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

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Tone

◆ Tone languages use variations of voice height = “pitch”, or “F0” to distinguish words.

◆ Patterns: LEVEL or CONTOUR

Thai tones

nâː: face falling
nǎː: thick rising
náː: aunt high level
naː: rice field mid level
nàː: 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 & Nitirarun, 2007, p. 347

Tone perception by native speakers

◆ Native speakers perceive tones as linguistic categories

◆ 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

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 F0 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

- "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

Functional scale of pitch contrasts

- Adapted from Van Lancker, 1980: 210
Pitch prominence typology and predictions for tone perception accuracy

<table>
<thead>
<tr>
<th>Language</th>
<th>Domain</th>
<th>Prominence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tone (Mandarin)</td>
<td>Lexical, syllable</td>
<td>Maximal</td>
</tr>
<tr>
<td>Pitch-accent (Japanese)</td>
<td>Lexical, word</td>
<td>High-intermediate (pitch is exclusive)</td>
</tr>
<tr>
<td>Word stress (English)</td>
<td>Lexical, word</td>
<td>Low-intermediate (pitch is non-exclusive)</td>
</tr>
<tr>
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Predicted Sensitivity/Accuracy in tone perception

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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

Maximal  ---  Prominence of contrastive pitch at the word level  ---  None
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

500 ms

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:

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<th>Control Condition</th>
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</thead>
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<td></td>
</tr>
<tr>
<td>Height (n=12)</td>
<td>Control (n=48)</td>
</tr>
<tr>
<td>Mixed (n=24)</td>
<td>consonant</td>
</tr>
<tr>
<td></td>
<td>vowel</td>
</tr>
<tr>
<td>rising-falling</td>
<td>low-mid</td>
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Accuracy rates in each group

* = significant effect of 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

![Bar chart showing reaction times for different conditions and languages.]

- Interaction was not significant: $F(3, 37) = 2.4, p = .08$

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)
    - In 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?

Individual Korean Dialectal Differences
Kyungsang Korean

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
  Sukegawa, Choi, Maekawa & Sato, 1995
- Emergence of lexical pitch in standard Korean among younger speakers
  Silva, 2006

Dialectal boundaries
Lee & Ramsey, 2000

Kyungsang = Gyeongsang
Cholla = Jeolla

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. [yɡmo]: LH vs. HH ‘wool’, ‘adoptive mother’

From Kim, 2011; Kim & de Jong, 2007

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

Accuracy rates for each Korean subgroup

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

- We conclude that the Korean group most likely performed “More accurately than expected” because of the dialect differences within that group
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SLRF audience
LabPhon audience
SLS seminar classmates

References