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This study was published in
Laboratory Phonology:



INTRODUCTION

Degree of anticipatory coarticulation (AC) decreases with age & depends on the articulatory demands of the combined segments [1,2,3,4]. Carryover coarticulation (CC) is understudied.

AC	CC
Planning (learned)	Muscle inertia (innate)
[5]	[6,7]
→ Different developments across childhood	→ Similar development across childhood

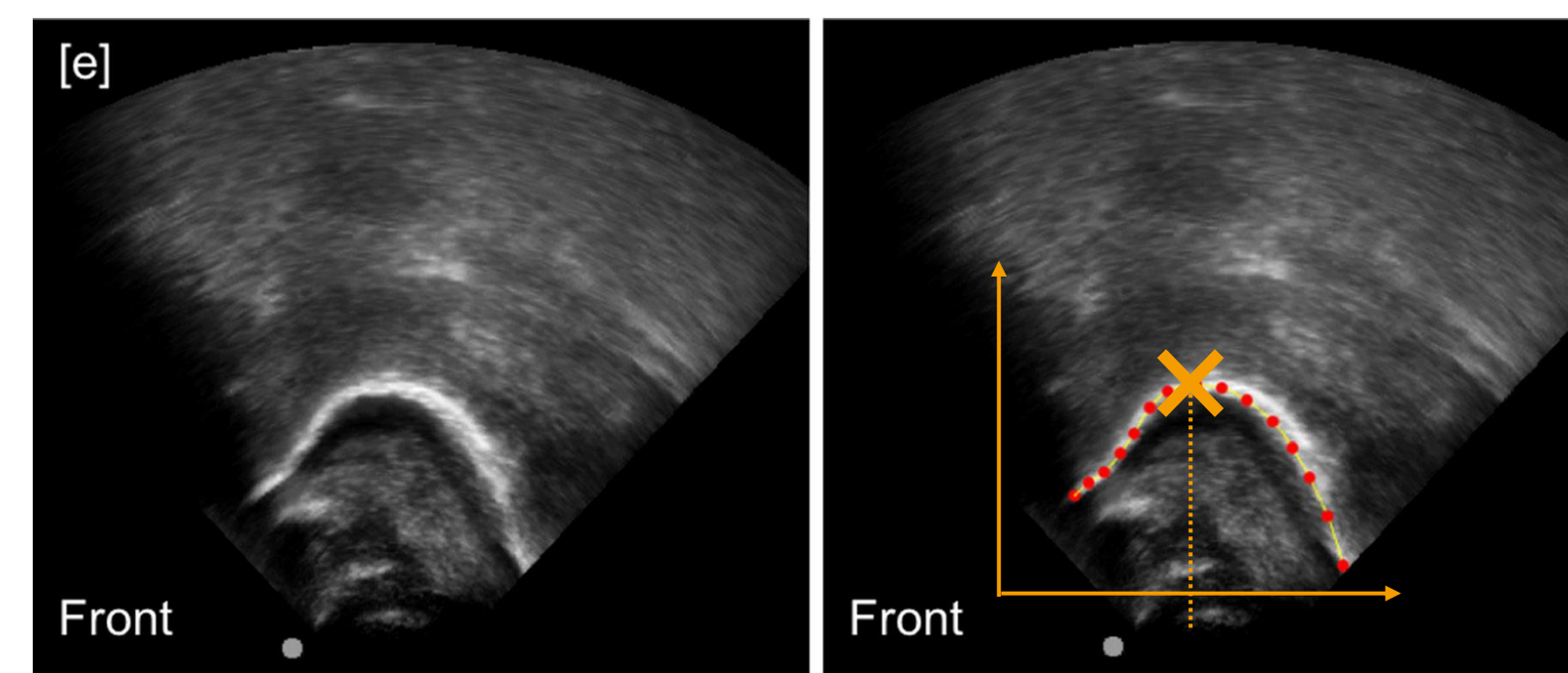
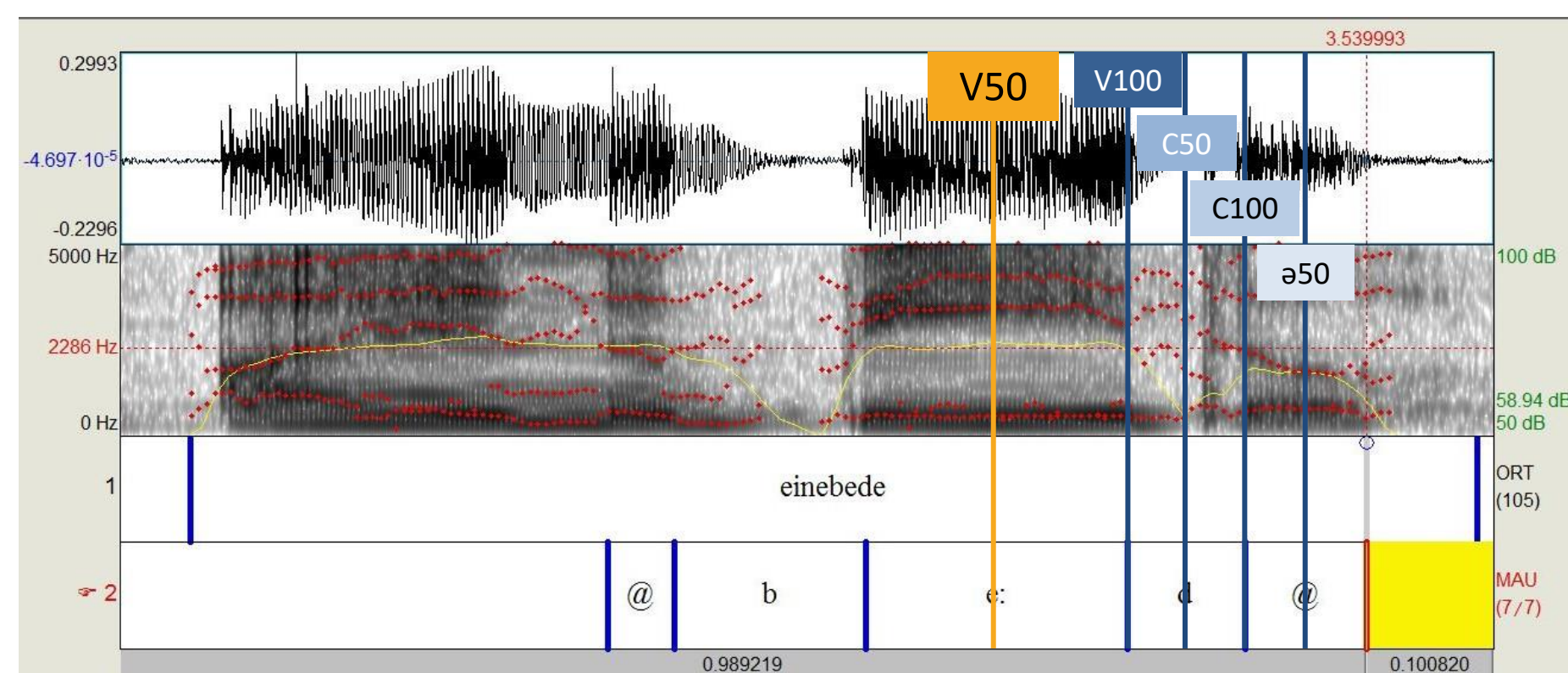
RESEARCH QUESTIONS

