Between "cost" and "default" of Scalar Implicature

The ongoing theoretical debate

Scalar Implicatures (SIs) are pragmatic inferences that are normally derived in conversational exchanges when a scalar term is used. Different theoretical accounts have been proposed to explain how and when implicatures are derived. We will focus here on one particular aspect of this debate, namely, the question of the "cost" of implicature computation, which has been the centre of the most recent debate between supporters of Relevance Theory on the one hand (cf., a.o., Sperber and Wilson, 1986) and of Default approaches on the other (cf., a.o., Levinson, 2000). Under the latter view, implicature computation constitutes a default process, i.e. something that our computational/processing system performs automatically, thus it is by definition virtually costless. On the Relevance Theoretical view, instead, every operation imposed to our processing system must be evaluated in terms of "costs and benefits", ultimately in terms of "relevance" to contextual assumptions: SIs are only computed if they are relevant enough to be worth a processing effort. Between these two approaches, there is a third proposal, very recently delineated by Chierchia (2006), whose intent is that to provide a unified account of the phenomenon of SI and negative polarity. In Chierchia's new proposal, a binary feature σ is introduced as regulating the activation of scalar alternatives associated to scalar and negative polarity items. This feature can be assigned two values: [± σ]. Selecting [+σ] results in the activation of the scalar alternatives (ALTs henceforth); selecting [-σ] results in the selection of the plain meaning in which ALTs are not active. The crucial point is that, whenever the feature [+σ] is selected, then the constraint on strengthening applies and an exhaustivization operator **O** (which has a meaning akin to that of *only*) must be used. Very informally, the operator **O** applied to a sentence containing a scalar expression of the form "A or B" in which the ALTs are active will result in the derivation of the scalar implicature associated to *or*: **O** (singing $or_{[+\sigma]}$ dancing) = *only* (singing *or* dancing) = *only* (singing *or* dancing) and not (singing *and* dancing). For our purposes, it suffices saying that the result of this mandatory operation always leads us to select the strongest (i.e. most informative) interpretation of a sentence containing a scalar item. Crucially, adding an implicature in Downward Entailing (DE) contexts leads to a weakening of the overall assertion (given that informativity is "reversed"), while it leads to a strengthening in case the scalar term appears in a NON-DE context. With respect to sentences (1), representing a DE context, and (2), representing a NON-DE context, we can derive the distributional generalizations listed below (if ALTs are active as the result of a subjective choice):

(1) If the troll is singing or dancing, he's happy [=DE context]
(2) If the troll is happy, he is singing or dancing [=NON-DE context]

- The exhaustive interpretation (via application of the operator **O**) of a scalar term is easier in a NON-DE than in a DE context → SI computation is easier in (2) than (1) (increased informativity)
- Having an implicature embedded in a DE context is way harder than having it embedded in a NON-DE context → SI computation is harder in (1) than (2) (loss of informativity)
- The flip between having an implicature and not having it is relatively easy in NON-DE contexts
- The flip between having an implicature and not having it is hard in a DE context

These predictions have been specifically tested in the experimental study I'm going to present.

A reaction-time study

Material and Procedure. My experiment presents a 2×2 condition design, in which two conditions were created as a within subject factor, each displaying 2 different levels. Condition I represents the type of environment in which the scalar term *or* appears: in sentences of type (a) *or* is embedded in the antecedent of conditional, which crucially constitutes a DE environment, like (1) above; in sentences of type (b) *or* is embedded in the consequent of the conditional, which constitutes a NON-DE environment like (2). Each sentence was presented to each subject in two different critical situations represented by a series of four pictures: S1, only compatible with the *exclusive* interpretation of *or* and S2, only compatible with the *inclusive* interpretation. Subjects were asked to say whether the sentence was "true" or "false" in the situation presented. Time to press the answer key was recorded and analysed. For example, (different) subjects had to evaluate sentences like (a) and (b) below in the two critical situations (note that only fantasy names were used in this experiment, to control for extra-linguistic influences):

(a) If a Glimp has a curp or a dorf, then he also has a pencil
(b) If a Glimp has a pencil, then he also has a curp or a dorf

Crucially, the *exclusive* interpretation of *or* is the most informative in case of sentences of type (b), i.e. in a NON-DE context, but not of sentences of type (a), i.e. in a DE context. Conversely, the *inclusive* interpretation of *or* is the most informative in case of sentences of type (a) but not of sentences of type (b).

Results. I will focus here on the main findings. First of all, a large majority of subjects (90%) accepted the (a)-sentence in Condition S2, compatible with the *inclusive* interpretation of *or*, while only half of them (57%) accepted it in S1, where *exclusive* interpretation of *or* is represented. This difference is statistically significant ($t(29)=-3.34$, $p<.01$). In the second place, the rate of acceptance of the (a)-sentence in Condition S1 (representing the *exclusive* interpretation) is also significantly lower than the rate of acceptance of the (b)-sentence (representing a NON-DE context) in the same condition, which was 87% ($t(29)=-3.07$, $p<.01$). However, the most interesting comparison to our purposes are those amongst the reaction times (RTs) taken to answer "true" and "false" in the different conditions. In this respect, Relevance Theory would predict a "cost" of scalar implicature computation. Thus, the first crucial comparison is the one between RTs for answering "true" between situations S1 and S2 and the comparison on RTs for answering "false" between the same conditions. The second crucial comparison is the one between the RTs for answering "true" and the RTs for answering "false" within the same condition. Interestingly, none of these comparisons turned out statistically significant. In fact, only one comparison revealed statistically significant among RTs. Precisely, this was the time to answer "true" in situation S1 in case of sentence (a) compared to the mean time to answer "false" when evaluating the same sentence in the same condition ($t(29)=5.16$, $p<.001$). This reflects the fact that subjects that derived the implicature in case of DE context did it at a "cost". This result is crucial in two respects: the same presumptive "cost" did not emerge from any other comparison, contrary to the Relevance Theory's expectations; also, this was the only "hard step" predicted by the distributional generalizations outlined above and derived from Chierchia's theory. On the contrary, no difference due to the monotonicity properties of the two contexts is in principle to be expected within Relevance Theory.

Conclusion

My intent here was to present an experimental study to contribute to the ongoing debate centred on the "costly" or "default" nature of implicature computation. I believe that my results are interesting at least in two respects: in the first place, they seem to be in contrast with recent works on SI computation realized within the Relevance Theoretic tradition, which were all focused on finding evidence of its presumptive "cost" (Noveck and Posada (2003), Bott and Noveck (2004), Breheny et al. (2005) and Katsos et al. (2005)); in the second place, they provide empirical support to the claim that the default interpretation of scalar terms depends on the monotonicity properties of the context in which they are embedded. In fact, the only evidence of a "cost" that I found is when an implicature is added despite the fact that it leads to a weakening of the overall assertion (i.e. in DE contexts): this loss in informativity, and not implicature computation *per se*, is interpreted as the source of this "cost". Interestingly, this "flip" is exactly the only one predicted to be hard in the distributional generalizations derived from Chierchia's theory, that I believe to be largely supported by the experimental findings presented here.

Selected References

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