A scalar implicature is a form of enrichment that arises through the use of a semantically weaker term when a more informative alternative could have been used. For example, “John ate some of the cookies,” standardly gives rise to the enrichment *John ate some, but not all, of the cookies*. Like all implicatures, scalar implicatures are optional: the listener can choose to interpret the sentence with or without the enrichment. Here we investigate the contribution of the alternatives in this decision.

We consider two possible models of the enrichment process. According to the first, the rate of enrichment is determined only by the salience of the alternatives. For example, if *all* is sufficiently salient when the speaker utters *some*, then the enrichment *some-* > *some but not all* always arises.

According to the second, the rate of enrichments is determined not only by the salience of the alternatives, but also the activation of a mechanism that uses the alternatives (i.e., negates the alternatives and combines the result with the basic meaning). For example, even if *all* is very salient, the enrichment may not be derived if the usage mechanism (*all* - > *not all*) is not sufficiently active. The difference between the models is that the first model (the single model) assumes the usage mechanism is entirely contingent on the saliency of the alternatives, whereas the second model (the dual model) assumes the mechanisms are independent. We test between the models using a structural priming task (e.g., Raffray & Pickering, 2010).

**Overview.** Bott & Chemla (2014) showed that when participants derived an implicature in one trial, they were more likely to derive an implicature in a subsequent trial, that is, scalar implicatures can be primed. We use this result to test between the single and dual models presented above. We used three types of prime trials: (1) strong trials, in which participants derive enriched interpretations (scalar implicatures) of sentences with a scalar trigger expression (e.g., *some*) (2) weak prime trials, in which participants accept literal meanings of the same sorts of sentences, or (3) alternative prime trials, in which participants accept literal meanings of sentences involving scalar alternatives (e.g., *all*). Subsequent to the prime trials were target trials, in which participants could choose whether a strong interpretation (scalar implicature) or a weak (literal meaning) interpretation was the most appropriate meaning of sentence containing a scalar trigger expression. Responses to the target trials therefore measured the rate of scalar implicature interpretations, and formed our dependent measure.

**Hypotheses.** According to single and dual models, alternative and strong prime trials should increase the saliency of the alternatives relative to the weak prime trials. The rate of implicatures in the target trials should therefore be high. However, the single model assumes that the rate of strong interpretations is *entirely* determined by the saliency of the alternatives, whereas the dual model
assumes that the usage mechanism also plays a role. Thus the single model predicts that strong and alternative primes will lead to equal amounts of priming (or greater priming for the alternatives). In contrast, the dual model predicts that priming effects will arise from priming of the alternatives and priming of the usage mechanism. Since the strong primes raise the saliency of the alternatives and prime the usage mechanism whereas the alternative primes only raise the saliency of the alternatives, the dual model predicts that greater priming should be observed for the strong prime trials than the alternative prime trials.

**Design and Procedure.** Participants were presented with a sentence and two pictures (see Fig 1). They were required to match the sentence with the correct picture. In prime trials there was always one picture that unambiguously matched the sentence. In target trials, one picture matched the weak meaning of the sentence, and the other contained the words, “Better Picture.” (Huang et al., 2013). Participants were instructed to select the “better picture” option if they thought that there was a picture that better matched the sentence (i.e., if they derived the strong interpretation). Responses to target trials therefore measured the rate of implicatures. The sentences used one of three scalar expressions: (1) *some* (2) numbers or (3) *ad hoc* constructions, or their alternatives, e.g., *all*.

Experimental items were organised into 36 blocks consisting of two prime trials followed by a target trial. Thirty-six filler trials were included to prevent participants from identifying the blocks. Block and filler presentation order was randomised. Forty participants took part.

**Results.** Rates of strong interpretations (the proportion of implicature responses—better picture selections) were significantly higher following strong and alternative primes than weak primes (35%, 35%, and 24%), t(39)’s >3.71, p’s <.005. However there was no significant difference between strong and alternative primes (t(39)=.687, p=.496). We also examined the effect by expression (*some*, number, *ad hoc*) and found the same pattern for each expression.

**Experiment 2.** The alternative and strong primes used in Experiment 1 used the same structure for the images, whereas the weak primes used a different structure (see Fig 1). This visual organisation of the images could therefore explain our findings. In Experiment 2 the weak primes were changed so that they structurally they matched the other primes (see Fig 2).

**Design and procedure.** Fifty participants took part in Experiment 2. The design was similar to Experiment 1 except for the structure of the weak primes.

**Results.** The findings from Experiment 1 were replicated. This means that the previous experiment’s results were not due to visual cues. Strong interpretations were again significantly higher following strong and alternative primes than weak (32%, 31%, 20%) t’s(49)=6.00, p<.001, and there was no significant difference between strong and alternative primes (t(49)=1.25, p=.219). As in Experiment 1, the same pattern was evident for all expressions.

Conclusions. The results indicate a crucial role for the salience of the alternative in determining when scalar implicatures arise. Moreover, we found no evidence that the usage mechanism makes an independent contribution to the rate of implicature generation: it appears that provided the alternatives are salient, the implicature arises automatically.

Our findings raise two important points for theoretical models of scalar implicature. (1) Many models are vague about whether implicatures are obligatory given salient alternatives (see Chierchia et al., 2012, for a discussion of this point). Our findings clarify that implicatures are indeed obligatory in the right context. (2) Grammatical models of implicature e.g. Chierchia et al., involve an operator that negates alternatives and uses the result (e.g., the only operator). Such an operator should be susceptible to priming in the same way as many other operators and representations (see Pickering & Ferreira, 2008). That we could not prime the operator suggests that it is quite different to other structural representations used in psycholinguistics.

**References**


