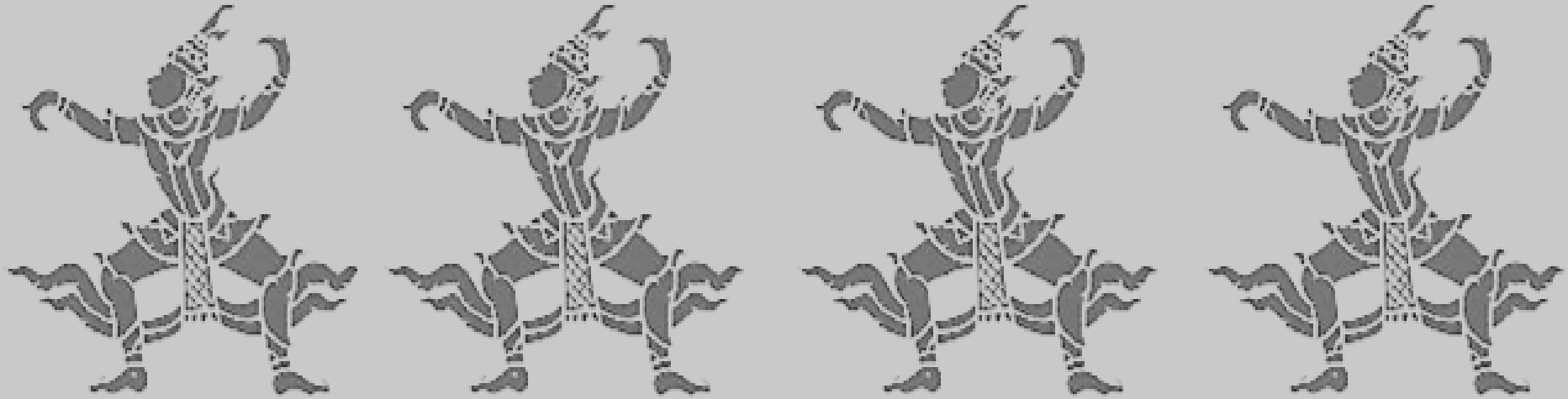

Cross-linguistic perception of Thai tones is shaped by the functional prominence of lexically-contrastive pitch in L1

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New Sounds 2013
Montreal, Quebec, Canada
Concordia University
May 17-19, 2013

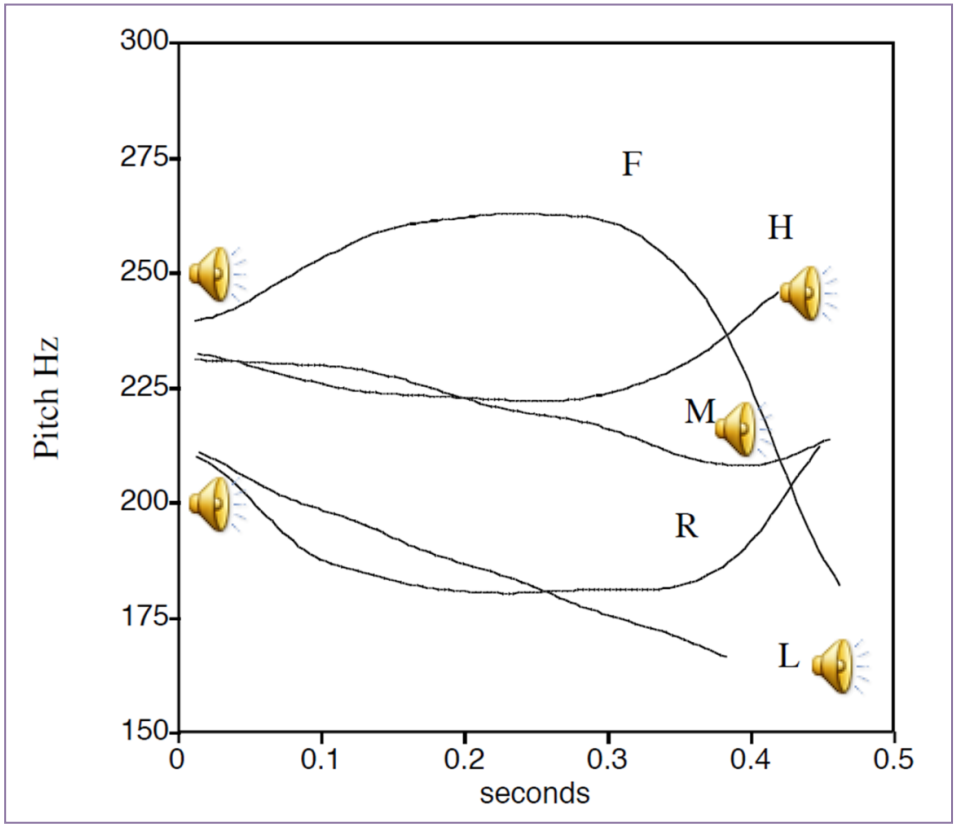
Tone

- **Tone** languages use variations of voice height = “pitch”, or “F_0” to distinguish words.
- Patterns : **LEVEL** or **CONTOUR**

