Priming Scalar Inferences

Linguistic communication depends on a listener considering not only what a speaker has said (e.g. *The movie was good*) but also the utterance alternatives a speaker could have produced but chose not to (*The movie was excellent*). This process yields inferences beyond the literal meaning of the original utterance, including scalar inferences (SIs, e.g. *The movie was good, <u>but not excellent</u>*). Recent work has shown that SIs, rather than being deterministically derived, can be primed experimentally [1, 2, 3, 4]. The **salience theory** [5] of scalar implicature priming (SIP) posits that SIs are modulated by experimentally manipulating the salience of utterance alternatives; the **disambiguation theory** posits that modulation occurs by training individuals to associate semantically lower-bounded scalar forms (e.g. *good*) with either an exhaustive (*good but not excellent*) or non-exhaustive (*good and possibly excellent*) interpretation. The former theory predicts that exposure to pragmatic alternatives leads to SIP; the latter predicts SIP after exposure to contexts where scalar forms are explicitly associated with a SI.

Exp. 1 (MTurk, n = 120) is a partial replication of a SIP study reported by Rees and Bott [5] (R&B). We tested interpretation of the quantifier *some,* cardinal number expressions, and existential declaratives that give rise to ad-hoc scalar inferences (i.e. *There is an X*). Priming trials consisted of a sentence containing constructions from one of these three expression categories and a forced choice between two candidate images that best matched the sentence (Fig. 1). Target trials followed two priming trials and consisted of a sentence plus a forced choice between a) an image consistent with a non-exhaustive meaning of the sentence and b) the option to select "Better Picture?" (indicating exhaustive interpretation of the sentence).

Every participant saw four three-trial blocks (2 priming trials + 1 target trial) in each of the 12 conditions (3 expression conditions * 4 priming conditions), for 48 critical blocks total; plus 48 filler blocks (where the image on the target trial makes the sentence false). In the <u>strong</u> priming condition, the optimal image choice on priming trials was consistent with an exhaustive meaning; on <u>weak</u> priming trials, it was an image consistent with a non-exhaustive meaning. These conditions were instances of 'disambiguation' priming, in that they involved training participants to associate scalar forms with one of two possible interpretations. The <u>alternative</u> condition was an instance of 'salience' priming: these priming trials had unambiguous sentences which semantically encoded a stronger meaning than did the sentence of the target trial.

Replicating R&B's results, we see relatively high rates of "Better Picture" selection in the strong and alternative conditions and relatively low rates in the weak condition (Fig. 2). However, the pattern of results relative to our novel <u>baseline</u> condition - in which participants saw an arithmetic problem and the two candidate images displayed a correct and incorrect solution to that problem - supports the disambiguation theory but not the salience theory. We observe significant main effects of strong/weak priming in pairwise comparisons to baseline using a Bayesian mixed effects logistic regression (maximal random effects structure; 95% CI for effect of strong priming: [0.38, 1.65]; 95% CI for weak priming: [-2.33, -1.09]). The effect of alternative priming was not significant (95% CI: [-0.86, 0.15]).

We next investigated whether salience priming is observed when the primed form is not a canonical pragmatic alternative to the expression of interest on target trials. In Exp 2., we introduced an <u>exhaustive</u> condition, in which prime sentences unambiguously expressed an exhaustive meaning (results in Fig. 3). Pairwise comparison between this condition and baseline did not reveal a significant effect (95% CI: [-0.25, 0.70]). These results provide preliminary evidence that simply making alternative forms salient is not enough to change pragmatic inferences (cf. Degen and Tanenhaus [6]); the listener must receive evidence of the speaker's form-to-meaning mapping. We discuss the implications for theories of pragmatic alternatives.

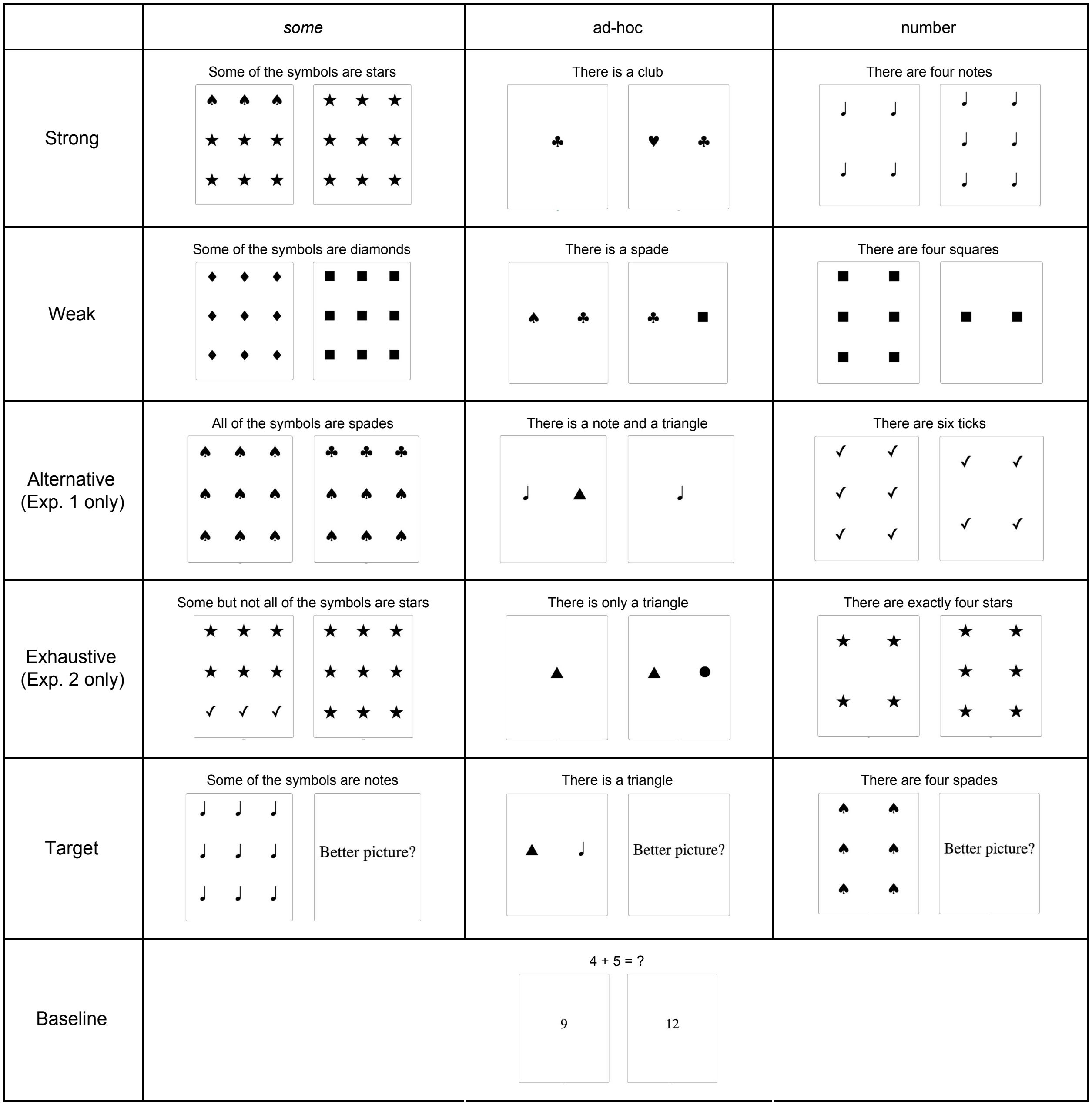

Fig. 1 - Example priming and target trials for each priming condition and expression type (‘correct’ selection for priming trials on left).

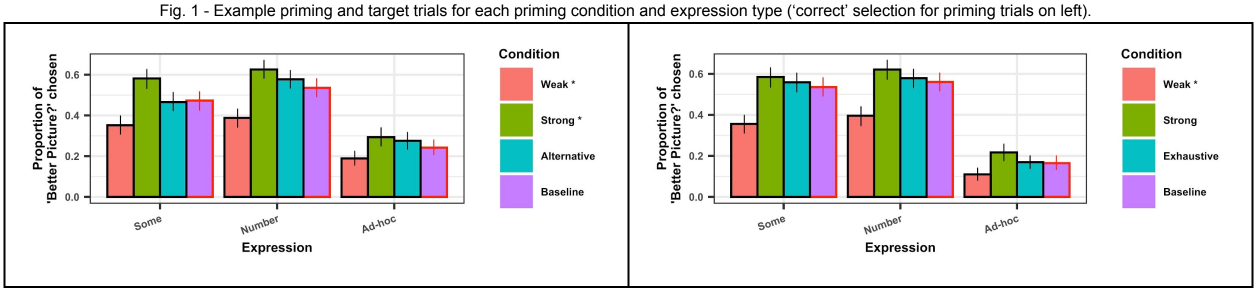

Fig. 2 (left) - results from Exp. 1; Fig. 3 (right) - results from Exp. 2. Error bars denote 95% bootstrapped confidence intervals; asterisks denote significance of pairwise comparison to baseline (red border) as determined by Bayesian logistic regression.

References: 1. Noveck, I. A. (2001). When children are more logical than adults: Experimental investigations of scalar implicature. *Cognition*, *78*(2), 165-188. **2. Papafragou, A., & Musolino, J. (2003)**. Scalar implicatures: experiments at the semantics–pragmatics interface. *Cognition*, *86*(3), 253-28 3. **Skordos, D., & Papafragou, A. (2016)**. Children’s derivation of scalar implicatures: Alternatives and relevance. *Cognition*, *153*, 6-18. **4. Bott, L., & Chemla, E. (2016)**. Shared and distinct mechanisms in deriving linguistic enrichment. *Journal of Memory and Language*, *91*, 117-140. **5. Rees, A., & Bott, L. (2018).** The role of alternative salience in the derivation of scalar implicatures. *Cognition*, *176*, 1-14. **6. Degen, J., & Tanenhaus, M. K. (2015).** Processing scalar implicature: A constraint-based approach. Cognitive science, 39(4), 667-710.