- 1) Does the degree of CC decrease with age as was found for AC?
- 2) Do the articulatory demands of the combined segments impact CC as was found for AC?

PROCESSING

- Semi-automatic acoustic labeling
- Time points of interest:
 - V50, V100, C50, C100, ə50

- Semi-automatic tongue contour detection using SOLLAR in Matlab
- Extraction of horizontal position of the highest point of the tongue dorsum



PARTICIPANTS

Native German speakers without hearing or language impairment

- 19 **3-year-olds** (10 f)
- 14 **4-year-olds** (7 f)
- 14 **5-year-olds** (7 f)
- 15 **7-year-olds** (10 f)
- 13 **adults** (7 f)

STIMULI

Disyllabic trochaic pseudo words in carrier phrase:



PROCEDURE

Repetition task embedded in a child-friendly planet story in SOLLAR [9].

Recording via

- **ultrasound** (midsagittal tongue surface contour)
- **microphone**
- **video camera**



ANALYSES & RESULTS

Does the horizontal position of the tongue dorsum at V100, C50, C100 and ə50 depend on the horizontal position of the tongue dorsum at V50?

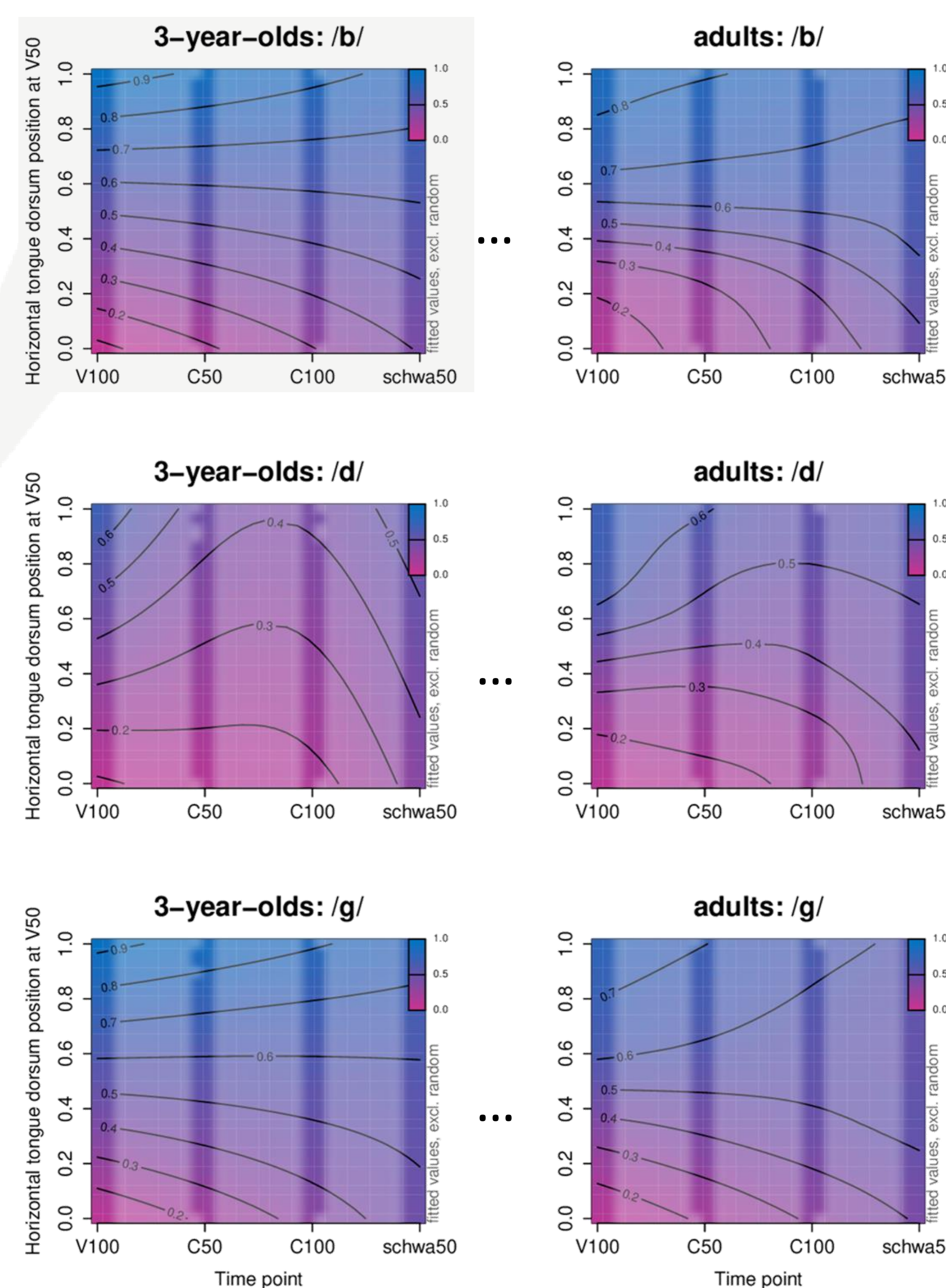
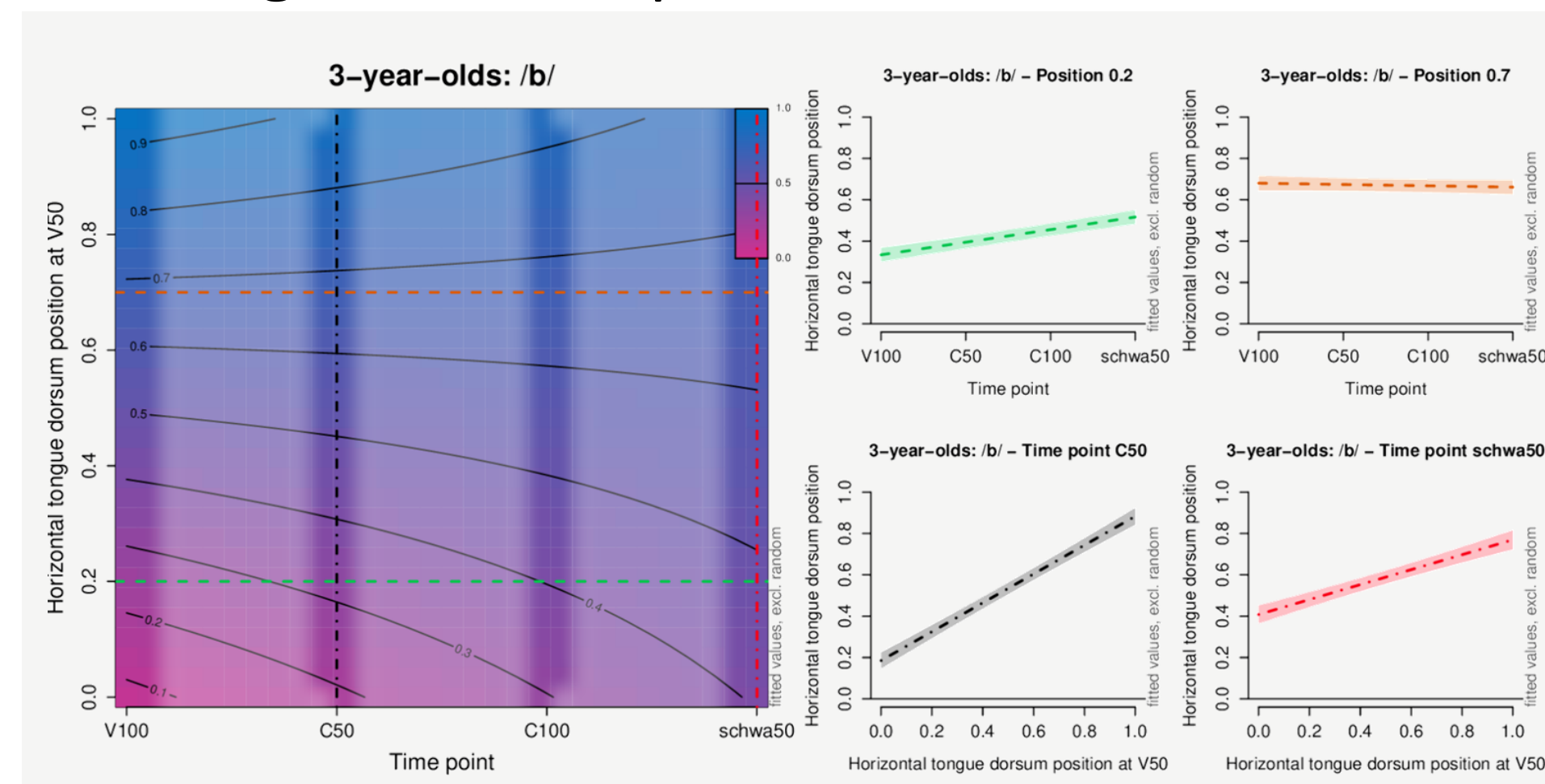
- 1) Age cohort differences?
- 2) Consonant context differences?

