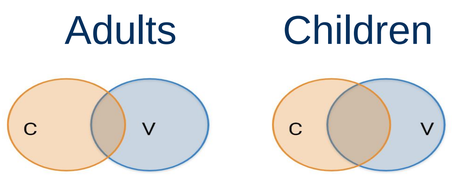
Articulatory Strategies and Coarticulatory Patterns Across Age

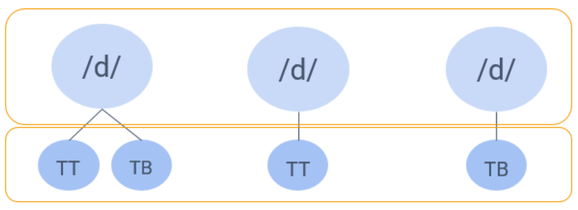
Dzhuma Abakarova[a], Khalil Iskarous[b,c], Aude Noiray[a,c]
[a]University of Potsdam, [b]University of Southern California, [c]Haskins Laboratories
dzhuma.abakarova@uni-potsdam.de

1. Introduction

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



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



← same segment

← different articulatory strategies

Method: experimental data combined with simulation

2. Experimental data

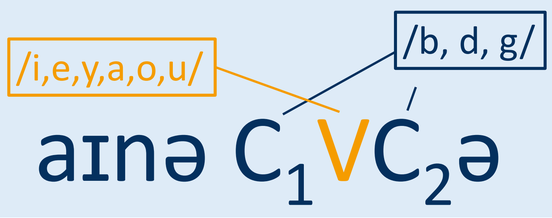
***Question**:* Are there differences in tongue shapes that suggest differences in articulatory strategies?

Dataset
Pseudoword repetitions recorded with ultrasound

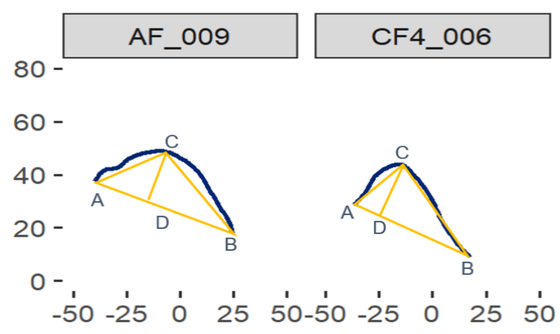
Subjects
native speakers of German

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

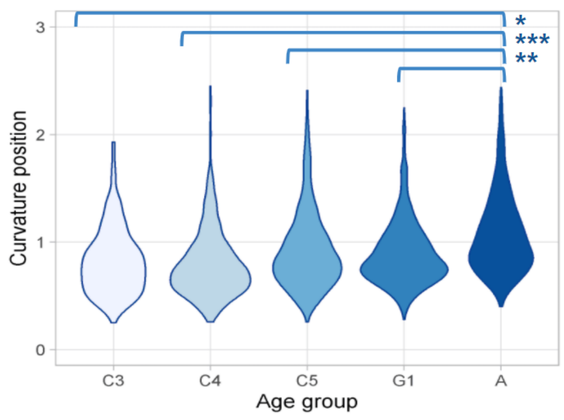
Stimuli
Disyllabic trochaic pseudo words in a carrier phrase



Analysis



Curvature position [6]
=
AD/ DB
↓ curvpos = more fronted
↑ curvpos = less fronted

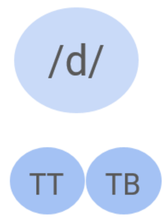


Results
- TBx is more fronted in pre-schoolers but not 7y.o. compared to adults.
- No differences betweeb child groups.

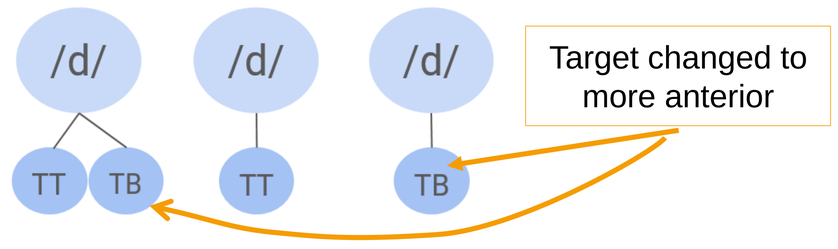
3. Simulated data

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

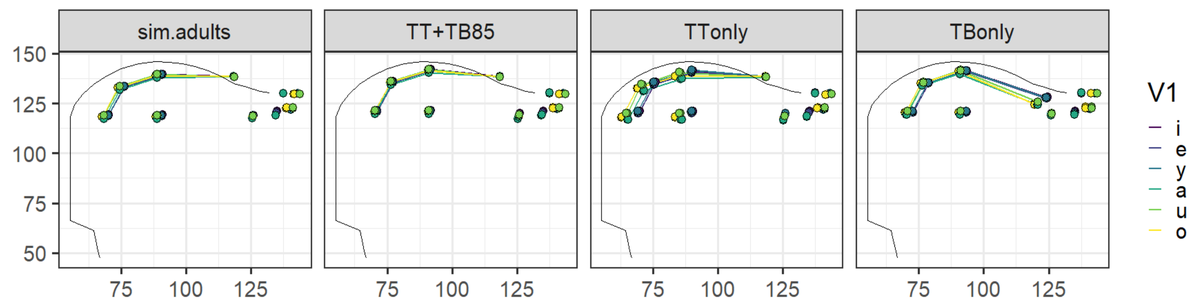
Adults:



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.

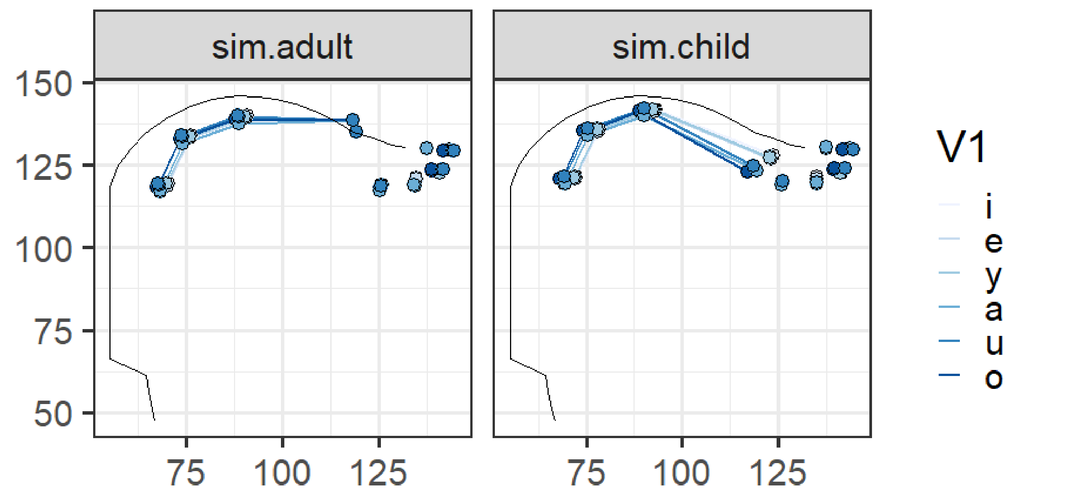
4. Coarticulation degree

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

Analysis
Linear mixed models with TBxC ~ TBxV

Results

contrast	*estimate*	*SE*	*Df*	*t.ratio*	*p.value*
TBxV–TBxC: sim.A-sim.C	-3.97	0.08	92	-52.88	<.0001



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.

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.

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