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).

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

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

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.

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
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”
Results

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?