Experiments on exhaustivity inferences associated with prosodic focus

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1 Background and aim of the project

The recently developed RATIONAL SPEECH ACT MODEL (Frank, Goodman et al. 2009; Frank and Goodman 2012; Frank and Goodman 2014; Goodman and Stuhlmüller 2013; Goodman and Lassiter 2015) is the most important available computational model for implicatures. It computes a number of different Gricean implicatures based on the assumption that interlocutors use iterated Bayesian reasoning to find the best interpretation of an utterance given a range of alternatives that could have been used instead. While the model is particularly successful in dealing with examples such as (1), it has a conceptual difficulty in dealing with examples such as (2).

(1)   Some of the students danced. $\rightarrow$ Not all of the students danced

(2)   PETER danced. $\rightarrow$ Nobody other than Peter danced.

While, according to standard analyses, (2) should be modelled as the same kind of Quantity Implicature as (1), a Bayesian model based on prior probabilities would predict that the probability of the inference given in (2) will decrease with the number n of available alternatives in the domain. This is because the logical prior probability of the state of affairs in which only Peter danced will be smaller if there are 100 alternatives as compared to a case in which there is only one alternative. Intuitively, however, the interpretation in (2) does not depend on the number of alternatives in the domain in the way predicted by the model, even though we suspect that the interpretation does depend on prior probabilities in some alternative way. In particular, we suspect that there is a threshold of probability starting at which the interpretation flips. So, for (3), probably, speakers do not get the inference in (2) at all. As opposed to this, for (4), the inference is still stable.

(3)   Imagine, there was a party with many people yesterday. And can you believe it, PETER danced.

(4)   Imagine, there was a party with many people yesterday. And can you believe it, only PETER danced.

The aim of the project is to further develop the RSA model by including new mathematical features that allow the model to deal with variable sets of alternative states of affairs that will influence on interpretation in a more intuitive way than suggested by the RSA model.

2 Aim of the experiments

The aim of the experiments was to establish a clear data-set that allows us to provide an empirical mathematical model of the domain and prior dependence of quantity implicatures based on prosodic focus.

3 Experimental design and example stimuli

We performed two main types of experiments: Experiments based on slider ratings and experiments based on written responses given by the participants. The first kind of experiments is used to determine prior and posterior probabilities for the exhaustive state. Through the production experiments we can determine the lexicon of alternative expressions that participants consider when interpreting utterances.

In order to account for lexicalisation dependency, we use three different lexicalisations. For most experiments, the domain size n_{ind} is varied so that $n_{ind} \in \{2, 3, 4\}$. Tab. 1 gives an overview of the elements which were combined to form the items.

lexicalisations	probability type	domain sizes
beeing on vacation halloween dinner party movie night	prior probability posterior probability	$n_{ind} \in \{2, 3, 4\}$

Table 1: Possible combination of elements used to form items.

4 Procedure and Participants

The experiments were mainly provided in a within subject design so that each subject saw three experimental items with different domain sizes. We presented the stimuli in written form and in random order.

We recruited participants that are native English speakers through *Prolific Academic* (`www.prolific.ac`). Responses are collected in return for a small payment.

5 Expected and obtained results

The RSA model predicts that the probability of the maximality inference we test for will decrease as the number n_{ind} of individuals in the domain increases. We suspected that this prediction is wrong and therefore expected the experimental findings to contradict this prediction. The results indeed indicated no influence of the domain size on the maximality inference. Our theoretical task is now to provide a mathematical refinement of the model to capture the data.

References

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