

Non-contrastive voice quality characteristics of Northern Vietnamese tones

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Goals of Study

- Investigate reports that Northern Vietnamese *huyền* and *hỏi* may have non-modal voice qualities
- Use the results to inform L2 pronunciation instruction

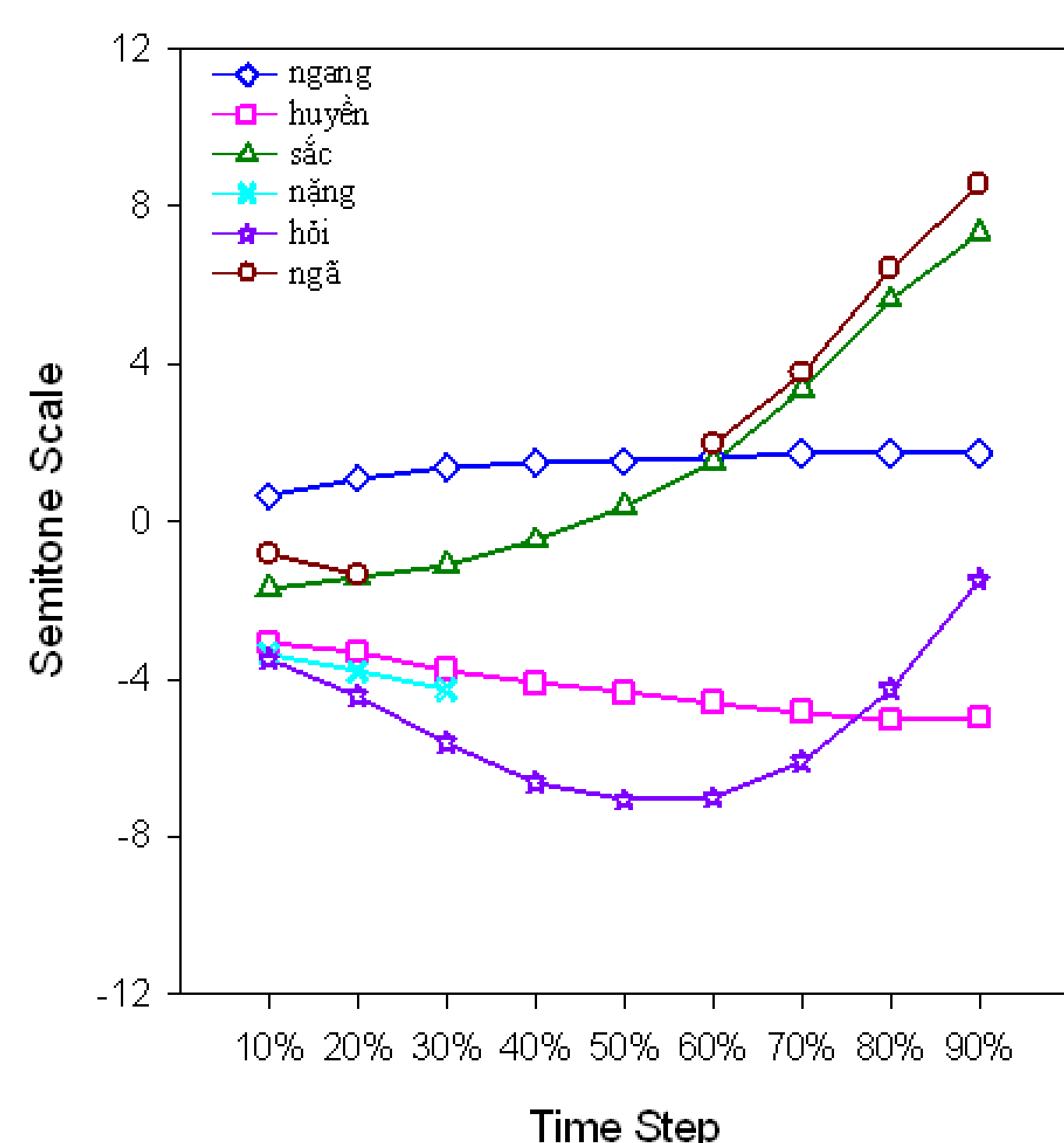


Fig. 1. Time normalized Northern Vietnamese tones from Bauman et al. (2009)

Speakers and Task



Từ bạng
xanh
đỏ
xanh
tím
đen

- 4 native Northern speakers (2 male, 2 female)
- Speakers produced three-word utterances akin to “The word *bạng* is blue” in self-paced task
- Because target words changed in color, tone, and vowel, speakers generated novel content each time
- Stimuli and task were built around a larger study of tone and vowel production among native speakers and adult learners

