

## Decreased competition between semantically related referents in Developmental Language Disorder

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**Introduction:** Developmental Language Disorder (DLD) is a prevalent language disorder characterized by challenges in learning and utilizing language. Children with DLD struggle with word comprehension and production compared to their typical language (TL) peers.<sup>1,2</sup> Resolving competition from phonological competitors (e.g., can-cat) is central to word-level deficits in childhood DLD.<sup>3</sup> However, little work has explored whether challenges in resolving competition in individuals with DLD are specific to phonological competition or apply to lexical competitors more broadly (i.e., lexical-semantic competition). Further, there is a severe lack of research focusing on the progression of DLD into adulthood. In the current study, we explore lexical competition in adults with and without DLD to provide a more comprehensive understanding of the trajectory of DLD into adulthood and potential links to key underlying mechanisms.

**Method:** Ten adults who were diagnosed with DLD during childhood ( $M_{Age} = 34.92$  (7.85)) and 13 adults with typical language development profiles (TL) ( $M_{Age} = 34.90$  (7.93)) completed a picture description Visual World Paradigm task. In the task, participants named the target image in the red circle (Fig. 1) while their eye gaze was monitored. We manipulated the presence of the competitor on the screen (competitor present vs. absent). In the competitor-present condition, there was a semantically related competitor image present on the screen (e.g., target: rose, competitor: lily), and in the competitor-absent condition, the target and competitor images were semantically unrelated to each other (e.g., target: rose, competitor: sandal). In E1-E2, two different types of semantically related competitors were tested: 1) E1: the target and competitor were semantically associated (e.g., 'king vs. 'queen') where the target could be named with a basic-level noun (e.g., the king) regardless of the presence of the competitor, 2) E2: they were from the same category (e.g., 'rose' vs. 'lily'). Hence, the target should be named with a more specific label when the competitor is present (e.g., the rose, not the flower) (E2).

**Prediction:** If individuals with DLD have a broad-based deficit in suppressing lexical competitors, we would predict increased competition (i.e., sustained competitor activation) between the target and the competitor in DLD vs. TL. Alternatively, if individuals with DLD only struggle with phonological competition, we expect to find no differences across groups.

**Results:** Eye gaze (Fig. 2-3) was analyzed in two-time windows in each experiment – T1: 200-700ms and T2: 700-1200ms post-stimulus. A mixed-effects model included group (TL vs. DLD) and condition (competitor present vs. absent) as fixed effects. The R package “buildmer” estimated a parsimonious random effects structure for the model.<sup>4</sup> The dependent measure was the Target Advantage Scores (TAS: the empirical logit for the ratio of target fixations to competitor fixations). In E1, the TAS was greater when the competitor was absent vs. present ( $t = 2.01$ ,  $p = .04$ ) during T1. However, the main effect of group ( $p = .38$ ) and the interaction were not significant ( $p = .13$ ). In T2, the model revealed a significant main effect of condition ( $t = 6.53$ ,  $p < .001$ ) and the significant interaction between condition and group ( $t = -1.98$ ,  $p = .04$ ), driven by a bigger condition effect in TL ( $t = 5.39$ ,  $p < .001$ ) compared to DLD ( $t = 3.02$ ,  $p = .003$ ). The results suggest that the competition between the target and the competitor is decreased in DLD compared to TL, and the target activation in DLD was sustained longer than TL. The results of E2 were similar to the E1 results. Only the main effect of condition ( $t = 3.60$ ,  $p < .01$ ) was significant in T1, and the effects of condition ( $t = 7.73$ ,  $p < .001$ ) and group ( $t = 2.28$ ,  $p = .02$ ) were significant in T2.

**Conclusion:** In the current study, we observed decreased lexical-semantic competition in adults with DLD vs. TL. These findings may be attributed to associated deficits in understanding semantic relations between words, suggesting that individuals with DLD experience challenges in semantic competition, alongside phonological competition, even in adulthood. To corroborate this idea, we plan to code and analyze latency of naming and accuracy.

