

Tone and phonation in Baima (Tibeto-Burman)

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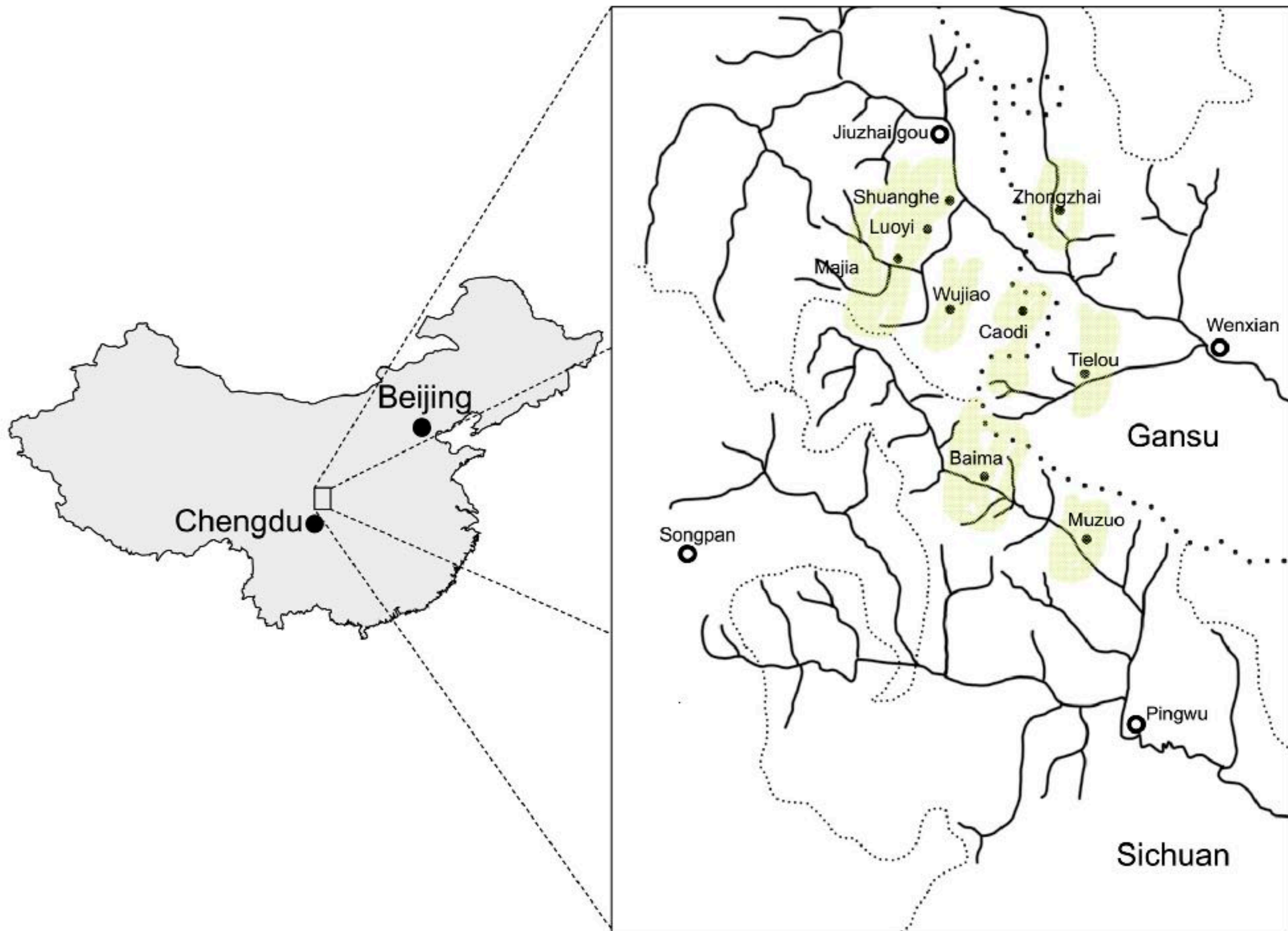
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