

Lost ALL of your marbles? The impact of the Question Under Discussion on embedded implicatures

1. Theoretical background

A sentence like “Ann found some of the marbles” may give rise to the inference that Ann did not find all marbles, referred to as an implicature (Grice, 1975). Whether or not listeners draw implicatures depends on several contextual factors such as the Question Under Discussion that the context evokes (QUD, Roberts, 1996; Zondervan, 2010; Degen & Goodman, 2014). Degen & Goodman (2014) found that implicature rates increase if the context triggers the implicit QUD *Did Ann find all marbles?* compared to the QUD *Did Ann find any marbles?* (see also Zondervan, 2010). The likely reason for such an effect is that the former QUD makes the stronger alternative *all* more relevant. In fact, most theories of implicature assume that alternatives need to be relevant/active as a precondition for an implicature to arise.

Here, we apply the paradigm proposed by Degen & Goodman (2014) to embedded implicatures. It is a controversial theoretical question whether implicatures can arise in embedded positions. To give an example, researchers disagree whether the sentence “Every person found some of the marbles” implicates that every person found some but not all marbles (e.g., Sauerland, 2004; van Rooij & Schulz, 2004; Chierchia, 2004; 2006). On a globalist view, implicatures are computed after the literal meaning of the whole utterance is computed (e.g., Sauerland, 2004). On a localist view, on the other hand, implicatures are integrated into compositional semantics at the site where the implicature trigger appears. Hence, the latter but not the former account predicts the existence of embedded implicatures. The question concerning the existence of embedded implicatures thus provides an important test bed adjudicating between different theories of implicature.

2. Previous experiments

Experimental research concerning the existence of embedded implicatures has yielded contradictory results. Geurts & Pouscoulous (2009) observed no evidence for embedded implicatures, which was taken as a refutation of localism. However, these findings have been called into question (Clifton & Dube, 2010; Chemla & Spector, 2011; Benz & Gotzner, 2014). For example, Chemla & Spector (2011) showed that embedded implicatures arise in a modified version of the truth value judgement paradigm contrasting global and local readings (see also Potts et al., submitted for a recent replication of this effect). It is hotly debated whether Chemla & Spector’s results can be explained as a typicality/contrast effect (Geurts & van Tiel, 2013; van Tiel & Geurts, 2014; Cummins, 2014; Chemla & Spector, submitted). Thus, the evidence on whether listeners draw embedded implicatures is mixed, suggesting that the experimental paradigm and the contexts evoked by these paradigms affect the probability of drawing embedded implicatures.

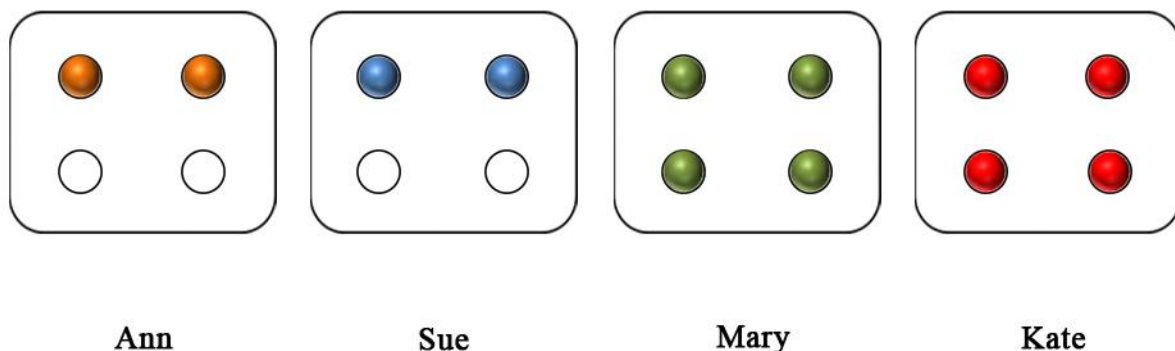
To our mind, the most interesting question is under which contextual circumstances embedded implicatures arise. It has been noted in the theoretical literature that such readings may arise when the embedded implicature trigger is stressed (e.g., van Rooij & Schulz, 2004). Further, embedded implicatures like unembedded ones could be sensitive to the QUD. A demonstration of such an effect would provide evidence for the assumption that embedded implicatures only arise when stronger alternatives are contextually relevant. Furthermore, this

finding may provide insights into the question of what characteristics the experimental task needs to exhibit (see also Degen & Goodman, 2014 concerning this point).

2. Our Experiments: manipulation of QUD

We have extended the experimental paradigm introduced by Degen & Goodman (2014) to embedded implicatures. In our experiments, participants are presented with a scenario involving four sisters who each own a set of four special edition marbles which get lost during play. In the introductory context, we present scenarios triggering different QUDs. One scenario triggers the QUD *Did any person find all marbles?* which – if local implicatures are possible in principle – should increase embedded implicature rates for the sentence “Each person found some of their marbles”. The second scenario, triggers the QUD *Did any person find any marbles?* which should be less likely to give rise to an embedded implicature. In the test phase, participants see pairs of sentences and pictures on the screen. The critical sentence is “Each person found some of their marbles” in both QUD conditions. Participants’ task is to indicate whether the sentence is true given the situation represented by a particular picture. In one implicature condition/pictorial setup (see Figure 1), the setup contradicts the embedded implicature because two girls found all marbles (weak condition in Chemla & Spector, 2011). So far, we have replicated the effect found by Chemla & Spector (2011) with a basic version of this marbles scenario, ensuring that embedded implicatures may arise in our experimental scenario. We are currently preparing the introductory scenarios evoking different QUDs.

Figure 1: “Each girl found some of her marbles” (weak condition)



3. Future Goals

With the proposed project, we address the following questions: (1) What are the contextual factors that facilitate the computation of embedded implicatures (with a focus on the QUD and prosodic cues)? (2) What role does the relevance and activation of alternatives play? (3) Which models can capture these contextual effects (e.g., Goodman & Stuhlmüller, 2013; Bergen et al., submitted; Potts et al., submitted)? We will compare different manipulations of contextual factors such as the proposed QUD manipulation and a manipulation of prosody which has been found to encourage implicature computation of simple sentences (e.g., Gotzner & Spalek, 2014).

On a methodological level, we address the question which dependent measures and experimental designs are most appropriate to investigate (embedded) implicatures (see Degen & Goodman, 2014).