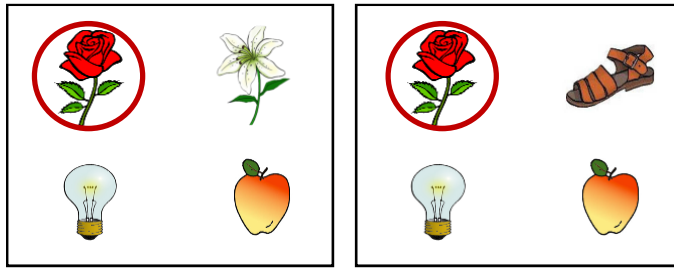


Figure 1. Example stimuli: competitor-present (left) and competitor-absent condition (right)

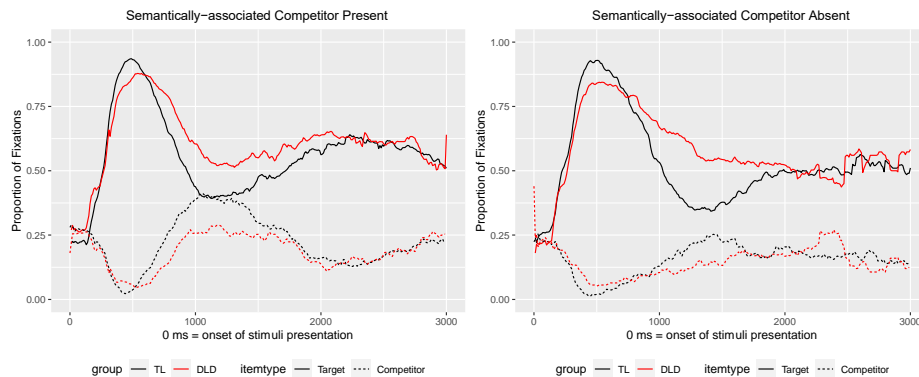


Figure 2. Proportion of fixations following the onset of stimulus presentation by group (adults with TL vs. DLD) in E1: competitor-present (left) and Competitor-absent condition (right)

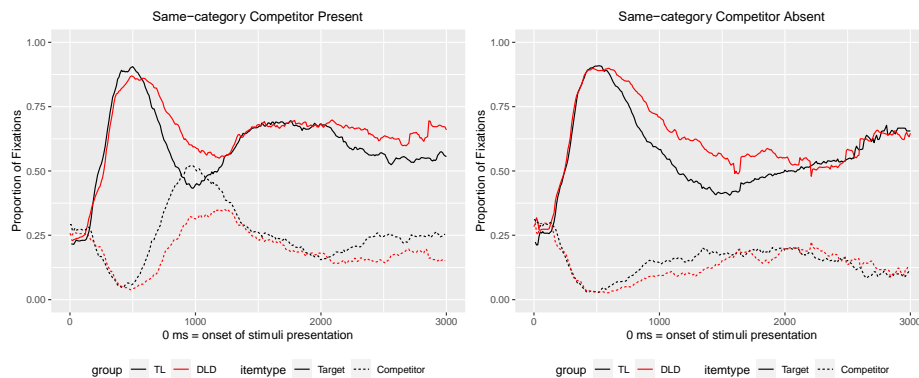


Figure 3: Proportion of fixations following the onset of stimulus presentation by group (adults with TL vs. DLD) in E2: competitor-present (left) and Competitor-absent condition (right)

**REFERENCES:** <sup>1</sup> Bishop, D. V. M., Snowling, M. J., Thompson, P. A., Greenhalgh, T., & CATALISE-2 Consortium. (2016). CATALISE: A multinational and multidisciplinary Delphi consensus study of problems with language development. Phase 2. Terminology. *PeerJ Preprints*, 4, e2484v1.

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