May 4th, 11:00 AM - 1:00 PM

Implicit Learning in Preschoolers with Developmental Language Disorder

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Cairns, Crystal L.; Ward, Sam; Duran, Emma; Franz, Molly; and Quam, Carolyn, "Implicit Learning in Preschoolers with Developmental Language Disorder" (2022). *Student Research Symposium*. 3.  
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IDENTIFYING THE CORE IMPAIRMENT IN LANGUAGE LEARNING FOR DEVELOPMENTAL LANGUAGE DISORDER MAY LEAD TO MORE EFFECTIVE INTERVENTION STRATEGIES.

Abstract

- The Procedural Deficit Hypothesis (PDH) proposes that implicit learning is the core impairment in developmental language disorder (DLD).
- To test the PDH, we compared implicit learning in 26 preschoolers with DLD to 26 preschoolers with typical language development (TLD). We predicted children with DLD would show impairments in a test of implicit learning, and no impairments in explicit learning (which was tested in another experiment).
- First, participants completed hearing screening and standardized testing to confirm eligibility. Following confirmation of eligibility, participants completed a sound discrimination task to assess baseline sensitivity to pitch and/or duration.
- Next, participants completed a computer-based training session. Here, participants were presented with a monster, Leonard, and told that Leonard would make sounds to ask for the food or the drink. Then, they heard the monster make sounds of varying pitches and durations and watched as he subsequently received food or drink. This was followed by a computer-based testing session, in which participants had to decide whether a sound of a given pitch or duration indicated the monster was requesting food or drink.
- In an unintended experimental-design issue, the target picture switched sides between experimental trials nearly 2/3 of the time. Eye-gaze data indicated that participants anticipated the target side would alternate. Thus, we unintentionally investigated sensitivity to two competing cues: our target variable (pitch or duration) and target-side alternation. All participants relied on target-side alternation cues, rather than pitch and duration cues.
- In a second experiment, the flaw in the experimental design was fixed and 29 children with TLD successfully discriminated across pitch and duration categories. Participants learned pitch categories significantly better than duration categories.
- In the next phase of this second experiment, we plan to recruit children with TLD to compare to the children with TLD, and examine whether the two groups show any differences in implicit learning.

Results and Discussion

- Based on prior work, we expect that children with DLD will not demonstrate successful learning of pitch or duration categories.
- We conducted univariate ANOVAs on participants’ implicit-task accuracy.
- Our results suggested that children with TLD learned sound-object pairings instead of pitch or duration categories, as eye-gaze analysis suggested an alternative reason for accuracy.
- Eye gaze data was coded manually at 30 frames per second using Adobe Premiere Software.
- Custom awk and perl scripts combined information on the start and end times of left and right looks with trial-order information about the target side on each trial, to indicate when each child was fixating the target side, or the other side of the screen at each point in each trial.
- Post-hoc analysis computed each group of children’s performance to chance (first not splitting by cue, because of the alternate explanation for above-chance accuracy described below) indicated that typically-developing children’s accuracy was significantly above chance in the implicit task.
- As a follow-up study, we fixed the flaw in the experimental design that allowed participants to anticipate target side.
- Results from this study showed that 29 children with TLD successfully discriminated across pitch and duration categories.
- Participants learned pitch categories significantly better than duration categories.
- In the next phase of this second experiment, we plan to recruit children with DLD to compare to the children with TLD.
- In future work, using naturally recorded whole words, instead of synthesized isolated vowels, could boost performance in the auditory discrimination task.

Contacts and Thanks

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We would like to thank Molly Franz, Yu Wanchi, Celeste Gallegos, Holly Cardinal, Abigail Tolomei, Josie Johnson, Katharine Ross, Genesis Oceguera-Escino, Anahita Abdahraini, and Todd Hodde for their contributions to this study. Finally, we extend a tremendous thanks to the participating preschoolers, their parents, and the preschool staff.

References


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