Effects of singing on perceptual pitch learning by nonmusicians.

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Introduction

Musical Perception & Production

- An oddity of current Western culture is that many people listen to music, but don't make music themselves.

- Non-musicians still listen using implicitly learned conventions of musical culture (Krumhansl & Keil, 1982; Smith et al., 1994) and to sing without explicit training (Watts et al., 2003).

- Those who pursue musicianship come to training with many perceptual and productive prerequisites (Sloboda, 1994).

- Musicianship is about more than training the body to produce sounds, and becoming a musician has powerful effects on perception (Münte et al., 2002; Skoe & Kraus, 2012; Bradley, 2013).

- Music perception and production are tightly linked (Zatorre et al., 2007), and their interaction is an important aspect of musical development (Novembre & Keller, 2014).

- Music pedagogy includes the development of the ear through aural skills training alongside instrumental/vocal training.

Hypotheses

- Does pairing perceptual training with singing enhance learning for novices, or is a certain level of proficiency necessary for synergy?

- Context affects learning, and active musical participation produces greater behavioral and neural effects than passive listening (Patel, 2011), leading to the expectation that activating both modes of music should increase perceptual learning.

- Speech evidence (Wong & Perrachione, 2007) suggests learning of new contrasts proceeds along a continuum: phonological category formation depends on acoustic perception, and functional use depends on the robustness of the contrast.

- Some level of perceptual competence may be prerequisite for production, and production training at an early stage may be a distraction, rather than an enhancement to perceptual learning.

Acknowledgements

Experiment

- We trained 12 nonmusicians[a] to identify melodic intervals using computerized aural skills training (*EarMaster*).
- All participants practiced identifying the intervals by name.
- Some participants also practiced singing the same intervals, while others received only perceptual training.

[a]Some had amateur instrumental experience, but none were professional musicians and none had studied aural skills.

Ear Training

Training Tasks

- Participants were trained on four melodic intervals presented in ascending and descending directions in a piano timbre.
- All learners trained on identification with feedback, and a supplemental task depending on condition.

Major Second   Perfect Fourth   Perfect Fifth   Octave

Interval ID: Learners hear one interval, and choose its name.
Interval Comparison: Learners hear two intervals which begin on different notes and choose which interval is "larger".
Interval Singing: Learners hear an interval, and repeat it by singing or humming; *EarMaster* scores the accuracy of the production.
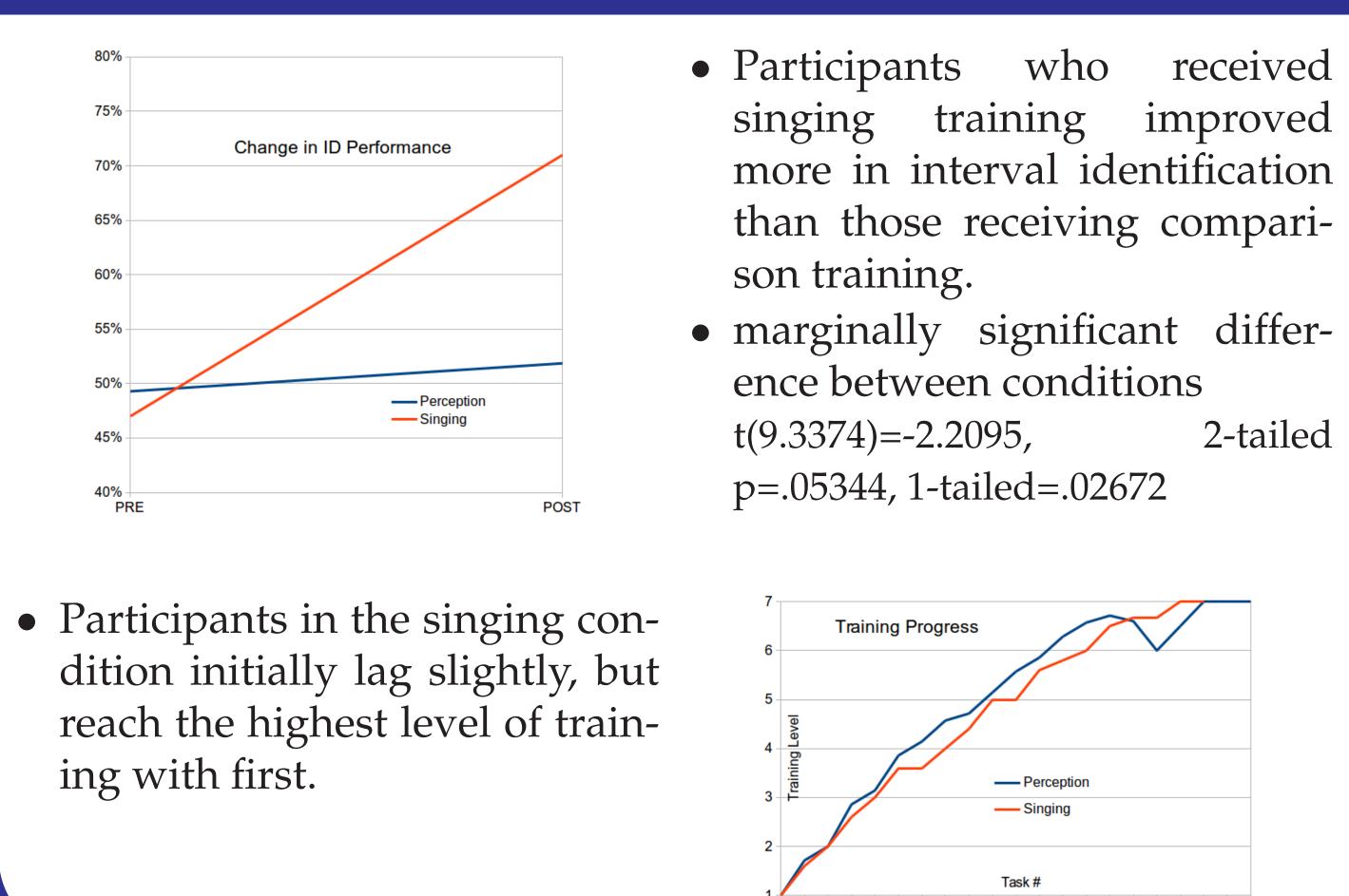
Levels of Difficulty

- Learners begin and end with identification of all four intervals.
- Training level included two intervals of increasing similarity.
- Learners repeated a level once if they scored <70% at ID.

Level	Perception	Singing
Pre-Test (4 intervals)	ID (20)	ID (20)
M2 vs. 8ve	Comparison (20) ID (20)	Singing (20) ID (20)
P5 vs. 8ve	Comparison (20) ID (20)	Singing (20) ID (20)
M2 vs. P4	Comparison (20) ID (20)	Singing (20) ID (20)
P4 vs. P5	Comparison (20) ID (20)	Singing (20) ID (20)
Test (4 intervals)	Comparison (20) ID (40)	Singing (20) ID (40)

Results

- Participants who received singing training improved more in interval identification than those receiving comparison training.
- marginally significant difference between conditions t(9.3374)=-2.2095, 2-tailed p=.05344, 1-tailed=.02672

- Participants in the singing condition initially lag slightly, but reach the highest level of training with first.

Discussion

- Pairing production training with perceptual training appears to improve perceptual outcomes, compared to perceptual training alone.

- Further research with a wider sample is needed to clarify the relationship between the training method and characteristics of the learner.

- Our goal is to use these findings to design longer term training paradigms, and to examine crossover of musical training to lexical tone learning, including with L1 and L2 tone language speakers

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