Thai tones

nâ:	*face*	*falling*
nǎ:	*thick*	*rising*
ná:	*aunt*	*high level*
na:	*rice field*	*mid level*
nà:	*custard apple*	*low level*

2 contour tones
3 level tones



Source: Contour shapes of Thai tones in citation form.
Representative examples from one speaker.
From Zsiga & Nitisaroj, 2007, p. 347

Tone perception by native speakers

- Native speakers perceive tones as linguistic categories

  Van Lancker & Fromkin, 1973; Wang, Jongman & Sereno, 2001

- Tonal information also constrains lexical access Lee, 2007

Tone perception by non-native speakers

- Speakers of a tonal language display high accuracy in non-native tone perception

  Wayland & Guion, 2004

- Speakers of non-tonal languages have less sensitivity to tonal contrasts than people with previous tonal experience

  Hallé, Chang & Best, 2004, for French listeners; Gandour & Harshman, 1978; Wang, Behne, Jongman & Sereno, 2004, among others

Do all non-tonal language speakers perform equally in non-native tone perception?

- There are differences AMONG non-tonal language speakers in non-native tone perception

  e.g., L1 pitch accent speakers perform at comparable accuracy levels to L1 tone language speakers Burnham et al., 1996; So, 2006

- Languages differ in the extent and function to which they use F_0 variations:

  - All languages use pitch for intonation at the level of phrases while only some use pitch for distinctions at the word level

Lexically-contrastive pitch usage

- **Tone**

  e.g., Mandarin Chinese, Thai, Vietnamese

- **Pitch-accent languages**

  High pitch on the accented mora, determining the pitch level (H or L) of preceding/following moras (+ more rules)

  e.g., Japanese, Swedish

  e.g., A-me 'rain' (HL) vs a-ME 'candy' (LH)

- **Word-stress languages**

  Pitch variation as one correlate of lexically-contrastive word stress

  e.g., English, German, Spanish. **e.g., REcord vs reCORD**

Lexical

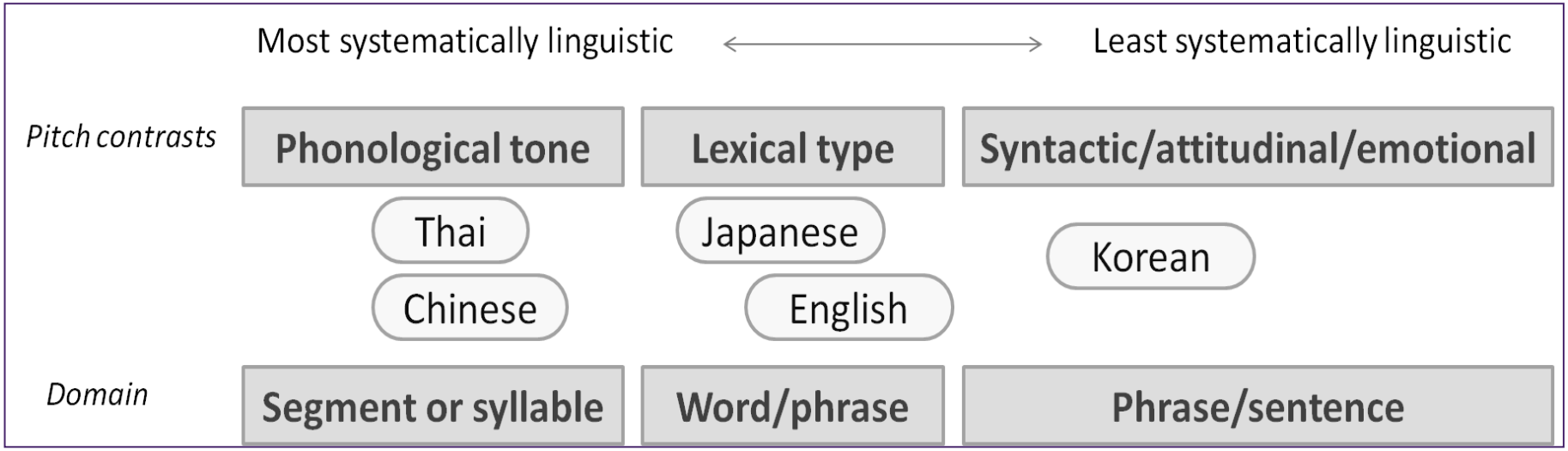
- **"Intonation - only" languages**

  These languages do not use lexically-contrastive pitch, but like all languages we know of, they use intonation (phrase domain)

  e.g., Korean, French

Non-lexical

Functional scale of pitch contrasts



Adapted from Van Lancker, 1980: 210

Pitch prominence typology and predictions for tone perception accuracy

Language	Domain	Prominence
Tone (Mandarin)	Lexical, syllable	Maximal
Pitch-accent (Japanese)	Lexical, word	High-intermediate (pitch is exclusive)
Word stress (English)	Lexical, word	Low-intermediate (pitch is non-exclusive)
Intonation-only (Korean)	Non lexical	Low

