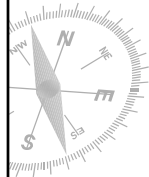


Pitch Discrimination and Pitch Matching Abilities with Vocal and Non-vocal Stimuli

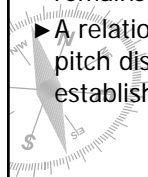


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Introduction

- ▶ The ability to accurately discriminate and match pitches varies across individuals.
- ▶ Nature of differences in these abilities remains unclear.
- ▶ A relationship between pitch matching and pitch discrimination abilities has been established (Pitt, 1994; Watts, Moore, McCaghren, 2005).



Processes involved in Pitch Discrimination and Pitch Matching

- ▶ Pitch Discrimination
 - Hearing
 - Memory
 - Attention
- ▶ Pitch Matching
 - Hearing
 - Representation in memory
 - Planning/coordination of the vocal mechanism
 - Auditory Feedback



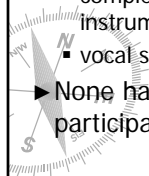
Auditory Feedback

- ▶ Compared to inaccurate pitch matchers, accurate pitch matchers may possess:
 - more finely tuned perceptual systems or
 - utilize different strategies for monitoring auditory feedback of their own vocal production



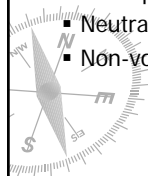
Previous Research

- ▶ Various stimulus types have been explored.
 - pure tones
 - computer generated complex tones
 - complex tones generated by musical instruments
 - vocal samples
- ▶ None have utilized recorded samples of a participant's own voice.



Purpose

- ▶ The purpose of this study was to examine pitch discrimination and pitch matching abilities with three types of stimuli.
 - Participant's own voice
 - Neutral female voice
 - Non-vocal complex tones



Research Questions

- ▶ Does stimulus type influence pitch discrimination and pitch matching accuracy in musically untrained individuals?
- ▶ Are there differences in pitch discrimination and pitch matching accuracy in musically untrained individuals who are accurate and inaccurate pitch matchers, when presented with different stimuli types?

Participants

- ▶ 20 females ranging in age from 20 to 30 years
- ▶ All participants had normal hearing thresholds
- ▶ No history of voice, speech, language, and/or hearing disorders
- ▶ No formal vocal musical training

Stimuli

- ▶ Non-vocal complex tones:
 - 212 Hz Fundamental Frequency/Reference
 - 200, 206, 212, 218, and 224 Hz
- ▶ Neutral female voice condition:
 - 212 Hz Digitally manipulated fundamental frequency
 - 200, 206, 212, 218, and 224 Hz
- ▶ Participant's own voice
 - Fundamental Frequency
 - +50 cent, +100 cent, -50 cent, and -100 cent

Pitch Discrimination Task

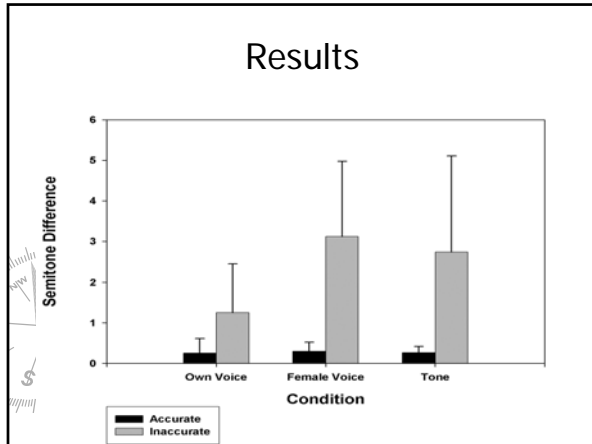
- ▶ Within each condition: 3 sets of stimuli.
- ▶ 3 sets of stimuli - 4 possible combinations:
 - All three stimuli having the same F0
 - The F0 of the first stimulus differing from the second and third stimuli
 - The F0 of the second stimulus differing from the first and third stimuli
 - The F0 of the third stimulus differing from the first and second stimuli

Pitch Discrimination Task Procedures

- ▶ Three blocks of 65 stimuli sets
 - non-vocal complex tones
 - neutral female voice samples
 - participant's voice
- ▶ Participant task: determine if the stimuli were the same pitch or if one of the stimuli was different in pitch

Pitch Matching Task

- ▶ The stimuli consisted of 15 target stimuli
 - non-vocal complex tones
 - neutral female voice samples
 - participant's voice
- ▶ Participant task:
 - Listen to the target stimulus
 - Vocally match the pitch with the vowel "ah"



Post Hoc Analysis

- ▶ Pairwise comparisons indicated a significant difference between the participants' matching of their own voice and the other two stimuli conditions.
- ▶ No significant difference between the neutral female voice condition and the non-vocal complex tone condition.

Discussion

- ▶ Own Voice
 - Loudspeaker – Air conduction
 - Production – Bone + air conduction
- ▶ Accuracy across stimuli
 - Accurate pitch matchers were generally accurate for all three stimuli types.
 - Inaccurate pitch matchers were most accurate for their own voice.

Implications

- ▶ Pitch matching to one's own voice and to tonal stimuli might indicate the source of singing inaccuracy:
 - coordination of the vocal mechanism
 - pitch discrimination
- ▶ Using one's own voice as target stimuli for voice therapy may be beneficial

Thank You.

Are there Questions?