

TITLE: The effect of home environment on sequence learning and language ability in children

AUTHOR: Julie Trapani

SPONSORS: Christopher Conway and Joanne Deocampo, Department of Psychology

Introduction: Sequence learning (SL) is a cognitive process that involves learning input patterns in which some items predict other items with varying probabilities. Previous research suggests that personality variables, such as openness to experience and intuition, correlate with SL ability (Kaufman et al, 2010). It has also been found that language skills are affected by both home environment (Pinto et al., 2013) and SL (Conway et al., 2011). However, it is not known to what extent home environmental factors affect SL.

Method: In this study, we explored whether SL mechanisms, as measured by event-related brain potentials (ERPs) and standard measures of language are correlated with parent-report ratings of home environment, as measured by the Confusion, Hubbub, and Order Scale (CHAOS). 23 children (12 females, ages 7-12) performed a visual SL task while we recorded ERPs. Language ability was assessed with the Peabody Picture Vocabulary Test 4th edition (PPVT-IV) and the Grammaticality Judgment subtest of the Comprehensive Assessment of Spoken Language (CASL).

Results: Overall, the results revealed that children from more chaotic environments performed worse on language and SL measures. Children in homes with excessive phone use performed worse on Grammaticality Judgment ($r=-0.437$, $p=0.042$) and also showed decreased ERP amplitudes of SL in the central posterior region ($r=-0.541$, $p=0.008$). Likewise, children in chaotic homes performed worse with vocabulary ($r=-0.658$, $p=0.001$) and Grammaticality Judgment ($r=-0.595$, $p=0.002$). Finally, children who spent more time watching television showed worse SL as measured by reaction-time ($r=-0.511$, $p=0.013$).

Conclusion: These findings suggest that home environment plays a role in the development of basic neurocognitive mechanisms underlying sequence learning and language. It may be that living in a more chaotic home environment that has a large amount of passive stimulation, such as TV, reduces the opportunities for children to actively interact with and learn from their environment, thereby limiting the development of the brain mechanisms supporting basic and fundamental learning and language abilities.