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Phonation in the tone system of Zhuang

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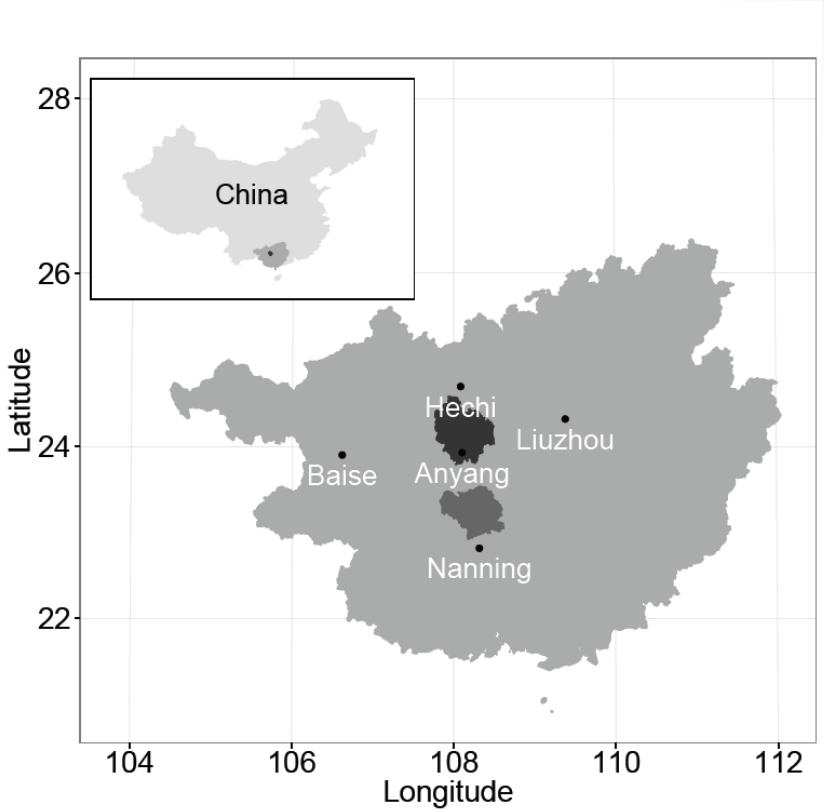
Zhuang

- Zhuang has the largest number of speakers of the 55 official minority languages in China
  - Zhuang is in the Tai-Kadai family (Thai, Laos, Vietnam, Myanmar & China)
  - The variety spoken in Wuming is considered the standard variety (Wei & Qin, 1980).
  - There is a vast degree of dialectal difference within Zhuang.
  - Many Zhuang dialects are not mutually intelligible.



Two dialects featured

DU'AN ZHUANG (DARK)
WUMING ZHUANG (LIGHT)

Outline

- Focus of this talk: Methodology
  - Specifically: how to collect data to understand a tone system of an understudied language
- Issues to deal with:
  - Incorrect tones on words in dictionary sources
  - Transcription by ear (no detailed phonetic study)
  - Speakers cannot read the script of their native language
    - How to elicit data?
  - Speaker variation (within a dialect)
- Research Purpose:
  - To discern the relative roles of F0, duration and phonation in Du'an Zhuang and Wuming Zhuang

Data Collection: Consultants

- Five female and three male native speakers of Wuming Zhuang and four female and two male native speakers of Du'an Zhuang, all in their 20's, were recorded in a sound attenuated booth at Guangxi University (Nanning, Guangxi) in 2015.
- At the time of the elicitation, the consultants communicated with their relatives and friends in their respective Zhuang dialect.
- In Nanning, however, the consultants mostly used a Guangxi variety of Putonghua.
  - *Putonghua = Standard Chinese*

Data Collection: Procedure

- Zhuang words were elicited using a frame sentence, presented in Chinese characters (but read in Zhuang).
  - 我正在读__这个词
  - “I am reading this word ____ now”

- Words in isolation were then elicited from a list of Chinese characters to exclude possible tone sandhi effects.
- The tones for these words in Wuming Zhuang and Du’an Zhuang are reported, facilitating the analysis (Wei & Qin 1980, Quosheng 1996).
  - In many cases, the tone is unknown in one dialect. We use a tone-classification procedure to assign tone to these words.

