The Computation of Scalar Implicatures: Pragmatic, Lexical or Grammatical?

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Abstract

The problem that I focus on in this paper is whether scalar implicatures are truly derived through pragmatic means. I provide an overview of the alternatives to the pragmatic approach that I have come across, as well as provide my own thoughts on the matter and offer some questions for further examination. I begin with an introduction for the non-linguist of scalar implicatures and the (neo-)Gricean theory as described by Geurts (2011), after which I identify two other competing theories laid out by Sauerland (2012), focusing on some-all implicatures. I then explain the advantages that the grammatical theory has over the pragmatic theory, with an emphasis on SIs embedded in disjunctions that Sauerland and Chierchia et al. (2013) point out. Considering these arguments, I offer a critical review of these papers and conclude that, despite the pragmatic theory facing challenges still, it seems that some degree or pragmatic reasoning is essential to understanding scalar implicatures, even if that means accepting a pragmatic-lexical hybrid approach.

1 Introduction: The Pragmatic Theory of Scalar Implicatures

Scalar implicatures have long been a phenomenon puzzling both linguists and philosophers of language. When taking an introductory logic course, students may be initially puzzled by the fact that in classical first-order logic, *some* is consistent with *all*. That is, given (1), it is often intuited that (1') is false:

(1) *Some* students failed the exam.

(1') *All* students failed the exam.

In reality, (1) is perfectly consistent with (1'), and a professor who announces to his class that "some students failed the exam" could do so truthfully in a world where—to the shock of his students—

they all failed. This confusion arises due to the phenomenon of *conversational implicature*: when one engages in conversation, not only is meaning taken from what is said, but assumptions are also made about the speaker's intention and knowledge to take meaning out of what is *not* said.

The type of conversational implicature observed in (1)-(1') is known as *quantity implicature* because its derivation involves reasoning with Grice's Maxim of Quantity: "Make your contribution as informative as is required" (Grice 1975). If the professor says (1) to his students, he could have said (1'), which is more informative. Nonetheless, he chose to say (1), violating the Maxim of Quantity. The students reason that he must have violated the maxim for a reason; in this case, it is likely *not true* that *all* students failed the exam. Thus, from the speaker's utterance of (1) alone, the listener infers that the speaker must believe (¬1'):

(¬1') It is not the case that all students failed the exam.

This path of reasoning is why the students would be so shocked in the case that they *did* in fact *all* fail the exam: it would contradict this quantity implicature. This variety in quantity implicature may be more specifically called *scalar implicature* (SI). SIs involve generating an alternative sentence by replacing one expression with another, more informative, expression in the same *Horn scale*. Given the Horn scale in (2), it is reasonable for (1') to be considered an alternative to (1), and, as (1') is more informative than (1), why it is employed in the computation of the SI (¬1').

(2) {*some*, *all*}

To be more precise, this conception of the computation of SIs involves the listener going through four steps that have been adapted from Geurts (2011) and laid out in (3).

(3) The speaker (S) has said (1).

i. S could have said the more informative (1'). Why didn't he?

ii. It's probably because S doesn't believe that (1') is true.

iii. Furthermore, S must have an opinion as to whether (1') is true: either S believes (1') is true or S believes (1') is false.

iv. By disjunctive syllogism, (ii) and (iii) entail that S believes (1') is false. (Geurts 2011, p. 32)

These steps are central to this approach towards SIs and will be referenced throughout this paper. Crucially, this conception is inherently *pragmatic*: it relies on reasoning about what the speaker believes. However, certain problems arise in the pragmatic theory of SIs (henceforth *the pragmatic theory*, or *Gricean theory*) that have led linguists to conceive of alternative approaches to provide an explanation for this phenomenon. Namely, the pragmatic theory seems unintuitive when considering cognitive efficiency, and makes the wrong predictions. In the following two sections, there is an elaboration on these challenges and an exploration of the alternative theories that have arisen in response.

2 The Lexical Theory

Sauerland (2012) lists three alternatives to the pragmatic theory: the lexical, pragmatic+lexical, and grammatical theories. The lexical and grammatical theories are discussed in this section, and the pragmatic+lexical theory returned to in the last section. When considering the pragmatic approach, what are perhaps the most obvious doubts that come about all pertain to the *efficiency* of computing SIs in this way. When a listener hears the utterance in (1), the inference that S believes (¬1') seems automatic and instantaneous; it seems that in an everyday situation, (1) will always include (¬1') in its meaning and there is no need to reason about speaker intentions in order to know this. Is it really necessary to go through steps (3, i) to (3, iv) to arrive at the same inference every time?

