

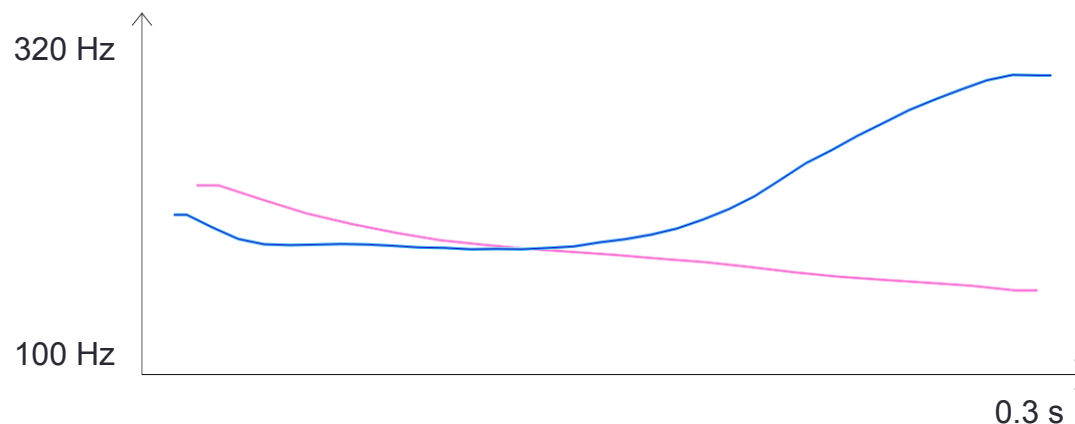
Perception of tone contrasts in Cantonese as a heritage language

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Tones in Cantonese

- Tone contrasts are lexical
- Identified primarily by contour shape and (relative) pitch
- Cantonese has 6 tones



tou2

(mid rising)

土 'soil'

討 'to ask for'

tou4

(low falling)

圖 'picture'

逃 'to escape'

Development of tone discrimination

Monolingual children

- 4 months Decline in sensitivity to lexical tones for nontone learning infants (Yeung et al, 2013)
- 2 years Children differentiate words based on tone (Singh et al, 2014)

Bilingual children

- Take longer than monolingual children (Law, 2007)
- Cantonese tonal system acquired around 3 years (Holm & Dodd, 1999)
- Similar order of development as monolinguals (Chu, 2008)

Development of tone discrimination

Heritage speakers/adoptees

- Adoptee children better at (re)learning tone contrasts (Zhou, 2015)
- Adoptee children show similar neural patterns to bilinguals in discriminating Mandarin tones (Pierce et al, 2014)
- Adult heritage speakers better at relearning contrasts between consonants in Korean (Oh et al, 2003)
- Adoptees in adulthood unable to perceive contrast between consonants in Korean (Ventureyra et al, 2004)

Research Question

Are heritage speakers able to perceive tonal contrasts in the same way as monolingual speakers?

Hypothesis

Yes

- Tonal contrasts are of high functional importance
- Previous experiments suggest non-monolingual speakers acquire/retain phonological knowledge

Especially if

- Tones are acquired before exposure to English
- There is continued exposure to Cantonese

Heritage speakers of Cantonese

Location	Brooklyn, New York (US)
Population	Chinese 7.6% (2014) 68% of Asian population
Number	69
Age	5-11 (mean: 8.5)
Birthplace	46: US 20: Guangdong Province (China)

