Articulatory Strategies and Coarticulatory Patterns Across Age

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1. Introduction

Previous findings on coarticulation degree [1,2,3,4,5]:

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  - Adults: 
  - Children:

Research question: Can these differences be explained by differences in articulatory strategies?

Method: experimental data combined with simulation

2. Experimental data

Question: Are there differences in tongue shapes that suggest differences in articulatory strategies?

Dataset: Pseudoword repetitions recorded with ultrasound

Stimuli:
- native speakers of German
- Disyllabic trochaic pseudo words in a carrier phrase

Subjects:
- 18 3-year-olds (9f)
- 14 4-year-olds (9f)
- 16 5-year-olds (7f)
- 17 7-year-olds (11f)
- 11 adults (6f)

Comparison:
- /b, d, g/ +/e, y, a, o, u/ vs. /aɪnǝ C1V C2ǝ

Analysis

Curvature position [6] = AD/DB

Results

- TBx is more fronted in preschoolers but not 7yo compared to adults.
- No differences between child groups.

3. Simulated data

Question: Can age differences in tongue shapes for /d/ production be explained by different articulatory strategies?

Adults:
- Children - Possible scenarios:

Simulations

Conducted in Task Dynamic Application [7], a computer implementation of the Articulatory Phonology framework.

Results

- For alveolar consonant production, children rely on lingual articulatory strategies less differentiated than those of adults.

4. Coarticulation degree

Question: Is there a difference in CD between simulated adult productions and simulated child productions?

Analysis

Linear mixed models with TBxC ~ TBxV

Results

<table>
<thead>
<tr>
<th>contrast</th>
<th>estimate</th>
<th>SE</th>
<th>DF</th>
<th>t.ratio</th>
<th>p.value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBxV~TBxC: sim.A-sim.C</td>
<td>-3.97</td>
<td>0.08</td>
<td>92</td>
<td>-52.88</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

The results suggest that:

1. For alveolar consonant production, children rely on less differentiated lingual articulatory strategies than those of adults.
2. These developmental differences in articulatory strategies result in differences in coarticulatory patterns.

Implications:

- Evidence for a link between articulatory organization of lingual gestures and coarticulation degree.
- Account of age-related changes in coarticulation patterns should include refinement of articulator strategies along with other factors.
- Further research is needed to explore the potential reasons for age differences in articulatory strategies, such as motor control maturation and vocal tract growth.

5. Discussion & Conclusions

The results suggest that:

1. For alveolar consonant production, children rely on less differentiated lingual articulatory strategies than those of adults.
2. These developmental differences in articulatory strategies result in differences in coarticulatory patterns.

Acknowledgements

This work was supported by the DFG GZ: NO 1098/2-1 and 255670607. We thank the LOLA team for their assistance at various stages of the project. Special thanks go to our adult and child participants (and their parents) who made it easy and fun for us to collect our data.

References