One may imagine that these inferences may actually be part of the *lexicon*. Lexical theories propose that SIs can be attributed to the memorized vocabulary of a language, rather than any logical derivation that relies on general, non-linguistic assumptions about the speaker's cooperativeness (e.g., Grice's Maxim of Quality). Perhaps *some* as it is used in English always contains a silent *not all*, so that (1), for example, is always taken to mean (4):

(4) Some *but not all* of the students failed the exam.

Surely, this is a much more cognitively efficient approach, as the derivation of the pragmatic inference is rendered obsolete. However, SIs are not quite as "automatic and instantaneous" as one might assume. There are cases where one may *not* wish to derive a SI at all, such as the use of *some* in (5) adapted from a class lecture:

(5) Speaker A: If some students failed, I will be disappointed.

Speaker B: #You will be disappointed even if all students failed.

In this case, Speaker A's utterance is not taken to mean "if some *but not all* students failed, I will be disappointed." This is because of the intuition that in this situation, Speaker A will be disappointed even if all students failed, hence the feeling of oddity towards Speaker B's response (he does not seem to be adding new information to the discourse). In sum, *but not all* cannot always be appended to the meaning of *some*, which suggests that SIs go beyond the lexical meaning of words.

Furthermore, Sauerland (2012) notes that the lexical theory makes the wrong predictions when "scalar expressions are embedded under an environment that reverses entailment relations" (Sauerland 2012, p. 12). One such example is adapted from Sauerland in (6):

(6) Elizabeth doesn't like all of Drake's songs.

(7) Elizabeth *likes some* of Drake's songs

(Sauerland 2012, p. 11)

(6) is predicted to give rise to the SI that (7), due to the negative predicate *doesn't like* reversing the entailment relation, *some* becomes more informative than *all*. By applying the pragmatic reasoning steps in (3) to sentence (6), one arrives at the SI that S believes that it is not the case that Elizabeth doesn't like some of Drake's songs, which is equivalent to S believing (7): the correct prediction. Under the lexical theory, however, a SI would not arise at all, as it is impossible to reach the correct prediction by adding a similar "silent" SI to the meaning of *all* as the lexical theory does for *some (but not all)*.

For this reason, and because of the problem observed in (5), the lexical theory is not widely accepted in current literature, and the remainder of this paper will pay more attention to the other theories mentioned by Sauerland.

That said, another weakness of the pragmatic theory is the inability to account for *local* SIs. The pragmatic theory is only able to correctly predict *global* SIs–- that is, "it can only apply to entire speech acts" (Sauerland 2012, p. 9). Because the pragmatic theory involves S's beliefs about the utterance as a whole, the wrong predictions are made for "local" environments where the SI is *embedded*, such as within a disjunct. The lexical theory does account for these local SIs, but as seen, it falls victim to other

challenges. One theory that does not seem susceptible to these challenges, however, is the grammatical theory.

3 The Grammatical Theory

These next two sections focus on SIs that arise in sentences containing *or*. The Horn scale for *or* is {*or, and*}, meaning that the sentence adapted from Chierchia et al. (2013) in (8) would have the alternative, more informative sentence in (8'):

(8) Jonas or Isabella will show up.

(8') Jonas and Isabella will show up.

(Chierchia et al. 2013, p. 2299)

Intuitively, (8) is taken to mean that either Jonas or Isabella will show up, but not both; i.e., one arrives at the SI that (¬8'), which seems consistent with the pragmatic derivation of SIs detailed in (3). However, under disjunctions that make use of *Hurford's Constraint*, the pragmatic approach makes the wrong predictions. Provided below is a paraphrase of Chierchia et al. (2013)'s definition of Hurford's Constraint in (9) and just one example of the shortcomings of the pragmatic theory with regard to disjunction and Hurford's Constraint in (10).

(9) **Hurford's Constraint (HC):** A sentence with a disjunctive phrase is infelicitous if either one of the disjuncts entails the other.

(10) a. Aashiha finished some of her exams.

b. Aashiha finished some or all of her exams.

(Chierchia et al. 2013, p. 2309)

(10) makes use of HC in the capacity that (10b) can only be interpreted as felicitous if *some* is taken to mean *some but not all*, or else the second disjunct will entail the first. The problem for the pragmatic theory arises in the fact that even if *some* is taken to mean *some but not all* in (10b), (10a) and (10b) are equivalent.

The problem is only obviated if it is assumed that there is an *exhaustivity operator* that applies to the first disjunct. Such an operator would be *grammatical* in that it would apply selectively to this one constituent of the sentence. Only grammatical rules can predict this behaviour, as, once again, pragmatic theories apply globally to the entire utterance in order to reason about speaker intentions and thus cannot posit any grammatical operators on an individual constituent level. Because of this, the pragmatic theory could derive from (10b) the inference that "Aashiha finished some but not all or all of her exams," but this would not account for the slight difference in (implicated) meaning between (10b) and (10a).

On the other hand, Chierchia et al. discuss the possibility of the additional alternatives *L* and *R* under a grammatical theory. When an exhaustivity operator is applied to a disjunctive phrase, the Horn set for *or* is taken to be {*or, L, R, and*}, where *L* takes the left disjunct and excludes the right disjunct, and *R* takes the right disjunct and excludes the left (Chierchia et al. 2013, p. 2314). This is exemplified in (11):

(11) Aashiha finished some *L* all of her exams. ⇔ Aashiha finished some of her exams.

If it is assumed that the exhaustivity operator is applied only to the first disjunct of (10b) and observes the alternative in (11), it is acceptable for the additional alternative to (10b) of "Aashiha finished some *but not all* of her exams," period, right disjunct excluded. Because this alternative is not consistent with (10a), which leaves open the possibility that Aashiha *did* finish all of her exams, the problem with distinguishing the implicatures of (10a) and (10b) is obviated.

Yet another challenge involving HC is what Sauerland (2012) refers to as *intermediate implicatures*. Take this adapted example from Sauerland in (12):

(12) Either Josh didn't read every page or he read no pages.

(Sauerland 2012, p. 19)

The grammatical theory is readily able to account for an example like this. Because "no pages" entails "not every page," the only way that HC is not violated in (12) is if the first disjunct is taken to mean (13):

(13) Josh didn't read every page, but did read some pages.

Once again, this requires applying an exhaustivity inference at the constituent-, and not utterance-, level. What is unique about this example, however, is that not only is the SI not global, it is not *local* either. This is due to a similar problem to what is seen in (6)-(7); the negative environment of the first disjunct reverses the entailment relations so that it may give rise to the SI in (13), which cannot occur if the implicature is taken to be locally attached to the lexical meaning of *every*. This concept is briefly returned to in the following section. To summarize, the grammatical theory accounts for SIs that interact with Hurford's Constraint in a way that the pragmatic theory cannot, as a grammatical exhaustivity operator would allow for the computation of SIs embedded in a disjunct, which the pragmatic theory fundamentally cannot do.

4 Critique & Discussion

This section touches on an attempt that has been made to counter the local SI problem for the pragmatic theory, especially considering a combined pragmatic+lexical theory. Following this is an explanation of how this still seems to fall short, however, a problem will be brought up with the grammatical approach that has not been seen to be addressed enough in the literature. The section will then conclude with an argument that the challenge within the grammatical approach is significant enough to favour a pragmatic theory, but there is extensive work to be done in order to fully accept the pragmatic approach.

Firstly, note that Russell (2006) offers a solution to some forms of disjunctive sentences that have historically been seen as counterexamples to the pragmatic theory. In particular, he details a logical derivation that employs some of the same tactics as Sauerland and Chierchia et al. (namely, considering individual disjuncts as alternatives to a disjunctive phrase) to *sometimes* predict the correct outcomes, which the grammatical theory literature has not given credit for. For the purposes of this paper, this logical derivation will be excluded simply because the grammatical theory has yet to overcome the instances of SIs interacting with Hurford's Constraint, a great feat for the grammatical approach. However, Russell (2006) is mentioned because it does offer hope for the pragmatic theory which the papers advocating for the grammatical theory did not adequately address. It is plausible that what are seen as "local" SIs are really not so distinct from their global counterparts. With some additional assumptions about speaker intentions that may not have been historically included in the pragmatic theory and a more careful consideration of the logical structure underlying a pragmatic approach to SIs, the Gricean theory may be able to account for even HC examples with speaker assumptions and logic alone. The pragmatic theory does, after all, have a common-sense advantage over the grammatical approach and, as such, should be intuitively preferred over the grammatical approach if ever a method is offered to account for

instances such as HC. As Sauerland (2012) himself states, "[t]he pragmatic account is an outgrowth of common sense reasoning" (p. 16). To illustrate this point, consider a passage from Chierchia et al. (2013).