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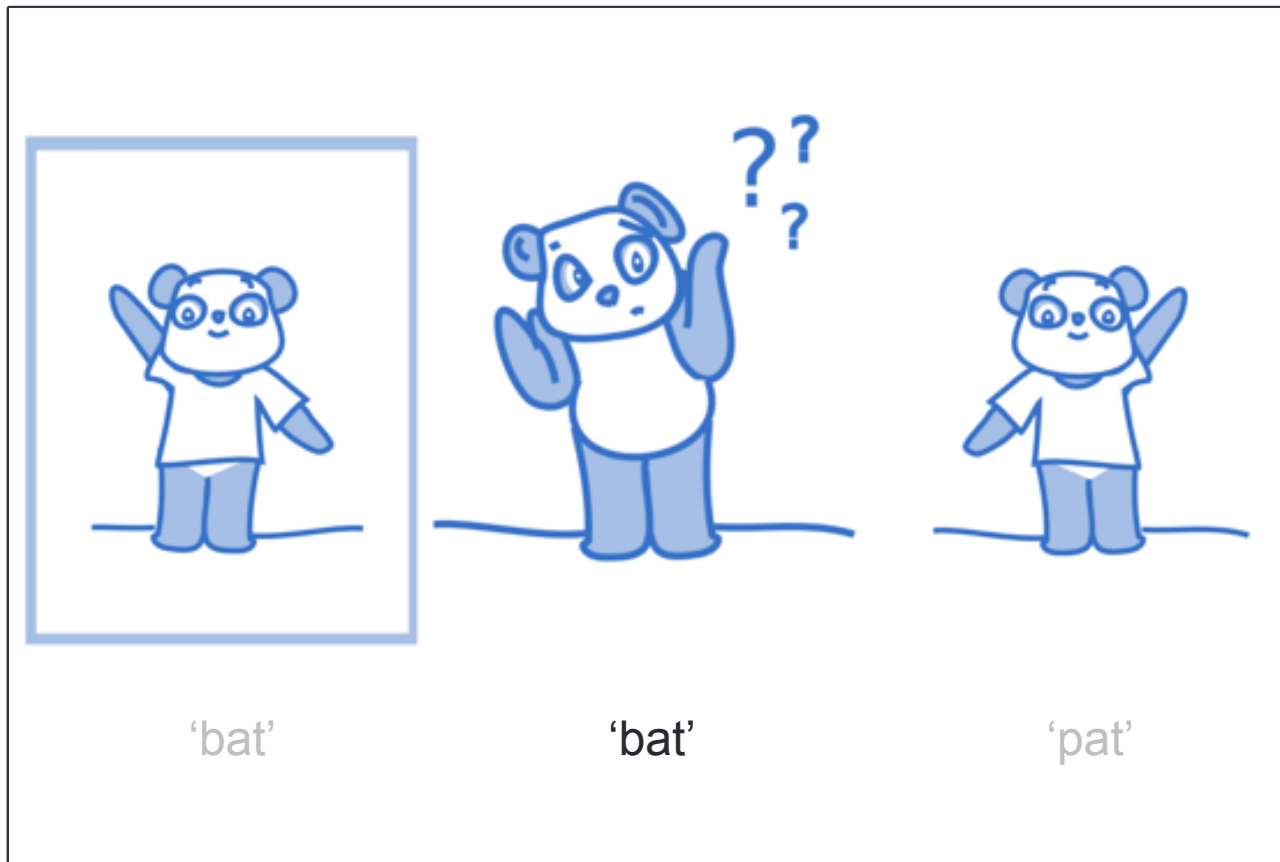
- Tones are acquired before exposure to English
 - 20 born in China
 - Parents know/use little English
- There is continued exposure to Cantonese
 - Parents used Cantonese at home (>75% of the time)

Control group

Location	Hong Kong
Population	88.1% Cantonese as 'mother tongue' (2016)
Number	64
Age	5-11 (mean: 9.3)

