Original Articles

The role of alternative salience in the derivation of scalar implicatures

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A B S T R A C T

Comprehension can be enriched by considering what a speaker could have said but did not; namely, the alternative. For example, "Betty passed some of her exams" can be interpreted as "Betty passed *some but not all* of her exams". This enriched interpretation is an example of a scalar implicature. We consider whether the salience and use of the alternative are independent processes in the derivation of scalar implicatures or whether use is dependent on salience. Participants completed three sentence interpretation experiments in which the sentences invited scalar implicatures. The experiments used a structural priming paradigm with alternatives and implicatures as primes. We found that (1) adults could be primed to derive scalar implicatures when the alternative was the prime (2) they did so at a rate equal to if the scalar implicature itself were the prime. In the absence of evidence that the use of the alternative can be primed independently of its salience, we conclude that salience and use are not independent processes. Instead, we suggest that when the alternative is sufficiently salient, the implicature will automatically be derived.

1. Introduction

People often communicate much more than they explicitly say. For example, consider the following exchanges.

1. A: Are John and Mary coming to the party?
   B: John is.
   = > Mary is not.
2. I ate four doughnuts.
   = > I ate *exactly* four doughnuts.
3. Betty passed some of her exams.
   = > Betty passed some *but not all* of her exams.

In (1), B answers A's question about John coming to the party. Although B has not explicitly answered A's query about Mary's attendance, his utterance communicates that *Mary is not coming*. In (2), the listener can infer that the speaker ate *exactly* four doughnuts, even though the speaker did not explicitly say *exactly four*, and in (3), the listener can conclude that Betty passed *some but not all* of her exams, even though the speaker did not explicitly say *not all*.

Enrichments such as those above are commonly known as *scalar implicatures*. In each case the listener generated an enriched meaning based on the alternative to what the speaker said, that is, something that the speaker could have said but did not. There are many accounts of how implicatures can be derived but most assume something like the following, inspired by Grice (1989): (i) The listener computes the basic meaning of an utterance, (ii) recognises that an alternative phrase could have been used, (iii) negates the alternative and (iv) combines this with the basic meaning. For example, in (1), Speaker A recognises that B could have said "John and Mary are coming to the party" (the *alternative*). Since B did not say this, and assuming that she is being co-operative, A can infer that "John and Mary are coming to the party" is not true. Thus, combining what is said, *John is coming to the party*, with the negation of the alternative, *it is not the case that John and Mary are coming to the party*, the listener arrives at the meaning that *John but not Mary is coming to the party*. Similar reasoning can be used to derive the enrichment seen in the other examples. In (2), since the speaker said *four* but not *five, six, seven*, etc., the listener can infer that *not five, not six, not seven* is the case, and conclude that the speaker means *four but no more*. In (3) the speaker could have said *all*, but since they did not, the speaker can infer *not all*.

Implicatures are optional: the listener chooses whether to incorporate an implicature into the sentence meaning. For example, in (3), if the preceding discourse had been about whether Betty would pass *any* of her exams, the listener would likely not derive the *not all* inference (since the *not all* part would be largely irrelevant). Understanding how and why certain contexts cause people to enrich the basic meaning of expressions has been a fundamental research goal in pragmatics (e.g. Chierchia, 2013; Geurts, 2010; Grice, 1989; Horn, 1972, 1989; Levinson, 2000) and psycholinguistics (e.g. Bott, Bailey, & Grodner, 2012; Bott & Chemla, 2016; Bott & Noveck, 2004; Breheny, Ferguson, & Katsos, 2013; Breheny, Katsos, & Williams, 2006; Degen &

Tanenhaus, 2015; Gotzner, Wartenburger, & Spalek, 2016; Grodner, Klein, Carbary, & Tanenhaus, 2010; Huang & Snedeker, 2009a; Tomlinson, Bailey, & Bott, 2013). In our study we address the role of the alternative in this process. We test whether the salience of the alternative entirely determines whether an expression will be enriched, or whether an additional, independent usage mechanism is justified.

1.1. Combination and salience models of implicature

Most researchers agree that there are two stages to the implicature process. The first is that a relevant alternative is retrieved from the lexicon or the context, or constructed. The second is that this alternative is negated and combined with the basic meaning of the sentence. However, it is not clear how the second stage depends on the first. The second stage could apply automatically once the first stage is complete, so that the implicature is always derived if the alternative is sufficiently salient, or the second stage could be activated independently of the first. We refer to the former possibility as the *salience model*, since the implicature depends purely on the salience of the alternative, and the latter as the *combination model*, since the implicature depends on a combination of the salience of the alternative and the activation of an independent, usage mechanism (see Fig. 1).