Data Collection
Tone Tokens and Phonological criteria

- Monosyllabic words
  - Only monophthongal vowels were included
  - Onset consonants were limited to alveolar, palatal and velar obstruents
  - Nasal codas were included
    - These yielded higher amounts of creakiness in the COVAREP algorithm
  - Among checked syllables, only alveolar and velar stop codas were included

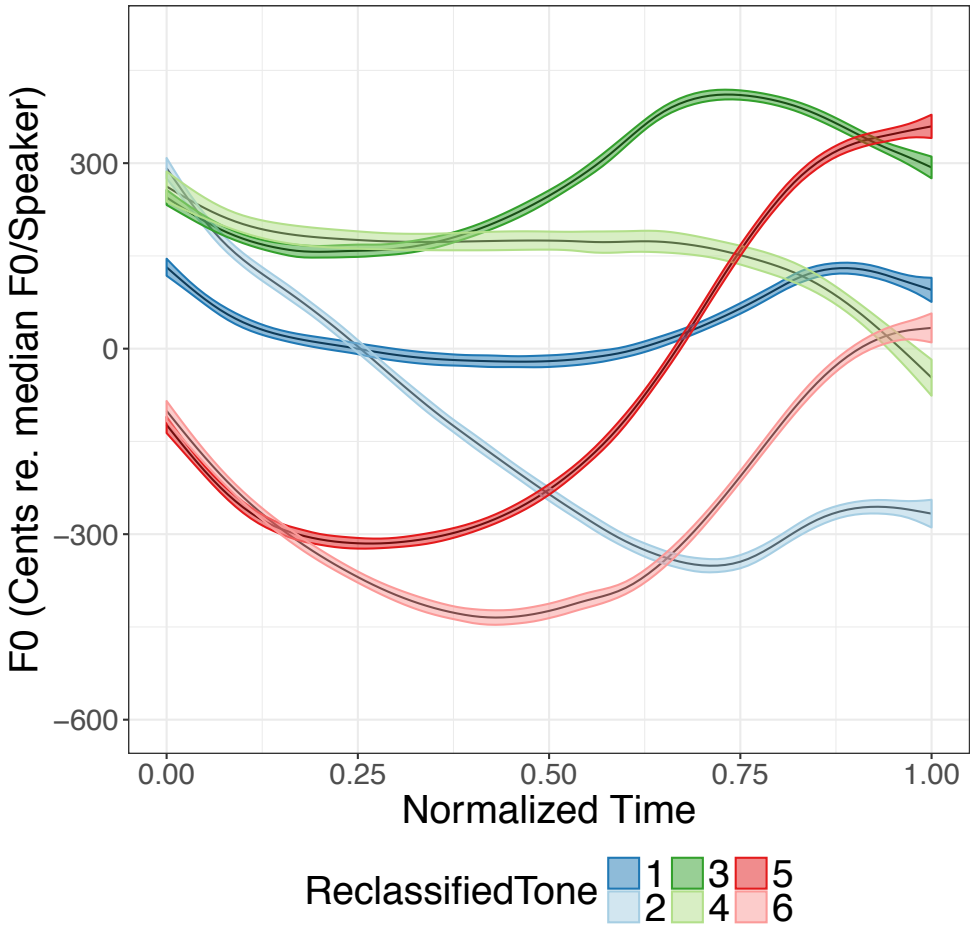
- In sum
  - 197 words with 5 repetitions
    - Some words had 10 or 15 repetitions due to an error
  - 1,030 tokens in total (for each speaker)
  - 1 Unique random permutation of the token list per speaker

Data Cleaning Procedure I

- 14,422 tokens to be collected
- Participants could skip words they didn't know
  - 979 (6.8%) words were skipped
- 13,443 tokens recorded
- 903 tokens (6.7%) had 2 syllables (EXCLUDED)

