The Articulation of Derived Affrication in American English

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Research Questions

What do articulatory gestures tell us about coronal stops before /s/ in English?

1. Do different morphological structures play a role in the articulation of coronal stops before /s/ (e.g., tree vs. next room)?

2. As in various other coarticulation phenomena, does frequency influence the articulation of coronal stops before /s/ (e.g., dream vs. tawdry)?

Data

• Coronal stops often become affricated (or palatalized) before /s/:
  
  |      | /tːiː/ | /[tːiː]| /[tːiː]/ |
  |      | /dːim/ | /[dːim]| /[dːim]/ |

  Morphological structures and frequency of words influence the degree of many coarticulatory processes (Bush, 2001, Ernestus et al., 2006, Myers and Li, 2009).

  Derived affrication, as another coarticulatory process, may show evidence of the influence from morphological structures and frequency.

  - Greater degree of affrication / palatalization in within-morphemes, high-frequency environments expected

Data Collection & Analysis

• 7 speakers of American English recruited at the University of Arizona
  - 4 male & 3 female speakers
  - Age range from 21 to 36
  - Speakers of Midwestern American English except for Speaker 5

• 2 morphological conditions - within- vs. between-morphemes

• 2 frequency conditions - high- vs. low-frequency

  - Frequency information retrieved from Corpus of Contemporary American English (COCA, Davies, 2008)

  - All 7 speakers were perceived to show affrication in at least some test words.

  - 51 tokens per speaker considered for analysis (17 words × 3 repetitions × 7 speakers × 357 tokens in total)

  - Ultrasound tongue contours manually traced

  - Statistically analyzed using Smoothing Spline ANOVA (Davidson, 2006)

Results

Result 1: Within- (red) vs. Across-Morphemes (green)

The articulation of coronal stops before /s/ did not show any effect of morphological structures in general.

![Graph of tongue height (pixels) showing affrication](image)

Result 2: High- (red) vs. Low-Frequency (green)

The articulation of coronal stops before /s/ only shows frequency effect for /d/, but mostly not for /t/.

![Graph of tongue height (pixels) showing frequency effect](image)

Discussion

<table>
<thead>
<tr>
<th>RQ</th>
<th>Comparison</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1a</td>
<td>/t/ in within- vs. across-morphemes</td>
<td>mostly no difference</td>
</tr>
<tr>
<td>Q1b</td>
<td>/d/ in within- vs. across-morphemes</td>
<td>mostly no difference</td>
</tr>
<tr>
<td>Q2a</td>
<td>/t/ in high- vs. low-frequency items</td>
<td>mostly no difference</td>
</tr>
<tr>
<td>Q2b</td>
<td>/d/ in high- vs. low-frequency items</td>
<td>sometimes different</td>
</tr>
</tbody>
</table>

• Most of the times, morphological structures and frequency do not play a role in articulatory patterns (Q1a, Q1b, Q2a).

• However, the articulation of /d/ before /s/ often shows frequency effect (Q2b).

• The articulatory data from 7 speakers yield individualized patterns in terms of tongue contours.

Conclusions

• Overall, the preliminary results from 7 speakers show that morphological structures and frequency do not always manifest as articulatory gestures.

• Future studies are needed to further examine the influence from morphological structures and frequency across various modalities of speech processing.

Selected References


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