Testing American English for a glide-vowel distinction: A classification by acoustic cues

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Study Aims

- Test if native speakers of American English exhibit a glide-vowel distinction (here, [j] vs. [i])
  - in pre-existing word pairs
  - in nonce words
- Analyze what acoustic cues most consistently convey any such distinction, for purposes of
  - acoustic phonetic documentation
  - comparing phonological representations

Background

- Competing accounts debate whether a glide-vowel distinction is phonologically possible/attested.
  - glide-vowel counterparts are fully predictable allophones: no distinction available (Steriade 1984)
  - language systems can contrast between glide-vowel counterparts: distinction available (Levi 2008)
- Those arguing for a distinction debate its nature and best characterization.
  - Place/articulator: [j] = Cor; [i] = Dors (Levi 2008)
  - Constriction/height: [α vocalic] (Padgett 2008)
  - Syllabic pre-linking: identically featured, (Levin 1985, Levi 2008) pre-specified wrt syllabification

Methods

- 9 native speakers of American English
- audio-recorded sentence reading task
  - real words + nonce names (separate blocks, 4 reps each)
  - ½ target stimuli, ½ fillers

Stimuli

- paired C_V environments
  - real word pairs (by expected pronunciation)
    - [i]: Estonia, hernia, millennia, Armenia
    - [j]: pneumonia, California, Kenya, gardenia
  - example sentences
    - The citizens of Estonia protested the decision.
    - Her pneumonia pushed her into a heavy fever.
  - nonce names (last names w/ randomly assigned honorifics)
    - orthography: expecting <y> → [j] vs. <i> → [i]
    - position: C_; word-initial vs. word-medial
      - C_; Labial Coronal Dorsal
      - /p/, /b/, /m/, /t/, /d/, /s/, /n/, /k/, /q/.
    - training
      - You will hear sentences with unfamiliar last names.
      - All use the vowels [a], [i], [u], [o].
      - The stressed vowel is marked with an accent.
    - example sentences (position × orthography, C_; /n/)
      - Dr. Nyápa avoids alcohol. Sister Niáfi boxes at the gym.

Analysis and Competing Acoustic Predictions

vocalic material between C_ and _C segmented and measured

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Prediction</th>
<th>Reason</th>
<th>Account</th>
</tr>
</thead>
<tbody>
<tr>
<td>F2max</td>
<td>[jV] &gt; [iV]</td>
<td>[j] more front than [i]</td>
<td>place/articulator</td>
</tr>
<tr>
<td>F1min</td>
<td>[jV] &lt; [iV]</td>
<td>[j] higher than [i]</td>
<td>constriction/height</td>
</tr>
<tr>
<td>intensity range</td>
<td>[jV] &gt; [iV]</td>
<td>[j] more constricted than [i]</td>
<td></td>
</tr>
<tr>
<td>duration</td>
<td>[jV] &lt; [iV]</td>
<td>[jV] = 1s; [iV] = 2s</td>
<td>all accounts</td>
</tr>
<tr>
<td>F2max time</td>
<td>[jV] &lt; [iV]</td>
<td>[jV] = earlier transition (Chitoran 2002)</td>
<td></td>
</tr>
<tr>
<td>F2 slope</td>
<td>[jV] &gt; [iV]</td>
<td>[jV] = faster transition (Liberman et al. 1966)</td>
<td></td>
</tr>
</tbody>
</table>

Results

element utterances →

<table>
<thead>
<tr>
<th>jV:</th>
<th>shorter duration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>wider intensity range</td>
</tr>
<tr>
<td></td>
<td>(yellow line)</td>
</tr>
<tr>
<td></td>
<td>less F2 climb</td>
</tr>
<tr>
<td></td>
<td>earlier F2 fall</td>
</tr>
</tbody>
</table>

SSANOVA F2 plots

nonce name utterances

Conclusions and Discussion

Native speakers of American English appear to have a distinction between [CjV] and [CiV] sequences, both apparent in pre-existing words and productive in new/nonce words.

- The [j] glide has a consistently earlier transition to _V and a seemingly higher lingual articulation (lower F1min) than its [i] vowel counterpart. Results also suggest that [j] is not significantly more front than [i].
- These observations support a constriction/height-based characterization of this distinction. (e.g., Padgett 2008)

→ Do these phonetic characteristics hold for languages with distinctions that have been phonologically analyzed as place/articulator-based? (Levi 2008)