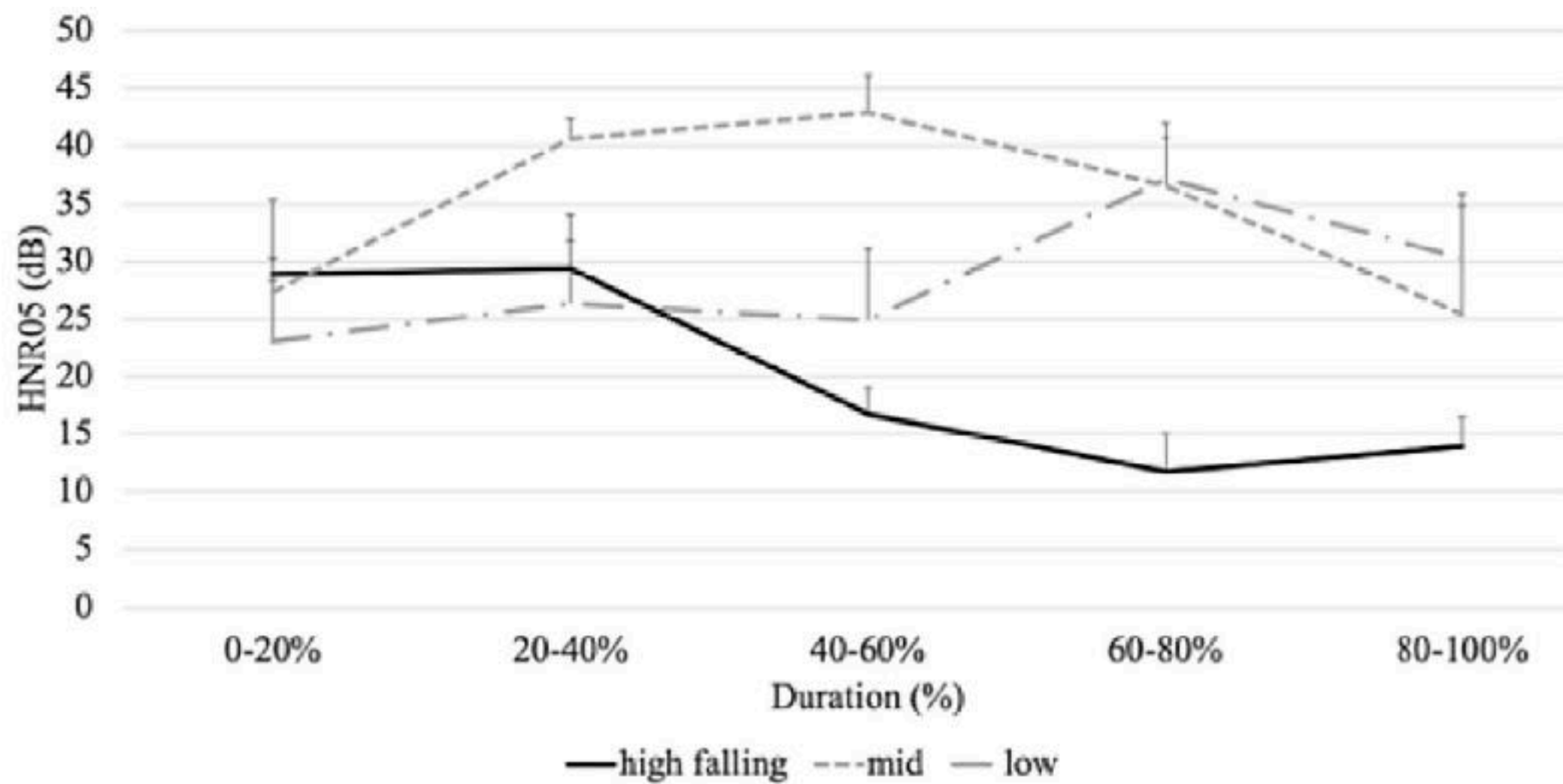
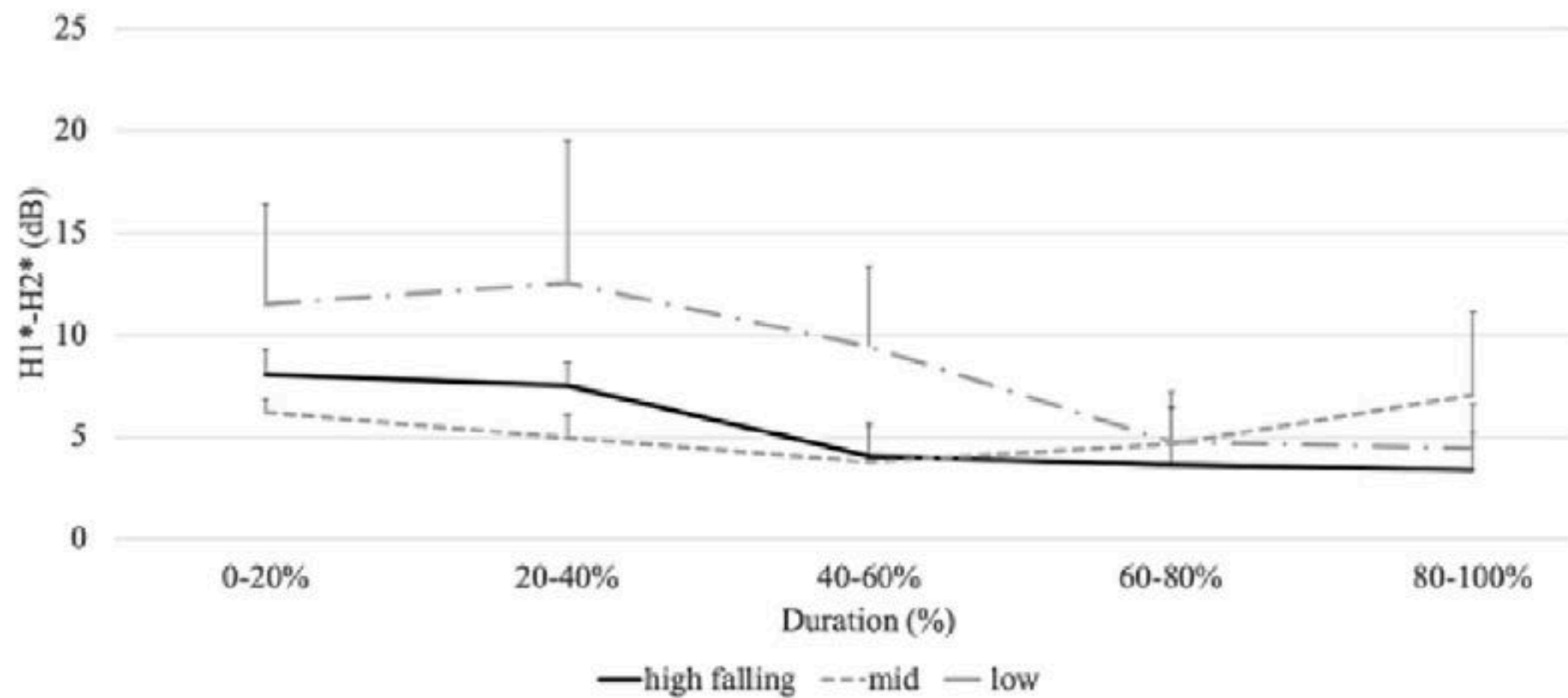
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Premises

