SCALAR USES OF *ONLY* IN CONDITIONALS

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We argue that sentences of the kind "You only have to go to the North End to get good cheese" can be ambiguous and employ a scalar version of 'only' on one of their readings. So do the exceptive constructions – the cross-linguistic counterparts of 'only have to' sentences. 'Only' is treated as inducing a 'comparative possibility' scale on propositions. The properties of this scale explain the absence of the prejacent presupposition that is usually associated with 'only'. The sufficiency meaning component is argued to be a pragmatic inference, not a part of the truth conditions.

1. Introduction

Adverbial *only* has been recently argued to require a special treatment when occurring in sentences expressing sufficient condition. The following sentence, first discussed in von Fintel and Iatridou 2005, proved to be problematic for the existing analyses of *only*:

(1) To get good cheese you only have to go to the North End.

According to the observation in Bech 1955/57, sentences like (1) are equivalent to:

(2) To get good cheese it suffices to go to the North End.

This suggests that *only* can 'reverse' the relation of necessity, expressed by the embedded *have to*, giving rise to the sufficiency reading.

Another striking fact about (1) and others of its kin is that they do not entail the truth of the prejacent, the propositional complement of *only*. In other words, in uttering (1), we do not convey that the embedded anankastic conditional in (3) is true.

(3) To get good cheese you have to go to the North End.

The truth of the prejacent is elsewhere invariably guaranteed and derived in one way or another from the meaning of *only*.

According to von Fintel and Iatridou 2005's cross-linguistic survey of the morphosyntax of the sufficiency modal construction (SMC), as they call (1), a set of languages, like French, Modern Greek, etc., employs a negative adverb and an exceptive phrase instead of *only*:

(4) Si tu veux du bon fromage, tu n'as qu'aller à North End.
if you want of good cheese you NEG have except go to North End

The goal of this paper is to develop a compositional analysis for "only have to" without introducing a new species of *only* in order to account for the lack of the prejacent entailment/presupposition. We claim that the data in question involve scalar uses of *only* and *except*. By integrating the scalarity into the semantics of the SMC, we explain the polarity facts observed in both variants of the construction. Finally, our analysis predicts that (2) is not equivalent to (1) and (4) but rather a pragmatic inference from them.

2. Problems with Previous Analyses

To solve the "prejacent problem" von Fintel and Iatridou 2005 pursue a lexical decomposition alternative, assuming that *only* splits into the negation and *except*, drawing on the parallel to the "ne que" construction in French. By allowing the modal to intervene between the two operators they derive the following truth condition for (1):

(5) In some of the good cheese worlds you don't do anything other than going to the North End.

This truth condition combined with the presupposition (6) in the spirit of Horn 1996 does not entail the prejacent.

(6) In all of the good cheese worlds you do something.

The SMC is thus predicted to express the possibility to achieve the goal expressed by the subordinate clause if the condition in the matrix clause is fulfilled. However, this semantics appears too weak to account for the sentences that appear to involve sufficiency in the logical sense:

(7) For the bomb to explode, you only have to press the button.

The condition in (5) would wrongly predict that (7) is true in a world in which pressing the button does not trigger an explosion.

Another proposal, due to Huitink 2005, is to analyze *only* as a universal modal with reversed order of arguments and to use the notion of modal concord to dispense with the semantic contribution of *have to*. The truth condition she arrives at is:

(8) In all North End worlds you get good cheese.

which renders (1) equivalent to (2). This makes wrong predictions in case there are easier ways for obtaining good cheese than going to the North End. If you can as well get good cheese in the nearest shop, (1) is predicted true contrary to our intuitions. The general problem with the modal analysis is that it fails to capture the fact that the SMC does not only introduce a sufficient condition, but also ranks it as the easiest possible.

3. Scalar meaning of SMC

Two major inferences from (1) are associated with the contextually provided effort scale:

- none of the ways of getting good cheese (⟦**gc**⟧) ranked higher on the effort scale than going to the North End (⟦**ne**⟧) are necessary
- none of the ways of getting good cheese ranked lower on the effort scale than ⟦**ne**⟧ are sufficient

3.1. The Scale

The effort scale ranks propositions according to the degrees of difficulty they are assigned in the world of evaluation. To define the scale, we suggest that the degree of difficulty of a proposition corresponds to its possibility in the actual world. Thus, the comparative possibility relation from Lewis 1973 is used for ranking:

(9) *p* is more difficult in *w* than *q* iff $q <_w p$ (i.e. *p* is less possible than *q* in *w*)

In the degree talk, p is more difficult than q in w iff $D_w(p) < D_w(q)$, where D_w is a function from propositions to their possibility degrees in w.

