Speaker constraints vs. hearer inferences

From a Gricean perspective, hearers are predicted to draw pragmatic inferences based on the speaker's decision to use a particular utterance rather than alternatives (Grice 1989). For instance, in the scalar case, the speaker's use of a weak scalar term (such as 'some' in (1)) is taken to implicate that the stronger term ('all') does not hold.

(1)   Did the students pass the exam?
        Some of them did.

For this to go through, at least three further licensing conditions must be met: firstly that the stronger statement would be informationally relevant, secondly that the speaker is knowledgeable about the stronger proposition, and thirdly that the speaker is epistemically committed (i.e. that if they do not consider the stronger proposition to be true, they consider it to be false). Experimental work shows that hearers draw or decline to draw scalar implicatures when these factors are manipulated (Breheny, Ferguson and Katsos 2009).

However, in typical real-life interactions, the hearer may not be in a position to know whether these conditions are in fact met, and would be expected to factor in this uncertainty to their reasoning. If this follows, then implicatures should be drawn only probabilistically, according to the hearer's judgement as to whether the speaker is informed and epistemically committed and whether the situation demands further information.

In this paper, I consider the implications of this observation for the treatment of implicature. In particular, I outline a novel proposal for the analysis of the speaker's use of numerically-quantified expressions, and discuss how the hearer is predicted to interpret the resulting utterances. I discuss new experimental findings in support of these predictions, and consider how these feed into a view of implicature as a probabilistic phenomenon.

My proposal models the speaker's use of quantified expressions as the output of a multiple constraint satisfaction mechanism. I argue that, in accordance with Relevance Theory (Sperber and Wilson 1995) the speaker's task is to select the expression that achieves optimal relevance, in terms of minimising cognitive effort while maximising cognitive effects. However, it is generally not possible to find an utterance that is simultaneously optimal with respect to all considerations – for instance, utterances which are economical in expression tend not to be as informative as more verbose utterances.

For that reason, I propose to construe the speaker's choice of utterance as the solution to a problem of multiple constraint satisfaction, founded in an Optimality Theory (OT) formalism (Prince and Smolensky 1993). I follow McCarthy (2002) in applying a discovery procedure for OT constraints that involves identifying statistical or typological preferences and restating these as constraints. Using this approach I identify six constraints that are applicable to the usage of numerically-quantified expressions: numeral salience (use a salient numeral), quantifier simplicity (use a simple quantifier), quantifier priming (reuse a quantifier that is contextually activated), numeral priming (reuse a numeral that is contextually activated), informativeness (make the most informative statement possible) and granularity (make a statement at the appropriate granularity level). These constraints are independently motivated at once by experimental results, philosophical considerations, and appeal to the existing literature. They are drawn from a range of disciplines of enquiry, including discourse pragmatics, psycholinguistics and numerical cognition. By placing these constraints in an OT model,

my proposal enables these diverse considerations to be integrated into a single account of quantifier usage.

Considered from the hearer's perspective, this account makes novel predictions about the pragmatic enrichments available from numerically-quantified expressions. For instance, it has previously been argued (Fox and Hackl 2006, following Krifka 1999) that expressions of the form 'more than n' fail to give rise to scalar implicatures, on the basis that (2) does not implicate (3) (and thus does not give rise to the corollary (4)).

(2)   Tom has more than three children.

(3)   Tom does not have more than four children.

(4)   Tom has exactly four children.

However, according to the novel account I propose, the failure of implicatures to arise depends on granularity considerations. On the basis that 70 is a more salient number than 71, but is not more salient than 80, it is predicted that a speaker who knows (5) to be true might nevertheless prefer to utter (7), but a speaker who knows (6) to be true will not prefer (7).

(5)   Jane owns more than 71 books.

(6)   Jane owns more than 80 books.

(7)   Jane owns more than 70 books.

Consequently, the utterance of (7) is predicted to give rise to the implicature that (6) does not hold, but not the implicature that (5) does not hold. Empirical investigations (Cummins, Sauerland and Solt submitted) show that these implicatures are indeed generated by hearers: "more than n" is given a range interpretation that does depend on granularity, and participants' comments reflect conscious awareness that this type of pragmatic enrichment is available to them.

The model further predicts that the content of the preceding discourse context will influence the availability of this type of pragmatic enrichment. Specifically, the prior mention of a numeral may grant the speaker a reason to use an expression that is not maximally informative. Consequently, the model predicts that the implicature discussed above will be attenuated under these circumstances. For instance, if 70 is contextually activated (e.g. by a prior utterance such as (8)), the speaker of (7) should not be understood as conveying that (6) does not hold. As a result, the model predicts that the range of interpretation associated with (7) will be broader if (7) occurs after (8) than if it occurs after a non-numerical expression such as (9). This prediction is also borne out by experimental investigation.

(8)   Who owns more than 70 books?

(9)   Who owns a lot of books?

Similarly, this model predicts the interpretative enrichments arising from superlative quantifiers ('at least/at most'), by virtue of their additional complexity by comparison with 'more/fewer than'. Specifically, 'at least n' is predicted generally to give rise to the implicature that 'exactly n' is a possibility, on the basis that otherwise 'more than n-1' could have been used instead. Moreover, the model predicts that the above considerations will interface with numeral roundness: for instance, 'at least n' is predicted to occur more frequently than 'more than n-1' for round values of n. This is borne out by corpus investigations. I argue on empirical grounds that the constraint-based approach

offers a more complete, economical and satisfactory treatment of the semantics and pragmatics of superlative quantifiers than that offered by Geurts and Nouwen (2007) or Cummins and Katsos (2010).

I conclude by exploring the general implications of this model for the analysis of implicature. Given perfect knowledge of the speaker's constraint ranking (which, according to this model, encodes their usage preferences for numerically-quantified expressions), the hearer would be able to reconstruct much of the underlying situation from the choice of utterance. However, in practice, the hearer does not typically have such detailed knowledge. Rather, any utterance encodes two types of information: information about the situation (such as gives rise to pragmatic enrichments) and information about the speaker's preferences. I argue that this approach leads us towards a view of implicature that is probabilistic, rather than absolute: and consequently that we might think of implicatures in terms of propositions being made to appear more or less likely to be true, from the hearer's perspective, rather than being made to appear definitively true or false. I discuss the relation between implicature, construed in these terms, and other forms of non-asserted content (and asserted content) from a psycholinguistic perspective.

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