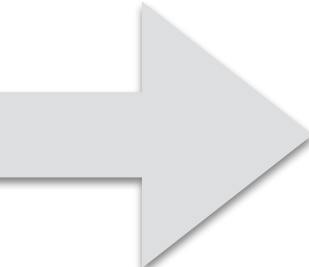
- Tonal system of Baima has been subject to controversy
 - synchronic description & historical development (Chirkova 2023)
- Chirkova et al. (2023): a tone language with a complex interrelation between (1) pitch height, (2) vowel duration, and (3) voice quality of the vowel
- 1 speaker (male, in his 70s)
 - acoustic signal, VoiceSauce (Shue et al. 2011)
 - difference between the amplitude of the first and second harmonics (H1-H2)
 - harmonics-to-noise ratio (measured here using harmonics-to-noise ratio below 500 Hz, HNR05)



Significance

- interesting and novel implications
 - synchronic phonological typology

“register tone”: tone is hard to separate from phonation categories (and/or vowel quality categories) (e.g. Henderson 1952; Brunelle & Kirby 2016)
 - tonogenesis in the area

dominant tonegenetic path: the primary H-L split is conditioned by Old Tibetan onsets (through obstruent devoicing and cluster simplification) (e.g. Sun 2001)
-  the primary H-L split is induced by Old Tibetan rhyme type (checked vs. smooth)
- classification

Present investigation

- 9 speakers (5 male, 4 female)
 - 100 words x 3 repetition per word x 9 speakers = 2700 tokens
 - simultaneous audio and electroglottography (EGG) recordings
- in this presentation we report preliminary results based on:
 - 4 speakers (2 male, 2 female)
 - 3 minimal triplets for tone (9 words) x 3 repetitions = 108 tokens

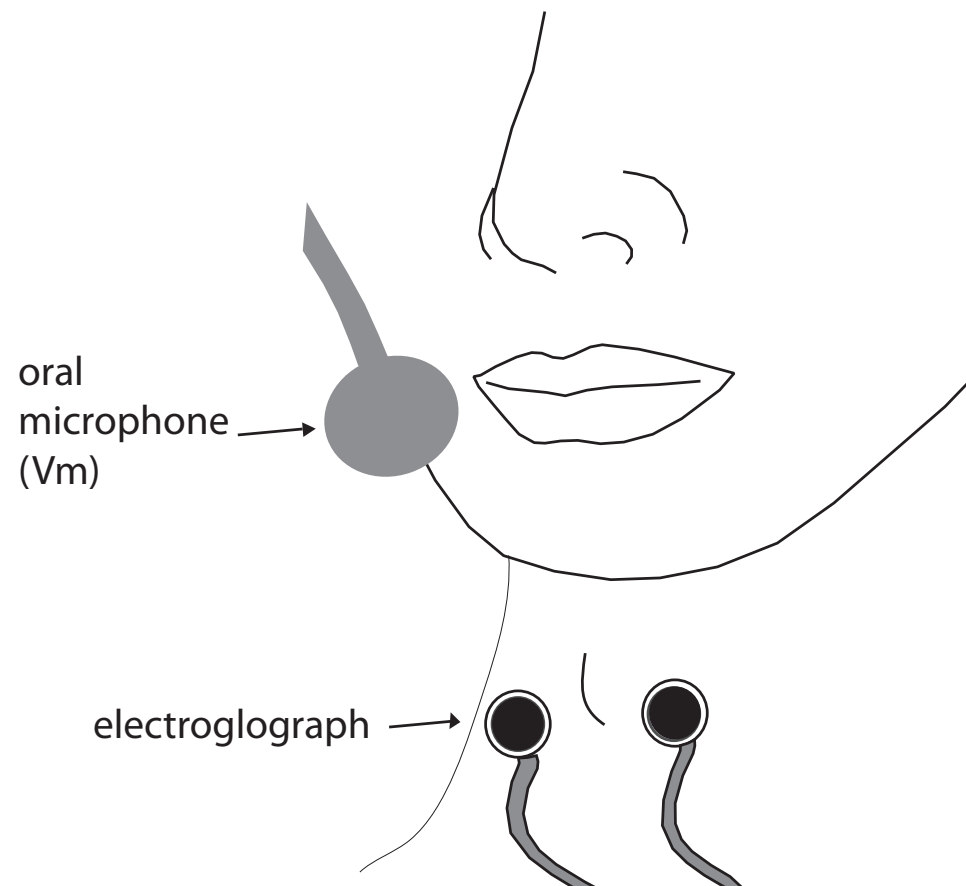
/nô/ 'inside' – /nō/ 'sky' – /nò/ 'exist'

/ɲê/ 'fire' — /ɲē/ 'sleep'– /ɲè/ 'mountain god'

/ɲguê/ 'to bark' — /ɲguē/ 'pan' — /ɲguè/ 'downstairs'