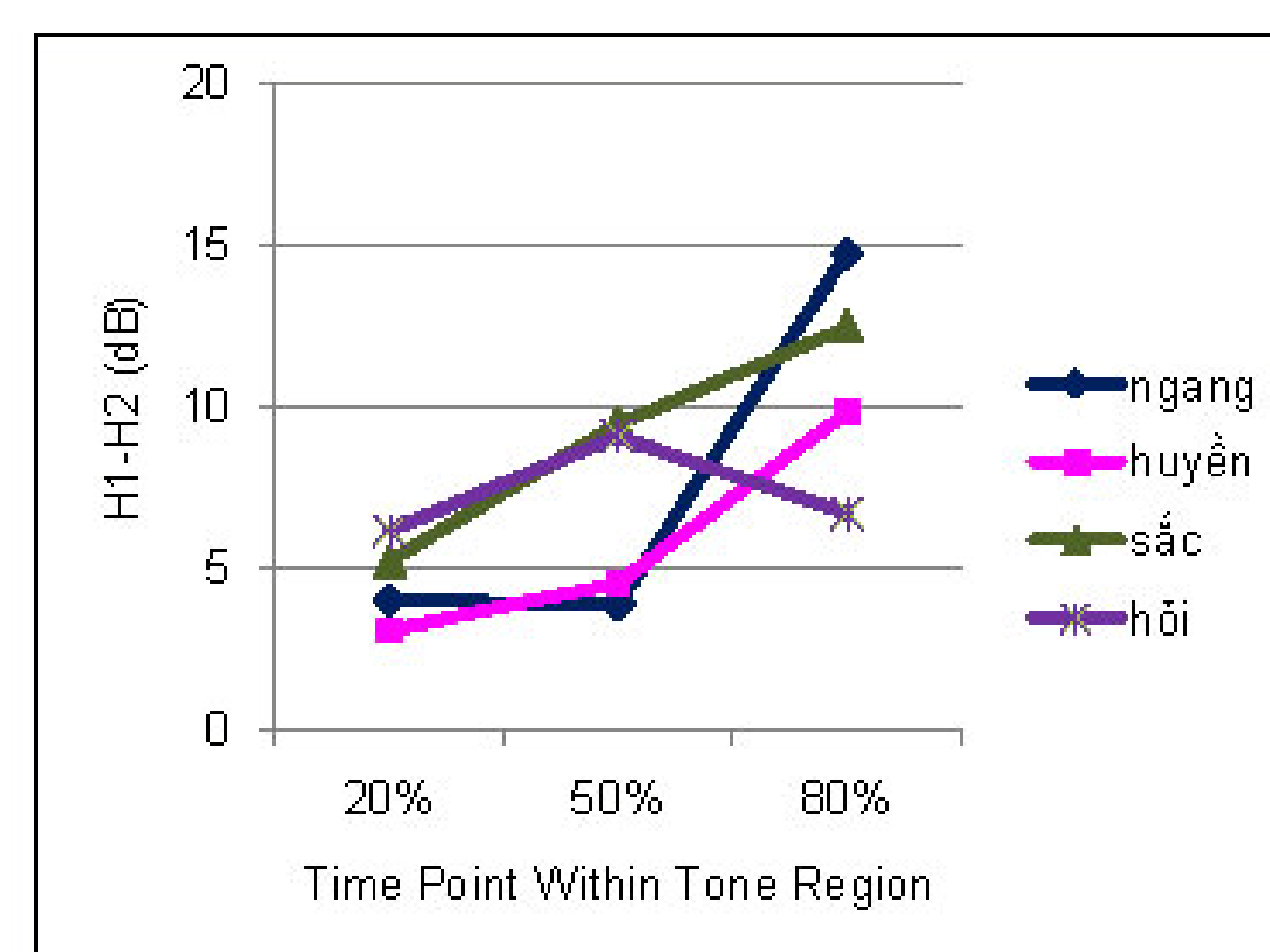
Primary Analysis

- 6 tokens per tone per speaker: 2 open syllable tokens for 3 non-high vowels: *a*, *ơ*, *ô* ~ /a/, /ə/, /o/
- Created long-term average spectra (LTAS) over 40 ms windows centered around 20%, 50%, 80% time points in tone region
- Measured amplitude of first harmonic (H1), second harmonic (H2), and first formant (A1)
- Known voice qualities anchor data interpretation:
 - Modal = *ngang*, creaky = *nặng*

Prediction 1 – Partially Supported

Huyền will be consistently breathy across speakers (Pham, 2003) or breathy for some speakers and otherwise modal (Nguyen & Edmondson, 1998; Thompson, 1965; Vu, 1981)

Fig. 2a. H1-H2 Speaker 15 (female)