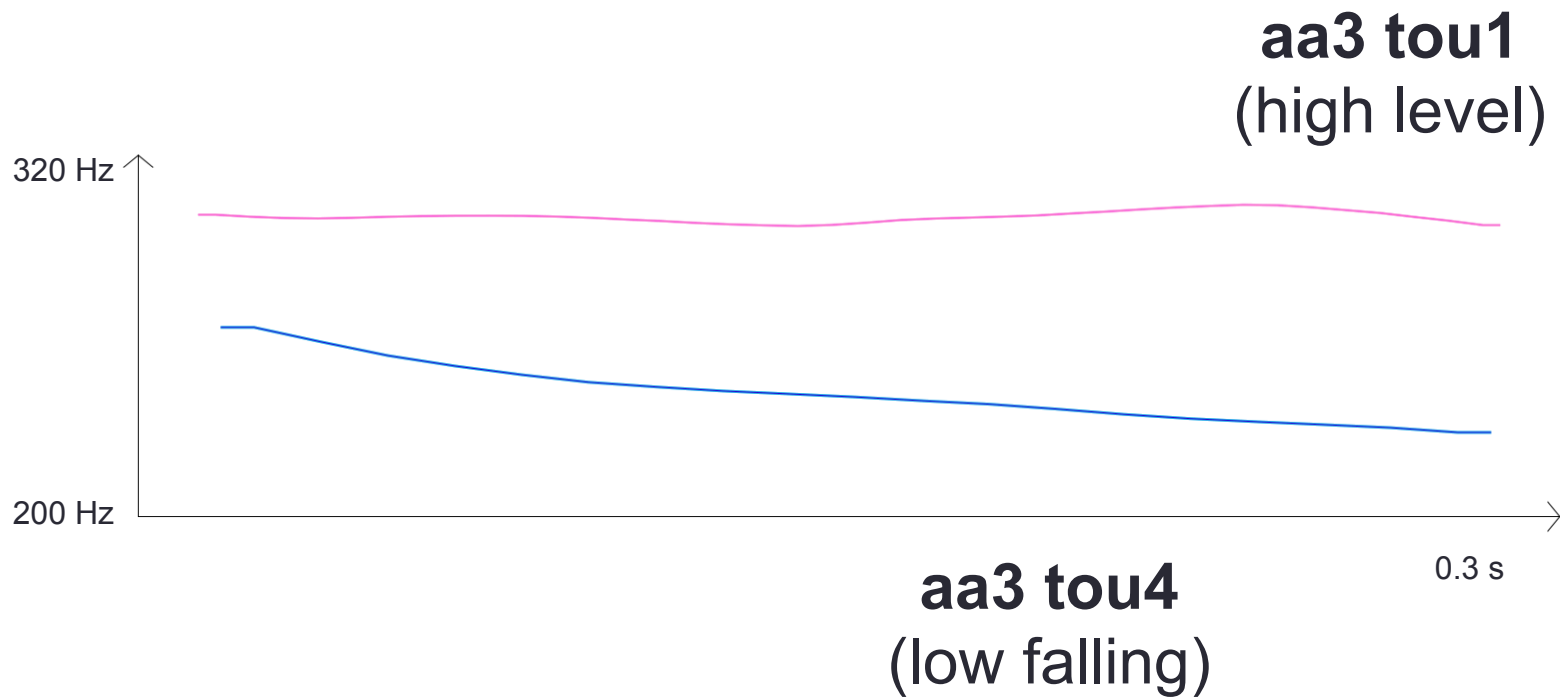
Method

- ABX discrimination task



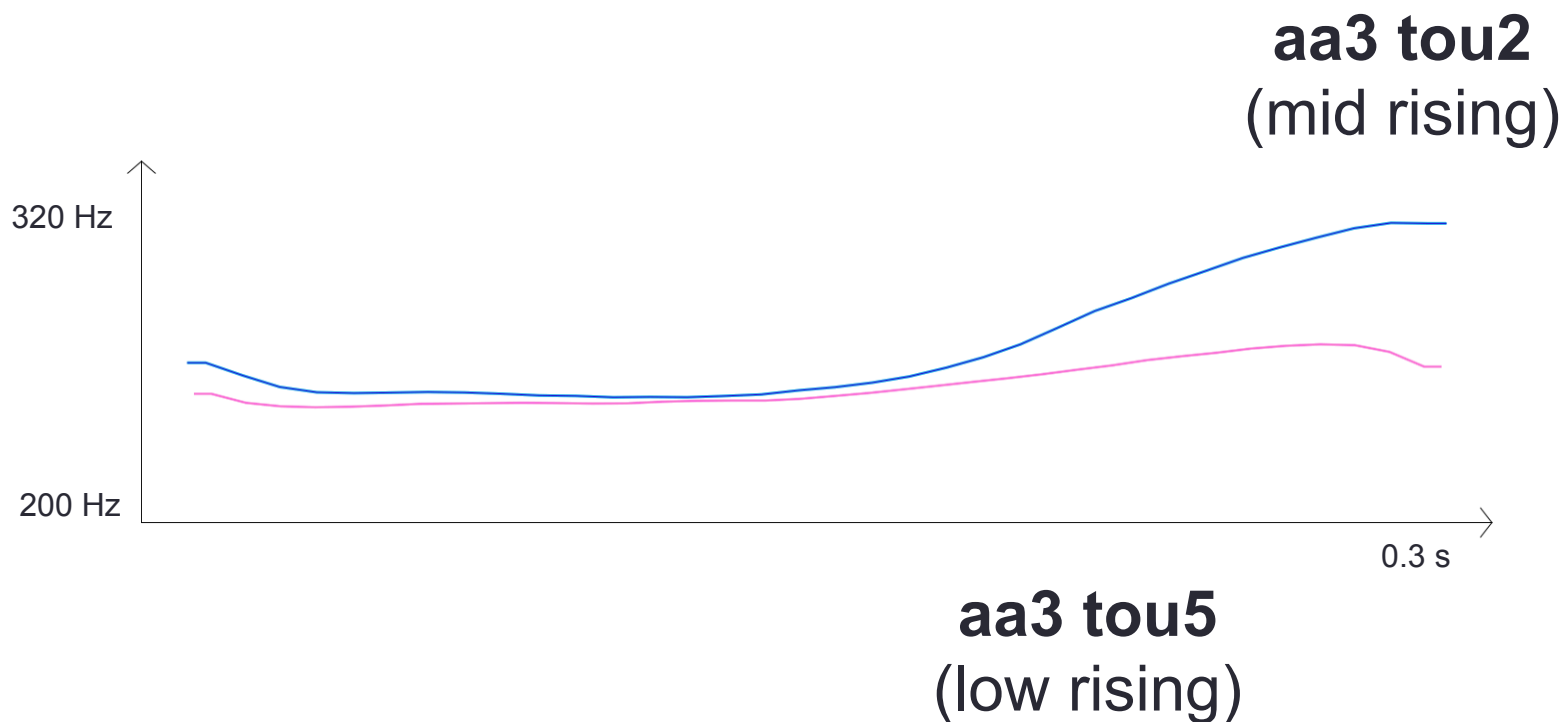
Method

Distinct tones (large contrast)



