The extent of variation in the production of coronals in English infant-directed speech

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I. Introduction

• Casual adult-directed speech (ADS) has copious phonetic variation [e.g., 4]
• In contrast, infant-directed speech (IDS) has been previously argued to be more canonical (faithful to dictionary pronunciation) [5][6]
• However, recent studies find IDS and ADS to be equally variable [2]
• Typically IDS variation examined word-finally
• But cross-linguistically in adult grammars, onset positions are more phonologically stable and salient [1]

Does the extent of phonetic variation in IDS differ based on segment position in a word?

II. Methods

• IDS from Providence Corpus (longitudinal) [3]
  - 6 monolingual English-speaking 1- to 3-year-olds interacting with parents (usually mothers) at home during everyday activities
  - Data from two age ranges, 16-18 and 22-24-mo-old
• Utterances with coronal stops and fricatives (/t/, /d/, /n/, /s/, /z/) identified using orthography
• Utterances were forced-aligned [7]
• Alignment check, phonetic transcription of allophonic variants by 3 phonetically-trained native speakers of English.
• Automated data extraction, problematic tokens (alignment/transcription error) rechecked by 4 new phonetically-trained native speakers of English
• Examples of phonetic coding of segments

<table>
<thead>
<tr>
<th>Target sound</th>
<th>Phonetic realization</th>
<th>Position in word</th>
<th>Preceding segment</th>
<th>Following segment</th>
<th>Word class</th>
</tr>
</thead>
<tbody>
<tr>
<td>t</td>
<td>?</td>
<td>final</td>
<td>p</td>
<td>n</td>
<td>content</td>
</tr>
<tr>
<td>s</td>
<td>?</td>
<td>medial</td>
<td>p</td>
<td>t</td>
<td>uppers</td>
</tr>
</tbody>
</table>

- Final corpus: 28,775 segments
- Currently processed: 25,296 segments

III. Results – Variants by position

Initial (7,054 tokens)
- Canonical variant [released stop/fricative] was the most frequent variant for every segment

Medial (7,095 tokens)
- Canonical variant was still the most frequent variant for every segment, but to a lesser degree

Final (11,147 tokens)
- Canonical variant is not the most frequent variant for either /t/ (13%) or /d/ (31%)
- Large differences by segment

IV. Results – Duration variation by position

• How variable is the production of coronal tokens in different positions?
• Even among canonical tokens, duration of /t/ varies most word-finally; in contrast, there are no differences in duration of canonical /n/ & /s/ across positions.

V. Results – Comparison to ADS

• Comparing a subset of our IDS data in assimilation contexts (word-final /d/, /t/ and /n/, 725 tokens) directly to the ADS study by [4] (4349 tokens)
• Less canonical in current IDS study: /t/ (χ2(2,323, N = 2,324) = 56.77, p < .001)
• /d/ (χ2(1,308, N = 1,309) = 33.33, p < .001)
• Similarly variable in current IDS study: /n/ (χ2(1,117, N = 1,118) = 0.03, p = 0.86)

VI. Summary

• We replicate [2]'s results that IDS is not more canonical than ADS
• Not all segments are equally variable - /n/ and /s/ are produced mostly canonically, /t/ has many more variants
• Variation is mostly limited to coda positions
  - In onsets, the canonical variant is always the most frequent
  - This is not true for codas
• This positional difference could be beneficial for category learning:
  - Word-initial segments: acquire canonical forms, support word segmentation
  - Word-final segments: variation, learn allophonic variants in connected speech
• Future work: more on acoustic properties of phonetic variants

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Selected references


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