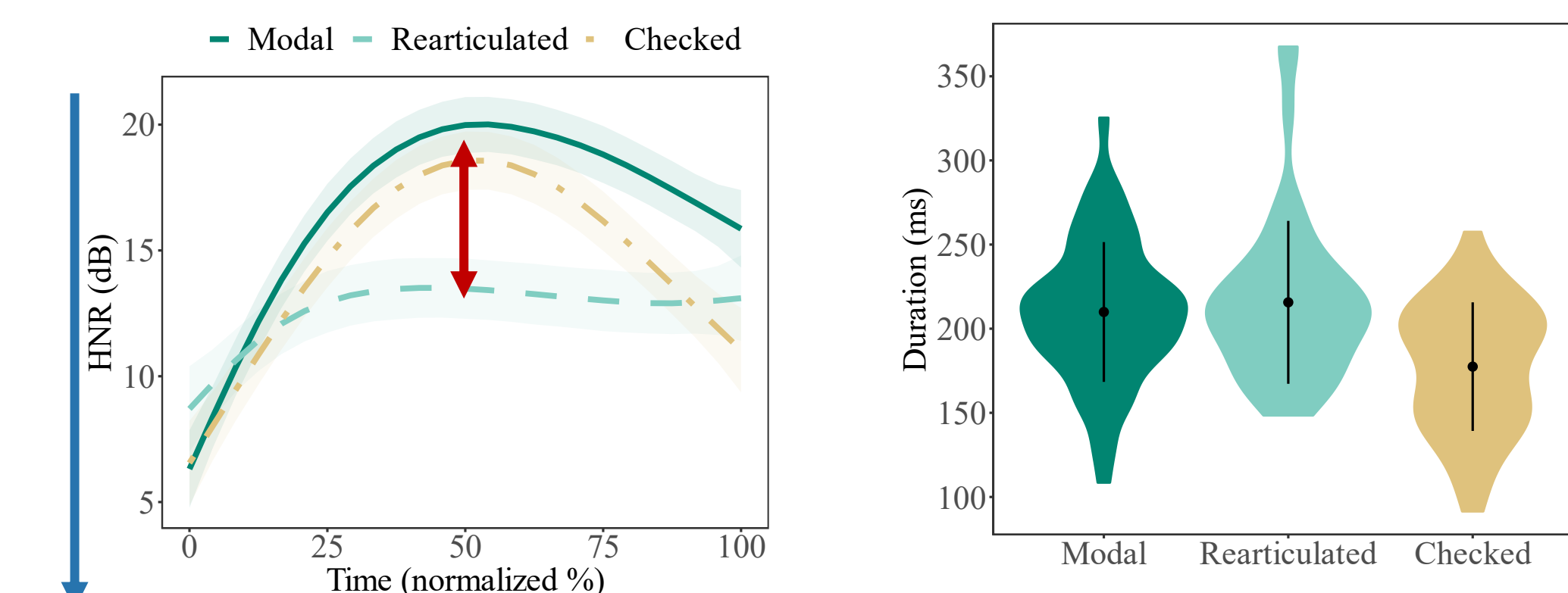
Scan QR code for word list

Speaker: A male speaker of 37-year-old; Speaks YZ, Spanish, English
Corpus: 49 monosyllabic words * 3 repetitions
Question: What are the acoustic properties of the three phonations in YZ? What acoustic properties most effectively differentiate them?

Creakier

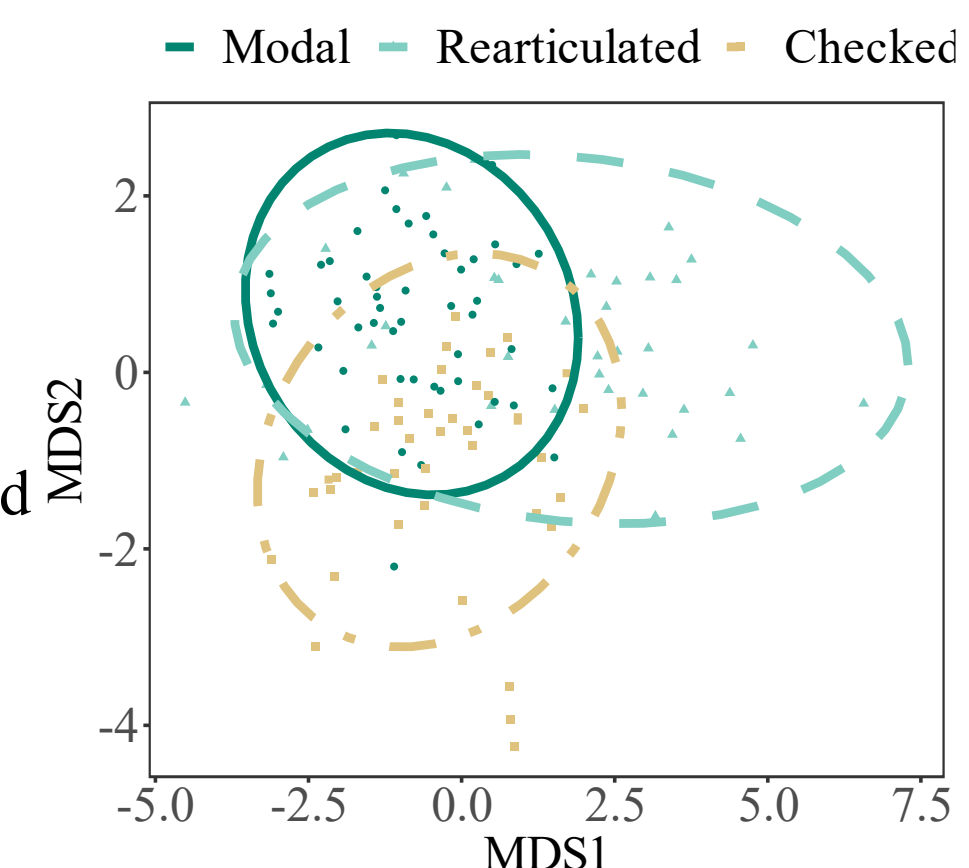**Creakier**

Creakier

References and Acknowledgement

[1] Jaeger, J. J. 1983. The fortis/lenis question: evidence from Zapotec and Jawoñ. *Journal of Phonetics*, 11, 177–189.
[2] Jaeger, J. J., Van Valin, R. D. 1982. Initial Consonant Clusters in Yateé Zapotec. *International Journal of American Linguistics*, 48, 125–138.
[3] Chai, Y., Garellek, M. 2022. On H1–H2 as an acoustic measure of linguistic phonation type. J. Acoust. Soc. Am. 152, 1856–1870
[4] Cox, T. F., Cox, M. A. A. 2001. *Multidimensional scaling*, Boca Raton: Chapman & Hall/CRC.

Parameter reduction

Scan QR code for R script

Use multi-dimentional scaling (MDS) [4] to identify the acoustic parameters that most effectively differentiate three phonations:

Checked vs. Modal & Rearticulated Duration

Rearticulated vs. Modal and Checked Amplitude of voicing

Conclusion

- In Yateé Zapotec, both checked vowels and rearticulated vowels involve glottalization.
- However, they have different phasing of glottalization relative to the vowel.
- Rearticulated vs. Checked differ in:
  - Amplitude contour
  - Duration
- Future studies will investigate what acoustic parameter listeners rely on to differentiate the three phonations.