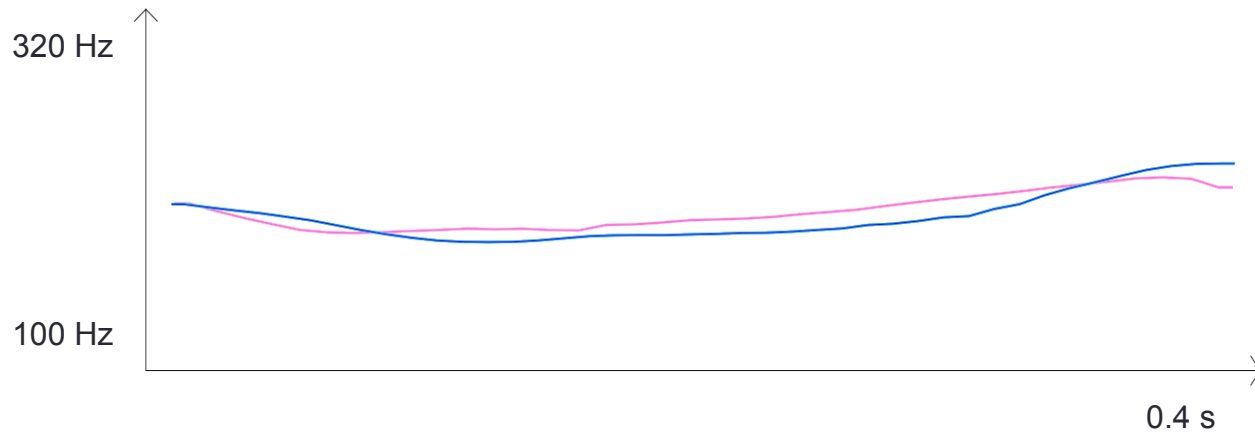
Method

Similar tones (small contrast)



Method

Same tone (contrast in nucleus+coda)



