Pragmatic and Linguistic Competence in Scalar Inferencing

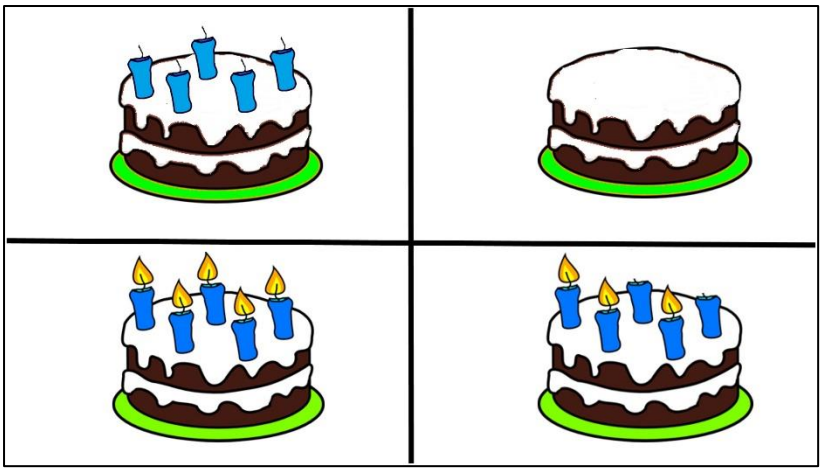
Children's pragmatic abilities have been the matter of a vivid debate since at least Chierchia et al. (2001) and Noveck (2001). Several studies in the past years investigated children's derivation of the Scalar Implicature (SI) *some but not all* associated to the weak scalar quantifier *some* in a context compatible with the more informative alternative *all*. In general, all the studies found that pre-school children have problems in deriving this pragmatic inference, also depending on the type of task (cf. Foppolo, Guasti and Chierchia, 2012 for a review). In general, pre-schoolers are bimodally distributed with respect to SI computation, either always accepting, or always rejecting, underinformative-some statements (Guasti et el., 2005).

Children's difficulty have been explained by different hypotheses: children are more tolerant of pragmatic violations than adults (Katsos & Bishop, 2011); children have difficulties in lexicalizing the scale and/or retrieving the lexical alternatives (Barner et al., 2011; Foppolo et al., 2012; Tieu et al., 2016); children do not (always) recognize what is conversationally relevant (Skordos & Papafragou, 2016).

In our experimental study, we employed a novel task in which the relevant scalar alternative to *some* was provided linguistically (as already done in previous studies, a.o. Foppolo et al., 2012 and Skordos & Papafragou, 2016). Crucially, relevant alternatives were also provided as a visual contrast in our task, in which participants had to find the correct target (among 4 pictures) by exploiting a sentential cue. We also administered a standardized test for grammatical competence (BVL, Marini) to the same group of children, in which they heard a series of 40 sentences (that differ in sentence complexity) and had to select the correct picture. We tested 57 pre-school children (age range (in months): 33-72, MA=58,5) split in two age groups (5-6 year olds, labelled "old"; 3-4 year olds, labelled "young"). Sentences in the implicature task contained the quantifiers *all* or *some*. An example of both is provided in Figure (1) and (2). In the case of *some*, the target could be identified by excluding the relevant *all*-alternative presented visually. An *all*-sentence was always provided first in the sequence.

A clear effect of age is found (Figure 3). