Implicit scalar alternatives are recognized over intermediate durations but not long-term

Nikole D. Patson (Ohio State) & E. Matthew Husband (University of Oxford)

Successful language communication requires comprehenders to not only process what speakers say, but to also infer what they mean. To do this, comprehenders often consider *alternatives* to what was said, and language provides speakers with a variety of devices, such as focus and scalar implicature, to mark when such inferences should take place. Importantly, alternatives may be explicitly mentioned, while at other times they are implicit. The explicit-implicit status of alternatives is known to affect how alternatives are encoded in discourse. In sentences with prosodic focus, evidence from probe recognition tasks finds that both explicit and implicit focus alternatives are active in memory for several seconds (Gotzner, Wartenburger, & Spalek, 2016); however, in recognition memory studies, only explicit focus alternatives are maintained for the duration of the experiment and after a 1-day delay (Calhoun et al., 2023; Fraundorf et al., 2010; 2013). This suggests that implicit focus alternatives may have less impact on longer-term comprehension, perhaps because they may not be as relevant for comprehension as explicit focus alternatives. In comparison, the alternatives of scalar implicatures are rarely mentioned explicitly, but are relevant for longer-term comprehension. When comprehenders encounter the scalar quantifier *some* in upward-entailing contexts, they typically infer the negation of the stronger scalemate *all*, drawing the strengthened interpretation *some-but-not-all*. Given the relevance of stronger scalemates for the comprehension of the strengthened interpretation of *some*, implicit scalar alternatives may be more robustly represented in intermediate and long-term memory compared to implicit focus alternatives.

Method. To investigate this possibility, we conducted two English-language recognition experiments with scalar alternatives. In both experiments, participants read short vignettes in which the second sentence included either the quantifier *some* or *all*, as in (1). Then participants saw one of three versions of the second sentence: either exactly as it had appeared (no change), or the quantifier was replaced with its stronger alternative (*all* for *some*) or weaker alternative (*some* for *all*), or the quantifier was replaced with *none*. Participants judged whether the sentence was the exact sentence they had seen previously. In Expt 1, conducted at a science museum, 66 participants completed the memory test after a block of 20 vignettes. This vignette/memory probe block repeated six times for a total of 120 items (60 experimental, 60 fillers). Expt 2 used the same vignettes and memory probes, however 48 participants read the study items in a laboratory and participated in an online memory study after a 1-day delay.

Predictions. For both experiments, we calculated *d'* scores for both critical sentence change types as a measure of sensitivity. If the stronger scalemate (*all* for *some*) is encoded in memory as an alternative due to scalar implicature, we expect to see a decrease in recognition sensitivity to probe change due to more failures to reject the stronger scalemate. Recognition sensitivity for changes to weaker scalemates (*some* for *all*) and non-scalemates (*none*) should, however, be unaffected as they are not relevant alternatives for computing the implicature.

Results. In both experiments, sensitivity in the non-scalemate change was high and did not depend on condition. Importantly, in Expt 1, we found that response sensitivity decreased for stronger alternatives compared to weaker scalemates over an intermediate (20 item block) delay. In Expt 2, this effect did not hold after a 1-day delay (see Figure, Table).

Conclusions. Interestingly, implicit alternatives relevant to a scalar implicature survive in intermediate memory, perhaps due to their relevance for local comprehension. However, they do not survive in memory after a 1-day delay. This suggests that scalar alternatives are more robust than implicit focus alternatives but less robust than explicit focus alternatives. This difference may reflect the specific pragmatic demands of scalar implicature, such as ignorance inferences and relevance considerations (Chemla & Singh, 2014), as distinct from focus.

Example Stimulus

(1) Kaine was excited for the science fair.
He won ***some/all*** of the awards at the ceremony.
He was excited to share his work with everyone.

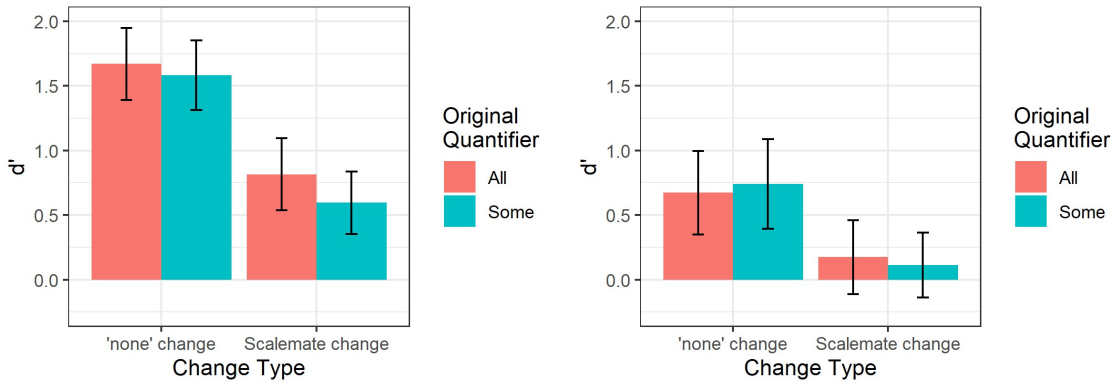
Probe: He won ***some/all/none*** of the awards at the ceremony.

Table. Paired *d'* contrasts calculated using `emmeans`.

	Estimate	SE	df	*t* ratio	*p*
Experiment 1					
none change, All - Some	0.0879	0.107	101	0.819	0.4148
Scalemate change, All - Some	0.2203	0.107	101	2.053	0.0427
Experiment 2					
none change, All - Some	-0.0682	0.139	70	-0.490	0.6256
Scalemate change, All - Some	0.0622	0.139	70	0.447	0.6560

Figure. Average *d'* scores by Quantifier and Change Type for Experiments 1 (A) and 2 (B). Error bars represent 95% confidence intervals. In both experiments, *d'* was computed by subtracting false alarms from hits by participant. Hits were calculated from the 'no change' condition and false alarms were calculated from the *none* and scalemate change conditions respectively.

(A) Experiment 1 (20 item block delay) (B) Experiment 2 (1 day delay)



Selected References. Calhoun, et al. (2023) Focus effects on immediate and delayed recognition of referents in Samoan. *Language and Speech*; Chemla & Singh (2014) Remarks on the Experimental Turn in the Study of Scalar Implicature, Part II. *Language and Linguistic Compass*; Fraundorf, et al., (2010) Recognition memory reveals just how CONTRASTIVE contrastive accenting really is. *Journal of Memory and Language*; Fraundorf, et al., (2013) What happened (and what did not): Discourse constraints on encoding of plausible alternatives. *Journal of Memory and Language*; Gotzner, Wartenburger, & Spalek (2016) The impact of focus particles on the recognition and rejection of contrastive alternatives. *Language and Cognition*.