Both models assume that alternatives have varying degrees of activation. For the salience model, if the activation of any one alternative exceeds a threshold, the usage mechanism will be applied, and the implicature will be computed. The usage mechanism is not modulated independently of the activation of the alternatives. The combination model also assumes that the alternatives have varying degrees of activation and a threshold, but additionally assumes that the usage mechanism does. For the salience model, contextual factors (e.g., the question under discussion, whether alternatives have been mentioned

in the discourse, speaker knowledge) affect the activation levels of the alternatives, but for the combination model, contextual factors affect activation levels of the alternatives and/or the usage mechanism, independently. Both models explain how the implicature arise in some circumstances but not others. For example, in (1) the salience model explains the implicature by assuming that the alternative (*John and Mary are going to the party*) is sufficiently active that it exceeds the threshold necessary to trigger the usage mechanism and so generate the implicature. The combination model also requires alternatives to be sufficiently active but additionally assumes that the usage mechanism is active. Similarly, consider a situation where an implicature would not arise. In (1), assume that B knows information about John but knows nothing about Mary, and the listener is aware of this. Under these conditions the *not Mary* implicature does not arise (the competency assumption; see Grice, 1989, and Sauerland, 2004). The salience model explains the absence of implicatures by assuming that the absence of speaker knowledge suppresses activation levels of the alternatives to such a degree that the usage mechanism is not triggered. The combination model explains this by assuming either that the alternatives are not sufficiently active, or that speaker knowledge directly suppresses the usage mechanism. The crucial difference between the two is that with the independent usage mechanism, the combination model has an extra method of accommodating contextual factors, such as speaker knowledge or alternative relevance.

Implicature theories from the formal pragmatics literature can be broadly mapped on to the salience/combination distinction. Among the salience models are Grice's original account and its more recent developments, the Neo-Gricean models (Horn, 1972; Levinson, 2000). Grice's account assumes that if there is linguistic material that is relevant and more informative than the basic expression, this material should be designated an alternative. Subsequently the alternative is
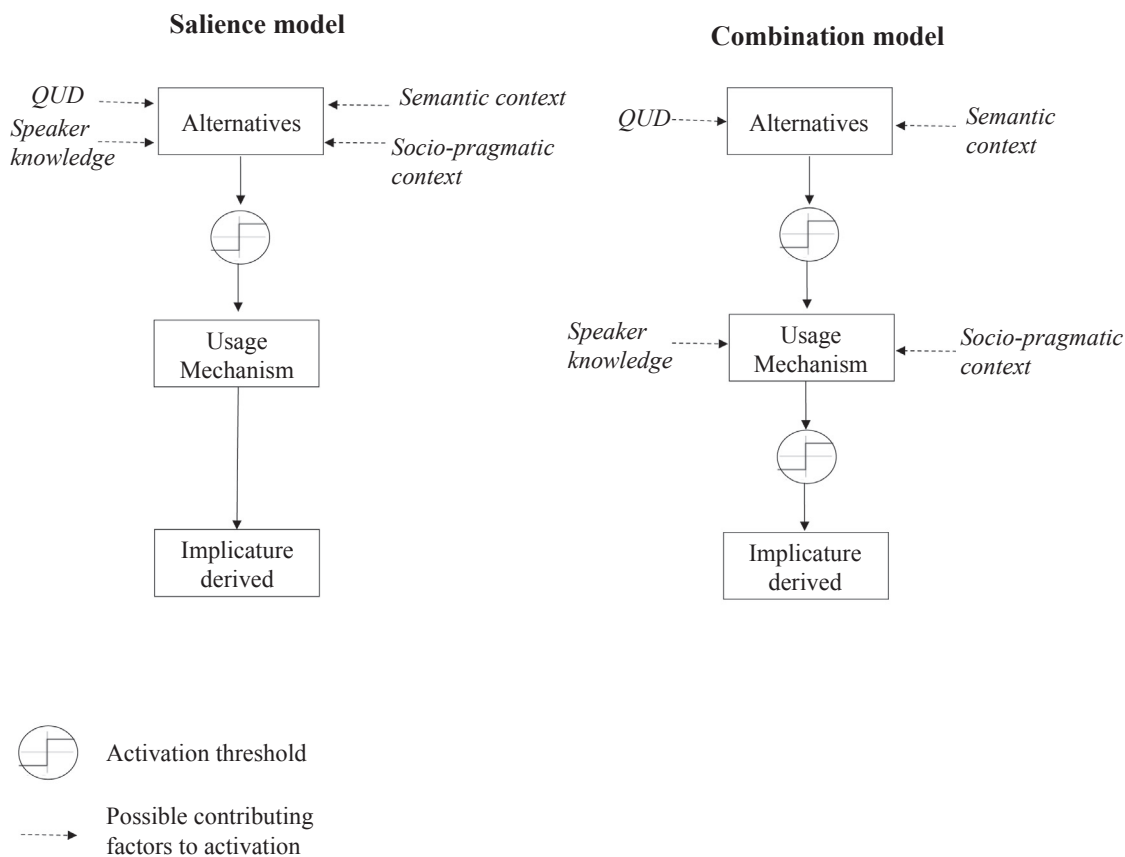

Salience model

Combination model

Fig. 1. Salience and combination models. Alternatives have varying levels of activation. For the salience model, the usage mechanism is automatically applied after the alternatives obtain sufficient activation to exceed a threshold but for the combination model, the alternatives and the usage mechanism are required to exceed a threshold. Note that both models have the same number of processing steps but the combination model assumes the usage mechanism can be independently activated whereas the salience model does not.