This ordering allows us to define the relation of sufficiency/necessity between a degree and a proposition based on the corresponding relations holding between propositions:

(10) $\forall q \in D_{st}, d \in D_d , w \in D_s$ (d is sufficient for q in w) ⇔
($\exists p \in D_{st}$, p is d-possible in w: $sufficient_w$ (p, q)

(11) $\forall q \in D_{st}, d \in D_d , w \in D_s$ (d is necessary for q in w) ⇔
($\exists p \in D_{st}$, p is d-possible in w: $necessary_w$ (p, q))

Further on, we assume that in the scalar context necessity and sufficiency are related in the following way:

(12) $\forall q \in D_{st}, d \in D_d, w \in D_s$ (d is sufficient for q in w) ⇔
($\forall d'$: $d' < d \Rightarrow$ d' is not necessary for q in w)

(13) $\forall q \in D_{st}, d \in D_d, w \in D_s$ (d is sufficient for q in w) ⇒
($\forall d'$: $d' < d \Rightarrow$ d' is sufficient for q in w)

(14) $\forall q \in D_{st}, d \in D_d, w \in D_s$ (d is necessary for q in w) ⇒
($\forall d'$: $d' > d \Rightarrow$ d' is necessary for q in w)

3.2. The meaning of Only in SMC

We argue that *only* in the SMC is an exclusive particle that operates on a modal, its complement and the contextually determined set of alternatives to the complement. It introduces an existential presupposition, cf. Horn 1996. Crucially, *only* is a scalar operator that uses a comparative possibility scale to order the alternatives.

(15) $[\![\textbf{only}^S]\!] = \lambda C \in D_{s(st)}.\ \lambda p \in D_{st}.\ \lambda M \in D_{(st)(st)}.$
$\lambda w \in D_s$: $\exists r \in C\ [w \in M(r)].\ \forall r \in C\ [\ p <_w r \rightarrow w \notin M(r)]$,
where C is a contextually determined set of alternatives to p and $<_w$ is a partial order on propositions relating their comparative possibility in w

The logical form for (1) is the following:

(16) $([\![\textbf{only}^S]\!](C)([\![\textbf{ne}]\!]))([\![\textbf{have to}]\!]([\![\textbf{gc}]\!]))$

The predicted truth conditions are in (17) and informally in (18):

(17) "You only have to go to the North End to get good cheese" is defined in w iff
$\exists q \in C$: $[w \in [\![\textbf{have to}]\!]([\![\textbf{gc}]\!])(q)]$
If defined, it is true in w iff $\forall r \in C$: $[\ [\![\textbf{ne}]\!] <_w r \rightarrow w \notin [\![\textbf{have to}]\!]([\![\textbf{gc}]\!])(r)]$

(18) A: You don't have to do anything that is less probable than going to the N.E.
P: There is something that you have to do to get good cheese.

From (17) it follows by assumption (12) that the possibility degree assigned to $[\![\textbf{ne}]\!]$ in w is sufficient for $[\![\textbf{gc}]\!]$, or equivalently, that there is a proposition as possible as $[\![\textbf{ne}]\!]$ that is sufficient for $[\![\textbf{gc}]\!]$. This does not derive the sufficiency of $[\![\textbf{ne}]\!]$ directly. However, we argue that the latter inference is a result of pragmatic strengthening: if the speaker knew $[\![\textbf{ne}]\!]$ is not sufficient, he would choose another alternative with the same degree of possibility to make a relevant statement. So the sufficiency of $[\![\textbf{ne}]\!]$ can be considered a conversational implicature.

