Interference leads to generalization

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We are generally unable to recall language we have witnessed verbatim and generally assume that that verbatim memory is lost immediately. Yet there is growing appreciation that people learn a myriad of complexities in each language and generalize beyond our linguistic experience [6-9]. Here we confirm above-chance recognition memory for full sentences, which is systematically underestimated by participants. Critically, we also find interference among multiple instances of the same grammatical constructions, suggesting a mechanism by which generalizations may emerge.

Stimuli. Three pairs of target - alternative constructions were selected, with constructions assigned as target or alternation counterbalanced across participants. Each participant witnessed 42 sentences in random order including: 10 instances of each target construction (CLUSTERED sentences) and 12 ISOLATE sentences. New (lure) sentences were of three types. Each ISOLATE-lure was highly semantically similar to an isolate sentence as confirmed by word2vec (*mean cosine similarity* = .92). Lures for the clustered sentences were created in pairs: CX-lures shared the same construction as one of the target constructions, the corresponding ALTERNATION-lures shared the same propositional content as the cx-lure but was expressed in the alternative construction. Cluster lures differed semantically from the cluster sentences, while the semantic similarity between the cx-lures and alternation-lures was high (*mean cosine similarity* = .95).

2AFC Recognition task. Participants judged whether a series of 36 sentences was familiar or new. Each participant judged 6 witnessed sentences (isolates only) and 30 lures (6 isolate-lures, 12 cx-lures, 12 alternation-lures). Order of presentation was randomized for each participant.

Participants: 120 English-dominant participants were recruited from Prolific and paid for their time (M_{age} = 35.4). After exclusions for failure to complete or failing one of two catch trials, 105 were included in analyses (71 F, 26 M, 8 non-binary).

Results: Signal detection theory confirmed the existence of verbatim memory for the isolate-sentences (d') (d' = .39, $t(105)$ = 22.45, $p < .0001$). Critically, results also demonstrate that exposure to multiple instances of the same grammatical construction led to emergent generalizations: participants were more likely to falsely believe that a new instance of the familiar construction was familiar, in comparison to a highly similar new instance of the alternative construction. Specifically, correct rejections of cx-lures vs. alternation-lures were compared, using a generalized linear model with accuracy as output, lure-type as the predictor, and maximal random effects for participants, construction, and items, as convergence allowed. Cx-lures were recognized less accurately (had a higher false alarm rate) than alternation lures (β = -.33, z = -2.75, p = .006).
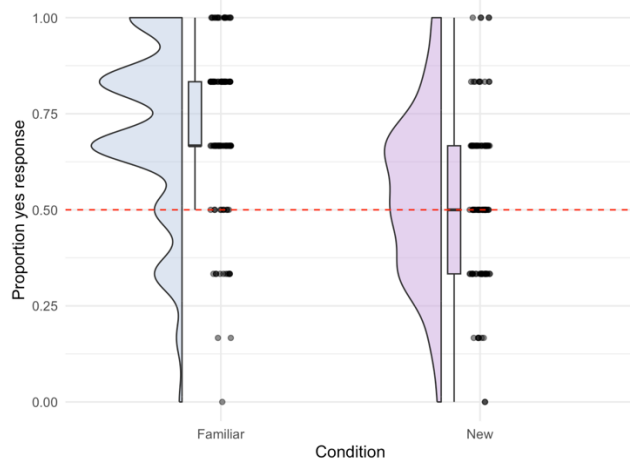
(As.Predicted: #157947)

Figure 1: Verbatim memory (for isolate sentences): proportion of Hits (familiar sentences) vs. False alarms (new sentences). Points are individuals.
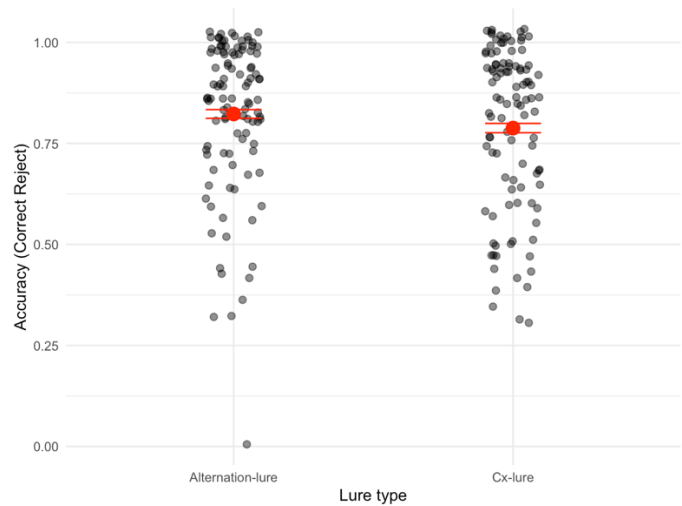

Figure 2: Emergent generalizations: mean Correct Rejections of alternation lures vs. cx-lures. Points are individuals. ($N = 105$)

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