Objectives

Measure Articulatory Setting (AS) in English & French monolinguals
Compare monolingual results to AS in English-French bilinguals

Background

- Different languages sound different because of:
  - Different phonemes
  - Different phonological processes
  - Different articulatory settings

- When speaking a foreign language, one’s articulators (i.e., the tongue, jaw, lips, etc.) seem to have a whole different underlying posture. This underlying or default posture is a language’s articulatory setting (AS).

- Some have insisted that learning the pronunciation of an L2 first would not measure it (Connor, 1973), but that it makes it impossible to distinguish AS from setting required for segments (Laver, 1980).

- Gick et al. (2004) compared AS across languages using existing x-ray movies of speech (Mushahli et al., 1994) to measure inter-speech posture (ISP).

- ISP is defined as the position of the articulators during inter-utterance pauses, when they are motionless (but still in speech mode - Ohman, 1967; Perkell, 1969).

- Found significant differences between Canadian English and Québécois French for the position of the tongue and the protrusion of the lips.

Method

Subjects:
- 10 monolingual Canadian-English speakers (reduced to 7)
- 12 monolingual Québécois-French speakers (reduced to 8)
- 11 bilingual English-French speakers (reduced to 9)

Trials:
- Monolingual subject trials:
  - 6 blocks of 30 utterances (≈ 180 rest positions per subject)
  - Bilingual subject trials:
  - 2 English blocks, 2 French blocks, 2 mixed language blocks

Before mixed language blocks, subject was informed that language of the next sentence is randomly selected - i.e., subject must be ready to produce either language

Data collection setting

Optotrak marker positions

MATLAB analysis

Results

Monolingual Results

<table>
<thead>
<tr>
<th>Tongue tip height</th>
<th>English higher</th>
<th>p = 0.0340</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper lip protrusion</td>
<td>English more protracted</td>
<td>p = 0.0242</td>
</tr>
<tr>
<td>Lower lip protrusion</td>
<td>English more protracted</td>
<td>p = 0.0163</td>
</tr>
</tbody>
</table>

Bilingual Results

Discussion and Conclusions

- AS, as seen through ISP, differs across English and French monolingual groups:
  - English tongue tip higher
  - English lips more protruded
  - English lips more narrowed from maximum spread

- Differences across a given bilingual’s AS in each language were similar to differences across monolingual groups

- Similar results for tongue tip height
- Identical results for lip protrusion
- Different results for lip narrowing

- Bilingual-mode AS is simply the AS of the dominantly-used language at that time
- Suggests that differences between bilingual mode and monolingual mode (Grosjean, 1998) do not hold at the phonetic level

- In the field of L2 acquisition, especially that of pronunciation teaching, these results provide much-needed quantitative evidence to support the teaching of AS

Future Research

- Determine whether AS is correlated to type and/or token frequency of phonemes in a language
- Test whether AS differs for natural speech vs. read speech, nonsense words vs. real words (i.e., whether AS is task dependent)
- Test what is perceptually salient in AS (i.e. if learned, how is it learned?) Test how much can be heard in the face
- Determine how AS differs from absolute rest position
- Discover under what circumstances AS is activated (e.g., when listening to speech, etc.)

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References


Columbia. (1983). *Pedagogical tools for teaching articulatory setting*. In M. J. Solé, Elaine Opps, & audiences at Ultrafest, ASA Vancouver, and Others.