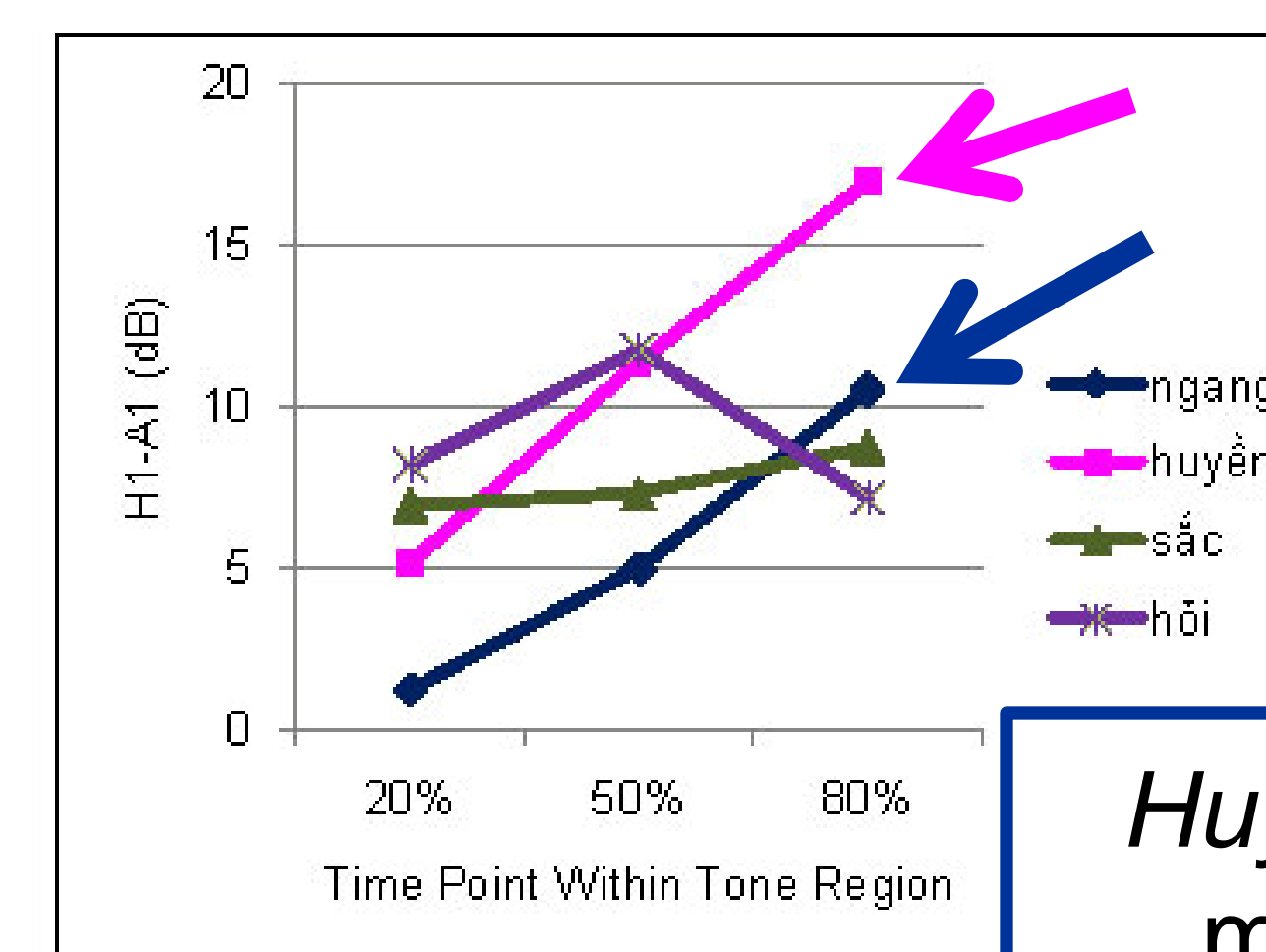


➤ **Expected** – Speaker 15: *Huyền* appears breathy & H1-A1 pattern stands in stark contrast to other native speakers

➤ **Unexpected** – Speakers 8 & 9: *Huyền* appears tense

➤ **Unclear** – Speaker 1: *Huyền* appears modal (H1-A1) as expected, but also appears tense (H1-H2) like Speakers 8 & 9

Fig. 2b. H1-A1 Speaker 15 (female)



Huyền higher than modal *ngang* ~ breathy

Fig. 3a. H1-H2 Speaker 8 (male)