aa3 loeng5

aa3 lam5

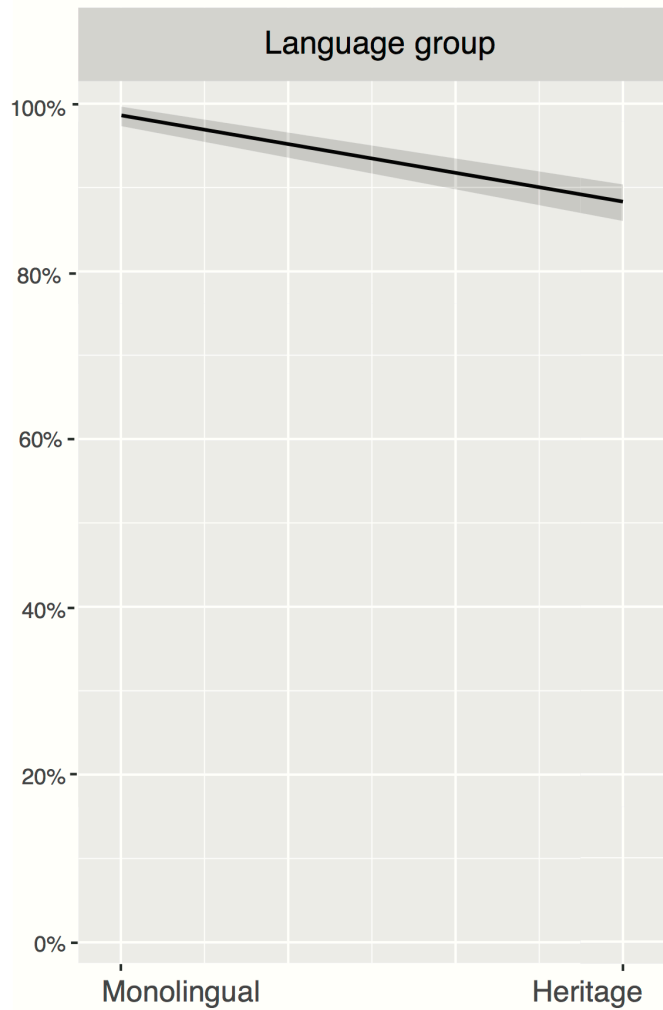
Hypothesis

- There are no differences between monolingual children and heritage speakers
- If there are any, they would be first found in the similar tones
 - Some merging in adult speakers in Hong Kong (Mok et al, 2013)

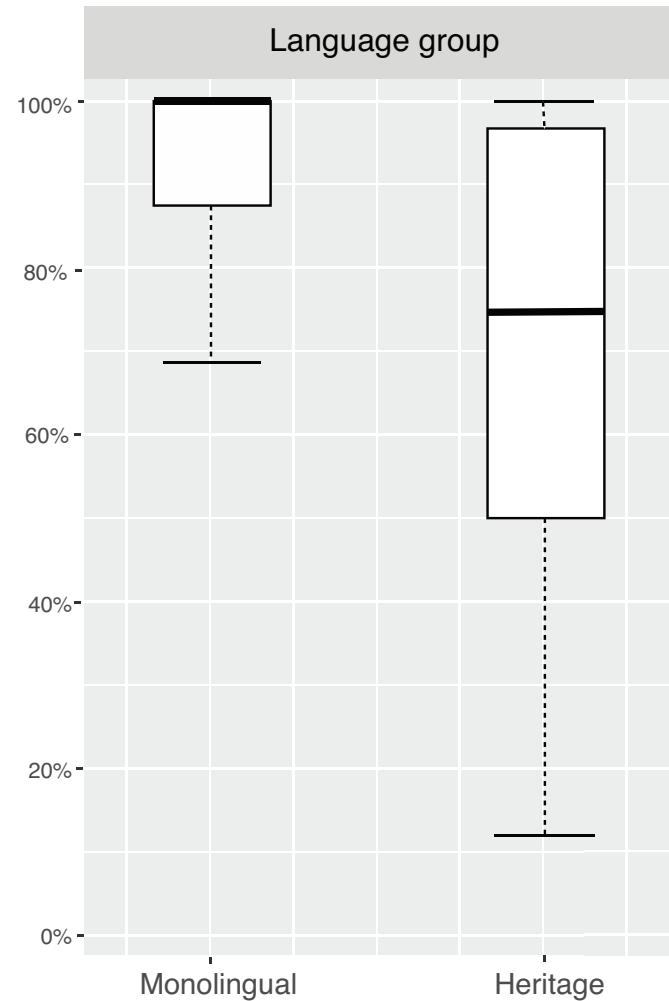
Results

- Random effects: subject
- Fixed effects: contrast type, language group, age of testing, accuracy on non tone trials (all $p < .001$)
- Marginal R^2 : 35.49%