Pitch prominence typology and predictions for tone perception accuracy

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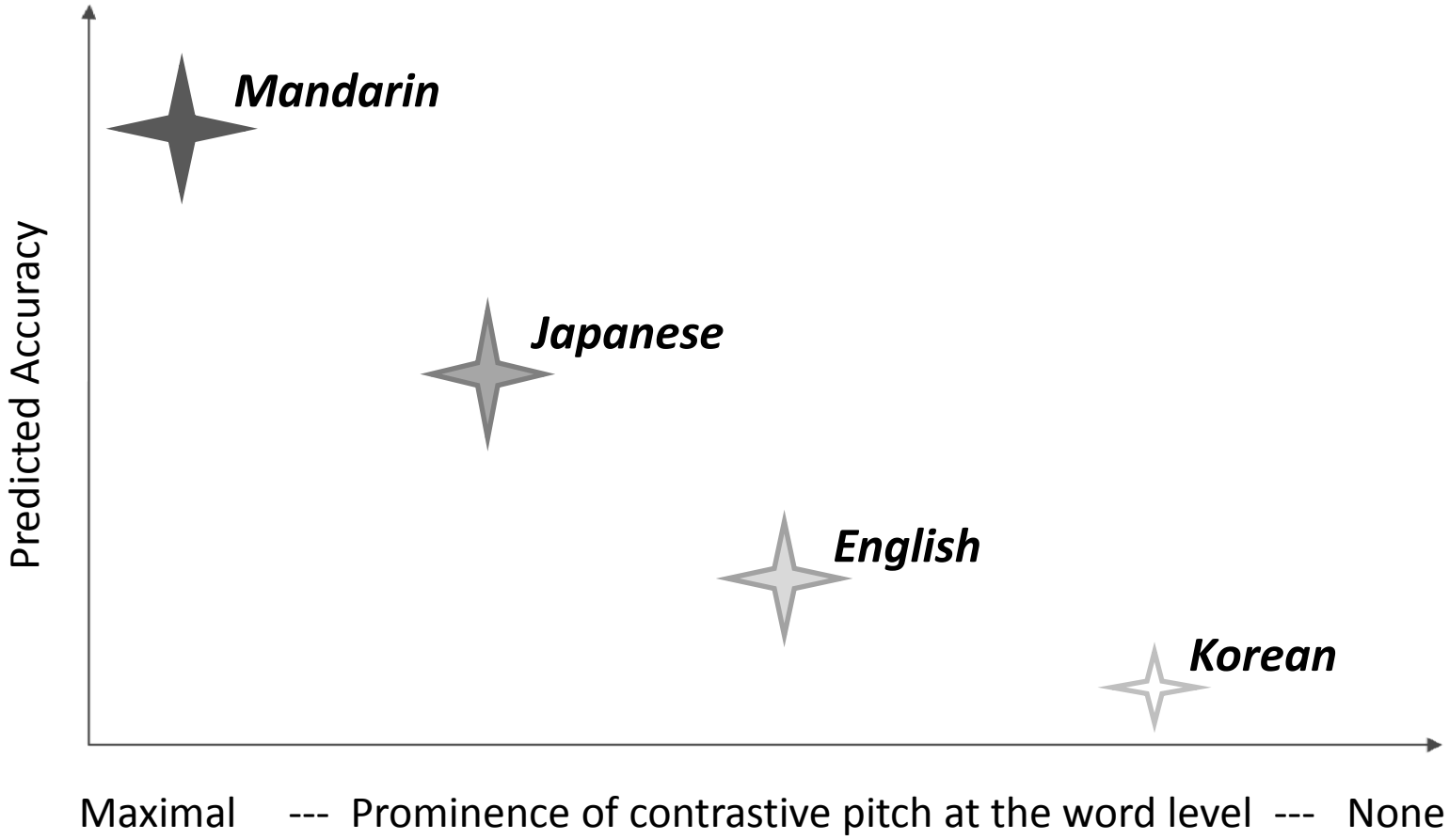
Pitch Prominence Hypothesis

- Similar predictions are found in previous studies
  - **Feature Hypothesis** McAllister, Flege, & Piske, 2002: L2 perception of Swedish vowel length contrasts by native speakers of Estonian, English, and Spanish
  - Linguistic relevance of a dimension in L1 shapes the brain response to L2 contrasts (with MMN data) Nenonen, Shestakova, Huotilainen, & Näätänen, 2003
- We predict accuracy of cross-language tone perception based on prominence of pitch in the L1