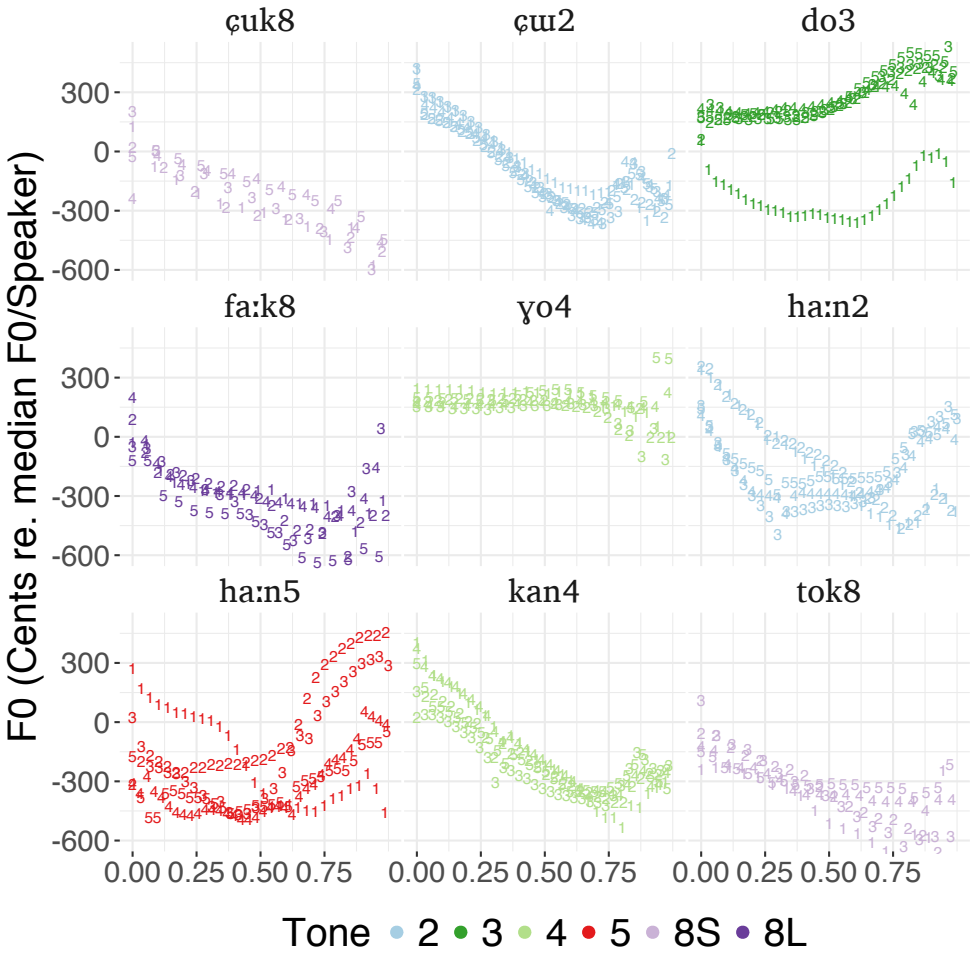
- Many tokens had unknown tone for 2 reasons:
  - 1. The elicited word didn't match the expected dictionary pronunciation (2,464 words; 18.3%)
  - 2. We included a single word list based on two sources, one of which didn't list the Du'an Zhuang pronunciations (1,000 words; 7.4%)
  - These tokens were temporarily excluded
  - 9,075 (67.5%) tokens remained.

Data Cleaning – Baseline F0 Plot



- Smooth-spline plots were created for F0 contours for each speaker.
  - *Shown: unchecked tones only for one Wuming Zhuang speaker*
- This acts as a baseline:
  - Find outliers
  - Find incorrect tones
  - Find inconsistent productions