Generalized Additive Modelling (GAM)

- Mixed effects regression model
- Detects linear & non-linear patterns

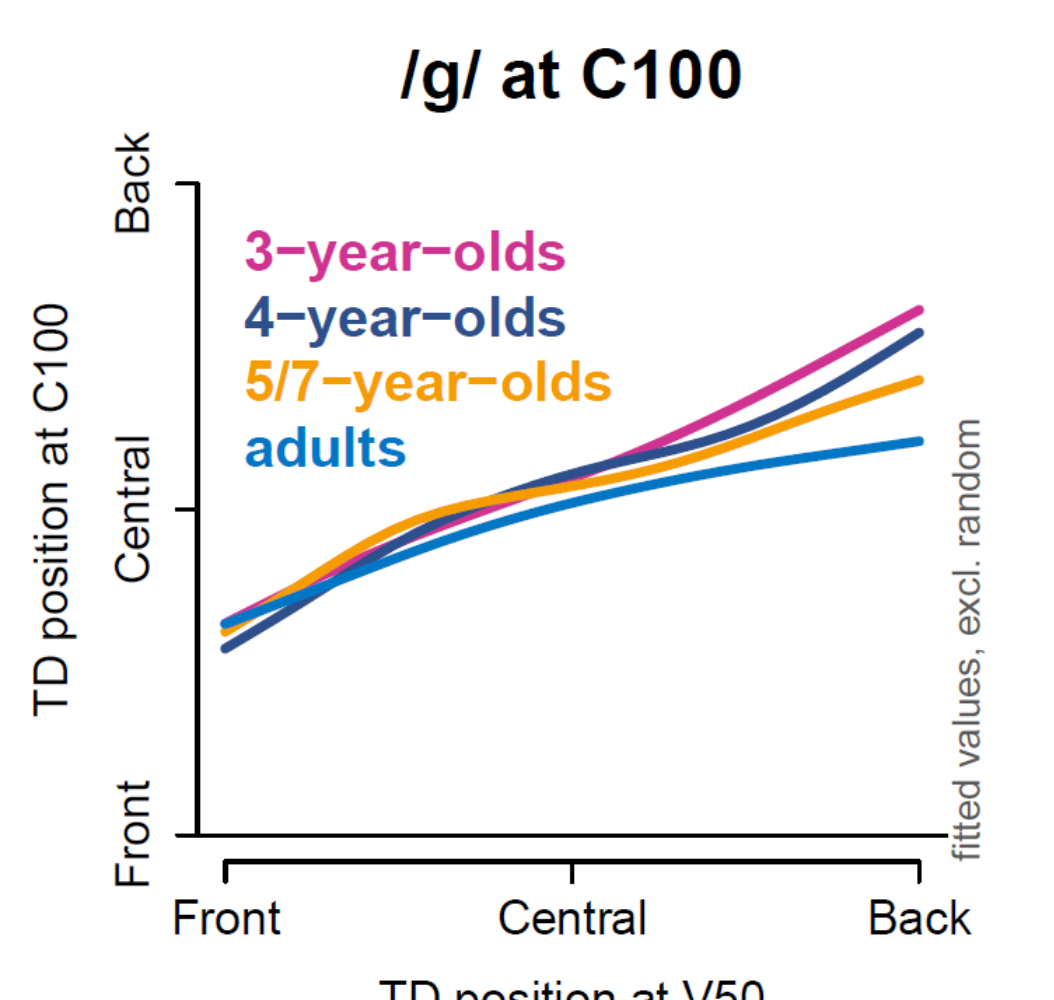
Heat maps present three dimensions:

- Time point: V100, C50, C100, ə50 (x-axis)
- Tongue dorsum position during V50 (y-axis)
- Tongue dorsum position (color & contour lines)



