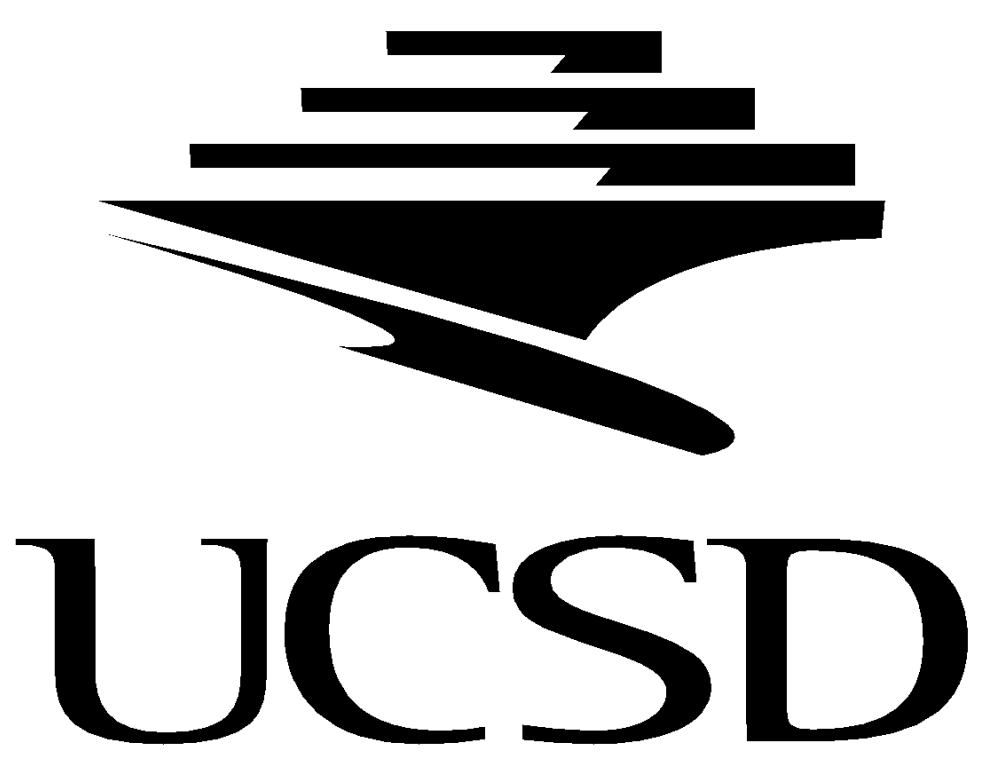# The tonal system of Hengyang Xiang

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I. Introduction

- Hengyang belongs to Hengzhou branch of Xiang Chinese, spoken in Hengyang, Hunan Province of China, by an estimated 2.4 million speakers.

- Six tones: high-rising, low-level, mid-level, low-rising, falling-rising, low-mid based on monosyllabic words in isolation [5, 8, 13].

	High-rising (yin ping)	Low level (yang ping)	Mid level (shang)	Low-rising* (yin qu)	Falling-rising* (yang qu)	Low-mid (checked; ru)
Chen (1982)	45	11	33	*34*	213	22
Yang (2007)	*55*	11	33	*35*	213	22
Li (1986), Peng (2005), Li (2007), Zhong (2011)	45	11	33	24	213	22

* These two underlying rising tones become mid- or low-falling tones in context

Previous reports conflict as to the number of tones [5, 8, 9]:

- The low-rising and falling-rising tones have merged to be <u>Mandarin low-dipping</u> tone (214) due to language contact and influences [9];

- Mostly in **common words** and tendency among **younger** populations [9]

Goal: Acoustic analyses of tonal differences in pitch and voice quality.

Research questions:

- Is this tone merger complete? Are there voice quality differences?

- How do the current tonal patterns of Hengyang compare to previous reports, and are merged tones associated with particular words and/or age groups?

