**Recovery from semantic prediction violations during sentence processing in preschoolers with Developmental Language Disorder**

Michelle Indarjit, Mariel Schroeder, Patricia Deevy, Laurence Leonard & Arielle Borovsky (Purdue University)

Prediction is one mechanism that is thought to promote rapid spoken language comprehension from at least age 2 (Mani & Huettig, 2012). Importantly, listeners generate graded lexical predictions for a range of expected less-expected but semantically-related items (Federmeier & Kutas, 1999). Some early evidence suggests these graded mechanisms of prediction might vary in children with Developmental Language Disorder (DLD). For example, typically-developing (TD) children and adults predictively fixate to verb-related items that are not highly expected given the entire sentence context (e.g. in a sentence like *The pirate chases the…* listeners will fixate largely to a highly expected item *SHIP*, and to a lesser degree, towards a less-expected, but chase-able *CAT*). However, adolescents with DLD show robust prediction for highly-expected sentence objects, but do not activate (i.e. fixate towards) less-expected objects (Borovsky, Burns, Elman & Evans, 2013). Moreover, children with DLD show lexico-semantic deficits (Sheng & McGregor, 2010) and slower speed of processing in off-line sentence comprehension tasks compared to TD peers (Montgomery, 2000). Here, we ask whether and how these differences in mechanisms of semantic activation during online sentence processing in DLD affect comprehension in unexpected sentence contexts.

Preschoolers (aged 4;0-6;0) with DLD (n=19) and TD (n=23) completed an eye-tracked sentence recognition task that sought to explore how quickly children in each group recovered from their initial predictions for a highly expected item when the sentence ended with a less-expected object. Children were asked to select images from 4-picture arrays that matched with spoken SVO sentences containing an informative agent and verb (*The pirate chases the…*), followed by object endings in two conditions: (1) unexpected action-related objects (UAR; *CAT*) or (2) unexpected, action-unrelated (UAU) objects, where the ending did not coordinate with the verb (*BONES*). Images from both conditions were present on screen, and children also saw filler sentence trials with expected sentence endings. We compared fixations towards the named target object in the two unexpected conditions in both groups.

Results highlight differences in looks to the named object in the UAR and UAU conditions between conditions and groups (Figures 1 & 2). Children with DLD looked more towards the target in the UAR condition ($M$ = 0.57, $SD$ = 0.13) compared to UAU condition ($M$ = 0.47, $SD$ = 0.09), $t(18) = 3.10$, $p = 0.006$, while for TD children there was a marginally significant difference towards the target in the UAR condition ($M$ = 0.63, $SD$ = 0.14) compared to UAU condition ($M$ = 0.56, $SD$ = 0.13), $t(22) = 2.05$, $p = 0.052$. TD children looked more toward the target in the UAU condition, $t(38.55) = -2.63$, $p = 0.012$, compared to DLD peers. There was not a significant difference for the UAR condition between groups, $t(39.38) = 1.44$, $p = 0.159$.

These findings suggested that children with DLD were especially slower (vs. TD peers) to recognize the most unexpected (UAU) items in the task. These patterns suggest that preschoolers with DLD show graded activation for UAR items compared to UAU items, contrary to prior results in older adolescents with DLD.

Our results yield novel insights into the dynamics of sentence processing with a range of language learning skills. Specifically, the results highlight that TD preschoolers generate graded predictions even in less-predictable linguistic contexts. Additionally, although children with DLD (in other work) do not generate robust predictive activation for semantically-related sentence outcomes, they more effectively process unexpected outcomes that have a semantic connection to their prior context. Together these findings suggest that lexical activation mechanisms supporting linguistic prediction and recovery in semantically-related and entirely unexpected contexts may not be identical, and suggest avenues for further study.