1) Age cohort comparison

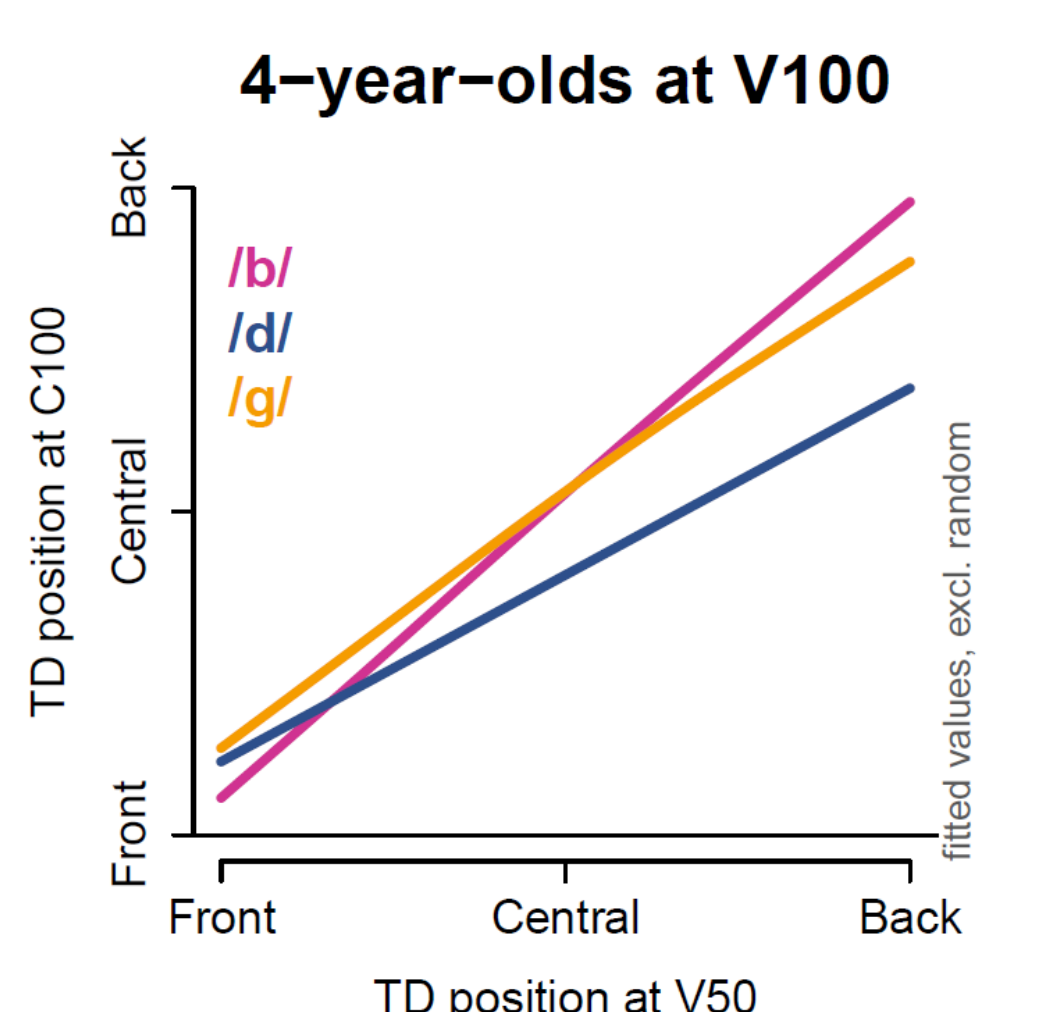
- Significant differences between age cohorts
- Decrease in degree of carryover coarticulation with increasing age in every consonant context



→ Same developmental trend as in anticipatory coarticulation

2) Consonant context comparison

- Significant differences between all consonants within each age cohort (except 3-yo /b/=g/)
- In line with coarticulation resistance hierarchy /b/ > /g/ > /d/

