## INTRODUCTION

### PITCH IN TALKER IDENTIFICATION
- Pitch (f0) is an important dimension in talker identification.
- Individuals also vary widely in their ability to identify talkers.

### Musical training sharpens pitch acuity.
- Musicians outperform non-musicians in non-linguistic pitch processing ([1] and [2]).
  - Tonal language experience improves pitch-related processing.
- Native tonal language users have advantages in a variety of tasks involving lexical tones ([3]) and in production/perception of musical pitch ([4] and [5]).

### OVERARCHING HYPOTHESIS: Pitch processing abilities are related to talker identification.

Q1. Do musicianship and tone language experience enhance talker identification by sharpening pitch perception skills in a domain-general manner?

Q2. Will experience-dependent advantages in talker identification exhibit different patterns in the native language vs. unfamiliar languages?

**Language Familiarity Effect:** Talker identification is easier in one’s native language than in unfamiliar languages.

## RESULTS

### EXPERIMENT 1

**Do musicianship and tone language experience enhance talker identification?**

**YES!**
- English M & Mandarin NM > English NM p < .01
- English M = Mandarin NM p = .20
- Mandarin NM > English M & Mandarin NM p < .001
- English M = English NM > Mandarin NM p < .001
- Mandarin: Mandarin NM > English M p < .001
- English musicians outperform non-musicians in non-native languages
  - English M > English NM p < .01
  - Spanish: English M > English NM p < .005

### EXPERIMENT 2

**Do pitch processing abilities relate to talker identification skills?**

**Figure 2: Talker identification**

- Musicianship predicts better talker ID p < .005
- ME > NM p < .005; MM > NM p = .06; MM = ME n.s.
- Tone language experience enhances talker ID
- Mandarin listeners > English listeners p < .05
- Language familiarity effect p < .001

**Figure 3: Pitch perception**

- Musical training enhances pitch skills p < .001
- ME > NM p < .001; MM > NM n.s.; MM = ME n.s.
- Tone language experience enhances pitch skills
- Mandarin listeners > English listeners p < .001
- Interaction: task differences larger in the English listeners overall p < .001

**Figure 4: Mediation analysis**

**Non-native language condition**

- Musical training predicted pitch perception.
- Indirect effect of musical training on talker ID, mediated by pitch perception p < .05
- Tone language experience predicted pitch perception.
- Indirect effect of tone language experience on talker ID p < .05

**Native language condition**

- No effect of musical training (p = .18) or tone language experience (p = .47) on talker ID

## DISCUSSION

**Talker Identification: The Role of Pitch Experience**

### Musical training

- Musicianship predicted pitch processing sensitivity.
- Musicians had a benefit over non-musicians when identifying talkers in unfamiliar languages.

### Tone language experience

- Tone language speakers (Mandarin listeners) had enhanced pitch perception compared to non-tone language speakers (English listeners).
- Mandarin listeners outperformed English listeners in talker identification in unfamiliar languages.
- Taken together, these results suggest an interaction between language skills and pitch processing ability in talker identification.

**Shared Mechanisms: Music, Language and Voice Perception**

- Previously, bi-directional influences between musical and linguistic pitch use ([7]).
- Domain-specific training (musical training/lexical tone use) heightens listeners’ sensitivity to pitch, and transfers to voice identity perception.

## METHODS

### EXPERIMENT 1

**TASKS**

**TALKER IDENTIFICATION TASK:**
- Blocked by language condition: Mandarin, Spanish, or English; counterbalanced (5 male speakers in each language condition)

<table>
<thead>
<tr>
<th>Familiarization</th>
<th>Practice</th>
<th>Generalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 times x 5 talkers x 5 sentences with feedback</td>
<td>Training sentences, Canaslkulka order</td>
<td>3 times x 5 talkers x 5 sentences without feedback</td>
</tr>
<tr>
<td>3 times x 5 talkers x 5 sentences with feedback</td>
<td>Training sentences, Random order</td>
<td>3 times x 5 talkers x 5 sentences without feedback</td>
</tr>
</tbody>
</table>

### EXPERIMENT 2

**TASKS**

**TALKER IDENTIFICATION TASK (see Exp 1):**
- Blocked by Language Condition (Mandarin or English)

**PITCH PERCEPTION TASK**
- 40 pairs of pure tone sequences (20 same, 20 different)
  - Each sequence contained six pure tones
  - Local pitch task:
    - Changes in height
  - Global pitch task:
    - Changes in contour

### PARTICIPANTS

- 26 native-English non-musicians
- 10 native-English musicians
- 25 native-Mandarin non-musicians

### ACKNOWLEDGEMENTS

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