Prominence predicts accuracy



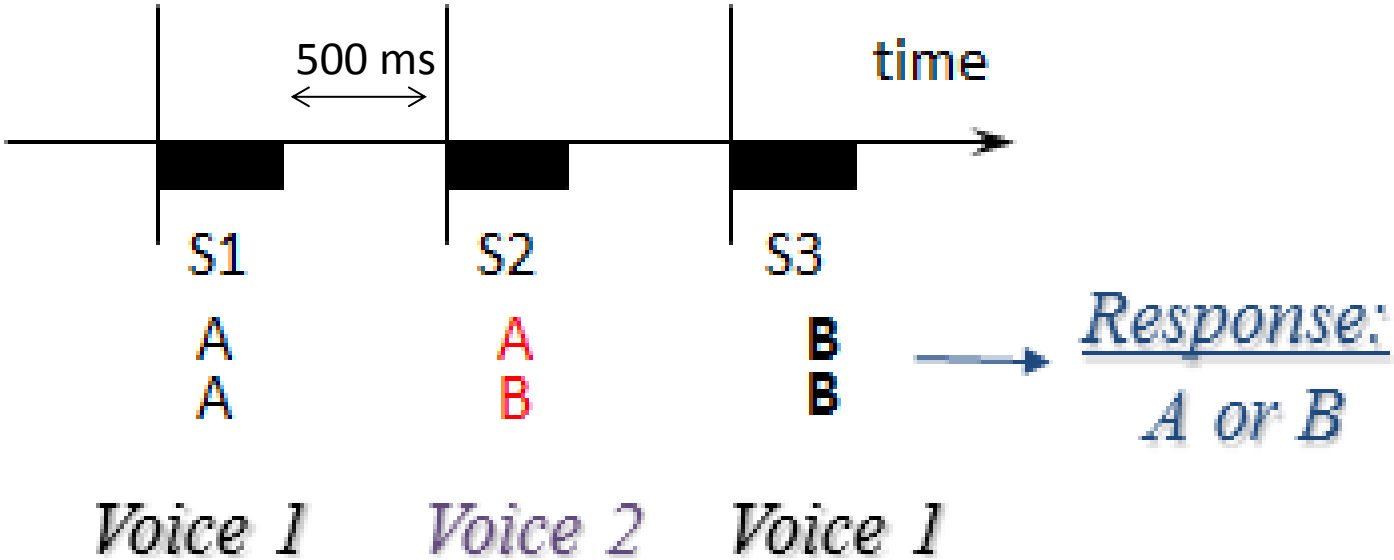
Methodology

Participants

N = 2 Thai native speakers
N = 10 Mandarin speakers
N = 11 Japanese speakers
N = 10 English speakers
N = 10 Korean speakers

- Graduate students
- Generally involved in language studies/linguistics
- Students in the US