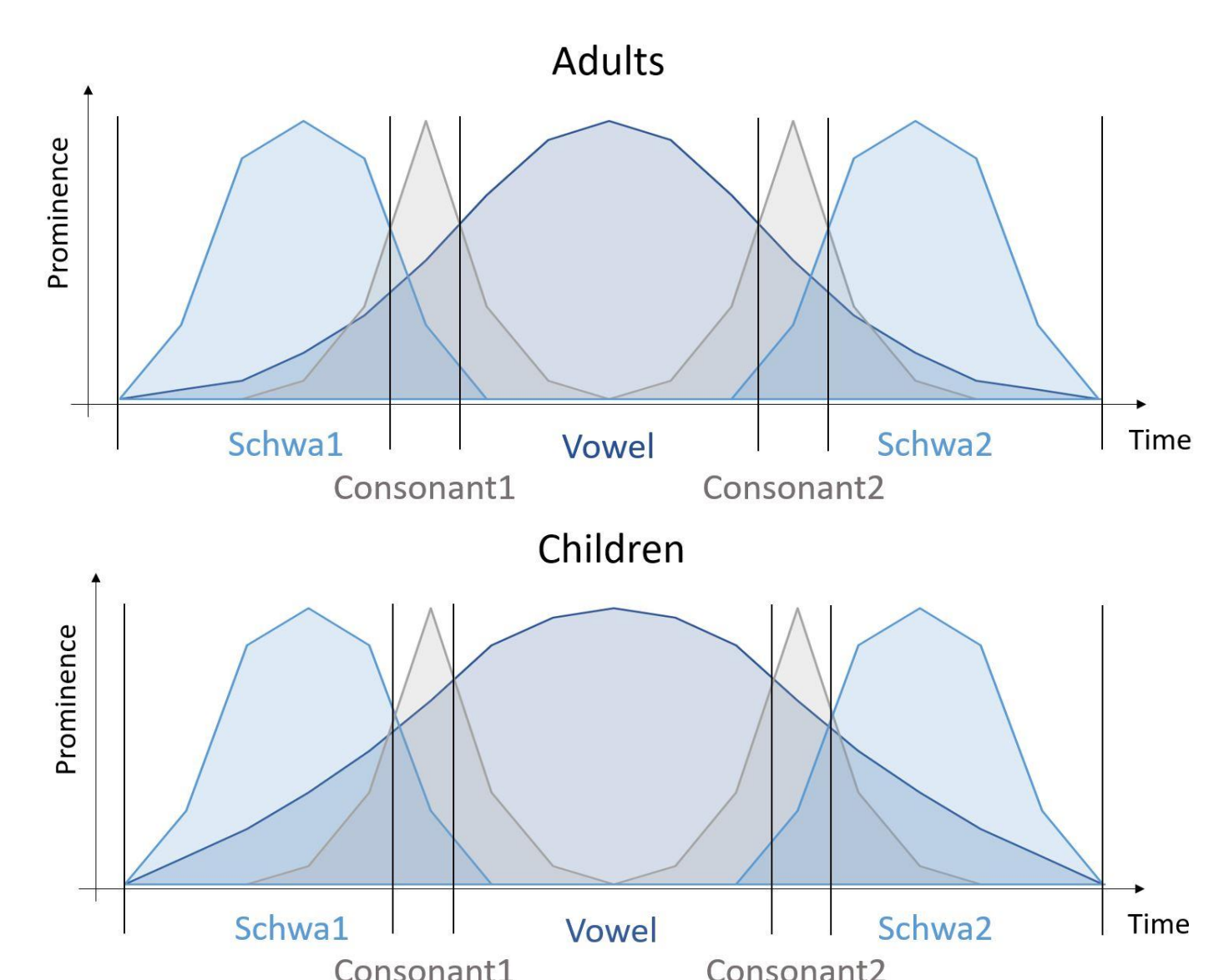


→ Similar impact of the articulatory demands of combined segments as in anticipatory coarticulation

DISCUSSION & CONCLUSION

- 1) The degree of carryover coarticulation decreases with age
 - 2) The impact of the intervocalic consonant's coarticulatory resistance on the degree of CC resembles that found in AC
- The two coarticulatory directions may not be underlyingly different

Children may have **broader vocalic activation curves** than adults, resulting in greater overlap and therefore more coproduction with surrounding segments. A possible reason is the combination of an **especially prominent status of stressed vowels** for young children [10], and a general **lack of inhibitory control** [11]. Children's immature capabilities to inhibit the hyperactive stressed vowel would explain a) earlier initiation as well as b) delayed deactivation of its according articulatory gestures in comparison to adults.



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ACKNOWLEDGEMENTS

This work was supported by the DFG (1098 & 255676067) and the Marie Skłodowska-Curie Actions ITN (641858). We thank the whole LOLA team for their great work. Special thanks go to our participants (and the children's parents) who made it easy and fun for us to collect data.

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