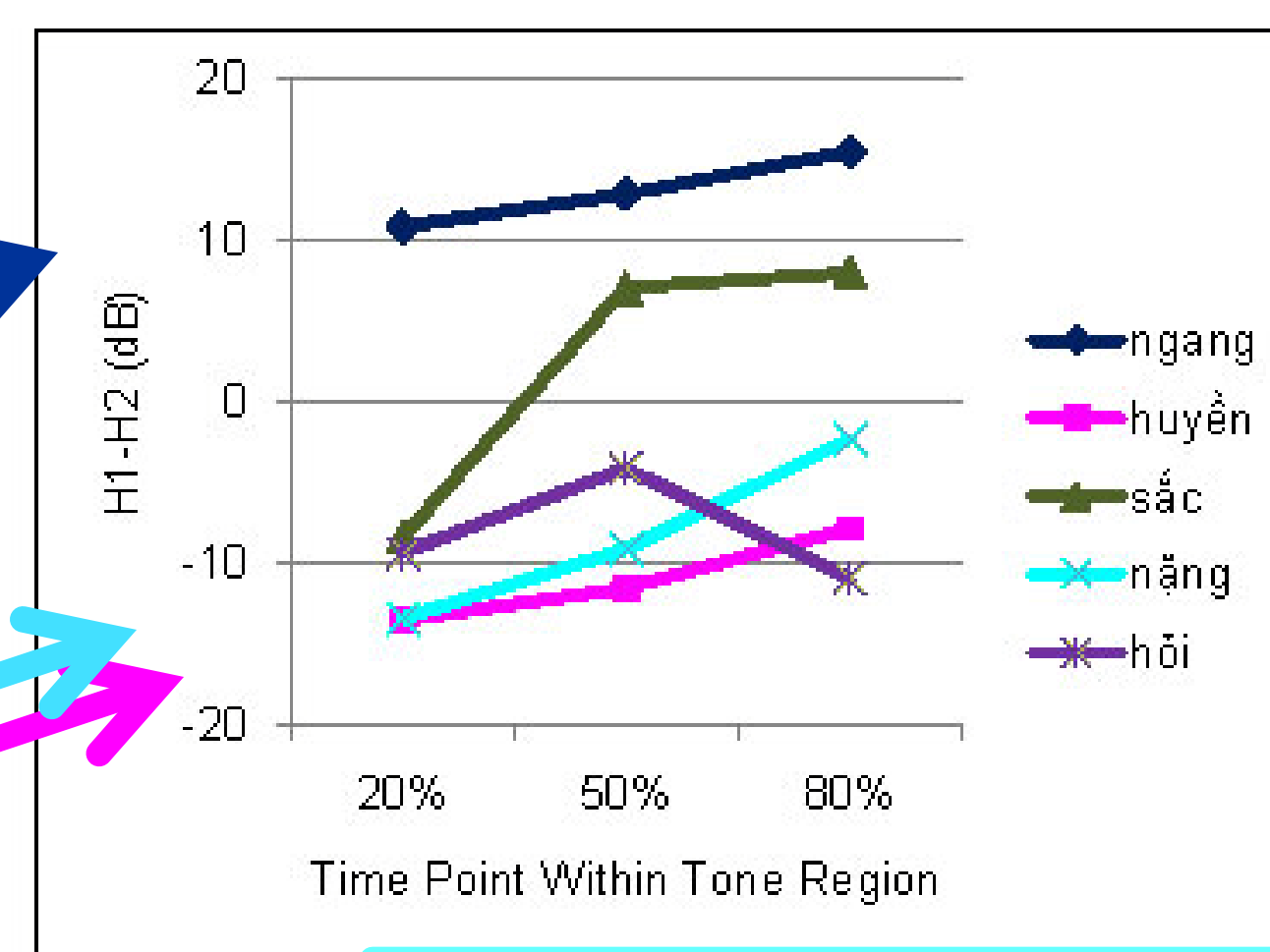
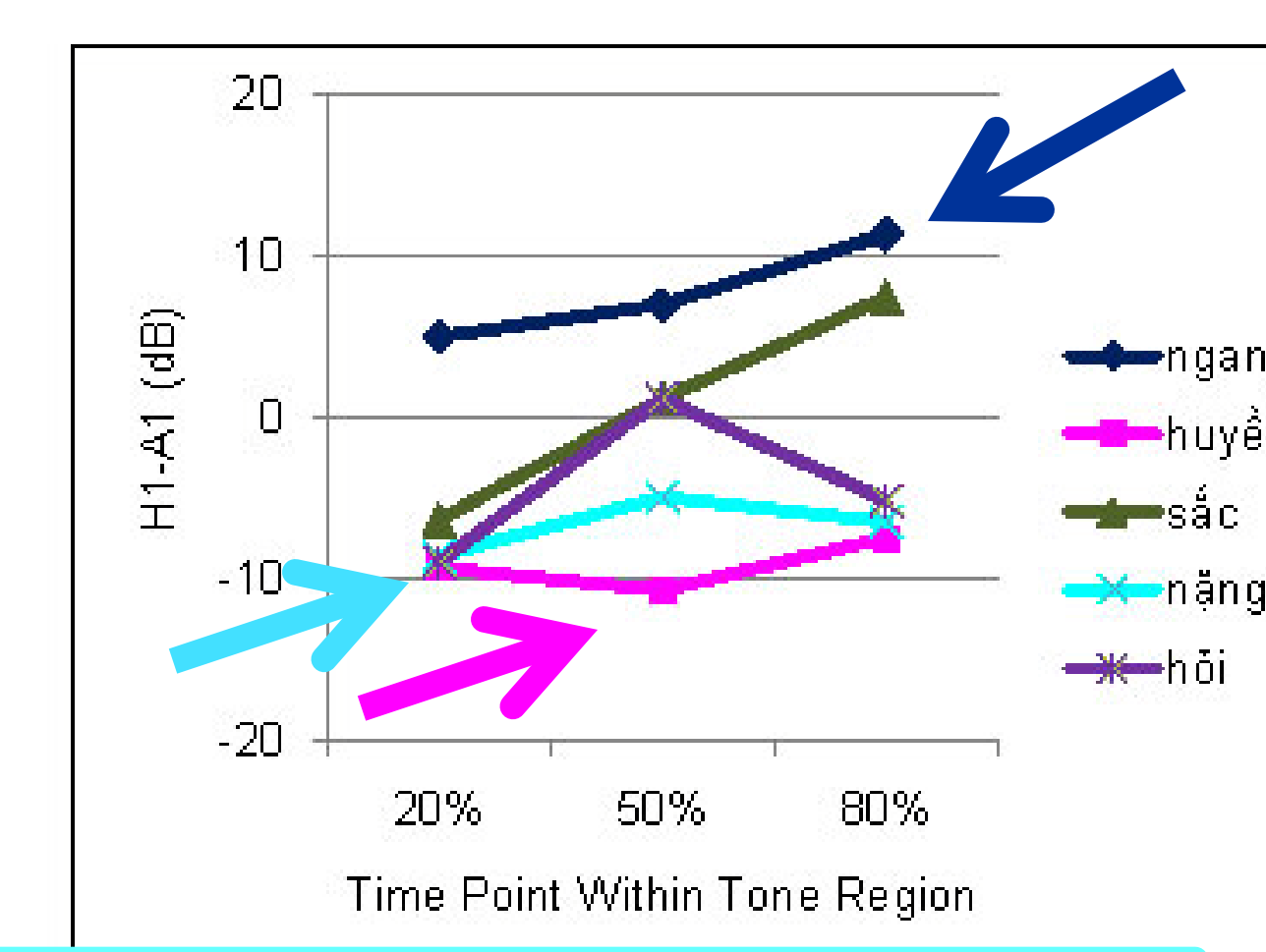