AXB categorization



Accuracy rates and reaction times

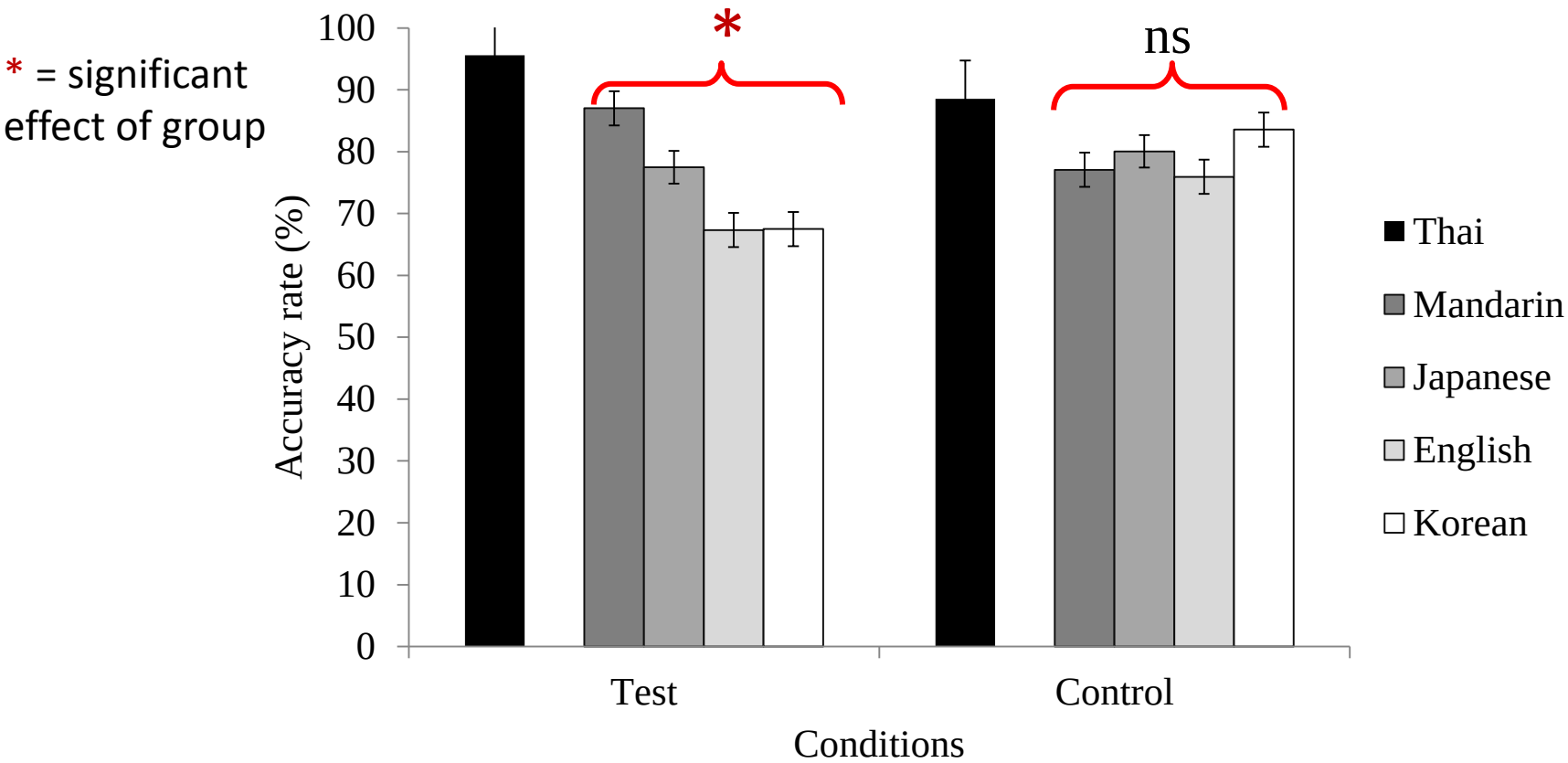
Experimental conditions

- Monosyllabic words & nonwords presented in triplets (48 „test“, 48 „control“)
- All test words were open syllables
- 3 test conditions:

Test Conditions			Control Condition
Direction (n=12)	Height (n=12)	Mixed (n=24)	Control (n=48)
rising-falling	low-mid	low-rising low-falling	consonant vowel
rising-falling	low-high	mid-rising mid-falling	
rising-falling	mid-high	high-rising high-falling	

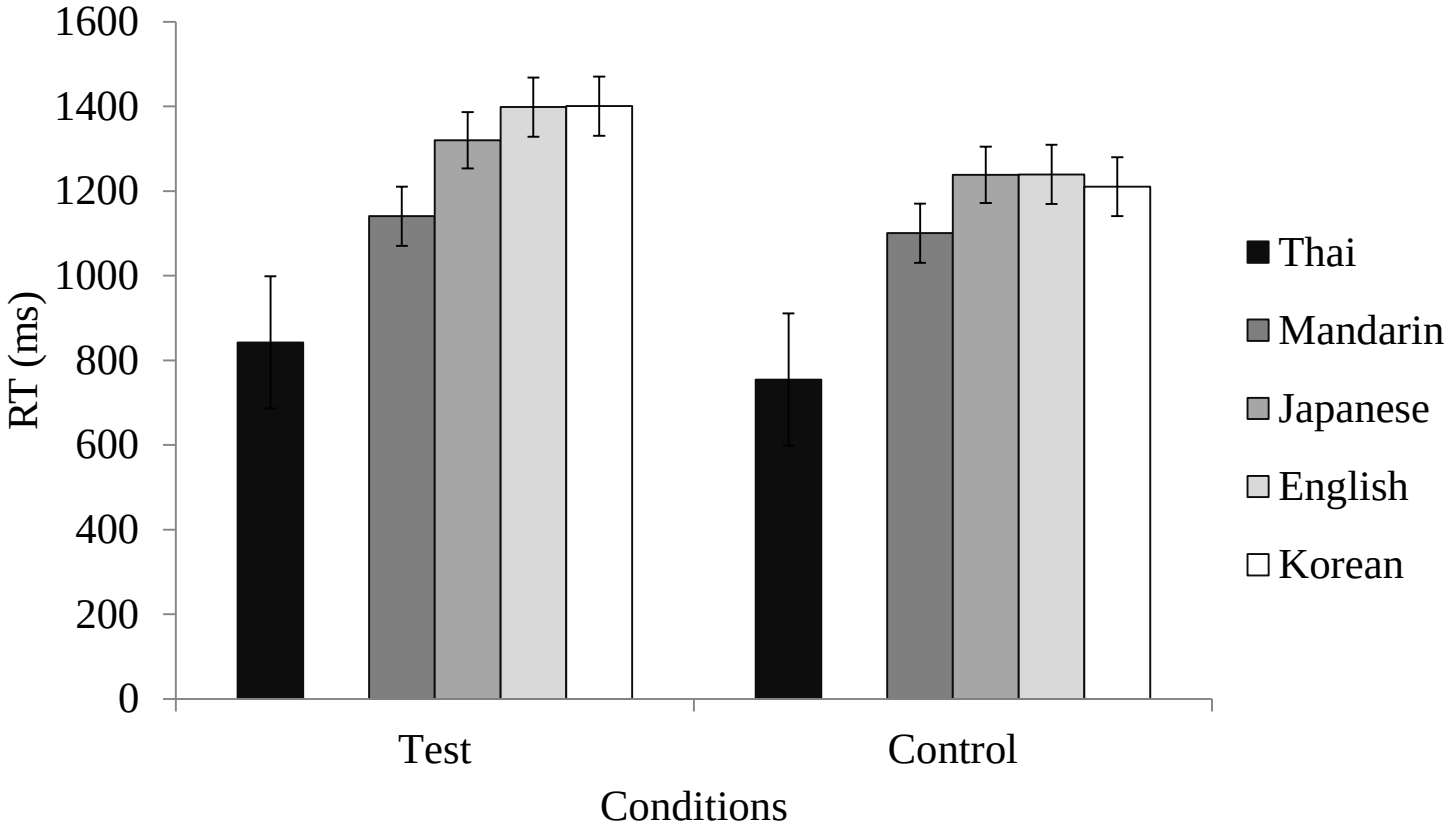
Results

Accuracy rates in each group



- Significant interaction between "group" and "condition": $F(3, 37) = 11.3$, $p < .001$
- Effect of group is significant for **test condition only :** $F(3, 67.3) = 11.3$, $p < .001$
- Predicted hierarchy of accuracy: Mandarin (M = 87% correct), Japanese (M = 77% correct), English and Korean (M = 67 % correct for both).