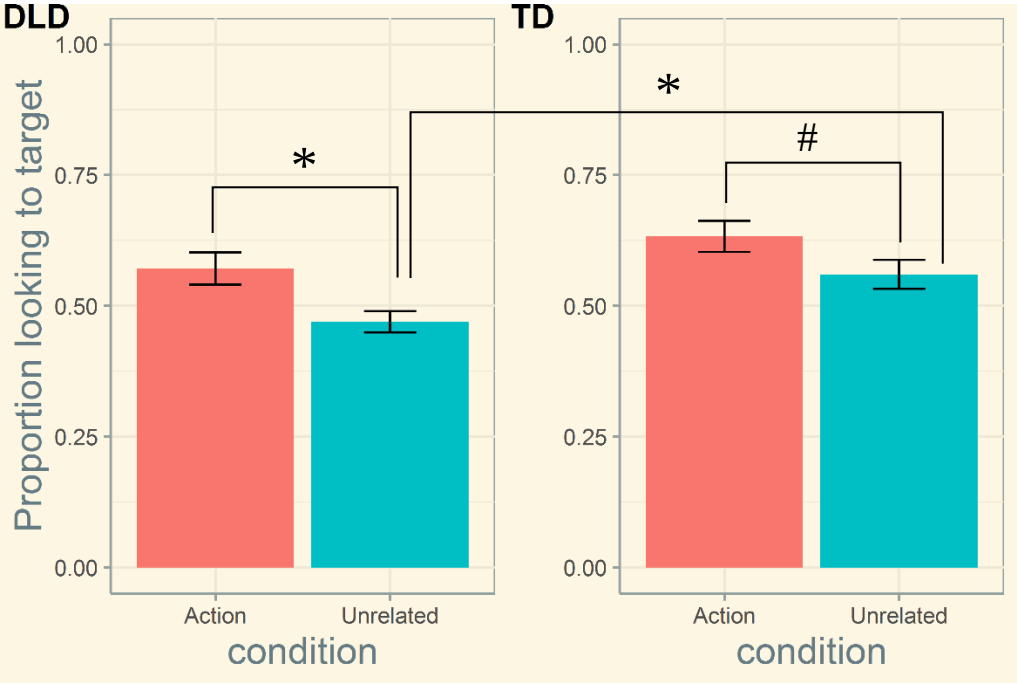


Figure 1: Mean proportion of looking to the Target object shown by group and condition ("Action" = UAR, "Unrelated" = UAU). Mean proportion of looks was calculated by time looking to Target / (Target + Distractor) object, from 300 ms post Target (object) onset to Target offset.

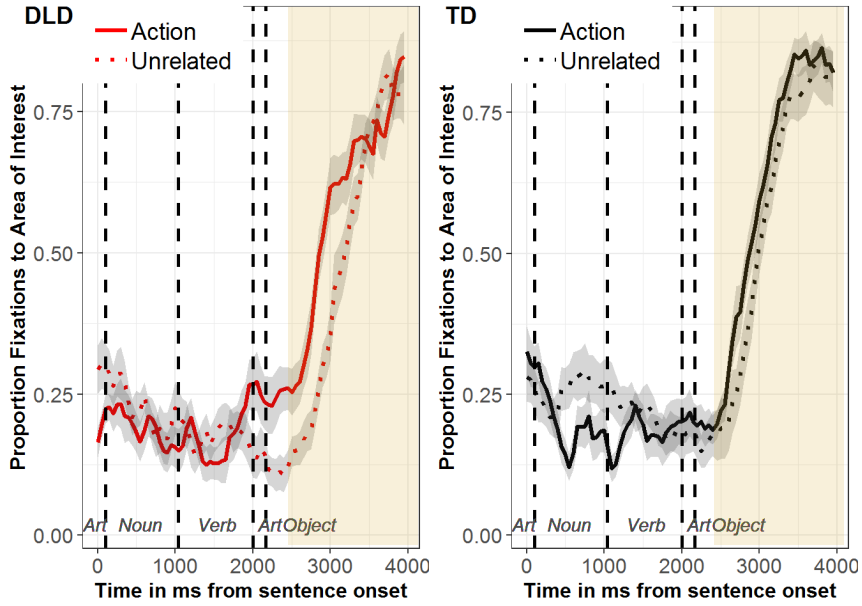


Figure 2: Time-course of fixating on target interest areas in Action-Related (UAR) and Unrelated (UAU) conditions across the entire sentence within each group of participants. Error ribbons represent SEM. Accuracy between groups was measured across a time-period starting 300 ms (shaded) after onset of the sentential object and continued until object offset.