

## Are there age of onset effects in vowel discrimination? Evidence from Turkish-German bilingual children

This study examined how age of onset (AoO) and length of exposure (LoE) to a second language (L2) affects the processing of vowel contrasts in early second language (eL2) learners. Bilingual sound perception received much interest in the past (see e.g., Flege 2006; Sebastian-Galles, Diaz & Costa, 2012 for an overview); however, it is still a matter of debate if and how AoO and LoE influence sound discrimination. Recent studies provided evidence for AoO effects in eL2-learners' vowel discrimination in their L2 German (Darcy & Krüger, 2012; Rinker et al., 2010). However, due to the cross-sectional design, the poorer performance of the eL2 children can also result from their lower exposure in the L2 German. Our study aimed to shed light on the role of AoO and LoE in bilingual children's vowel perception. We compared eL2 learners of German and Turkish as L1 (AoO 2-4 years) and Turkish-German simultaneous bilingual (2L1; AoO 0-2 years) children. The study addressed the following questions: (Q1) *Do eL2 learners differ from age-matched 2L1 learners in the processing of vowel categories?* and (Q2) *Do the discrimination abilities of eL2 learners improve with increasing exposure to the L2?*

We performed an Eye Tracking experiment using a visual world paradigm. The children had to identify a pseudo-object out of three pseudo-objects (target, competitor, distractor). The names of the target and a competing pseudo-object differed in the first syllable in the length of the vowel ([bu:l...] vs. [bʊl...]), what is a distinctive feature in German but not in Turkish. Three groups of Turkish-German bilingual children participated in the study: 8-year-old 2L1-children (n=8, mean age 96.6 months; mean AoO 1.7 months; mean LoE 95 months), 8-year-old ('young eL2'; n = 17, mean age 92.4 months; mean AoO 37.1 months; mean LoE 61.2 months) and 10-year-old eL2-children ('older eL2'; n = 8, mean age 117.6 months; mean AoO 39.0 months; mean LoE 78.6 months). All children are dominant in German. There were no significant differences between the 2L1 and the young eL2 group with respect to chronological age ( $t(23)=.876, p=.244$ ).

The gaze pattern revealed different time courses of word recognition for the three groups (Fig. 1). With regard to Q1, we found significant differences between 2L1 and young eL2 learners in the fixations of target and competitor pseudo-objects for two time windows (window 1:  $F(4,10204)=16.016, p<.001$ ; window 2:  $F(4,4914)=16.236, p<.001$ ; MANOVA; post-hoc tests: Sheffé). In window 1, the young eL2 learners showed significantly more fixations of the competitor (young eL2: 33%, 2L1: 25%;  $p<.001$ ), and less fixations of the target in window 2 (young eL2: 44%; 2L1: 60%;  $p<.001$ ). With regard to Q2, the data revealed significant differences in the fixations of the target (=window 2) between the younger and the older eL2 learners (younger eL2: 44%, older eL2: 50%;  $p=.022$ ). There was also a significant difference in the target fixations between 2L1 and older eL2 learners (2L1=60%;  $p<.001$ ).

Consistent with previous studies (cf. Darcy & Krüger, 2012), our results show persistent difficulties in eL2 learners processing non-native vowel contrasts if the AoO is between 2 and 4 years. The performance increased with exposure to the L2. However, even with nearly equal exposure, the eL2 children still differed from the 2L1 learners. Our findings suggest that - at least in bilingual children up to age 10 - length of exposure can hardly overrule age of onset-effects.

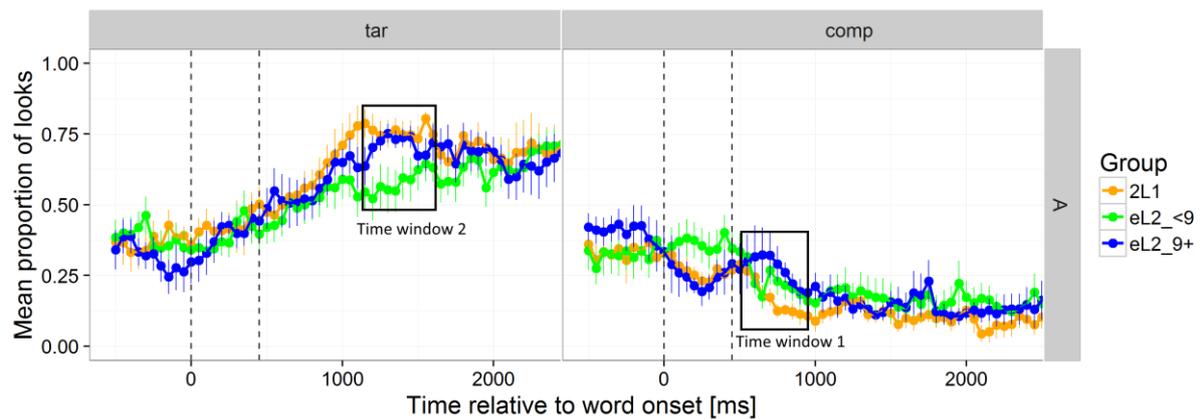


Fig.1: Fixation of target (tar) and competitor (comp) object over time in trials with German specific contrast (second dotted line indicates critical vowel presentation)

### References:

Flege, J. E., Birdsong, D., Bialystok, E., Mack, M., Sung, H., & Tsukada, K. (2006). Degree of foreign accent in English sentences produced by Korean children and adults. *Journal of Phonetics*, 34, 153–175.

Darcy, I., & Krüger, F. (2012). Vowel perception and production in Turkish children acquiring L2 German. *Journal of Phonetics*, 40(4), 568-581.

Sebastian-Galles, N., Díaz B., & Costa A. (2012). Bilingualism and Speech Perception. *The Encyclopedia of Applied Linguistics*.

Rinker, T.; Alku, P.; Brosch, S.; Kiefer, M. (2010). Discrimination of native and non-native vowel contrasts in bilingual Turkish–German and monolingual German children: Insight from the Mismatch Negativity ERP component. *Brain and Language*, 113(2), p. 90–95.