

More facts that Isomorphism cannot explain

A prevailing theme to many studies of negation and polarity in child language is the marked status of inverse scope interpretations. This view was recently challenged by Hulsey, Hacquard, Fox and Gualmini (2004). These researchers provide a new explanation for the data available in the literature, as well as a model of scope resolution that has broad methodological consequences. In this paper, we consider a recent critique to that study and we present the results of a new experiment testing the predictions of the Hulsey et al. model.

Previous research on scope resolution in child language has led to conflicting results. For example, Musolino (1998) showed that 4- and 5- year-old children interpret (1) on its surface scope interpretation, but Musolino and Lidz (in press) showed that the same children would interpret the relevant fragment of (2) on its inverse scope interpretation. Similarly, Gualmini (2003) found that 4- and 5-year-old children interpret (3) on its inverse scope interpretation, but they resort to the surface scope interpretation when asked to interpret (4) in the same context (a context in which the Troll manages to deliver two pizzas out of four).

- (1) Every horse didn't jump over the fence
- (2) Every horse jumped over the log, but every horse didn't jump over the fence
- (3) The Troll didn't deliver some pizzas
- (4) The Troll didn't lose some pizzas

In a recent study, Hulsey et al. argued that children's scope assignment is guided by contextual information in a transparent fashion. In addition, they propose a model that explains how apparent optionality can be derived from one underlying factor: discourse congruence. According to the Hulsey et al.'s model, which they call the Question-Answer requirement (QAR), children select the scope assignment that entails an answer to the Question under Discussion (QUD). Their proposal is that children's behavior results from the interaction of the Principle of Charity and the QAR, with the latter outranking the former.

The most recent contribution to the debate is due to Musolino and Lidz (2004), which takes issue with the QAR model and reaffirms that children's behavior largely follows from a default preference for surface scope interpretations. The first criticism offered by Musolino and Lidz (2004) is that the QAR does not account for some of the data described by Musolino (1998). In particular, they consider Musolino's experiment on children's interpretation of (1), repeated below as (5a).

- (5) Every horse didn't jump over the fence
 - a. Not every horse jumped over the fence (inverse scope)
 - b. No horse jumped over the fence (surface scope)

Musolino and Lidz (2004) set off to offer a charitable rendering of how previous data could be analyzed from the point of view of QAR, by considering whether any question would account for the data, according to the QAR model. In particular, they consider (6):

- (6) Will any of the horses jump over the fence?

This is what Musolino and Lidz (2004; p.8) write: "Suppose now that (6) is the QUD. In this case, (...) (5a) entails the Yes answer to (6), and (5b) entails the No answer." This claim is incorrect unless we are ready to abandon the distinction between entailment and implicature. The inverse scope interpretation of (5) *implicates* a 'yes' answer to (6), but there is no entailment. Crucially, however, Hulsey et al. (2004) explicitly define good answers in terms of entailment and in fact argue that children cannot avail themselves of implicatures in order to address the QUD.

The second criticism offered by Musolino and Lidz (2004) is that the Question-Answer requirement does not make the right predictions for scope-bearing elements other than *some*. While it is true that not all of the predictions of QAR had been investigated by Hulsey et al (2004), we should not take the absence of data as disconfirming data. In fact, a further study by Gualmini, Hacquard, Hulsey and Fox (2005) showed that, just like in the case of (3), a context that makes prominent the relevant question will also lead children to access the inverse scope interpretation (5a).

The third criticism offered by Musolino and Lidz (2004) relates to how one determines the relevant Question under Discussion. To evaluate this critique, we designed a new experiment, in which the Question under Discussion was presented overtly to children. Furthermore, in light of Musolino and Lidz's claim about the limited empirical coverage of the QAR, the experiment tested children's scope resolution abilities in a different domain: the ambiguity between negation and a modal operator in Italian. Consider (7) and the logically possible interpretations in (8).

- (7) Il leone non deve stare nella stessa gabbia con la tigre
 The lion not must be in-the same cage with the tiger
 'The lion cannot be in the tiger's cage'
- (8) a. It is necessary for the lion not to be in the tiger's cage (inverse scope)
 b. It is not necessary for the lion to be in the tiger's cage (surface scope)

The experiment took the form of a Truth Value Judgement task (Crain and Thornton, 1998). First, children were presented with the instruction in (7) in the context of a story. Then children were asked to answer (9).

- (9) Can the lion be in the tiger's cage?

The experimental hypothesis based on the QAR was that children should interpret (7) on its inverse scope interpretation in (8a). According to the QAR, this is so because only (8a) entails an answer to (9) demonstrated by the infelicity of the dialogue below.

- (10) Q: Can the lion be in the tiger's cage?
 A: It is not necessary for the lion to be in the tiger's cage

Thus, the prediction of the QAR was that children should answer 'No' to the question in (7). If an Isomorphism Effect exists, as claimed by Musolino & Lidz (2004), the children are expected to answer (7) in the same way in which they would answer a question whose answer is underdetermined, such as (11).

- (11) Can the hippo be in the tiger's cage?

So far, we interviewed 8 5-year olds. Each child was presented with 4 trials and in each trial the child was asked two questions. The first question was similar to (11), where nothing was previously stated against the possibility for the hippo to be in the tiger's cage, and we expect the children to answer 'yes' to this control. If a child answered 'yes' to (11), he was then asked (9). The prediction of the QAR model is that such a question will prime for the inverse scope interpretation (8b), admitting only 'no' as a possible answer. The results confirmed this prediction: children answered "yes" to (11) 87,5% of the time (28/32) and they answered "no" to (9) 84,3 % of the time (27/28 stories). The responses show that children interpret (7) on its inverse scope interpretation, thereby going against the putative preference for surface scope interpretations and against the Principle of Charity.

To recap, Musolino and Lidz's critique of the QAR model faces both theoretical and empirical problems, since our results confirm that no systematic preference for surface scope readings exists. Instead, a valid account of how children interpret ambiguous sentence seems to crucially rely on contextual factors, which can be captured by the Question-Answer requirement.