Methodology

- EGG device captures the vocal folds contact

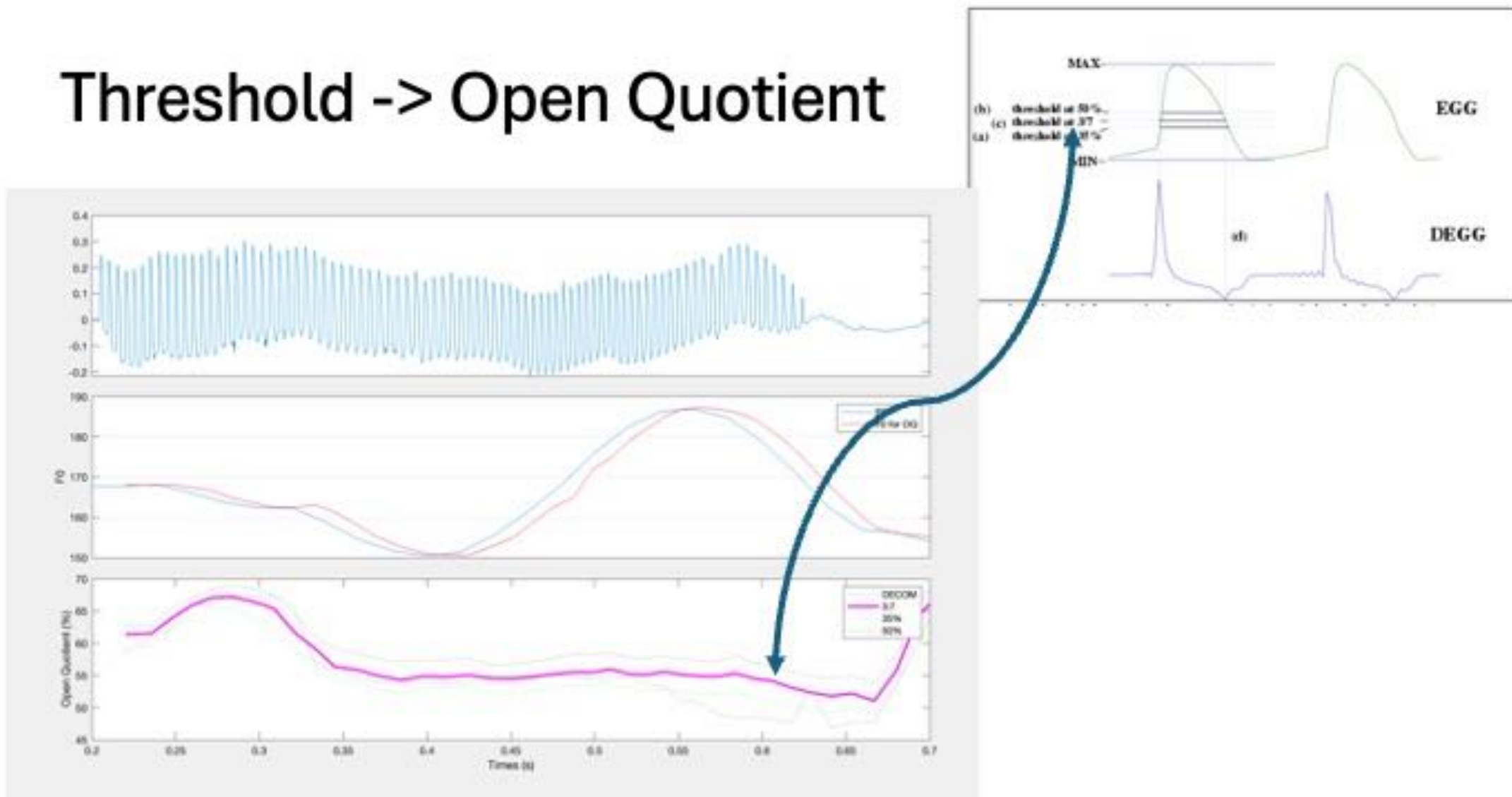


- Open quotient is a measure of the vocal fold for deducing glottic opening from contact measurements, the values obtained are indicative of the voice quality

Methodology

- Extraction of the open quotient (%) on each vowel
- Selection of 9 equidistant measurement points