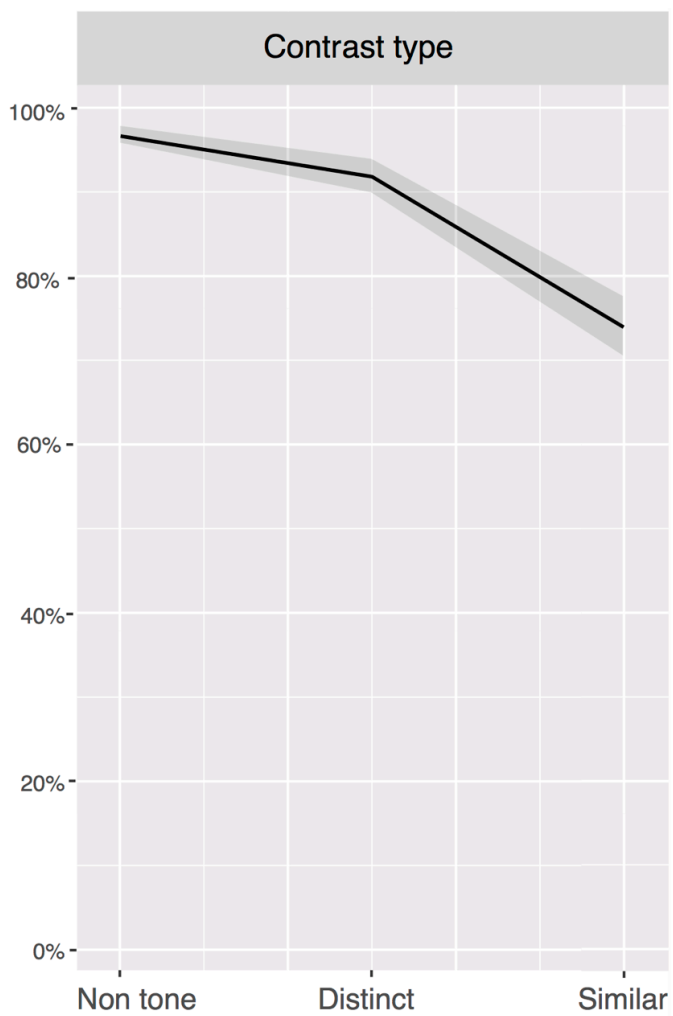
Predicted probabilities for accuracy



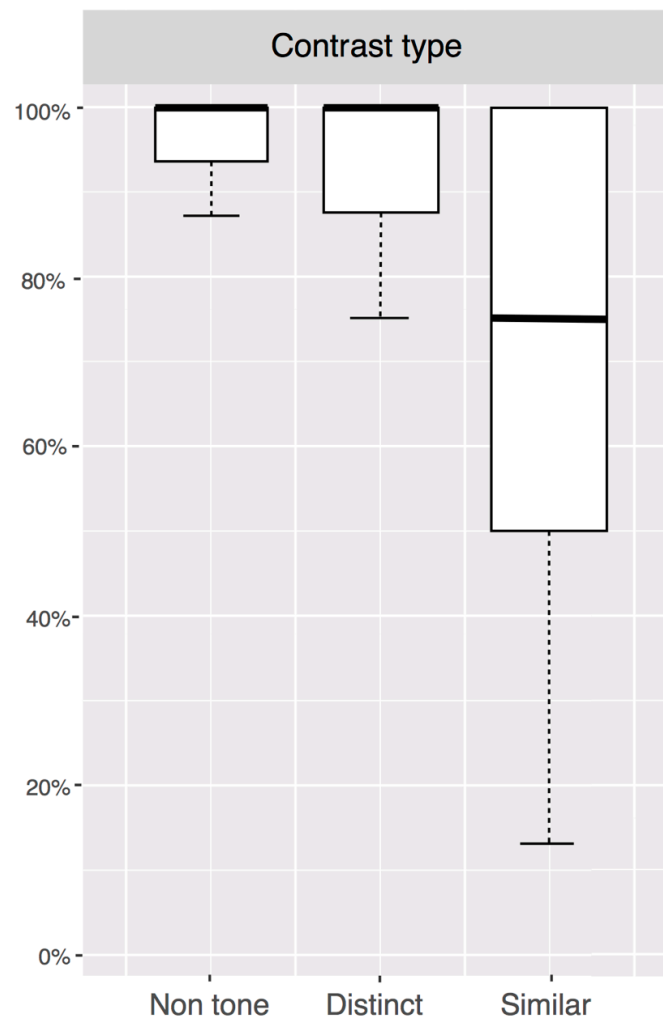
Raw scores



Predicted probabilities for accuracy



Raw scores



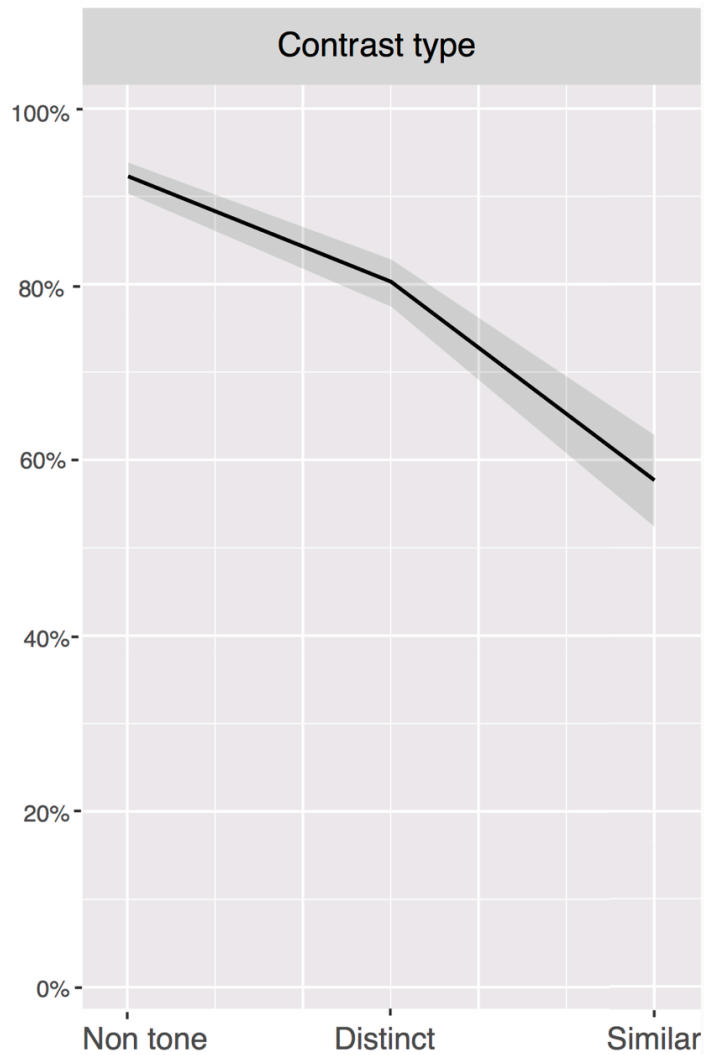