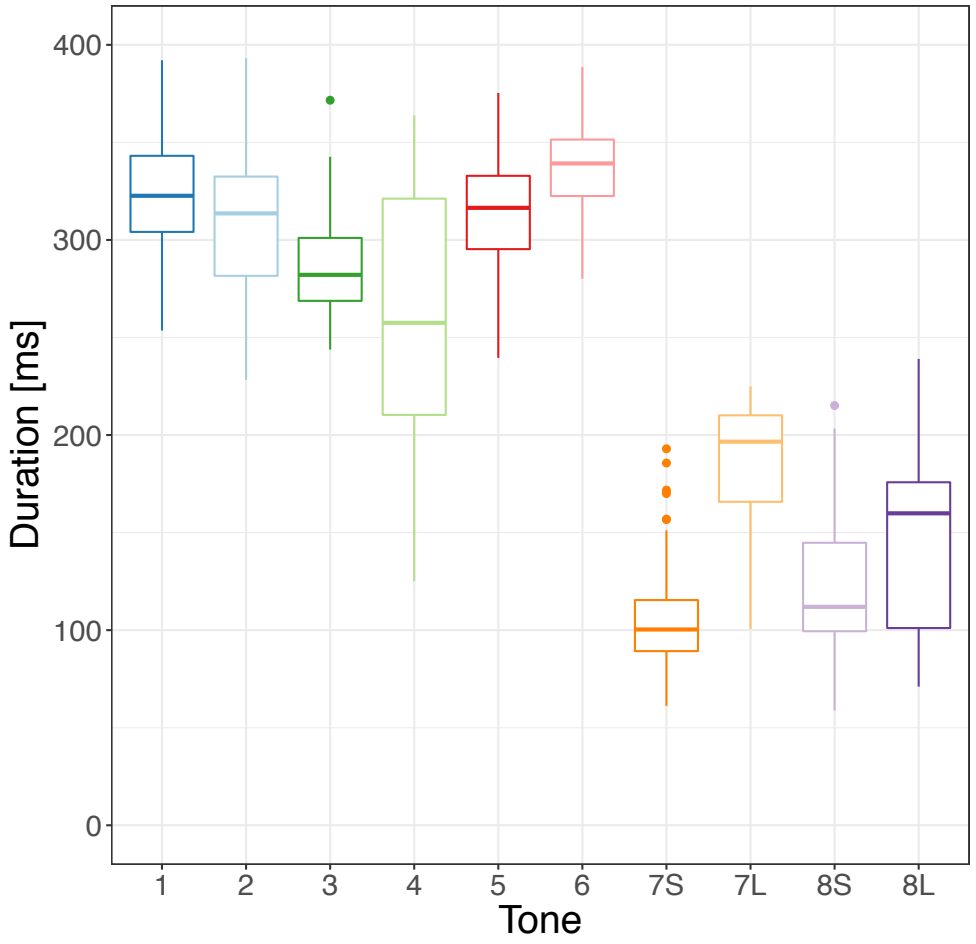
Data Cleaning – By-item plot example (F0)