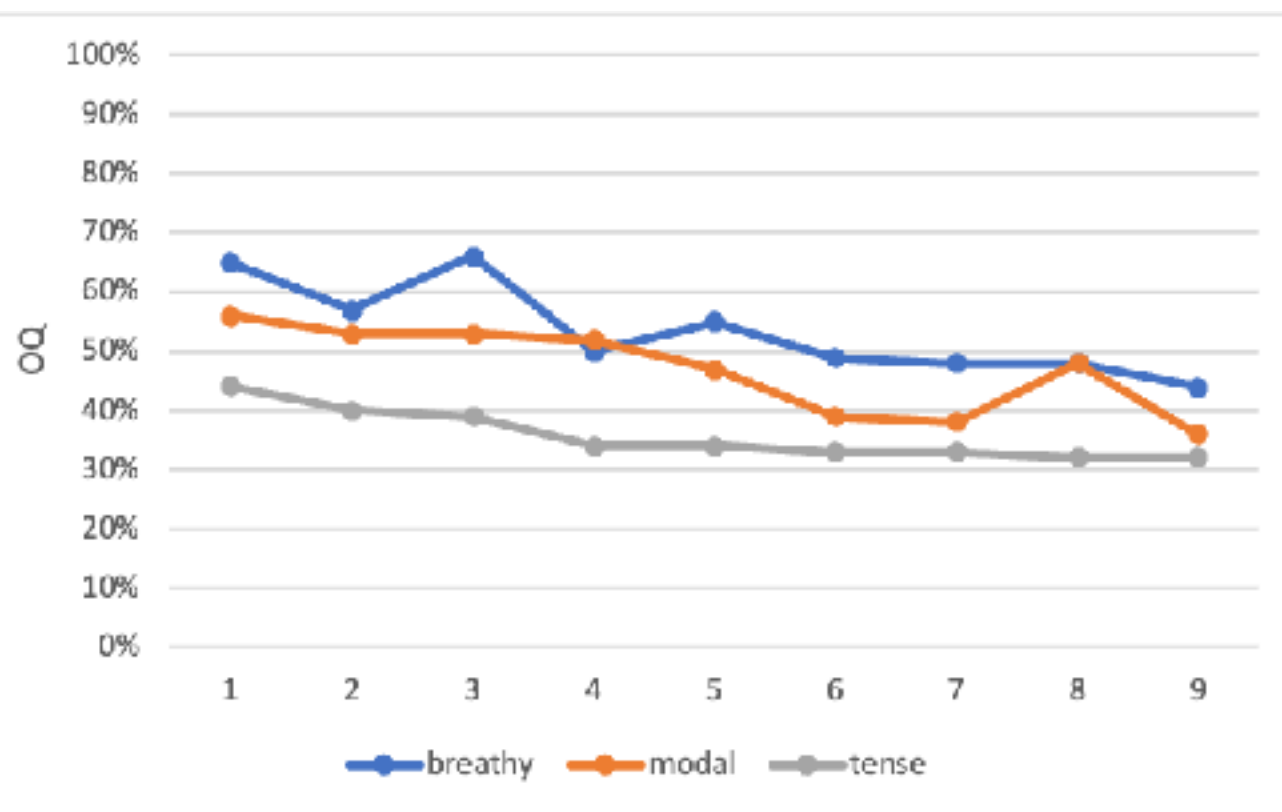
Threshold -> Open Quotient



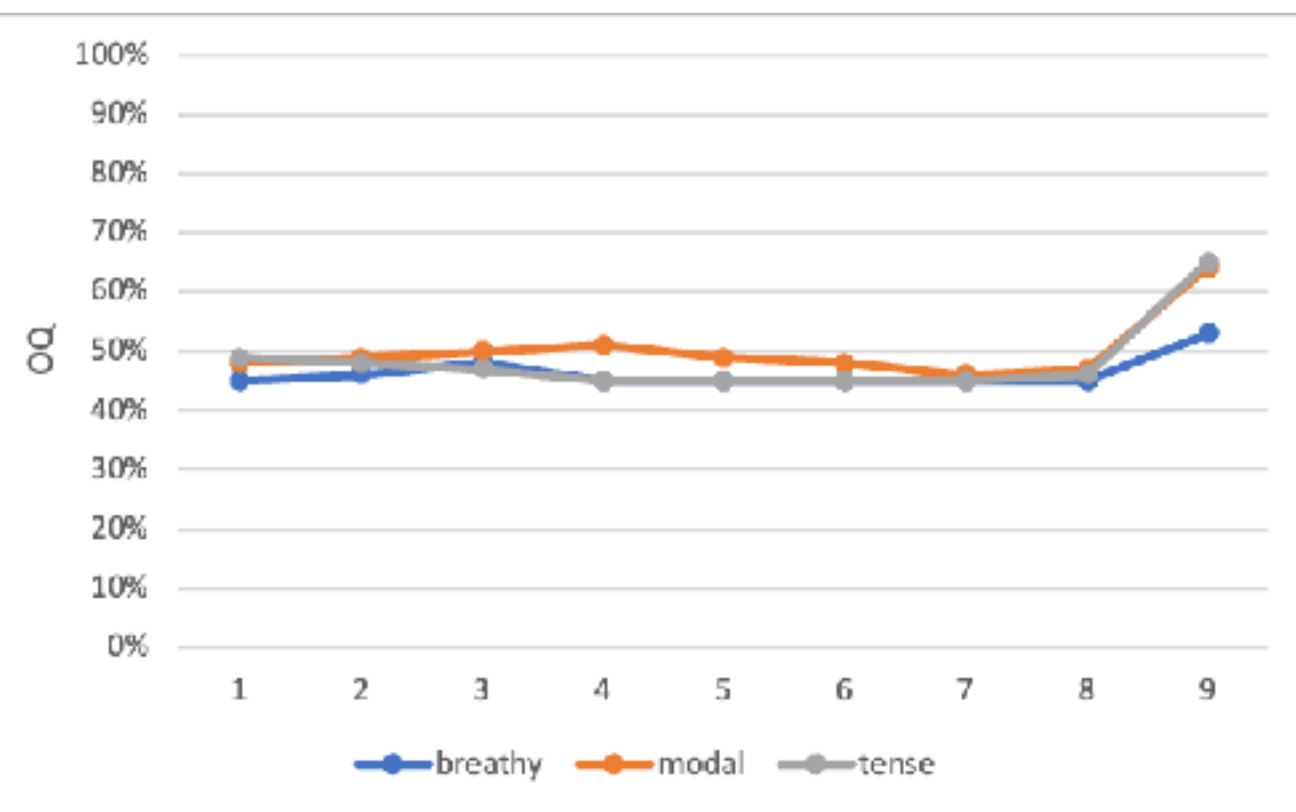
Preliminary results

- variation per gender and per triplet