Referring back to (8) and (8'), according to Chierchia et al. and following the derivation outlined in (3), the pragmatic theory would lead to the inference that "*it is likely* that the speaker takes (8') to be false" (p. 2299). Chierchia et al. note that although this seems to resemble the target SI, "[w]hat we actually want to draw is that the speaker is positively trying to convey that [Jonas] and [Isabella] will not both come," rather than simply make a statement about the likelihood of what the speaker believes (p. 2300). To open a debate on this argument, consider the following example which has been modeled after another that was the center of an in-class discussion:

(14) Chloe took some of the pears from the bowl.

Grammatical theories are often quick to criticize the context-sensitivity and dependency on *speaker competence*—the assumption in (3, iii) that is crucial for the derivation of SIs under the pragmatic theory. However, it is exactly this assumption that makes the pragmatic theory so appealing. Considering (14), in the context that there was something blocking the speaker's view of the pear bowl (e.g., a cat, a vase), the strongest implicature that can arise is that the speaker *does not believe* that Chloe took all of the pears from the bowl. That is, the competence assumption disappears, and the derivation is halted at step (3, ii). On the other hand, in the context that the bowl is in plain sight for the speaker, not only is it inferred that it is *likely* the speaker believes that Chloe *did not take all* of the pears, as Chierchia et al. contend, one *knows* that the speaker believes this! The competence assumption allows for both the contextual cancellation of the SI as well as a "positive conveying" of the SI. If anything, the pragmatic theory is more accurate on this front, given that the grammatical theory *cannot* predict the implicature cancellation in specific contexts. As Russell (2006) puts it, "[t]he enrichment of weak implicatures with contextual inferences in a global, Gricean framework correctly mirrors the observed fine-grained context-sensitivity of scalar implicatures" (p. 364).

That said, the pragmatic theory is still far from overcoming the problems that proponents of the grammatical theory have posed. Most alarmingly, the failure of the pragmatic theory to account for many varieties of local implicatures (those varieties not accounted for in Russell (2006) and Geurts (2011), such as in (10)) must somehow be repaired. One solution mentioned by Sauerland (2012) is a combination of

the pragmatic and lexical theories into one (P+L theory) (p. 15). Where the lexical theory fails to account for SIs that *must* be global or those under reverse-entailment environments, pragmatic reasoning may step in, whereas local SIs may be as simple as the lexical theory suggests, all of which may somehow be married into a single account. However, Sauerland's intermediate implicatures such as in (12) would force such a theory to also account for those SIs that are neither local nor global, which raises another challenge yet.

5 Conclusion

This paper has investigated the varying approaches to SIs in search of an alternative to the pragmatic theory. Considering local implicatures, the lexical theory was evaluated, coming to the conclusion that the lexicon alone cannot explain implicatures that are necessarily global nor those in reverse-entailment environments. This was followed by a discussion of Sauerland and Chierchia et al.'s use of Hurford's Constraint to justify the grammatical over the pragmatic theory. In conclusion, it is more plausible to construct a theory that incorporates pragmatic reasoning than to abandon pragmatic influences entirely and thus somehow account for contextual effects on the derivation of SIs through grammar alone.

References

Chierchia, Gennaro, Fox, Danny and Spector, Benjamin. "87. Scalar implicature as a grammatical phenomenon". Volume 3, edited by Claudia Maienborn, Klaus von Heusinger and Paul Portner, Berlin, Boston: De Gruyter Mouton, 2013, pp. 2297-2332. https://doi.org/10.1515/9783110253382.2297

Geurts, Bart. 2011. Quantity implicatures. Cambridge: Cambridge University Press.

Russell, Benjamin. “Against Grammatical Computation of Scalar Implicatures”. Journal of Semantics 23:4, 2006, pp. 361-382. https://doi.org/10.1093/jos/ffl008

Sauerland, Uli. “The Computation of Scalar Implicatures: Pragmatic, Lexical or Grammatical?” Lang. Linguistics Compass 6, 2012, pp. 36-49. https://doi.org/10.1002/lnc3.321