

## Alternatives in processing ad-hoc implicatures

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Considering alternatives is one of the fundamental tasks in pragmatic reasoning. The generation of implicatures requires hearers to reason about alternative expressions the speaker could have uttered but did not. Recent work by van Tiel & Schaeken (2016) suggests that differences between the alternatives of different types of implicatures critically influence their processing: Scalar implicatures were associated with a processing cost, while free choice inferences, conditional perfection, and exhaustivity in “it”-clefts caused no delay in reaction times (see also Chemla & Bott (2014) who find no processing costs for free choice inferences).

Based on Katzir’s (2007) formal, structurally oriented approach to scalar implicatures that explains scalar behavior by structural complexity, van Tiel & Schaeken (2016) and Chemla & Bott (2014) argue that scalar implicatures differ from other kinds of inferences in that in constructing the alternatives, the scalar term needs to be substituted with a more informative one. According to this view, these lexical processes are what makes processing scalar implicatures effortful, not constructing and reasoning about alternatives as such.

However, this account is unlikely to apply to ad-hoc scalar implicatures as these are based on alternatives that arise from the context and therefore do not require lexical access. In the present study, we studied effects of the alternatives’ complexity on ad-hoc implicatures. Since Katzir’s (2007) notion of complexity is confined to structural complexity and remains rather vague, we based our study on Hirschberg’s (1985) more detailed account on alternatives as sets with a partial order defined on them (posets). We hypothesized that retrieving alternatives from the context and constructing posets of alternatives in processing ad-hoc implicatures is effortful. Accordingly, easily accessible posets of alternatives will facilitate the generation of ad-hoc implicatures compared to more difficult ones. The present study was designed to test this prediction.

We devised an experimental paradigm that required participants to initially learn three pseudowords and their meanings (training phase). This way, we made participants establish different contexts and different sets of alternatives, respectively; i.e., we used the experimental task to make the alternatives available that need to be considered in the processing of scalar implicatures (see Degen & Tanenhaus 2016). In the experimental phase, participants’ generation of ad-hoc implicatures was tested in a picture selection task (see Degen, Franke, & Jäger (2013) and Stiller, Goodman, & Frank (2015) for similar paradigms).

Two different posets of alternatives were examined in a between participants design: In the partial poset condition, participants learnt the pseudowords OSIM, EGAT, and ULOS with the following meanings: ‘a monster that has arms’, ‘a monster that has legs’, and ‘a monster that has horns’. Here, we expected them to learn words for three out of the eight sets included in the power set  $P_1$  ( $\{\text{arms, legs, horns}\}$ ). In the full poset condition, participants learnt the same pseudowords, but they now referred to arms, legs and the conjunction of arms and legs,

covering the whole power set  $P_2$  ({arms, legs}) except for the empty set. In both conditions, participants were trained on the meanings of the pseudowords in 12 unambiguous trials.

For the experimental phase nine trials were constructed per condition. In each trial three pictures of monsters were presented, featuring a set of features from the power set  $P_1$  (partial poset condition) or from the power set  $P_2$  (full poset condition), respectively. The three pictures corresponded to three referents: One of the monsters only had the feature in question and no other feature from the relevant poset. If the participant generated the ad-hoc implicature, she selected this monster (implicature target). Another monster had more than one feature, i.e. it was compatible with the literal meaning of the pseudoword (logic target). The third monster did not have the feature in question (distractor).

With this design, we assessed how the accessibility of sets of alternatives affects the generation of ad-hoc implicatures of 180 native speakers of English recruited from Amazon's Mechanical Turk. In target choice trials, participants performed above chance level in both conditions, selecting the implicature target in 90.74% of the experimental trials in the partial poset condition and in 95.63% of the experimental trials in the full poset condition.

In a logistic mixed-effects model predicting implicature target choice as a function of condition (partial poset/full poset) with random effects of participants and items, the fixed effect of condition was significant. We compared the full model to a model without the effect in question. The AIC was lower for the full model indicating that the model with condition as a predictor fits the data better. However, the BIC was lower for the null model, suggesting that the difference between conditions was subtle.

We take our findings to suggest that the generation of ad-hoc implicatures depends on the accessibility of the relevant poset of alternatives. In the full poset condition, participants learnt pseudowords for all sets of the relevant poset (except for the empty set) and saw stimuli from this poset, facilitating the retrieval and construction of the relevant poset of alternatives. As a result, they generated more ad-hoc implicatures than participants in the partial poset condition. In future research, we will investigate further how the properties of alternatives (e.g. the set size, the salience of alternatives) affect the generation of scalar implicatures.

## References:

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