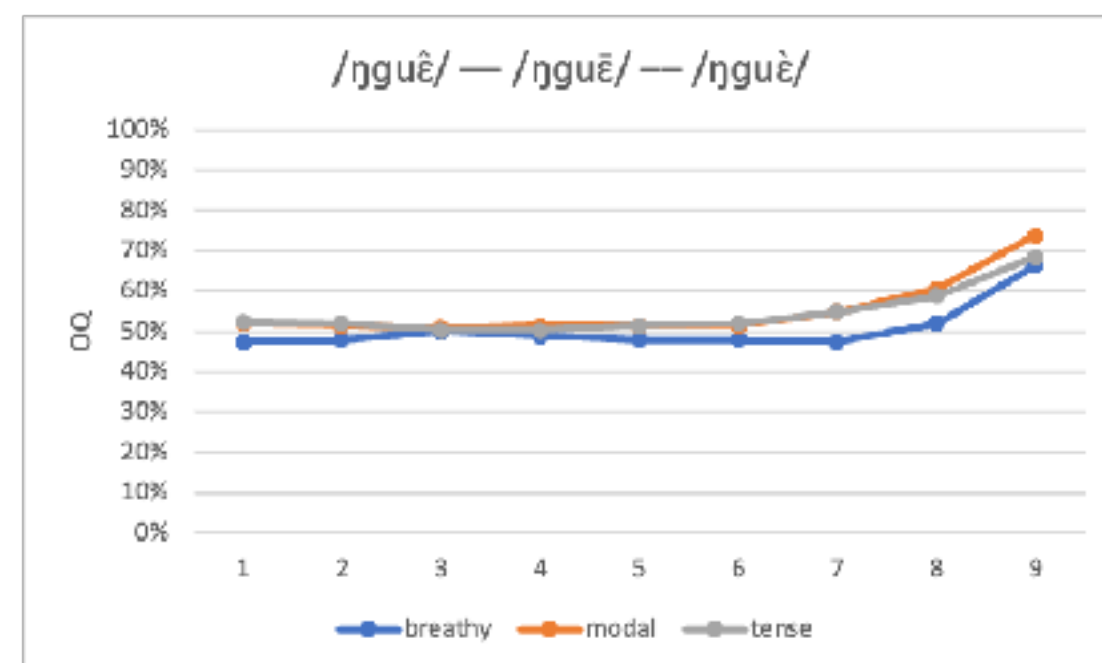
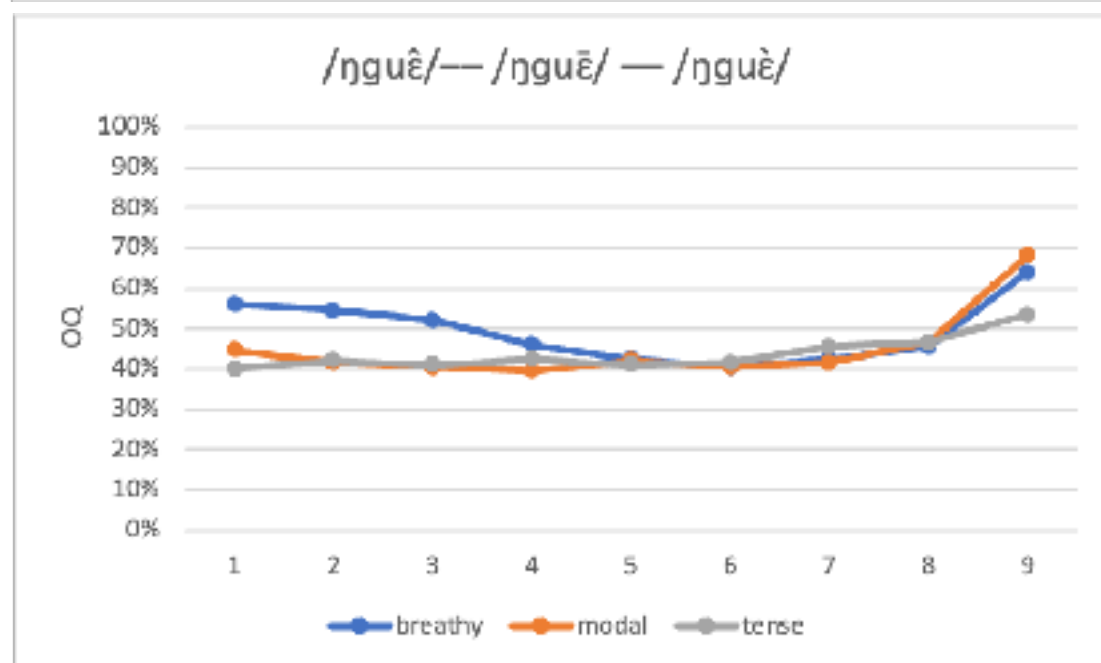
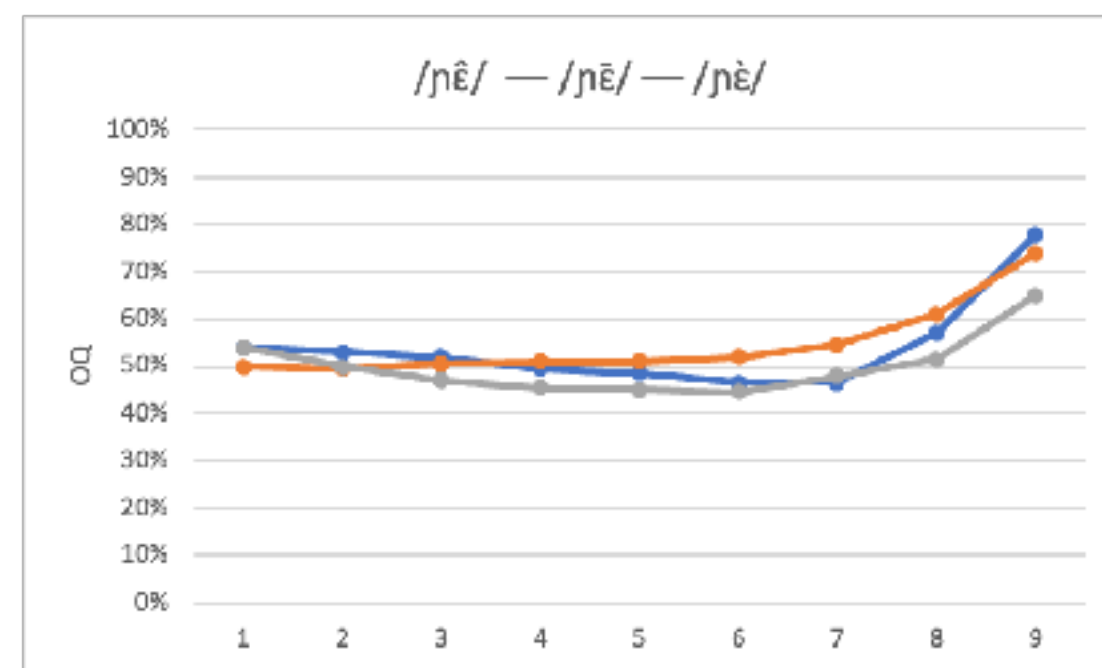
