

Scalar Implicatures with Alternative Semantics*

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Current theories of scalar implicature predict implicatures in comparative and disjunction cases where none are actually found. I propose an exhaustive operator within the alternative semantics system of Kratzer and Shimoyama (2002) that accounts for correct scalar implicatures, but does not overgenerate in these cases.

Problems

One standard account of scalar implicatures considers alternative sentences where the scalar item has been replaced with an item from the same scale, called a Horn Scale after Horn (1972). All such sentences that are stronger are implicated to be false:

- (1) I read three books. \Rightarrow I did not read four books.

Here “four” is an item in the Horn Scale for “three” and so the stronger statement with “four” is false. This account has empirical failings, though (shared with others, such as Groenendijk and Stokhof (1984)), two of which are listed in (2) and (3):

- (2) I read more than three books. \nRightarrow I did not read more than four books.
(3) I read *War and Peace* or some of the textbooks. \nRightarrow I did not read *War and Peace*.

In (2) as in (1), another item on the Horn Scale for “three” is “four” and therefore a predicted – but incorrect – implicature is that I did not read more than four books. In (3), as noted by Chierchia (2002), a predicted scalar implicature is “I did not read W&P or all of the textbooks,” which entails “I did not read W&P” – clearly not an implicature of the original sentence.

Background

To solve these problems, I first turn to the work of Kratzer and Shimoyama (2002), who propose that indefinites generate sets of individuals that are combined pointwise with the predicates that take them:

- (4) $\llbracket \mathbf{a\ book} \rrbracket = \{x_e \mid book(x)\}$; $\llbracket \mathbf{I\ read\ a\ book} \rrbracket = \{P_{st} \mid \exists x_e \in \llbracket \mathbf{a\ book} \rrbracket [P = I\ read\ x]\}$

Let us call this set of alternative simple propositions the sentence set. The final meaning of a sentence (generated by a silent \exists operator) is that one of the propositions in its sentence set is true.

Following Groenendijk and Stokhof, I will argue below that the appropriate set of alternatives for an exhaustive operator to consider is what I will call the focus set, a set of alternative propositions akin to the focus semantic value (e.g. Rooth 1992). For instance, the question “What did you read last night?” sets up the following focus set:

- (5) $\{I\ read\ War\ and\ Peace\ last\ night, I\ read\ The\ Brothers\ Karamazov\ last\ night, I\ read\ The\ New\ York\ Times\ last\ night, I\ read\ W\&P\ \oplus\ The\ NY\ Times\ last\ night, \dots\}$

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The focus set contains only propositions without quantifiers and may change as further focus conditions arise during a conversation.

Proposal

With these tools in hand, we can now propose how to express a sentence with a scalar implicature. I assume that scalar implicatures arise when a sentence contains a silent exhaustive operator, *Exh*, as defined below:

- (6) $\llbracket Exh \rrbracket = \{[\lambda p \in D_{st} . \lambda w' \in D_s . \forall f \in F [f(w') \leftrightarrow (p \Rightarrow f)]]\}$,
 where F is the focus set.

$Exh(p)(w)$ means that the statements in F entailed by p are true and these are the only true statements in F . *Exh* is of type $\langle st, st \rangle$ and therefore can combine pointwise with the sentence set (a set containing items of type st) to form a new sentence set, exhaustified over the focus set.

In order to analyze scalar implicature, I extend Kratzer and Shimoyama’s analysis of indefinites to items such as numerical indefinites, proper nouns, and proportional quantifiers. I propose that these items also generate sets of (possibly plural) individuals, which I assume to have properties of sets such as cardinality and subset relations:

- (7) a. $\llbracket \mathbf{3\ books} \rrbracket = \{x_e \mid books(x) \ \& \ |x| = 3\}$
 b. $\llbracket \mathbf{more\ than\ 3\ books} \rrbracket = \{x_e \mid books(x) \ \& \ |x| > 3\}$
 c. $\llbracket War\ and\ Peace \rrbracket = \{W\&P\}$
 d. $\llbracket \mathbf{some\ of\ the\ textbooks} \rrbracket = \{x_e \mid x\ is\ a\ proper\ part\ of\ the\ textbooks\}$

These strong meanings, such as “three books” meaning exactly three books, are acceptable because without *Exh*, a sentence such as “I read three books” just means that there exists a plurality of exactly three books such that I read that plurality; unexhaustified, it does not necessarily mean that there is no other larger plurality that I read.

Consequences

Kratzer (2005) suggests that an account using an exhaustive operator would solve the comparative problem in (2). Using the definitions in (7) plus *Exh*, we can see that the correct implicature is generated for (1), but the meaning of (2) – exhaustified relative to the focus set in (5) – is that the specific total plurality of things that I read last night is a plurality of books whose cardinality is more than three. Indeed, it does not generate the incorrect implicature that I read any particular number of books.

Similarly, once *Exh* applies to the sentence “I read some of the textbooks” with the focus set in (5), the meaning generated is that the specific total plurality of things I read last night is a plurality of textbooks that is a proper part of the plurality containing all the textbooks. Therefore, I did not read all of the textbooks (or read anything else, for that matter). Turning to (3), we can now derive the exhaustified sentence set in (8b) using the definition for “or” in (8a):

- (8) a. $\llbracket \mathbf{or} \rrbracket = \lambda X \lambda Y [X \cup Y]$
 b. $\llbracket \mathbf{Exh\ I\ read\ W\&P\ or\ some\ of\ the\ textbooks} \rrbracket = \{I\ read\ W\&P\ and\ nothing\ else\ last\ night, I\ read\ tb_1\ and\ nothing\ else\ last\ night, I\ read\ tb_2\ and\ nothing\ else\ last\ night, I\ read\ tb_1 \oplus tb_2\ and\ nothing\ else\ last\ night, \dots\}$

“Or” simply creates the union of two sets. This union is then combined pointwise with the predicate and with *Exh*. When \exists applies to the set in (8b), it means that last night I either read W&P and nothing else, or a proper subset X of the textbooks and nothing else. Therefore, I did not read *Brothers Karamazov* or any newspapers.

Conclusion

In short, building on Kratzer and Shimoyama's work, we can create a simple coherent system that answers many of the outstanding questions surrounding scalar implicatures. Further refinements in the paper include examining how the analysis proceeds in downward-entailing environments, how the *Exh* operator interacts with modal operators, and a possible application to the Lumping Problem.

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