

Introduction: Evidence suggests Sequential Learning (SL), the ability to learn information patterns in the environment unfolding over time, is important for language development (Conway & Pisoni, 2008). Research has also shown relationships between executive functioning (EF) and SL (Bahlmann et al., 2012), and between EF and language (January et al., 2009). This indicates a possible underlying process linking language, SL, and EF. We hypothesized that the three were interrelated and would support one another. We expected children who performed well on EF measures would do well on SL due to common underlying EF mechanisms, including inhibition, cognitive flexibility, and attention.

Method: Forty-one children (ages 7-12) completed a visual SL task. Children were shown sequential patterns of colored circles and asked to reproduce those patterns on a touch-screen. During a training phase, sequences conformed to a set of grammatical rules, while during the test only half followed the grammar. SL was assessed by performance on sequences with the same underlying structure (grammatical), compared to sequences that did not follow this structure (ungrammatical) (e.g., Conway et al., 2011). Language was measured with standardized assessments. EF was measured using Stroop and Flanker tasks.

Results: Although correlations suggested that EF was positively related to language and sequence memory (regardless of grammaticality), results unexpectedly did not reveal a significant relationship between SL and EF or language. Overall, EF was related to language and to both the performance on grammatical and ungrammatical sequences (sequence memory), but not to the difference between the two (SL).

Conclusion: Executive control and attention, both components of EF, could explain the relationship between EF and sequence memory. As sequence memory tasks involve attention, participants who have better executive control and attention are more likely to perform well on both grammatical and ungrammatical sequences. This may have masked any SL that occurred by allowing children to recall ungrammatical sequences well despite learning the grammar. Alternatively, the task used or the way it was scored may not have tapped into SL in the way intended. Further research could use other measures of SL to see if this particular task contributed to these results.

Keywords: Executive Functioning, Sequential Learning, Language, Children, Learning, and Cognition