Fig. 3b. H1-A1 Speaker 8 (male)



Huyền lower than modal *ngang*, approximating creaky *nặng* ~ tense

Fig. 4a. H1-H2 Speaker 9 (male)

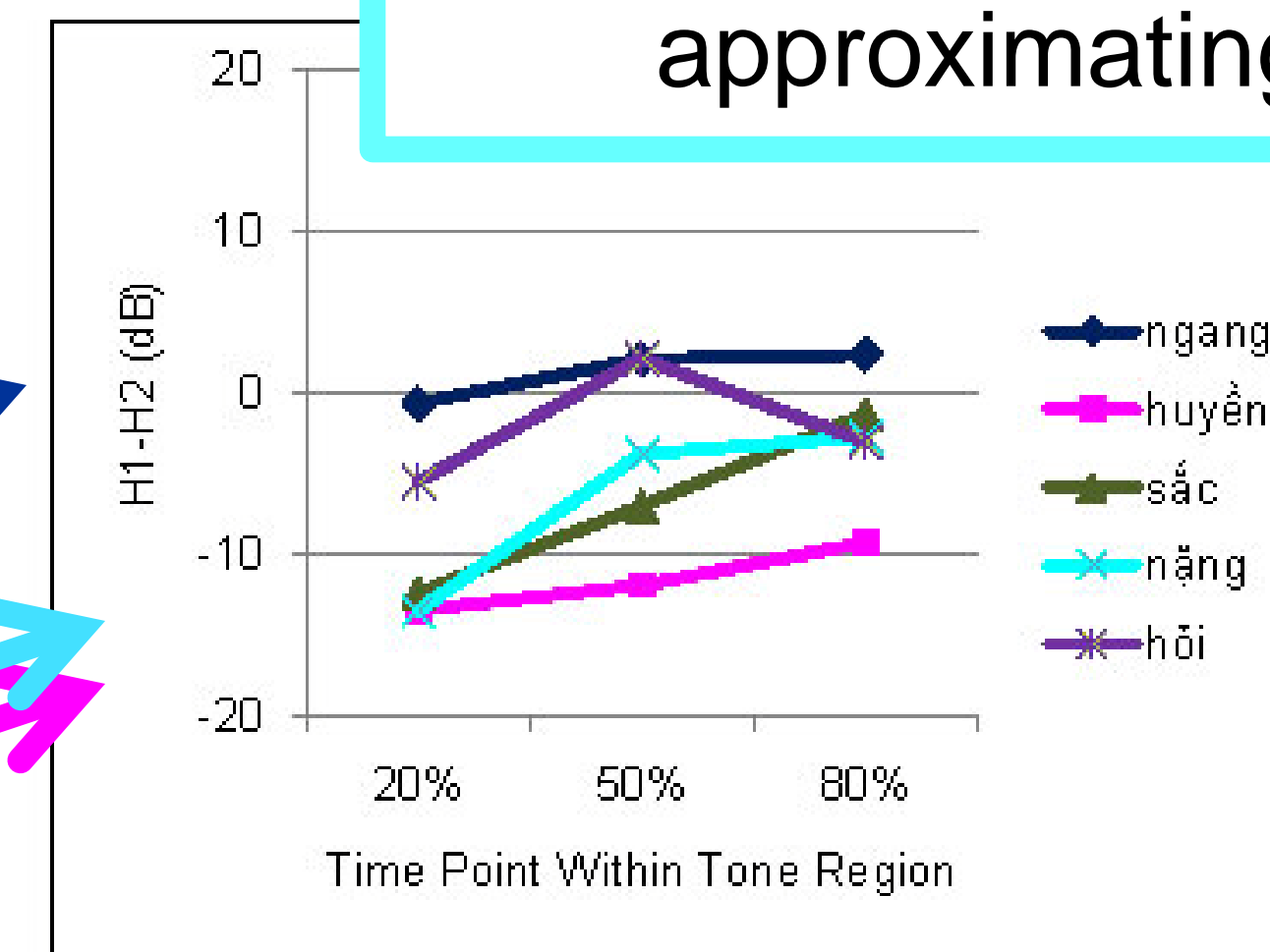
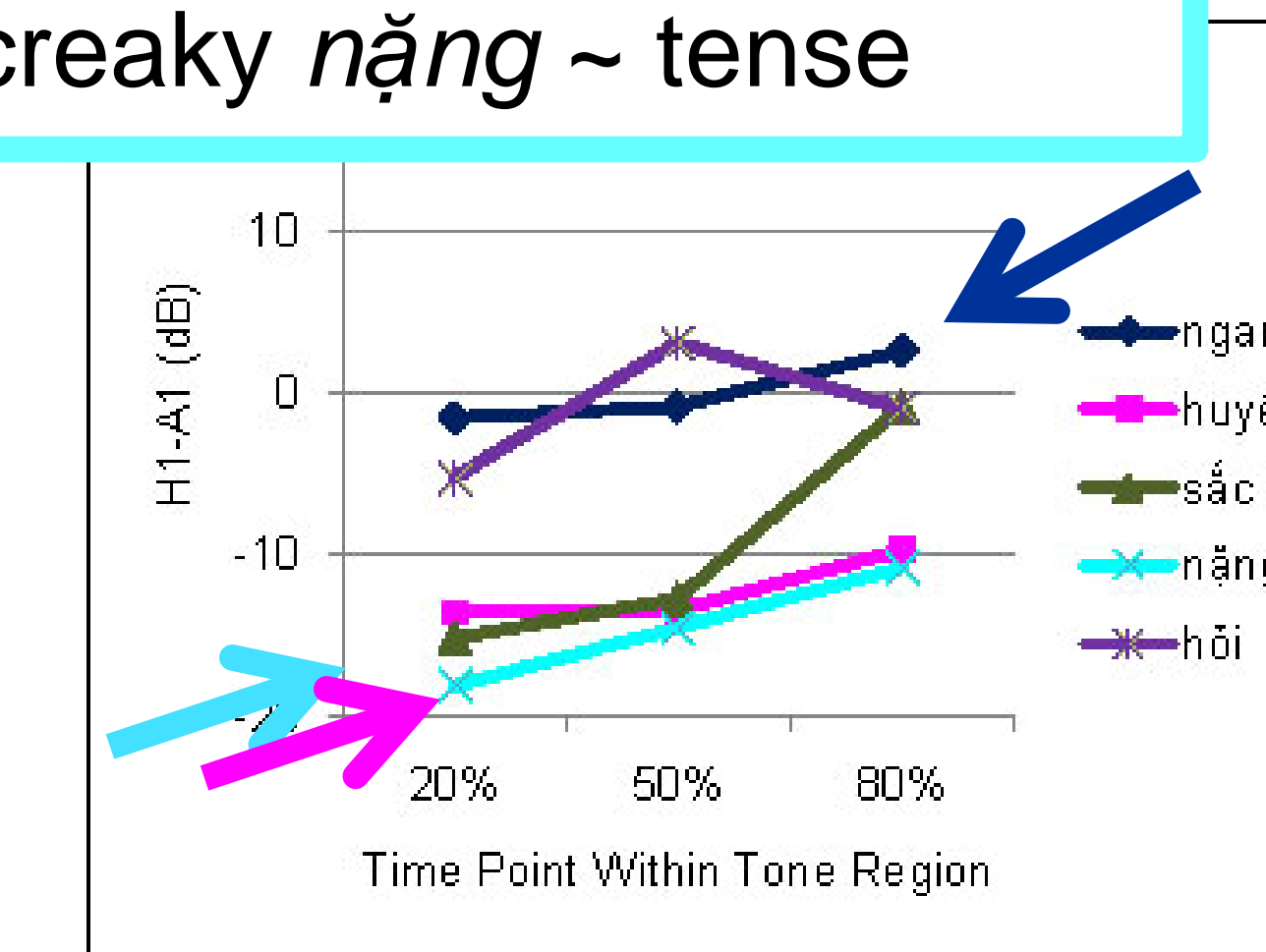