Reaction times in each group



- Interaction was not significant: $F(3, 37) = 2.4$, $p = 0.08$

Conclusions

☑ Influence of the L1 phonological system

The functional prominence of lexically-contrastive pitch in L1 shapes cross-linguistic perception of Thai tones

◆ Globally, our findings confirm previous results obtained across studies and add strength by allowing a direct comparison with the same methodology

Discussion: Overall performance

- Equal accuracy between English and Korean in tone discrimination was not predicted. Why?
- Are English "less accurate than expected"?
  - F_0 is rarely used *alone* to distinguish words in English, perhaps creating the same performance as if F_0 was not used at all to signal lexical contrast (English = Korean)
    - Stress constrains lexical access only to a limited extent in English (Cooper, Cutler & Wales, 2002)
    - By contrast, when F_0 can be used *alone* to distinguish words, as in Japanese, performance is higher
- Are Koreans "more accurate than expected"?
  - Influence of L2 English on Koreans?
  - Exposure to a pitch-accent Kyungsang dialect?

한국어

경상도 방언

Individual Korean Dialectal Differences

Kyungsang Korean

경상도 방언

◆ Dialectal boundaries
Lee & Ramsey, 2000

Kyungsang = Gyeongsang
Cholla = Jeolla

Lexical pitch in Korean

- Kyungsang listeners show categorical perception of Pitch accent patterns

  Kim & de Jong, 2007; Kim, 2011

- Limited advantage in the naïve perception of Japanese pitch accent

  Sukekawa, Choi, Maekawa & Sato, 1995

- Emergence of lexical pitch in standard Korean among younger speakers

  Silva, 2006

Pitch accent in Korean Kyungsang dialect

Minimal pairs of 3 lexical accent patterns

a. **[moi]**: HL vs. LH ‘feed’, ‘conspiracy’

b. **[more]**: HL vs. HH ‘sand’, ‘the day after tomorrow’

c. **[yaŋmo]**: LH vs. HH ‘wool’, ‘adoptive mother’

