L2 Acquisition and Production of the English Rhotic Pharyngeal Gesture

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INTRODUCTION

- Rhotic consonants vary cross-linguistically in the presence and parametric specification of a pharyngeal gesture.
- Three supralaryngeal constrictions in American English rhotic consonant all contribute to characteristic F3 lowering.
- Acquisition of the pharyngeal component of English /ɹ/ may pose significant perceptual and/or control issues to L2 learners.

RESEARCH QUESTIONS

1. To what extent do L2 English learners accurately acquire and produce the pharyngeal gesture in English /ɹ/?
2. Do the features of L2 English learners’ L1 rhotic consonants influence their production of English /ɹ/?

PARTICIPANTS & MATERIALS

- Three Male Speakers: 1 L1 English (ENG), 1 L1 Greek/L2 English (GK), and 1 L1 French/L2 English
- Real-Time MRI recordings of participants reading “The North Wind and the Sun” in English and their native language.
  - Temporal Resolution: 23.18 frames per second
  - Spatial Resolution: 68 x 68 pixels (200 x 200 mm)
  - 250 rhotic consonant tokens collected and analyzed (30 - 56 tokens per recording).

ANALYSIS

- Two pseudo-circular regions (radius of three pixels) manually defined along an automatically derived vocal tract milline.
- Blue region = High Pharyngeal (HI)
- Red region = Low Pharyngeal (LO)
- Average pixel intensity inside each region calculated for each frame.
- Higher pixel intensity = greater amount of tissue in the region.
- Onset and maximum constriction of gestures found using algorithm developed in [1].

RESULTS: HIGH PHARYNGEAL REGION

- Mean pixel intensity significantly higher in the HI region in both L1 and L2 for FR than for either of the other speakers.
- Indicates presence of expected French rhotic high pharyngeal gesture in both languages.
- Mean pixel intensity in HI region not significantly different between French and English for FR.

SUMMARY & IMPLICATIONS

- Neither FR nor GK consistently exhibited a native-like low pharyngeal gesture in their production of /ɹ/.
  - Significantly higher pixel intensity observed in LO region for ENG than for FR or GK.
  - Both FR and GK demonstrated similar production patterns in the production of their L1 and English rhotics, as gauged by mean pixel intensity within HI and LO regions.
  - Production similarities between L1 and their L2 for these speakers suggest influence of native language rhotic production on acquisition of English rhotic.
  - Evidence for transfer of high pharyngeal gesture from French to English for speaker FR.
  - Speaker GK’s lack of constriction in LO region consistent with L1 transfer, but may also reflect general acquisitional difficulty of pharyngeal gesture.