Fig. 4b. H1-A1 Speaker 9 (male)



Huyền lower than or equal to modal *ngang* ~ tense or modal

Fig. 5a. H1-H2 Speaker 1 (female)

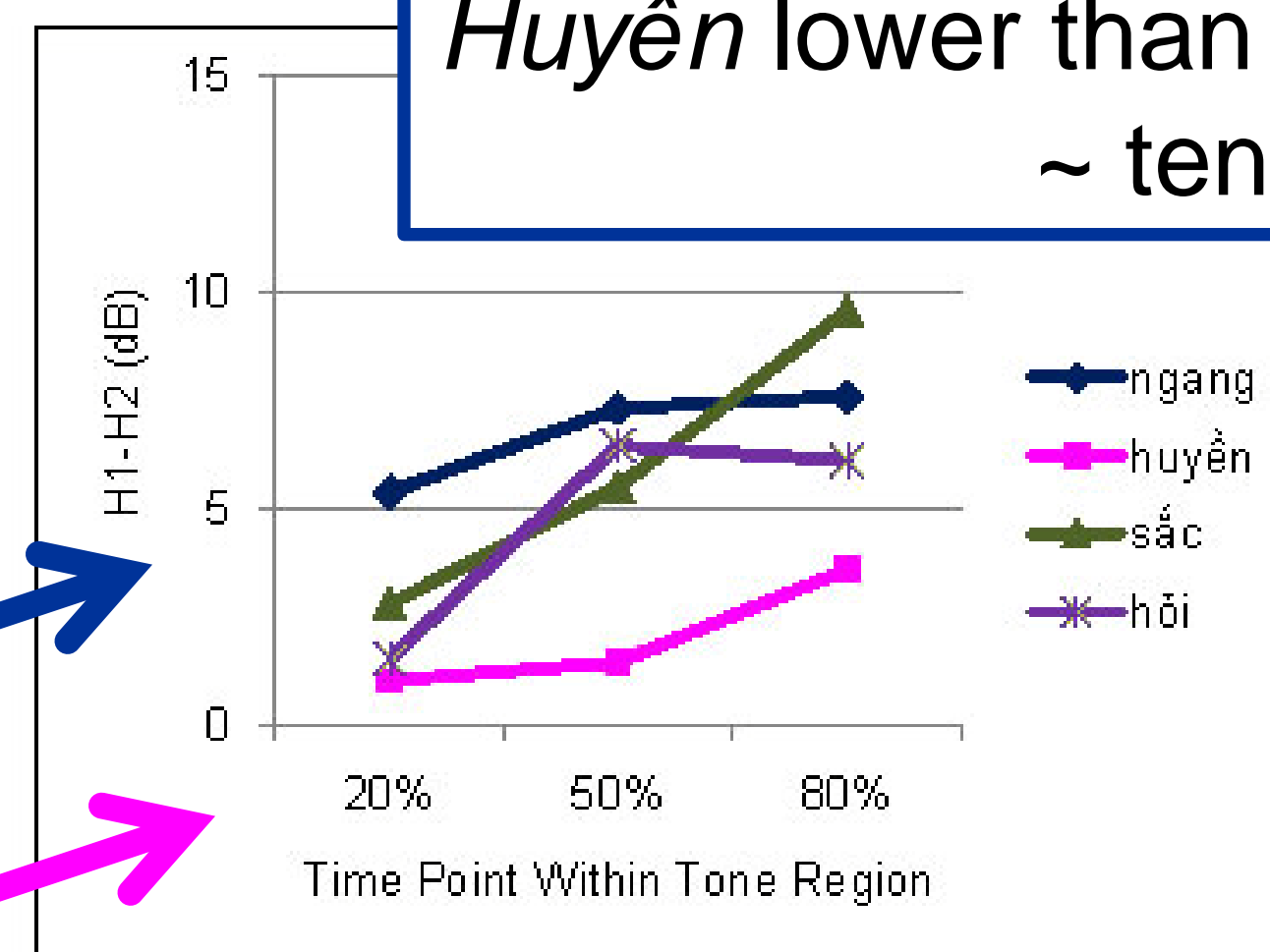
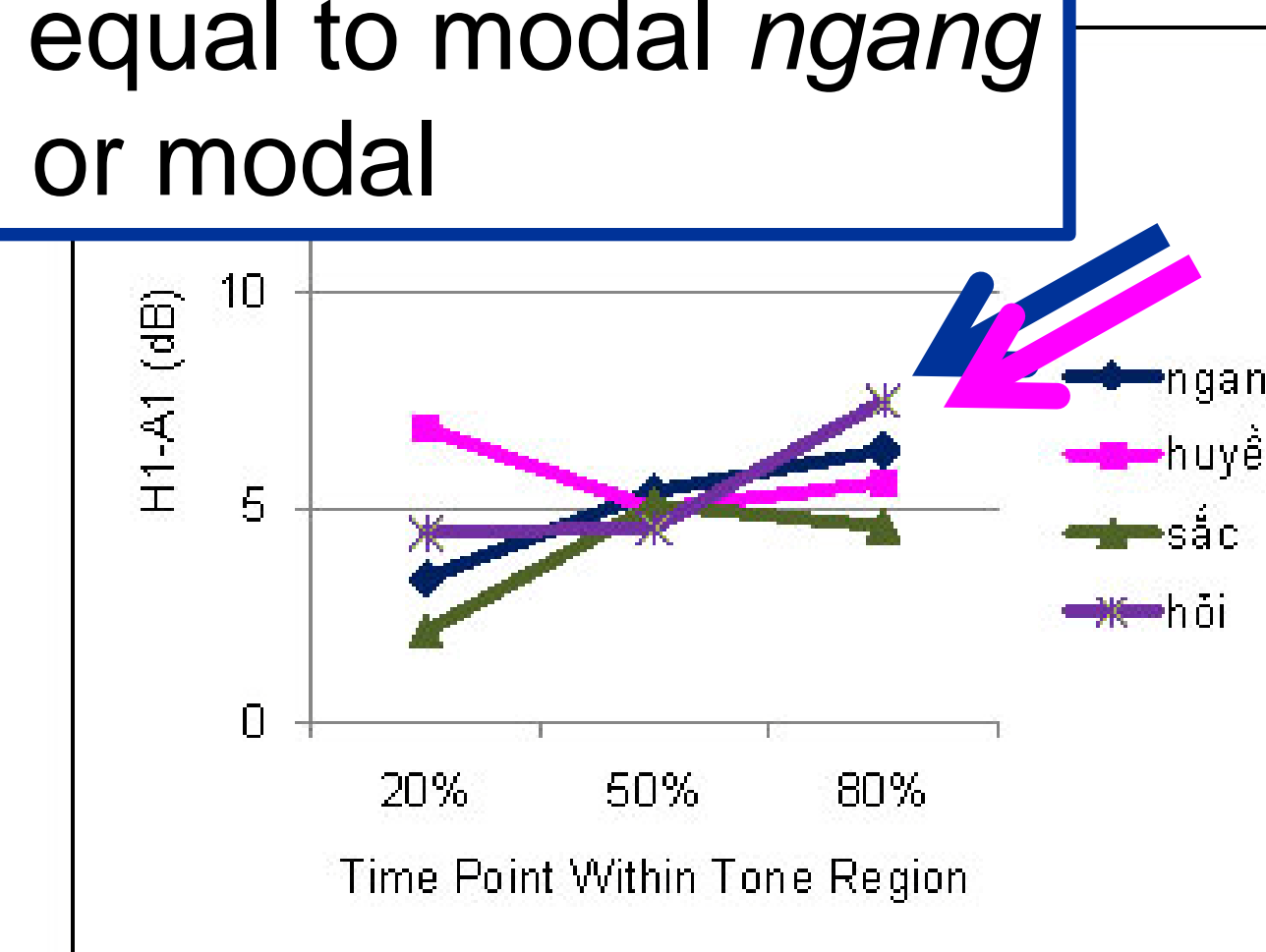


Fig. 5b. H1-A1 Speaker 1 (female)