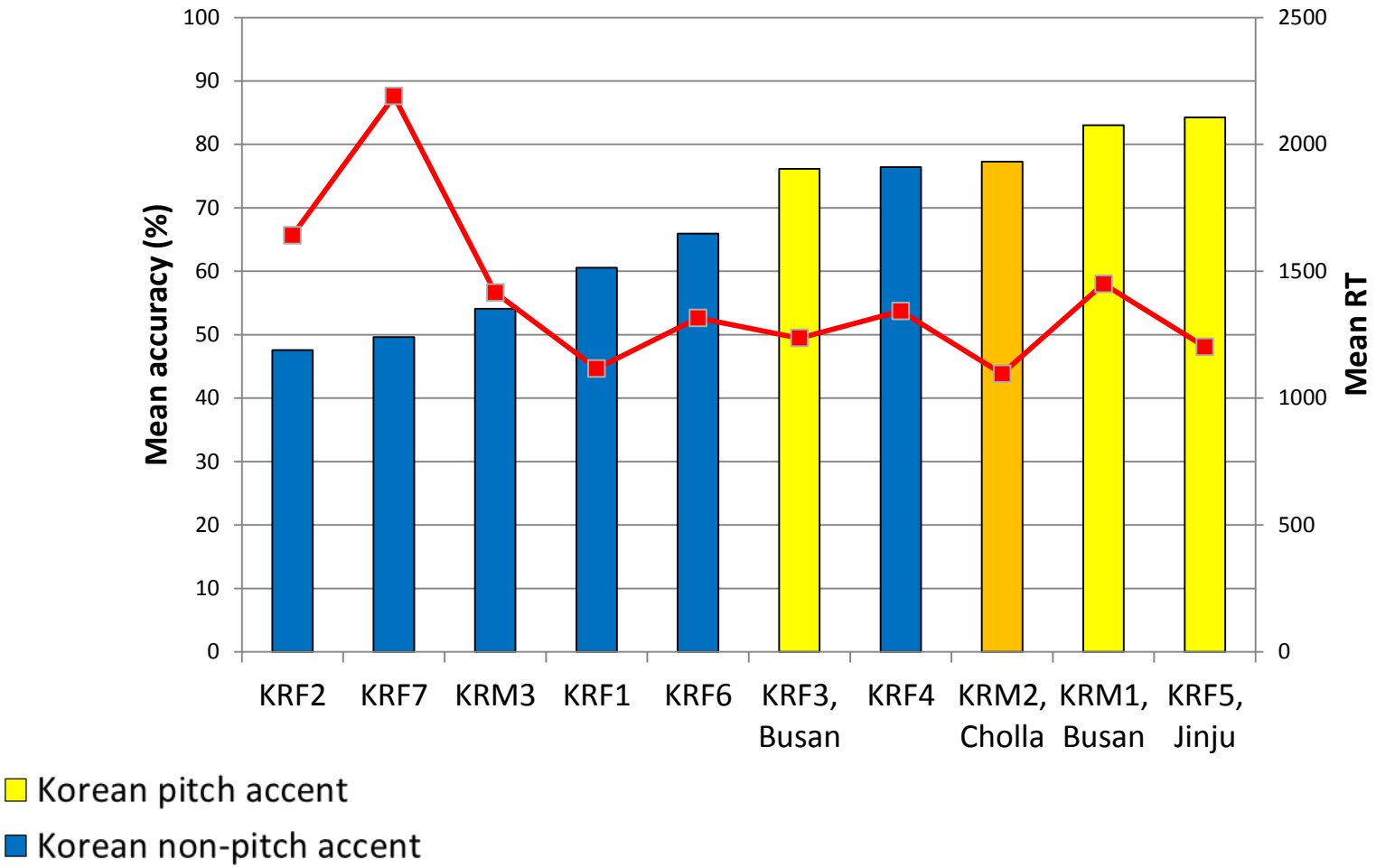
From Kim, 2011; Kim & de Jong, 2007

경상도 방언

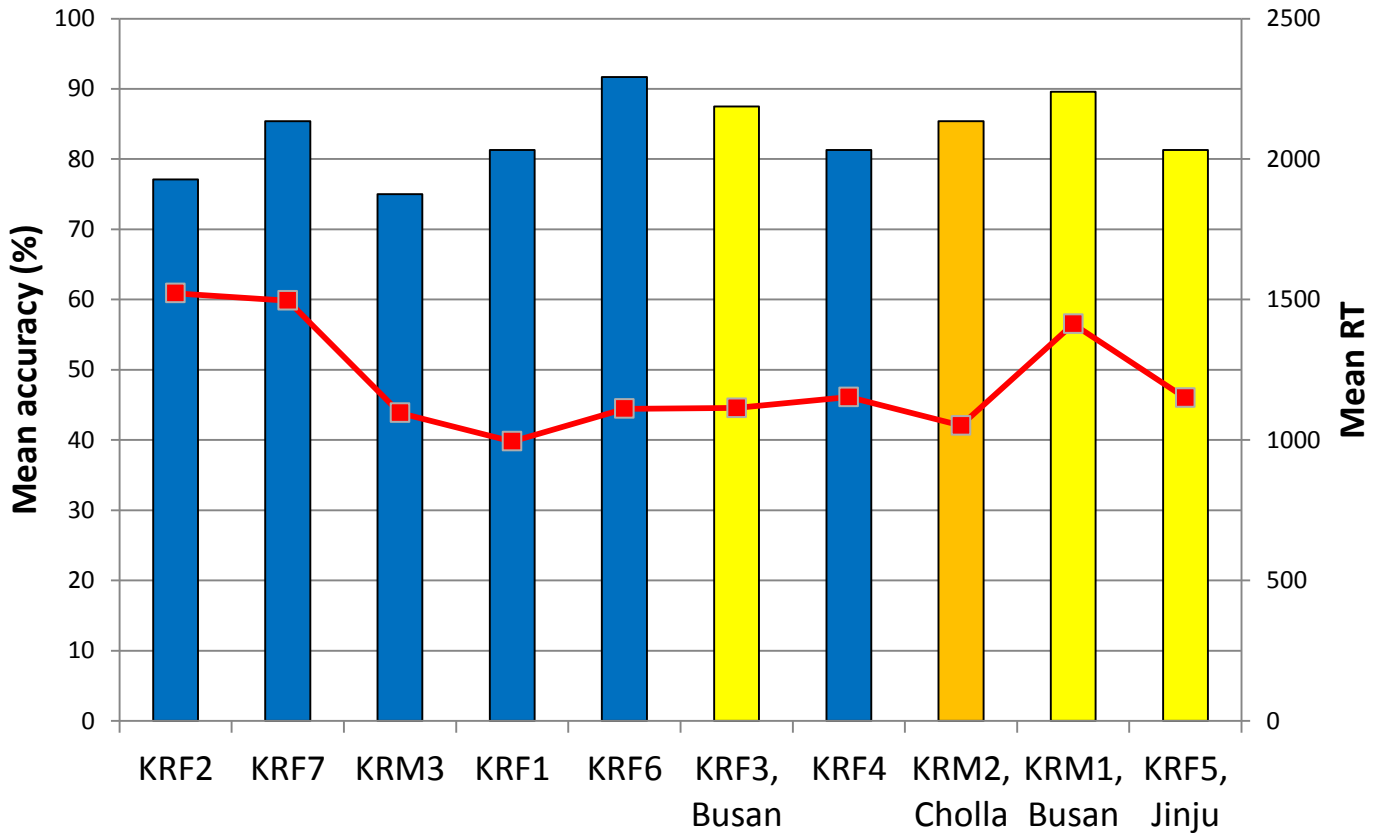
Predictions

- If the L1 phonological system determines accuracy, Kyungsang Korean dialect speakers should outperform non-Kyungsang speakers
- We examine individual performance for the Korean group