Hypotheses:

- An ongoing process of tonal change with variability in tones of question.

- Whether the low-rising and falling-rising tones have merged depends upon the frequency of the words and the age of the speakers.

II. Methods

- Materials: 165 monosyllabic words in isolation selected from [4]

- Participants: 10 native Hengyang Xiang speakers with 3 age groups

	young			mid			old			
Subj	m4	f4	f5	m5	f3	m3	f1	f2	m1	m2
Age	21	29	31	34	41	47	53	60	58	55

- Recorded 2020 Summer

- Cubic spline regression with a 3-degree freedom:
  lmer(F0~tone*ns(time,df=3)+ (1| dur)+(1 + ns(time, df = 3) |subj))

- Duration normalized across speakers and tokens, and plotted in proportion to the longest falling-rising tone 213

- Tone (T) values [11] converted to scales of 1-5:

$$5 * [log_{10} x - log_{10}(min)]/[log_{10} max - log_{10}(min)]$$

III. Results: tonal contours
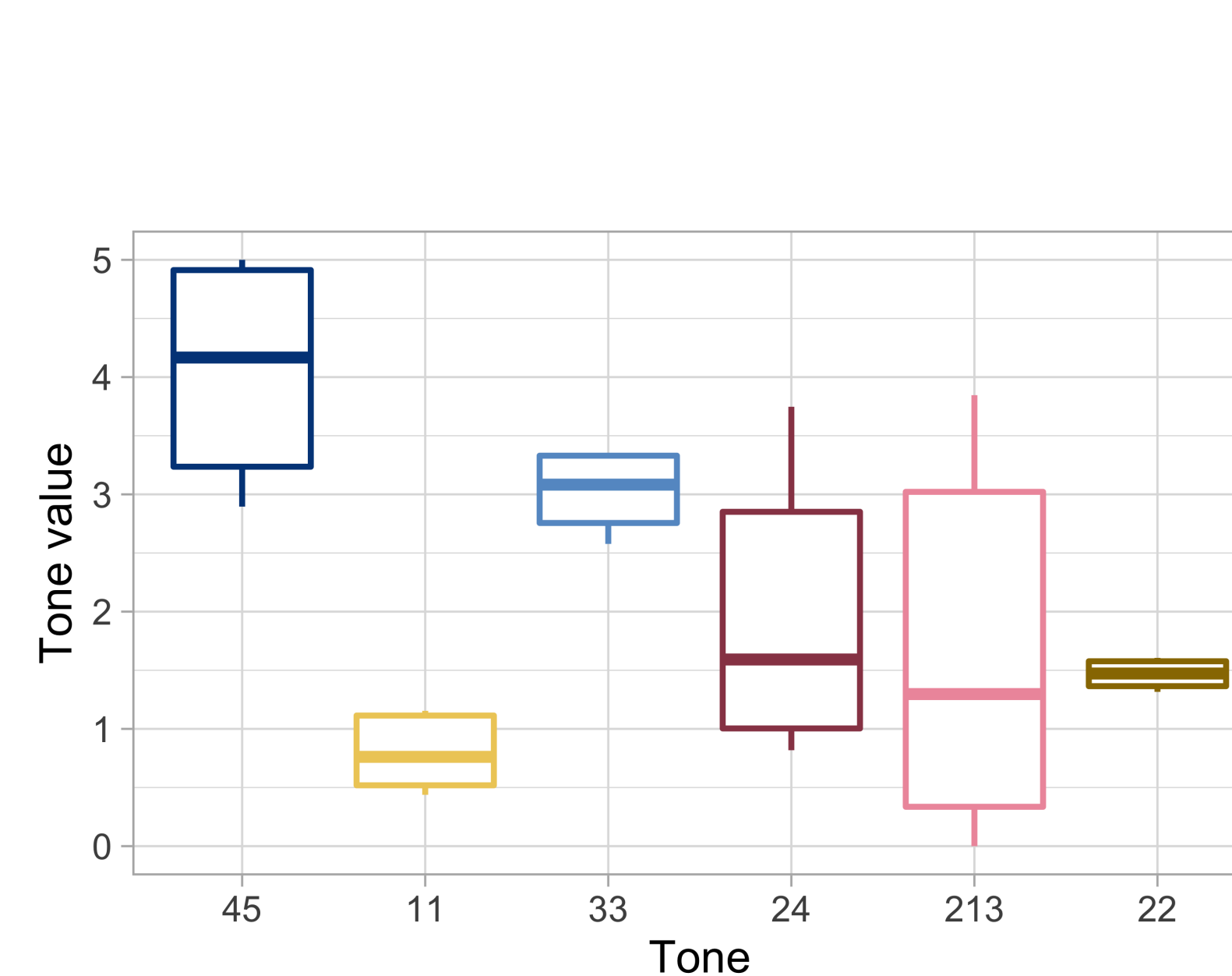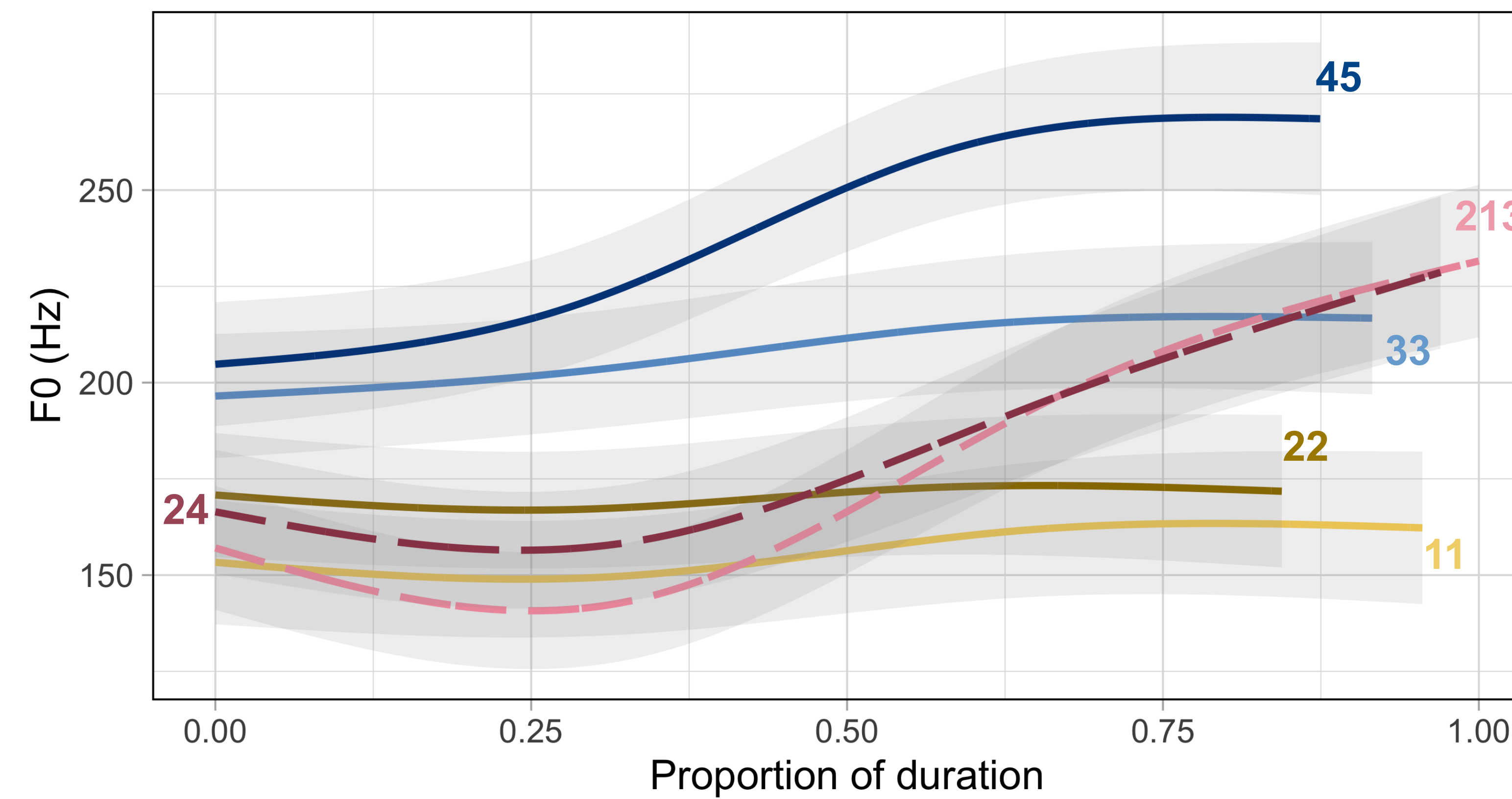
- Tone values consistent with previous analyses.
- 213 exhibits largest variation, and its T value is more accurately assigned as 214.
- Level tones have smaller variation.