Prediction 2 – Supported

Hỏi will vary considerably given reports of the mid-point being tense (Nguyen & Edmondson, 1998; Thompson, 1965), creaky (Brunelle, 2003), or breathy (Pham, 2003)

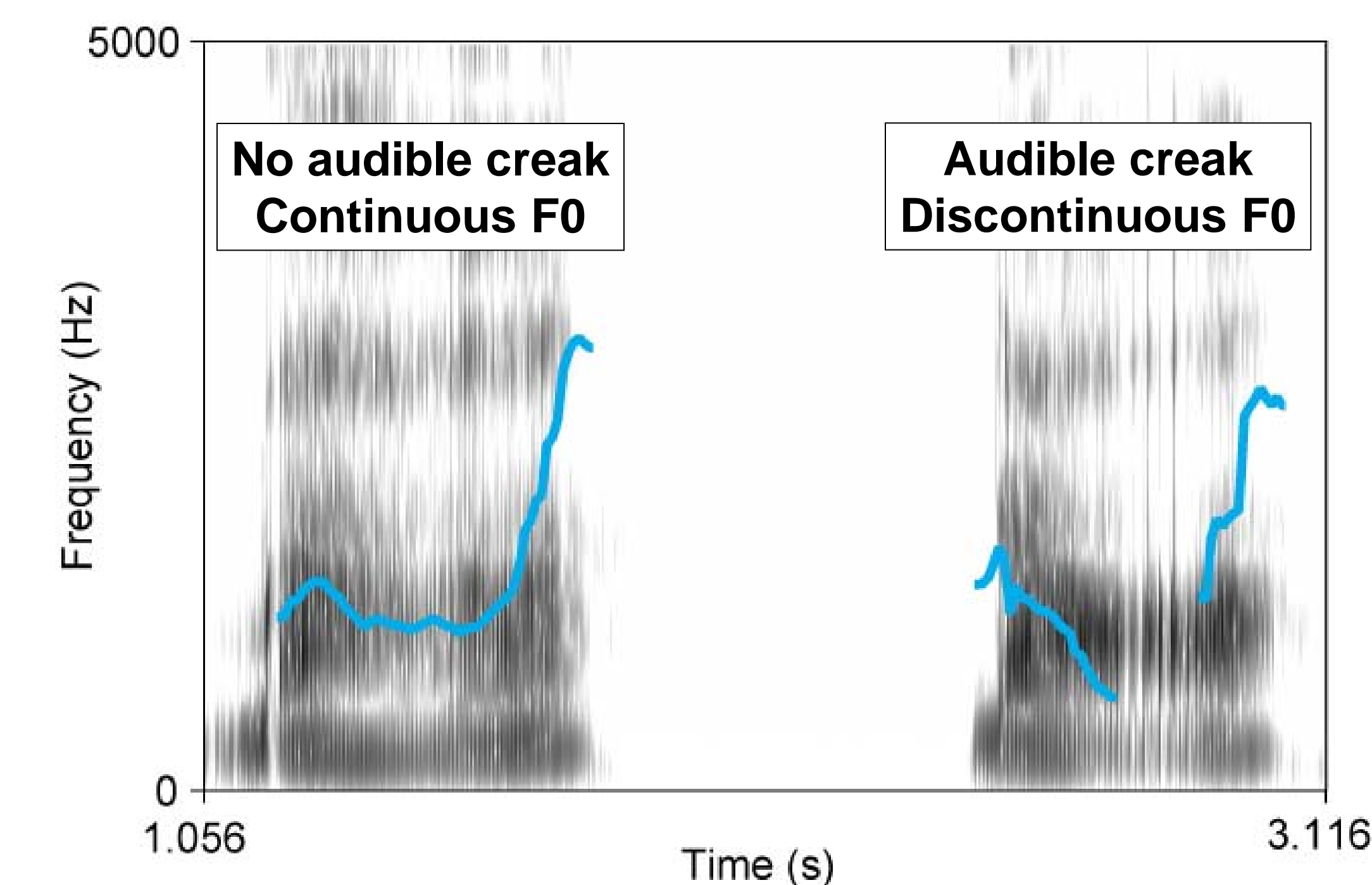


Fig. 6. Adjacent productions of *hỏi* demonstrating distinct mid-tone voice qualities within a connected utterance from Speaker 15

- **Breathy mid-tone:** Speaker 15 – Fig. 2a & 2b – *hỏi* higher than modal *ngang* at 50%; Speaker 9 -- Fig. 4b – similar?
- **Modal mid-tone:** Speaker 1 – Fig. 5a & 5b – *hỏi* comparable to *ngang* at 50%
- **Tense mid-tone:** Speaker 8 – Fig. 3a & 3b – *hỏi* lower than modal *ngang* at 50%

Prediction 3 – Supported

Low falling *hỏi* will be creaky or breathy (Vu Ngoc, d'Alessandro, & Michaud, 2005)

- Speaker 1 (female), 1 low falling *hỏi* token: **Visibly and audibly creaky**
- Speakers 8 & 9 (male), 1 & 7 low falling *hỏi* tokens, respectively: no obvious creaky voice, but *hỏi* tones were noisier than *huyền* tones taken from same utterance, **consistent with breathiness**
- Harmonics-to-Noise Ratio (HNR):
 $hỏi - 7.62 \text{ dB} < huyền - 14.08 \text{ dB}$ ($t[7]=8.5, p < .01$)

References

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