- One plot = one word
- Tokens = repetition #
- Tone = color

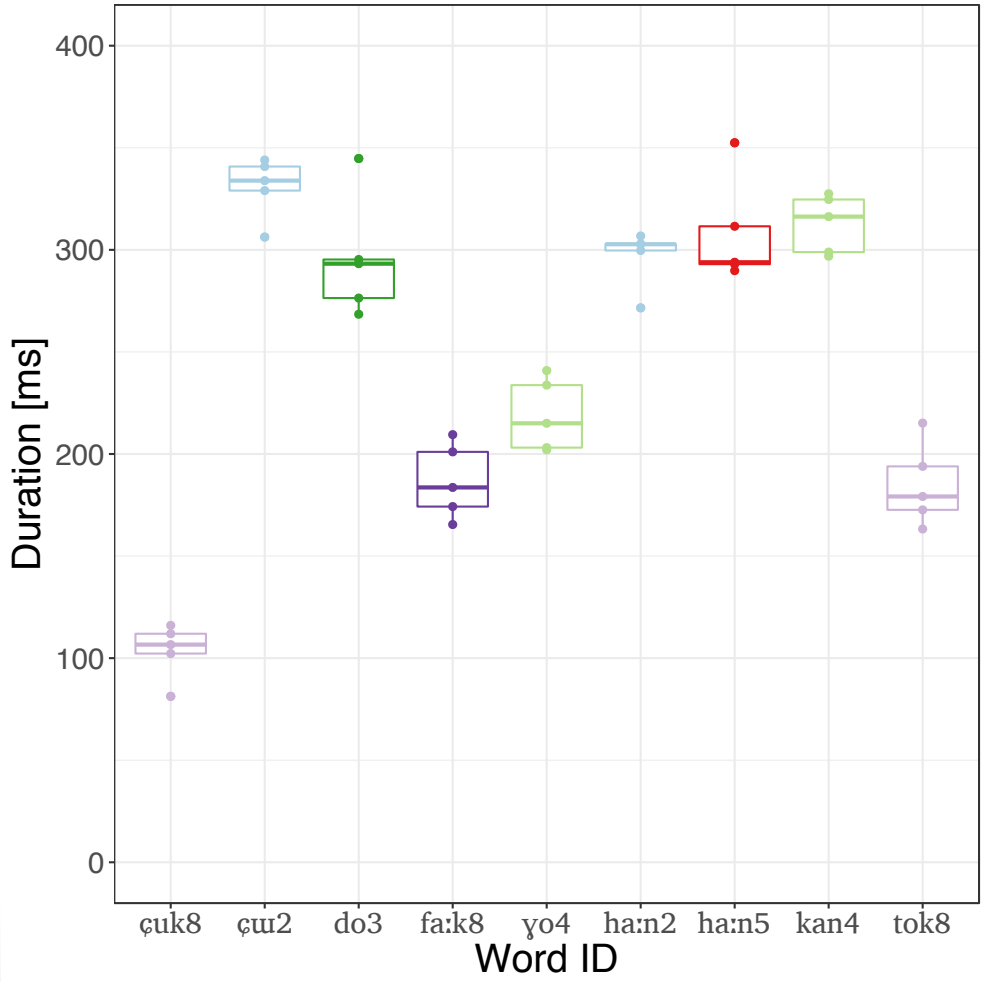
- 2 types of exclusions:
  - Excluded words (inconsistent pattern) e.g. ha:n2, ha:n5
  - Excluded tokens (errors or outliers) e.g. token 1 of do3
- Some words had incorrect tone
  - E.g. kan4 is not tone 4, but tone 2 (compare with ɕɯ2 and ɣo4)
  - These had their tone reclassified

Data Cleaning – Baseline Duration Distributions



- Duration distributions for each tone, across speakers.
- This is an additional baseline.
  - Checked tones 7L, 8L > 7S, 8S
  - Tone 4 is slightly shorter than others

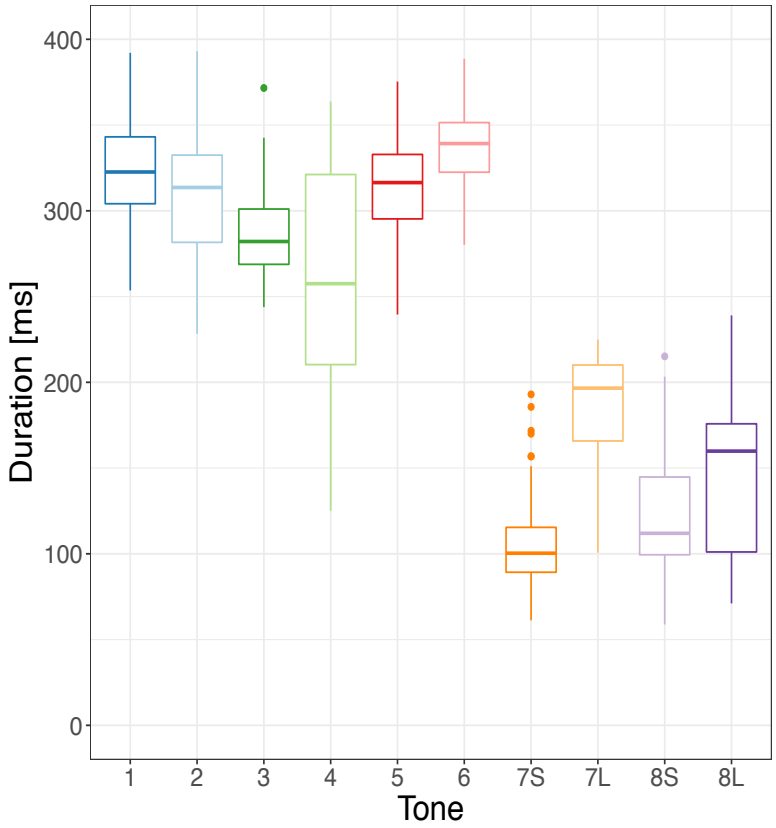
Data Cleaning – By-item plot example (Duration)