Predicted probabilities for accuracy



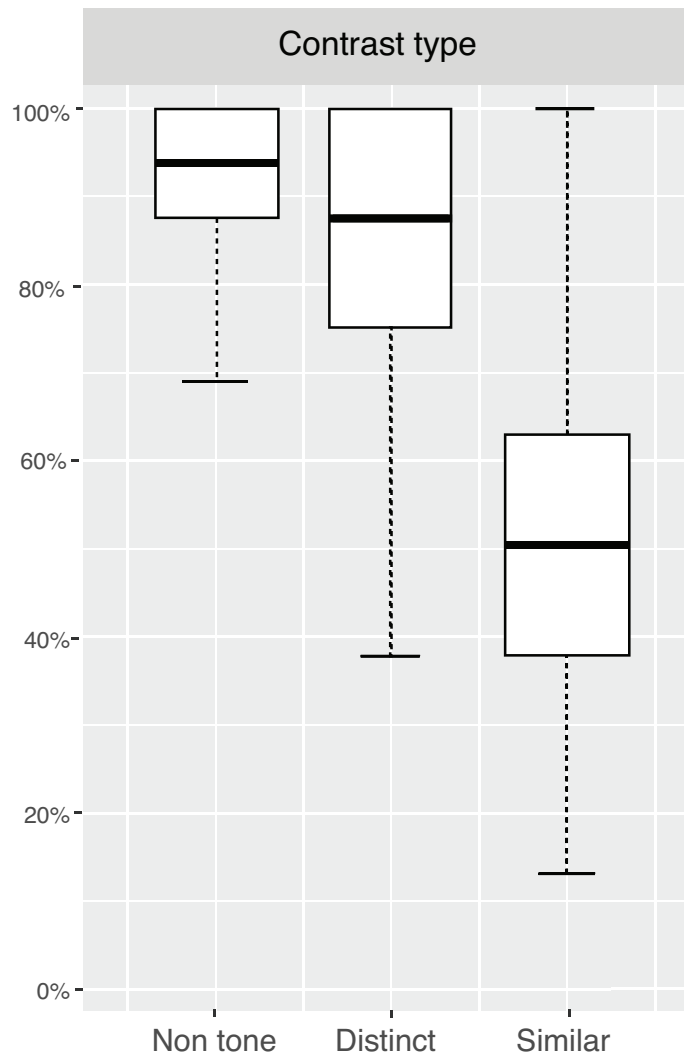
Heritage speakers only

- Random effects: subject
- Fixed effects: contrast type, age of testing, accuracy on non tone trials, literacy in Chinese (all $p < .001$)
- Marginal R^2 : 33.90%

