German non-L1-background children's reading fluency – evidence from the longitudinal audio (LAUDIO) corpus on post elementary school development

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The study of reading fluency is mostly limited to elementary school contexts. The according construct (FLUENCY 1) is based mostly on tempo and deviation from text, supplemented by "reading prosody" as an umbrella term for e.g. phrasing and the broad concept of expressiveness [1, 2]. The present approach is focused on a construct that fits older children (FLUENCY 2), when tempo and deviation deficits have gradually stopped being in the way of deriving more specific prosodic data from the audio material, e.g. with respect to pitch contours.

For the present study a subset from the LAUDIO-corpus was selected ("Longitudinal AUDIO" [3], approx. 1000 recordings from grade 3 to grade 7, N=61). It consists of 24 prima vista recordings of the short but demanding DOL-text (an entry on the word "Dolmetscher" (= interpreter) in a youth's lexicon, six phrases of approx. equal length: M=17.5 syl). The selection was based on teacher's information by which n=11 children were identified as having non-L1-background (though apparently fluent spontaneous speakers of German). Due to attrition, for most of these children no more than two DOL-recordings representing different points in time were available. Three children were represented with three points in time. The 24 recordings are analysed using the methods introduced in [3, 4] – then with 26 recordings from n=16 children identified as "especially fluent" in a screening with non-expert raters. From the signal-based and the perception-based sets of parameters introduced in [3, 4], for the present study the two most influential ones were selected respectively to create two-dimensional spaces for the reconstruction of FLUENCY-2-development (Fig.1).

The signal-based dimensions SYL/s and WIG represent articulation rate (excluding pause time, ranging from roughly 3 to 6) and the "wiggliness" of a phrase's pitch contour. The WIG analysis procedure relies on the semi-automatic identification and count of relevant positive or negative turning points (TP) in the contour and puts out a per-second-value (so WIG is actually TP/s, ranging roughly from 1 to 4, for details see [4]). For WIG, every recording was analysed on the phrase level and attributed the mean of the six phrase values of the DOL-text. The over all WIG-mean of the non-L1-background subsample is M=1.90 (SD=0.61) vs. M=2.46 (SD=0.60) for the especially fluent subsample [4]. The SYL/s-mean of the non-L1-background subsample is M=3.66 (SD=1.07) vs. M=4.66 (SD=0.60) for the especially fluent subsample. The interpretability of these general differences (around one SD between groups with both parameters) is limited and needs to be discussed. More relevant findings emerge in the biographical perspective: Fig. 1 compares signal-based developmental trajectories with perception-based trajectories of the well-covered three non L1-cases. For explanations of the signal-based dimensions see above. The perception-based dimensions (right column) are named C-score and R-score, representing the over-all "competetiveness" (C) of a recording in a fictuous oral reading competition on a 10-level rating scale (levels 1 to 4 omitted in Fig. 1) and "rhythmic variability" (R) on a 4-level scale (all ratings were obtained with three expert raters (including the author) in a 144 DOL-recordings reference field, recordings were attributed the mean of the three ratings [3]). Fig. 1 indicates that the signal-based modelling mirrors the essentials of perception-based modelling well. We also see an overall tendency that from grade 6 to 7 development loses dynamics or even recedes. This finding is confirmed when from both subsamples (non-L1 and especially fluent) all cases with grade 6 and 7 data available are included (seven cases altogether): around age 13 individual development of FLUENCY 2 apparently comes to an end regardless of background and so far achievement.
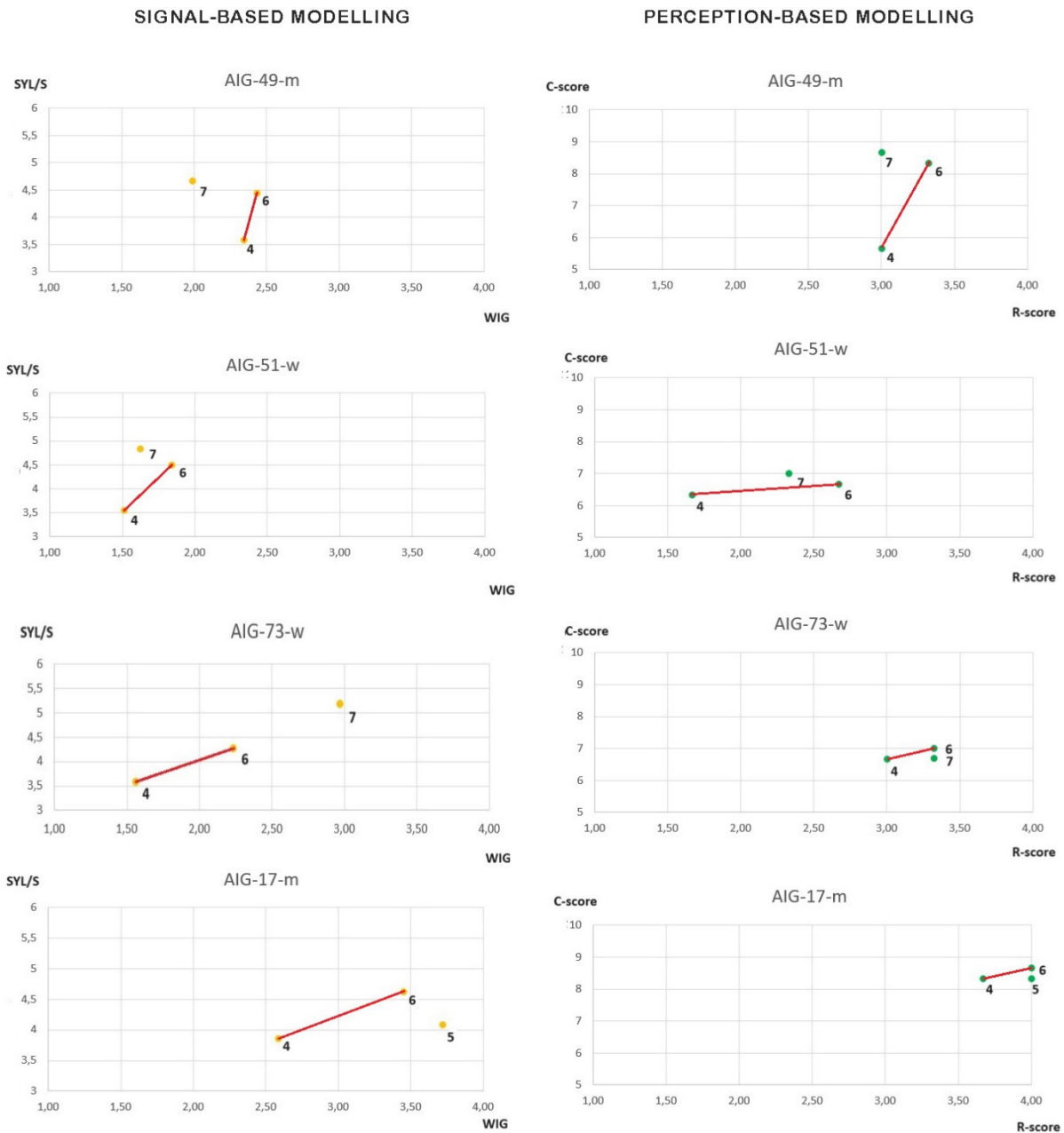
Fig. 1: Two-dimensional modellings of FLUENCY-2 developmental trajectories of children with non L1-background (AIG-49: male, AIG-51: female, AIG-73: female, no grade 5 data available) and an especially fluent reference biography (AIG-17: male, no grade 7 data available). Red lines show positive development from grade 4 to grade 6; over all, the trajectories are strikingly similar with signal- and perception based models.

References:

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