Indirect scalar implicatures are neither scalar implicatures nor presuppositions (or both)

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This paper provides an experimental comparison of indirect scalar implicatures (2-a) with direct scalar implicatures (2-b) and presuppositions (2-c), in both children and adults. The results suggest a three-way distinction between direct SIs, indirect SIs, and presuppositions. This distinction challenges the standard view, which groups both types of SIs on one side and presuppositions on the other, as well as more recent accounts that analyze (certain) presuppositions as being (broadly) on par with SIs (Chemla 2009, Romoli 2012 a.o.).

Background: Implicatures and Presuppositions in Children and Adults The behavior of children and adults towards direct SIs has been investigated extensively (Bott & Noveck, 2001 and much following work). Children have generally been found to more readily accept sentences like (1-b) in contexts inconsistent with their direct SIs ('literal' contexts henceforth) - e.g., a context in which all giraffes have a scarf - while adults more readily reject the same sentences in such contexts. This has been interpreted as showing that children tend not to compute direct SIs. A few studies included indirect SIs and found similar overall patterns (cf. Musolino and Lidz (2006) and Katsos et al (2011)), but they didn't focus directly on a comparison between the two SIs. A traditional, unified treatment of direct and indirect SIs predicts children and adults to behave uniformly. Our experiment tested this expectation. Even less is known about the acquisition of presuppositions in the context of negation. If we assume that children will have difficulties accessing interpretations with higher processing requirements, recent results on adult processing of presuppositions suggest that children will have difficulties accepting sentences like (1-c) as a legitimate description of a context in which no global presupposition is present - i.e., Bear didn't even participate in the race (Bott & Chemla 2012). Our experiment also tests this expectation.

Experiment 20 adults, 16 4-5 year-olds, and 14 7 year-olds saw sentences like those in (1) in a variant of the 'Covered Box' sentence-picture matching task (Huang et al. 2013). Each trial consisted of a context picture and two critical pictures, one visible and one covered (see Visible Pictures). To 'set the scene' and ensure felicity, the experimenter produced a short description of the context picture and then a test sentence that was purported to describe just one of the two (visible or covered) critical pictures. The participants' task was to decide for each test sentence whether it described the visible or covered picture. The visible picture was only consistent with the literal meaning of the sentence (w/o the global presupposition/scalar implicature), so its selection was interpreted as evidence that the participant was accessing this literal interpretation of the sentence. Selection of the covered picture, on the other hand, was taken as evidence that the participant had generated the relevant inference. After a training phase with feedback, participants were tested with 12 trials, 4 per condition and 12 additional controls with *some* (4), *not all* (4), and *not win* (4). Participants who did not respond correctly to at least 3 out of the 4 controls per condition were excluded.

Results & Discussion The rate of covered box choices (indicating presence of inference) depended on both age and type of inference. Children were least likely to draw direct SIs, more likely to draw indirect SIs, and even more likely to infer a global presupposition, whereas adults exhibited the reverse pattern. Using logistic regression mixed effect models, we found significant interactions between inference type and children and adults (separately for each child age group). Within each age group, all inference types differed significantly from one another. Within Inference Types, children significantly differed from adults for all types, and 7-year olds differed from 4-5 year olds in their rate of presupposition interpretations. The presupposition result is consistent with Bott and Chemla's (2012) processing results and traditional theoretical accounts. By contrast, the observed differences in responses to direct SIs and indirect SIs is unexpected for any current theories that we are aware of. Notice that the cross-over interaction serves as a form of double disassociation, which rules out a simple account (e.g. the presence of negation). And since the presupposition-based response pattern also differs from (both types of) implicatures, a three-way distinction appears to be required. We explore two possible interpretations of these results: first, indirect SIs could be conceived as being generated both via implicature and presupposition mechanisms, with variation in which one is put to use in a given case in online processing. This would explain why inference rates for indirect SIs are between those for direct SIs and presuppositions for both children and adults, even though the patterns go in opposite directions in the two populations. Second, indirect SIs could be a different type of scalar implicature, obligatory scalar implicatures in particular (Spector 2007 a.o.), in contrast to the non-obligatory direct ones. This would account for the difference between the two type of SIs. While other interpretations of the findings need to be pursued, these novel quantitative results clearly require serious reconsideration of standard theoretical assumptions about indirect SIs, and call for further investigation of the phenomenon in its own right.

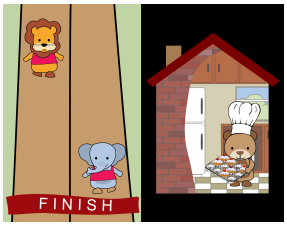
Selected References • Chemla, E. & Bott, L. in press. Processing presuppositions: dynamic semantics vs pragmatic enrichment. *L&CP*. • **Katsos, N. et al 2011**. Are children with specific language impairment competent with the pragmatics and logic of quantification? *Cognition*. • **Musolino, J. & Lidz, J., 2006**. Why children aren't universally successful with quantification. *Linguistics*.

(1) a. Not all giraffes have a scarf.
b. Some giraffes have a scarf.
c. The bear didn't win the race

(2) a. ⇝ *Some giraffes have a scarf*
b. ⇝ *Not all giraffes have a scarf*
c. ⇝ *The bear participated in the race*

(i) Indirect Scalar Implicature
Not all giraffes have a scarf

(ii) Direct Scalar Implicature
Some giraffes have a scarf



(iii) Presupposition
The bear didn't win the race

Visible Pictures by condition