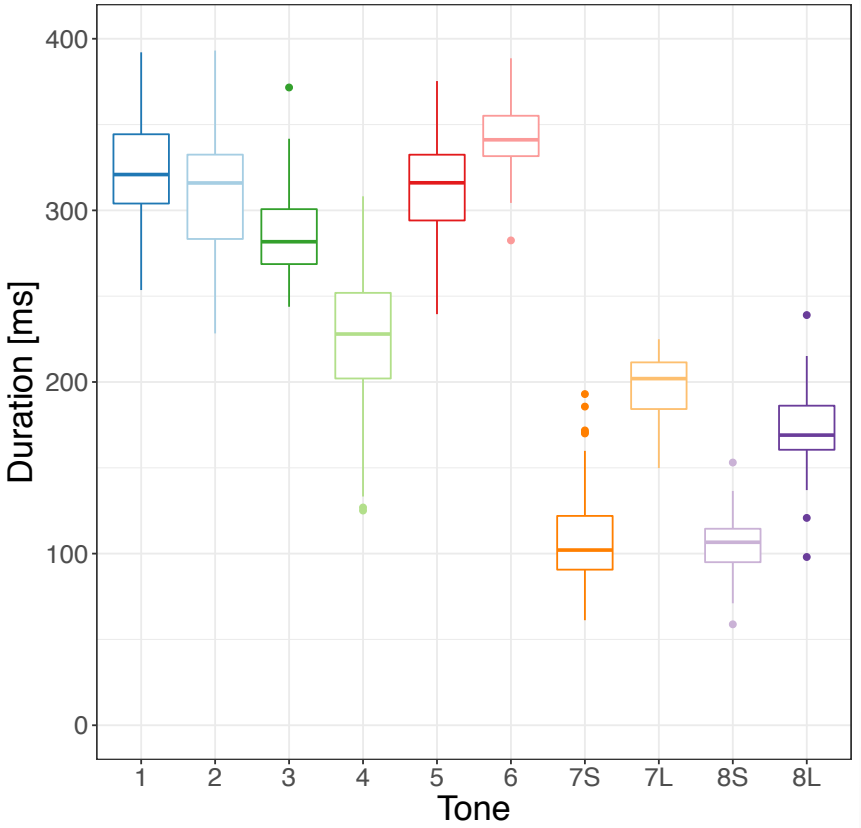
- Tone reclassifications based on duration for checked tones:
  - E.g. tok8 was reclassified from tone 8Long to 8Short
- Tone 4 typically has shorter duration.
  - kan4 is tone 2 (based on F0)
  - Duration suggests the same

- *Tokens with unknown or incorrect tone were re-introduced into the data set with correct tone assigned*