Korean performance on combined test items



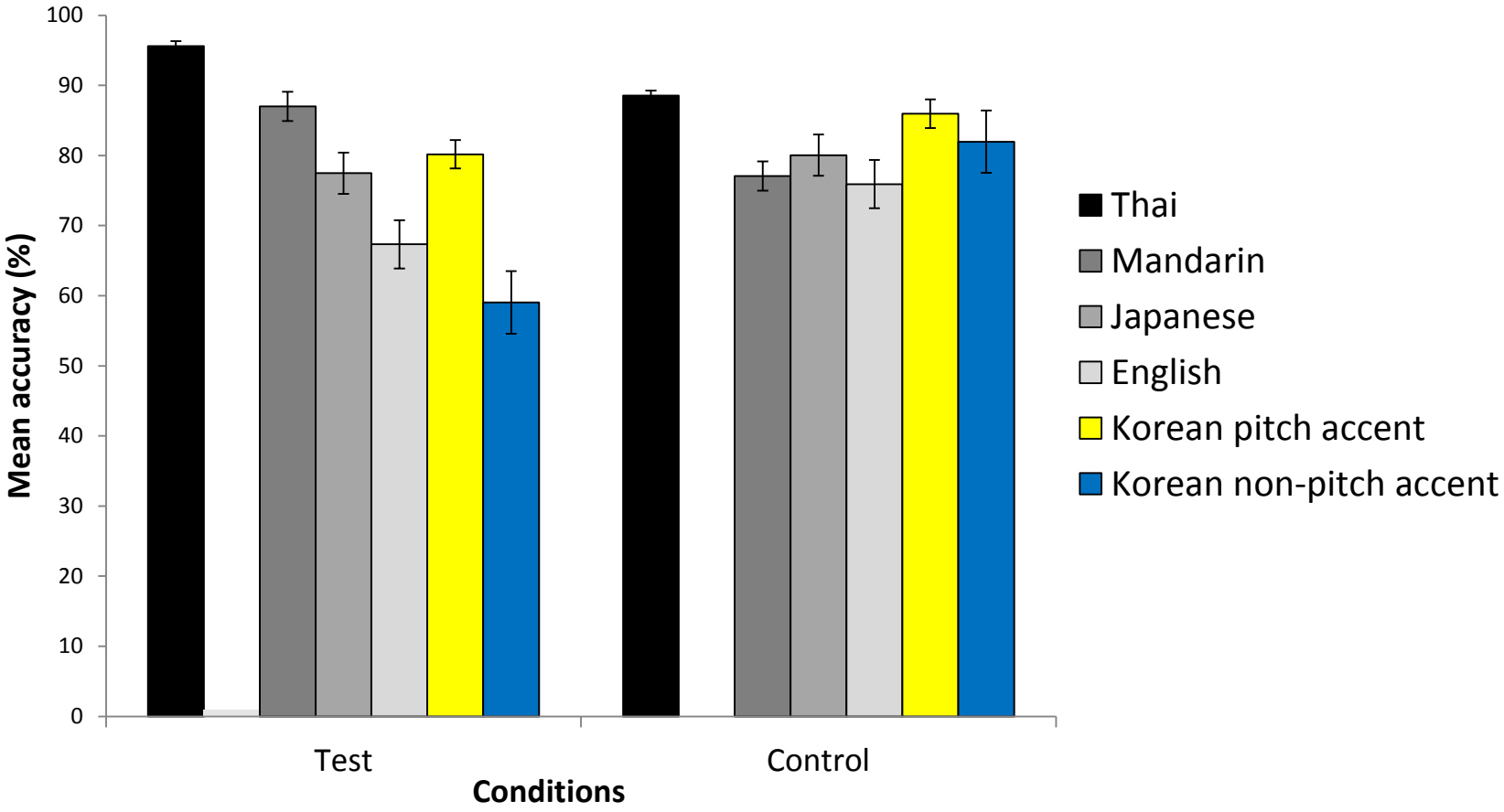
Korean performance on control items



Korean pitch accent

Korean non-pitch accent

Accuracy rates for each Korean subgroup



- We conclude that the Korean group most likely performed “More accurately than expected” because of the dialect differences within that group

Take home message

☑ Influence of the L1 phonological system - in a narrow sense, i.e. L1 dialect

- **The functional prominence of lexically-contrastive pitch in L1 shapes cross- linguistic perception**
- **Further support for the Feature Hypothesis (McAllister et al., 2002): Accuracy of perception of non-native phonological dimensions is shaped by the prominence of that dimension in the L1 phonological system**
- **For pitch: Exclusivity and domain size matter to determine prominence**

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Öner Özçelik
Rex Sprouse
David Stringer
Second Language Psycholinguistics Lab members
SLRF audience
LabPhon audience
SLS seminar classmates

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