THE EFFECT OF DISTRIBUTIONAL TRAINING ON THE PRODUCTION OF NON-NATIVE VOWEL CONTRASTS

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INTRODUCTION

Acquiring a second language as an adult learner is challenging:
- Adults have difficulty perceiving and producing L2 sounds contrasts (Flege, 1995)
- The perception of non-native stimuli depends on the listener’s L1 phonology (e.g. Kuhl, 1991; Flege, 1999; Best, et al., 2011; Strange, 2011)

Perceptual learning can transfer to production:
- Perceptual training improves L2 production (e.g. Flege, Kuhl, Berk, 1992)

Using distributional training to teach L2 contrasts:
- **Unimodal**: stimuli drawn largely from the middle of the continuum
- **Bimodal**: stimuli drawn largely from the two endpoints of the continuum near the target contrasts
- **Bimodal > Unimodal** (Maye, 2000; Hayes, 2003; Baese-Berk, 2010)

METHODS

Participants:
- 34 adults (ages 18-30)
- Mean age: 21.5 years (SD=3.0)
- Bimodal: 22.5 years (SD=2.0)
- Unimodal: 22.2 years (SD=2.7)
- No knowledge of languages containing front-back rounding contrasts

Stimuli:
- Native French speaker produced /o/, /o/, & filler vowels in /dVt/ within carrier phrase
- Synthesized eight-step continuum

<table>
<thead>
<tr>
<th>Step</th>
<th>Ideal F2 (bark)</th>
<th>Actual F2 (bark)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10.05</td>
<td>10.95</td>
</tr>
<tr>
<td>2</td>
<td>10.13</td>
<td>10.93</td>
</tr>
<tr>
<td>3</td>
<td>10.33</td>
<td>10.33</td>
</tr>
<tr>
<td>4</td>
<td>10.02</td>
<td>10.03</td>
</tr>
<tr>
<td>5</td>
<td>9.72</td>
<td>9.73</td>
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<tr>
<td>6</td>
<td>9.41</td>
<td>9.44</td>
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<td>7</td>
<td>9.10</td>
<td>9.08</td>
</tr>
<tr>
<td>8</td>
<td>8.79</td>
<td>8.79</td>
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Perceptual training:
- Hear stimulus 1-8
- Select image
- Added supports:
  - Lexical support
  - Feedback
  - Overnight consolidation

Repetition task:
- Performed at both baseline and post-training
- Repeated /dVt/ syllables containing /o/ and /o/, 4x each

Outcome measures:
- **Perception:** Boundary width, accuracy
- **Production:** Euclidean distance between /o/ and /o/

DISCUSSION

Summary of results:
- Listeners in both conditions improved perception
- Listeners in both conditions improved production

Transfer of learning:
- Perceptual training can result in improvements in production
- The findings support the idea of a link between perception and production

Participants in unimodal condition demonstrated learning:
- Unlike past studies, the unimodal condition resulted in as much learning in perception
- Performance in the unimodal condition may be attributed to the added supports present in this study

Clinical implications:
- May be used to facilitate the learning of other types of contrasts in second language acquisition
- May be used to help children with speech sound disorders to acquire difficult phonemes

PERCEPTION RESULTS

Identification performance:
- Post-training > Baseline

REFERENCES


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