	High-rising (yin ping)	Low level (yang ping)	Mid level (shang)	Low-rising (yin qu)	Falling-rising (yang qu)	Low-mid (checked; ru)
Tone value (present)	45	11	33	24	213? 214?	22
Mean duration (ms)	340.53	372.04	356.56	377.64	389.43	328.71

IV. Results: voice quality
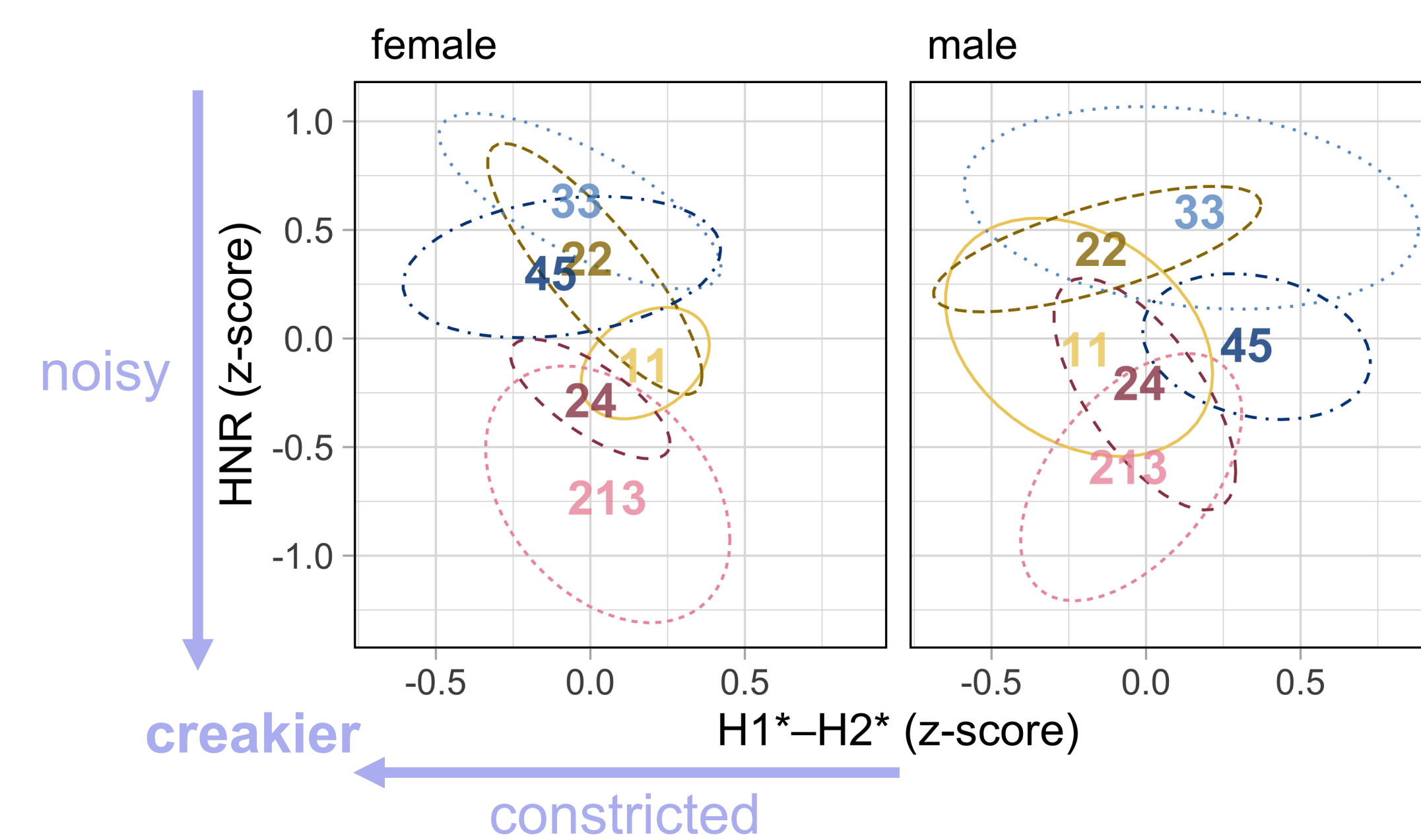
Modal tones:

- 45: low noise; **different constriction by gender**
- 33: low noise; variable constriction
- 22: low noise; variable constriction

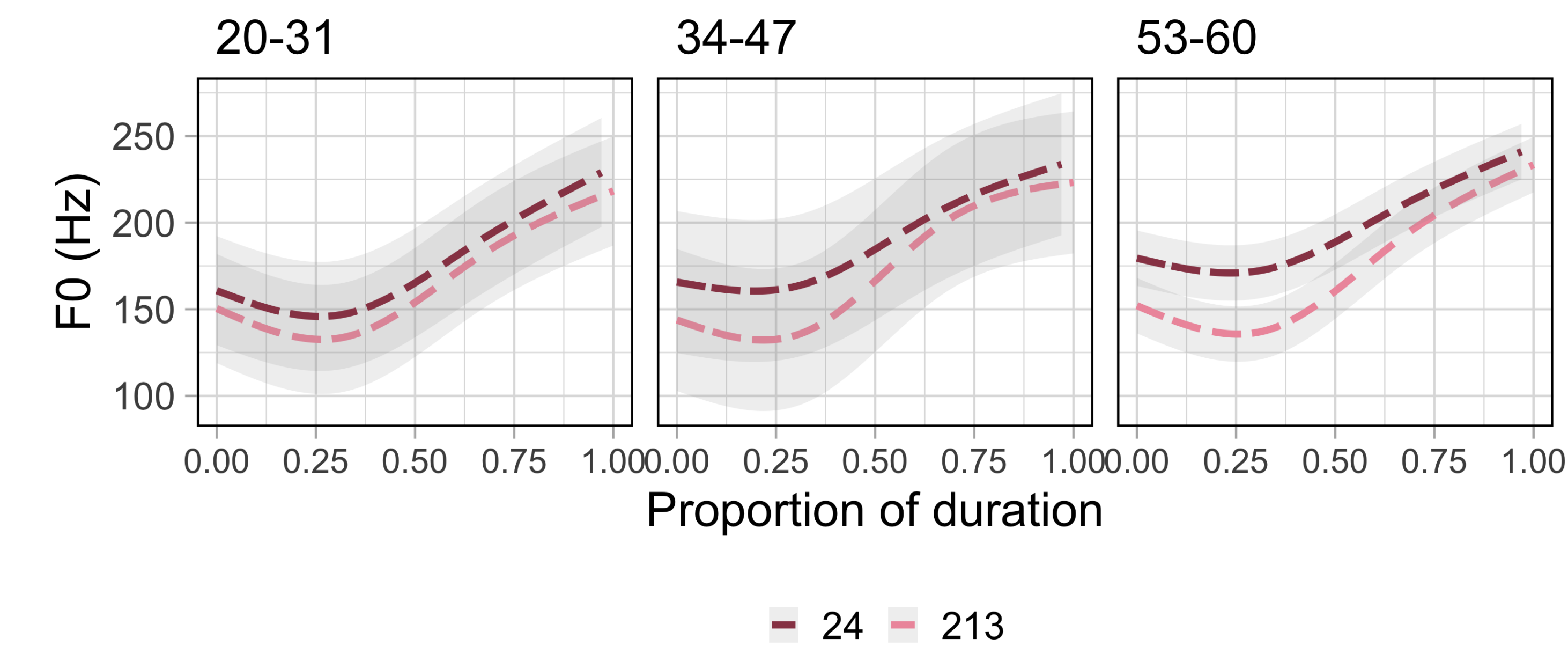Possible creaky tones:

- 213: **high noise**; variable constriction
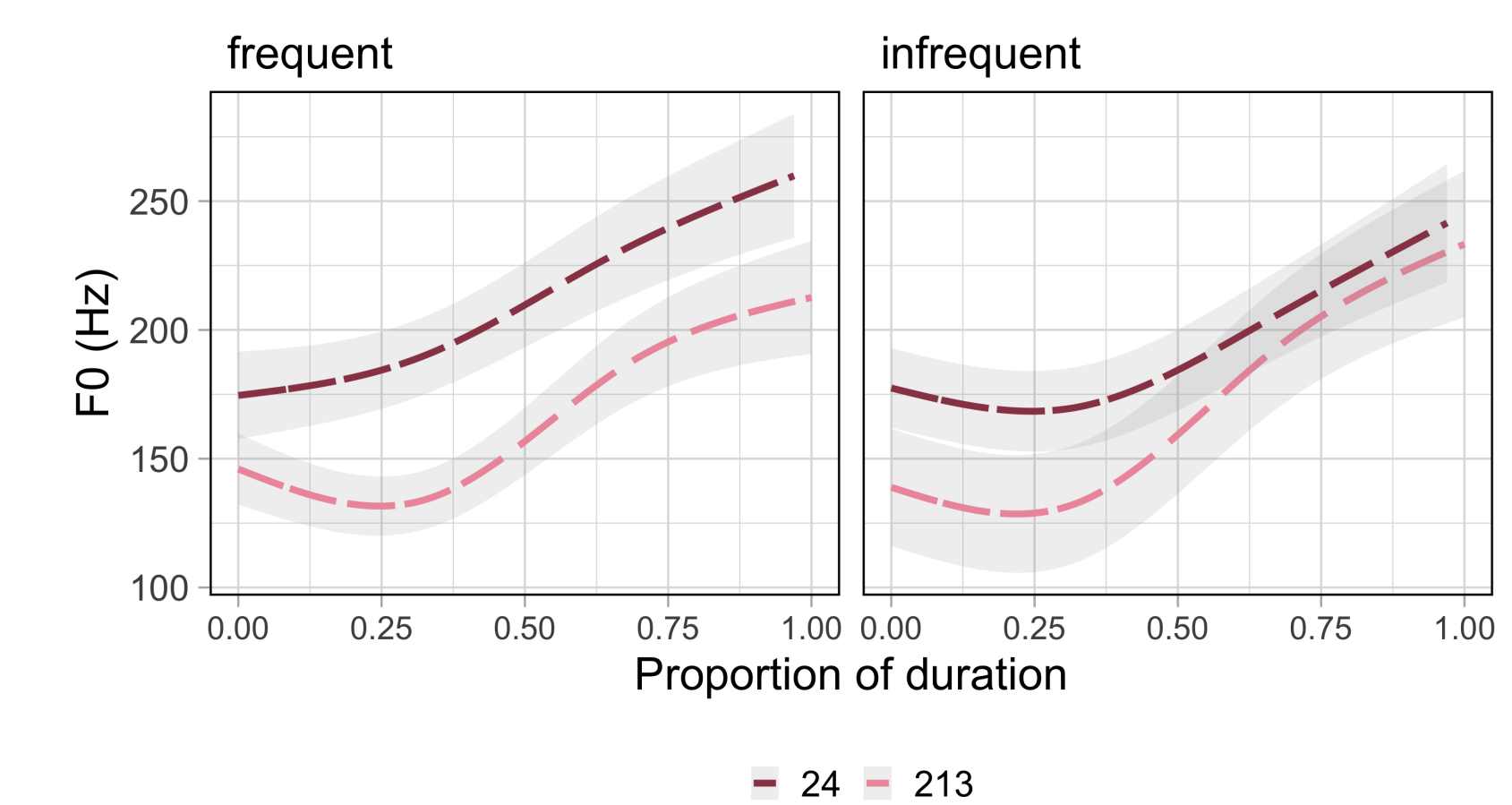- 24: mid noise and constriction
- 11: mid noise; mid-high constriction