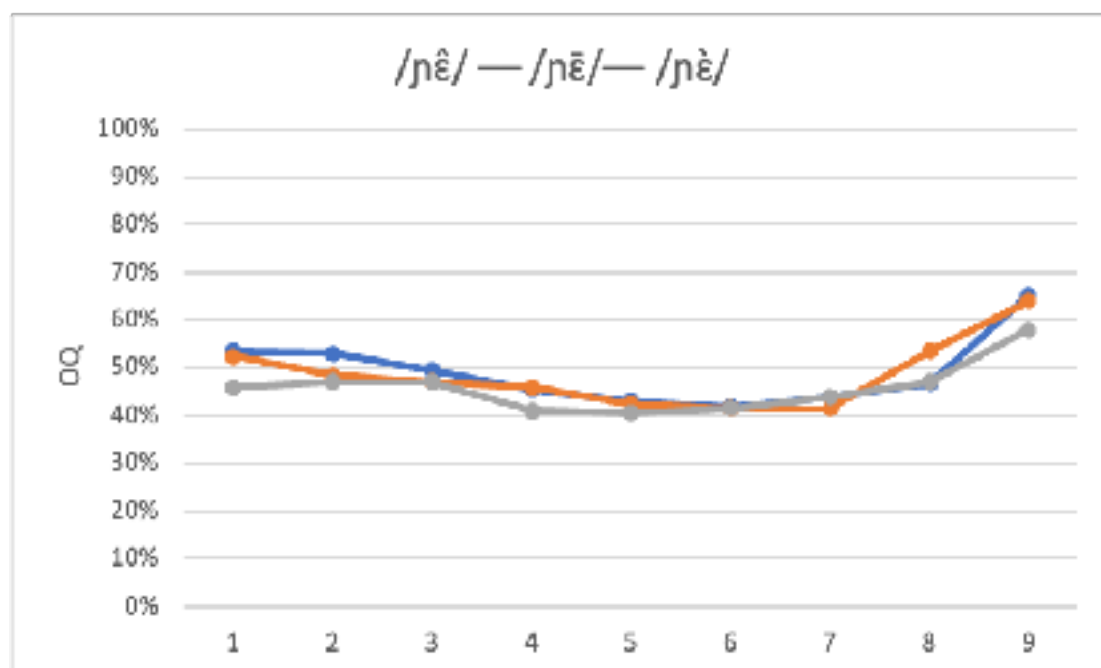
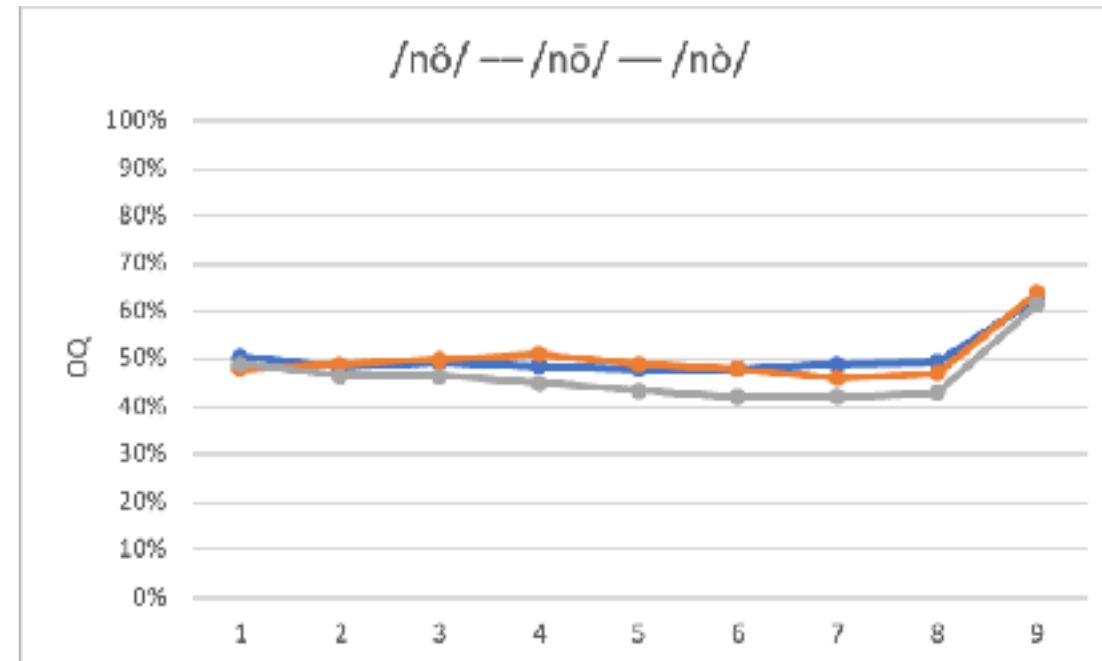
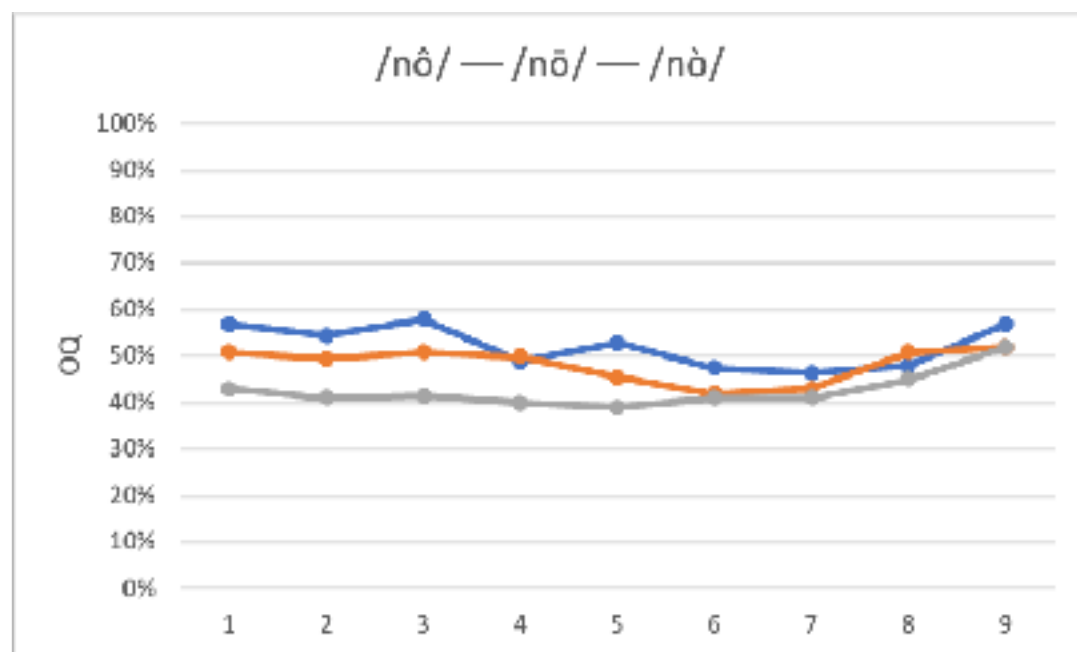
triplet /nô/ 'inside' – /nō/ 'sky' – /nò/ 'exist'



