Ultrasound Overlay Videos: Testing its Effectiveness for Teaching L2 Cantonese Sound Contrasts

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Introduction

• Ultrasound technology can be used to image hidden speech articulators, such as the tongue
  • Effective as biofeedback tool in L2 pronunciation training (Gick et al., 2008)

• Ultrasound overlay videos are a way to get around technological limitations
  • More widely accessible
  • Easier to understand

• Potential advantages for usage of overlay videos in learning pronunciation
  • Student survey data: helpful for novel phonetic contrasts (Narsen et al., 2010)
  • Pilot experimental data: improved Cantonese vowel contrast production (Alles et al., 2016)

  • The current study builds on pilot study with improved methods and larger sample size.

Research Question

Do Cantonese-learning students who interact with ultrasound overlay videos improve in distinguishing Cantonese sound contrasts in (i) production and (ii) perception? ----

(i) Can they produce a larger contrast between the sounds?
(ii) Can they perceive the sounds and their contrast more accurately?

Methods

Participants: 30 students enrolled in Introductory Cantonese

Materials: 2 Training Websites with either ultrasound overlay videos or audio

Variables:

- Sound Contrasts
  i) Low central vowels
     - aa [a] vs. o [e]
  ii) Final unreleased stop consonants
     - p [p] vs. t [t'] vs. k [k']

- Evaluations
  a) Production Recordings
     - numerals, vocab
  b) Perception Quiz
     - yes/no, same/different, 123

- Training Conditions
  1) Ultrasound Overlay Video (n=11)
  2) Audio-only (n=9)
  3) No Training* (n=10)
     *Self-selected group

Procedure:

Pre-Recording (Production)  Pre-Quiz (Perception)
1) Ultrasound Overlay Videos
2) Audio-Only
3) No Training

Post-Recording (Production)  Post-Quiz (Perception)

Results

Change in Vowel Height Differentiation by Word Type

Scores on Perception Quiz

Test
Pre
Post
Contrast
top
vowel

Discussion

Production

• Trend of vowel production improvement in Ultrasound Overlay Video training condition
• Largest increase from pre- to post-recording in vowel height (F1 value) differentiation between a and aa

Perception

• No significant differences in perception between training conditions or different question types
• All groups had improved scores for vowel and stop questions in the post-quiz

Future Directions

• Analyze stop consonant production data
• Gather nativeness rating data as second measure of productive abilities
• Test benefits of videos when more explicit instruction

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References