V. Results: T213 vs. T24

Age groups:

Distance between 213 and 24 expands as the age *increases*.

Word frequency [2] (only minimal pairs):

Frequent (chr/million>1000) [1]:
被, 地, 谢, 但, 做(24), 就, 是

Infrequent (chr/million<10) [1]:
敝, 剁, 舵(213), 坝, 桂, 剃

VI. Discussion

- Hengyang tones are produced using changes in both pitch and voice quality characteristics.

- The merger between 213 and 24 in production is not complete as voice quality differences are found besides pitch [e.g., 6].

- This merger becomes prominent in **younger** groups, consistent with [9]; in *infrequent* words, both tones have **lower** pitches and more **overlap** and **variability**, contrasting [9].

→ The effect of age may reflect the language contact w/ Mandarin; reduced similarity in frequent words suggests **goal-driven homophony avoidance**.

→ Tonal change may be a prolonged process due to language contact and word frequency.

References

[1] Brysbaert, M., Mandera, P., & Keuleers, E. (2018). The word frequency effect in word processing: An updated review. *Current Directions in Psychological Science, 27*(1), 45-50. [2] Cai Q, Brysbaert M (2010) SUBTLEX-CH: Chinese Word and Character Frequencies Based on Film Subtitles. PLOS ONE 5(6): e10729. [3] 陈子建. (1982). 衡阳话和普通话声调演变规律的对应. 衡阳师专学报, (1), 42-43. [4] Chinese Academy of Social Sciences. (1981). *Fangyan diaocha zibiao* [Questionnaire of characters for dialect surveys]. The Commercial Press. [5] 黄玉莲. "衡阳方言假声研究". Master's thesis, 湖南大学, 2013. [6] Kuang, J. (2013). The tonal space of contrastive five level tones. *Phonetica, 70*(1-2), 1-23. [7] 李旭晖. (2007). 衡阳方言青少年语音的社会语言学研究 (Master's thesis, 湖南师范大学). [8] 李永明. (1986). 衡阳方言. 长沙: 湖南人民出版社. [9] 刘静. (2010). 衡阳和湘潭市区方言声调实验研究 (Doctoral dissertation, 湖南师范大学). [10] 彭兰玉. (2005). 衡阳方言语法研究. 中国社会科学出版社. [11] 石锋. (1986). 天津方言双字组声调分析. 语言研究. (1), 77-90. [12] 杨艳. (2007). 衡阳方言语音研究 (Master's thesis, 湖南师范大学). [13] 钟佩玲. (2011). 衡阳方言单字调实验研究. 衡阳师范学院学报, 32(1), 84-86.