Does prior language experience hinder statistical learning?

Julie M. Schneider[1], Inbal Arnon[2], An Nguyen[3], Krystal Mendez[1] & Zhenghan Qi[1]

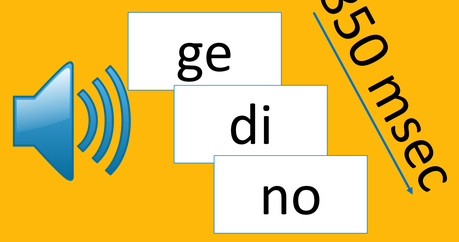
University of Delaware[1], Hebrew University[2], John Hopkins University[3]

Previous research has shown robust effect of prior linguistic experiences on SL at a group level, such that prior knowledge positively impacts learning when items to be learned are similar or consistent with your native language, and vice versa (e.g. Finn and Hudson Kam, 2008; Siegelman et al., 2018; Shukla et al., 2011; Lew-Williams & Saffran, 2012; Poulin-Charronnat et al., 2017).

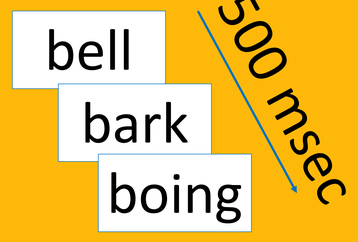
Current Study: By using a non-linguistic task as a control task within the same group of participants, we ask how prior linguistic experiences influence statistical learning across domains both at the group level and at the individual subject level.

Participants. Fifty-three native English speakers (M_{age}=21.1 years, SD_{age} = 4.0 years, 12 males)

Linguistic SL task.
5 tri-syllabic words made of 15 Hebrew syllables

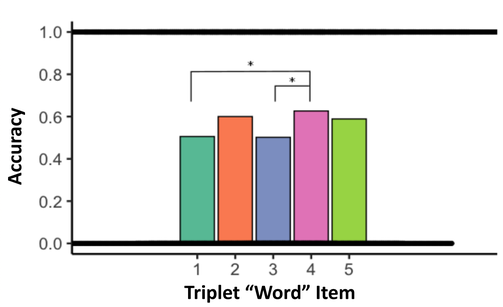


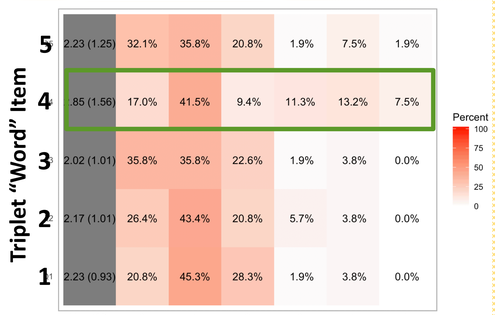
Non-Linguistic SL task.
5 triplet sound sequences composed of 15 familiar environmental sounds



Test Phase: 25 two alternative forced-choice trials
Familiarity ranking: Rated similarity of each linguistic triplet to English (0-5)
NIH Toolbox vocabulary

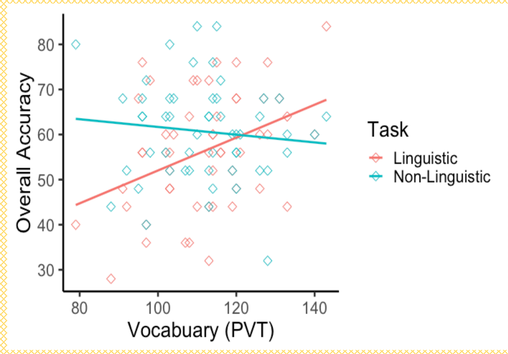
RQ #1 How does learners' familiarity with the stimuli relate to SL outcomes?





The subjective rankings of stimuli familiarity are <u>not</u> related to individual learners' performance (ρ = 0.14, p = 0.31).

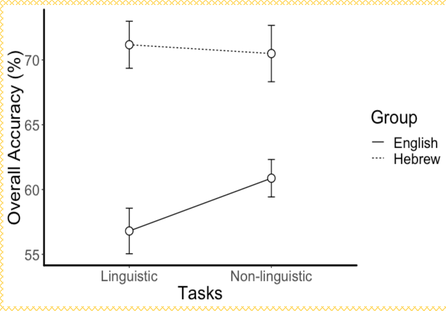
RQ #2 How is an individual learners' prior linguistic experience (vocabulary) related to their SL?



Vocabulary was significantly more strongly associated with linguistic SL accuracy (r = 0.36, p = 0.01) than with non-linguistic SL accuracy (r = −0.05, p = 0.73).

RQ #3 How does native language experience differentially relate to SL across domains?

53 native Hebrew speakers from Arnon (2018) had a greater advantage compared to the English speakers in the linguistic task than in the non-linguistic task (β = 0.24, z = 2.05, p = 0.04)



Summary:

1. Prior language experiences (the type of native language and vocabulary) have an effect only on linguistic SL, but not on non-linguistic SL.
2. Variations in vocabulary, but not in familiarity to stimuli, are reliably associated with individuals' performance on the linguistic SL task.
   - *Limitation: familiarity was measured after the SL task to avoid priming the learners.
   - *Item with highest English-likeness ranking show highest accuracy <u>at the group level</u>, replicating Siegelman et al. (2018).
3. Hebrew speakers showed a significantly stronger advantage than English speakers in the linguistic domain
   - *Better in the non-linguistic SL task = bilingual advantage?

Finn, A. S., & Kam, C. L. H. (2008). The curse of knowledge: First language knowledge impairs adult learners' use of novel statistics for word segmentation. *Cognition, 108*(2), 477-499; Siegelman, N., Bogaerts, L., Elazar, A., Arciuli, J., & Frost, R. (2018). Linguistic entrenchment: Prior knowledge impacts statistical learning performance. *Cognition, 177*, 198-213; Shukla, M., White, K. S., & Aslin, R. N. (2011). Prosody guides the rapid mapping of auditory word forms onto visual objects in 6-mo-old infants. *Proceedings of the National Academy of Sciences, 108*(15), 6038-6043; Lew-Williams, C., & Saffran, J. R. (2012). All words are not created equal: Expectations about word length guide infant statistical learning. Cognition, 122(2), 241-246; Poulin-Charronnat, B., Perruchet, P., Tillmann, B., & Peereman, R. (2017). Familiar units prevail over statistical cues in word segmentation. Psychological research, 81(5), 990-1003.