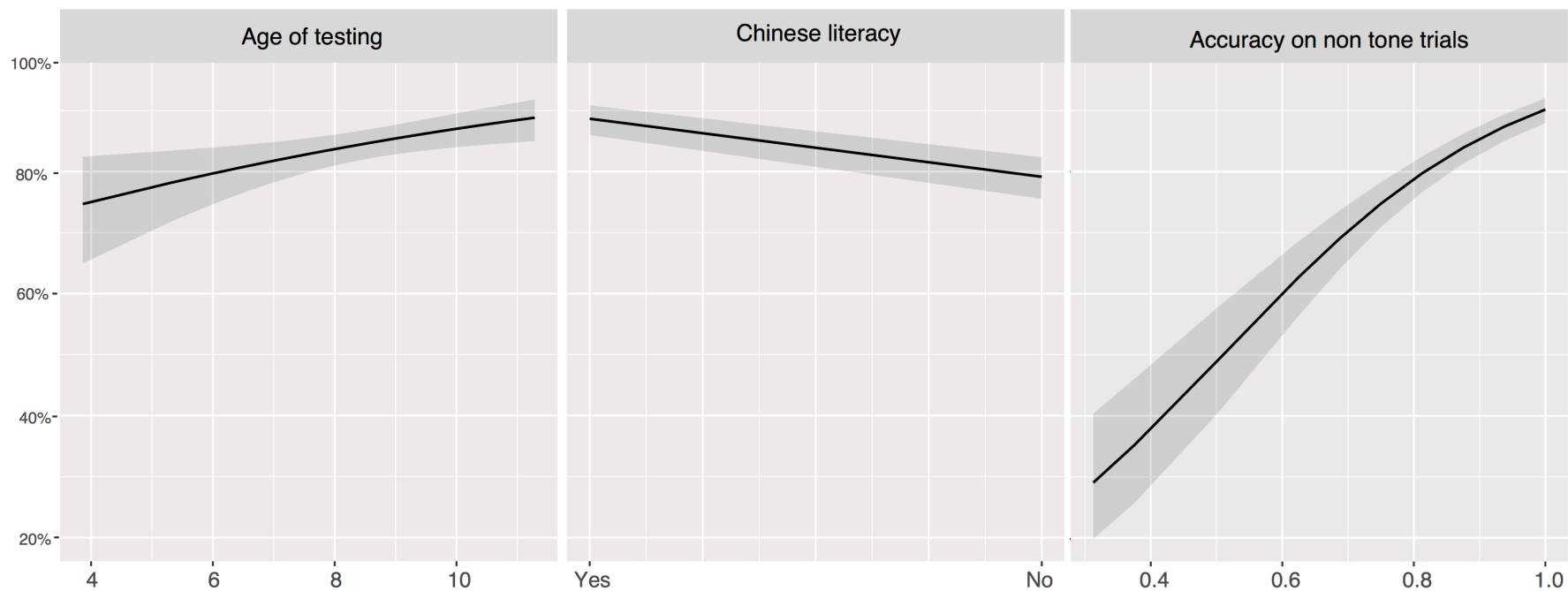
Predicted probabilities for accuracy



Raw scores



Predicted probabilities for accuracy



Why the poor performance?

- Prolonged stage of acquisition
- Functional load is not so high after all; Cantonese is comprehensible even when some of the tone information is lost → there is no 'need' to fully acquire it

Contact effects

- English interferes acquiring the tone system
 - Heritage speakers become 'desensitised' to tonal contrasts, and cannot perceive them accurately

Is input 'deficient'?

Qualitatively

- Possible
- Phonetic differences (Cao, 2016)
- Phonologically, not yet evidence of losing contrasts in adult immigrants

Quantitatively

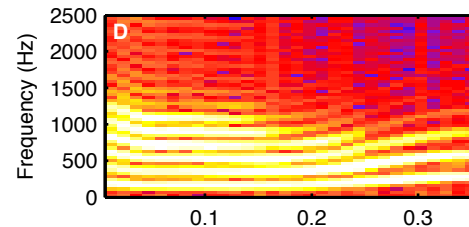
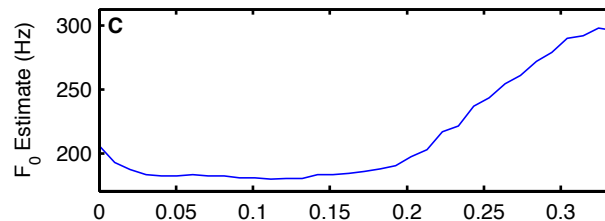
- These HS stood the highest chance
- Still less input compared to monolingual children
- When is input quantity important?

Conclusion

1. Heritage speakers turn out to not be able to perceive tonal contrasts as well as monolingual children
2. In particular the similar tones
3. However, they improve with age

Future work

- Frequency of meaningful tone contrasts
- Production data



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