Tone Reclassification –Duration Distributions Before & After



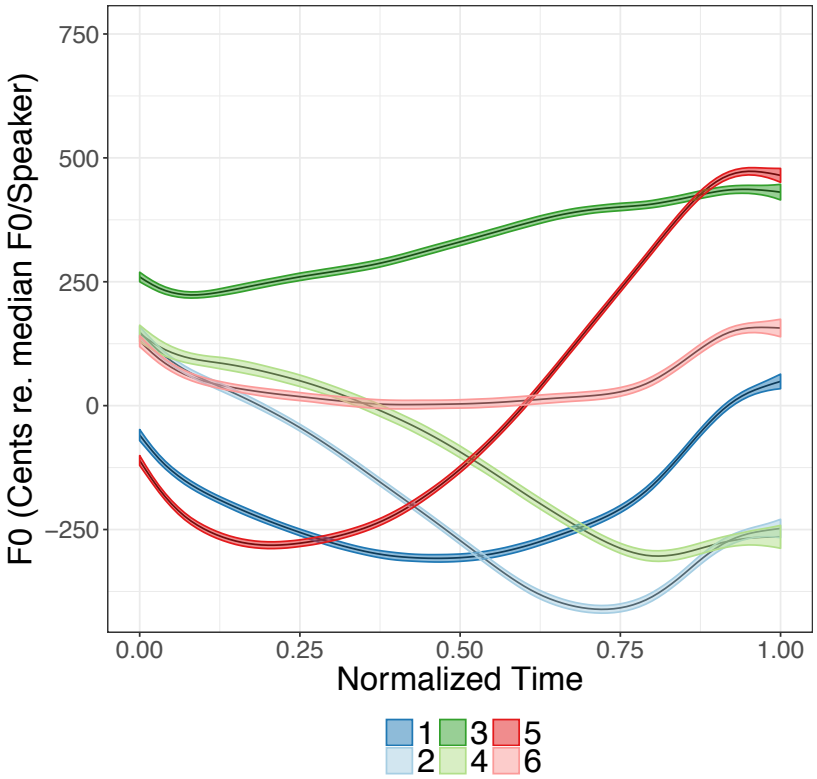
Prior to Reclassification

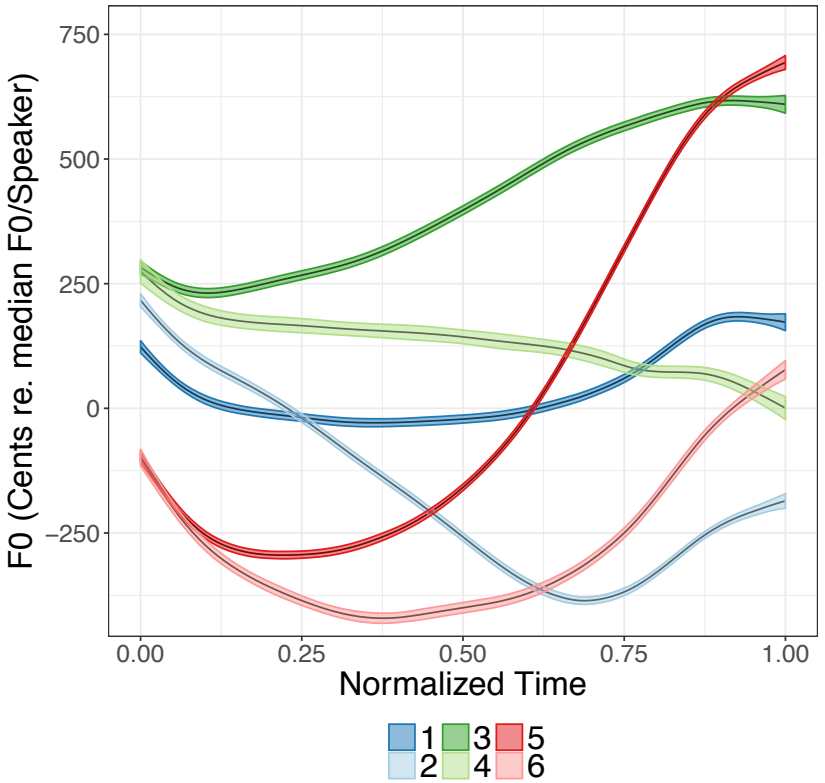


Following Reclassification
(Note Tones 4 and 8L in particular)

F0 Speaker Variation in Wuming Zhuang

- In Wuming Zhuang, 2 groups of 3 speakers (& 2 outliers):
  - Left: Mid-level tone 6, low rising tone 1 (T6 high group)
  - Right: Mid-level tone 1, low rising tone 6 (T6 low group)





Conclusion

- We outlined a procedure for field phonetics work on tone.
- Uses smooth-spline plots & by-item plots to:
  - Flag errors, outliers and inconsistent items for exclusion.
  - Visually classify unknown and incorrect tones.
  - Also allows for recognition and treatment of speaker variation

THANK YOU!!!

References

- Wei, Qingwen, and Qin, Guosheng (1980) *Zhuang yu jian zhi*. Beijing: Min zu chu ban she : Xin hua shu dian fa xing.
- Quosheng, Q. (1996) 壮语方言概论 *[Zhuang yu fangyan gailun] (An introduction to dialects of Zhuang language)*. Guangxi minzu chubanshe, Nanning. In Chinese.