Optimized speech sound category training bootstraps foreign word learning

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INTRODUCTION

Speech sound categories in foreign language learning

Background
1. Learning foreign speech sound categories is difficult because the perceptual space that listeners operate on is warped by previous language experience.
2. Specific auditory training can help learning, but large individual variability is observed.
3. The current objectives are to develop an optimized training paradigm based on current understanding of the neurobiology of category learning, and
4. To examine the extent to which optimized category learning can bootstrap word learning.

Mandarin tone learning
1. Mandarin Chinese incorporates 4 lexical tones that serve phonological functions, which native English speakers find challenging to learn.
2. The ability to discriminate these tones is essential in learning Mandarin words.

Premises of this study
1. Current foreign language learning softwares rarely emphasize speech sound category learning prior to the immersion approach.
2. Mandarin learning by native English speakers is a good example of speech sound category learning, where the category structure is novel but the sensory experience is not.
3. If we can optimize Mandarin lexical tone category learning, it should be possible to bootstrap tonal word learning as well.

RESULTS

Part 1: Optimized speech sound category learning

Analysis
• 2-way repeated measures ANOVA
• X = blocks; Y = learning group (optimized vs. control)

Significant main effects
- Main effect of BLOCK (p < .01), indicating that the participants’ accuracy in category judgments improved as they progressed through the sessions.
- Main effect of GROUP (p < .05), indicating that the participants in the optimized group identified the words better than those in the control group.

Part 2: Word learning

Analysis
• 2-way repeated measures ANOVA
• X = sessions; Y = learning group (optimized vs. control)

Significant main effects
- 2-way interaction between SESSION and GROUP (p < .05), indicating that the participants in the optimized group learned the words better than those in the control group.

DISCUSSION

Conclusions
1. The optimized speech sound category learning paradigm works, because it initially boosts the reflexive system through (1) full feedback and (2) grouped talker presentations, while moving on to boost the reflexive system through (1) minimal feedback and (2) random talker presentations. The competing systems were selectively enhanced.
2. Higher performance in the optimized relative to the control group is especially noteworthy given the participants received same amount of exposure.

Implications
1. The current understanding of neurobiological learning systems affords an insight to optimizing phonological training via relatively simple adjustments in learning procedures.
2. Optimized phonological training can bootstrap word learning.