3.3. Neg+Except

Except in "Neg+Except" languages mirrors the semantics of the scalar *only*:

(19) $[\![\textbf{except}^S]\!] = \lambda C \in D_{s(st)}.\ \lambda p \in D_{st}.\ \lambda M \in D_{(st)(st)}.$
$\lambda w \in D_s$: $\exists r \in C\ [w \in M(r)].\ \exists r \in C\ [p <_w r\ \&\ w \in M(r)]$

(20) NEG $([\![\textbf{except}]\!](C)([\![\textbf{ne}]\!])([\![\textbf{have to}]\!]([\![\textbf{gc}]\!])))$

3.4. Strengthening by Implicature

To account for the non-sufficiency of easier alternatives, we want to strengthen the meaning by the requirement that any possibility degree greater than the one assigned to $[\![\textbf{ne}]\!]$ is necessary. This condition can be derived as a scalar implicature. Note that the presence of the scale associated with the assumptions in (12) - (14) induces an ordering of informational strength on propositions corresponding to alternative degrees of possibility. Suppose that the elements of C are ordered as in (21). Then we expect the informativity ordering of alternative propositions to be as in (22).

(21) …
you go to the nearest shop = ns
you go to the North End = ne
you go to Italy = it
…

(22) $\forall p \in C$: $[[\textbf{ns}] <_w p \rightarrow w \notin [\textbf{have to}]([\textbf{gc}])(p)] \subseteq$
$\forall p \in C$: $[[\textbf{ne}] <_w p \rightarrow w \notin [\textbf{have to}]([\textbf{gc}])(p)] \subseteq$
$\forall p \in C$: $[[\textbf{it}] <_w p \rightarrow w \notin [\textbf{have to}]([\textbf{gc}])(p)]$

According to the requirement that the stronger statements are negated, we strengthen the truth condition by the following implicature:

(23) $\lambda w.\forall p \in C$: $p <_w [\textbf{ne}] \rightarrow \exists r \in C$: $p <_w r$ & $w \in [\textbf{have to}]([\textbf{gc}])(r)$

4. Polarity

The scalar reading based on the possibility scale is not the only one available in "only have to" sentences. It should be possible to understand sentences like (1) without comparing alternatives according to their possibility degrees. However, the "non-scalar" reading is available only if the alternative set can be built in a manner different from the one used for the scalar reading:

(24) You only have to take four eggs to bake the cake.
only^S: the scale of possibility is deduced from the scale of natural numbers and ranks propositions of the type *you take x eggs*.
Non-scalar *only*: the prominent alternatives are *you take 4 eggs*, *you take 500g of flour*, *you take a cup of milk and 4 eggs*…

In the absence of a natural scale, there is no way to distinguish between the alternatives for the two readings and the purely exclusive reading coincides with the scalar one.

Under negation, the non-scalar reading of *only* is not possible whatever might be the case in a positive sentence:

(25) You don't only have to take four eggs to bake this cake…

a) …you also need a cup of milk.

b) # …you need to take five eggs.

To account for the absence of the scalar reading of *only* under negation and the restriction that *except* can only occur in the scope of negation, we treat *only*^{S} and *except*^{S} as a PPI and an NPI respectively, drawing on Condoravdi 2002's analysis of *until*^{p}*/erst*. We give a pragmatic explanation for their polarity sensitivity, in the spirit of Krifka 1995.

Negating (1) or (4) results in the following truth condition:

(26) $\lambda w.\ \exists r \in C\ [[\textbf{ne}] <_w r$ & $w \in [\textbf{have to}]([\textbf{gc}])(r)]$

Taking into account the reversed informativity scale of alternative propositions in (27), we get the implicature in (28).

(27) $\exists p \in C$: $[[\textbf{it}] <_w p$ & $w \in [\textbf{have to}]([\textbf{gc}])(p)] \subseteq$
$\exists p \in C$: $[[\textbf{ne}] <_w p$ & $w \in [\textbf{have to}]([\textbf{gc}])(p)] \subseteq$
$\exists p \in C$: $[[\textbf{ns}] <_w p$ & $w \in [\textbf{have to}]([\textbf{gc}])(p)]$

(28) $\lambda w.\ \forall p \in C: [[\![\textbf{ne}]\!] <_w p: [\neg \exists q \in C\ [p <_w q\ \&\ w \in [\![\textbf{have to}]\!]([\![\textbf{gc}]\!])(q)]]$

It can be proved that, due to the denseness of the scale, (26) and (28) are incompatible. Therefore the negation blocks the scalar reading.

5. Conclusion

We have proposed a scalar analysis for the SMC that overcomes the problems of the previous analyses. The oddity of "only have to" sentences in scenarios with easier ways for achieving the goal is explained by a scalar implicature violation. The sufficiency inference is derived as a conversational implicature. Additionally, the properties of the assumed scale can be used to account for the polarity sensitivity of $only^S$ and $except^S$.

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