male speaker



female speaker



Explanations

- Phonetic (measurements, scripts)
 - women have less latitude between OQ values
 - OQ is calculated for men, so the threshold would need to be changed for women
 - perhaps we need to make a link with intrinsic vowel height, aligning with f_0

Explanations

- Regular patterns of linguistic change
 - phonation contrasts are cued in multiple dimensions and the relative importance of these cues are language-specific (e.g. Garellek 2019; Esling et al. 2019; Esposito & Khan 2020)
 - * Baima “register” distinction is being converted to one in which pitch is dominant
 - * a likely trigger for change is the close contact of Baima with Mandarin, a locally dominant and prestigious variety
 - women lead changes from above (e.g. Labov 1990: 213–214, 2001: 261–293)

Summary & work ahead

- our preliminary findings appear to confirm the original proposal
 - measure OQ not over the entire vowel, but rather the first 1/2
 - combine measurements from the EGG signal with those based on the acoustic signal (f0, duration)
 - analyze the entire corpus (2700 tokens)
 - consider impact of contact and social factors of age and language knowledge

Phoneme Quality, Voice Quality, and Tone: Origins of the Recently Uncovered Contrasts in Languages of Western Sichuan, China
(PhoTon, ANR-23-CE54-0003)

Thank you for your attention!

<https://anr.fr/Project-ANR-23-CE54-0003>



Sound files available at:

[https://www.cambridge.org/core/journals/
journal-of-the-international-phonetic-
association/article/abs/baima/](https://www.cambridge.org/core/journals/journal-of-the-international-phonetic-association/article/abs/baima/)

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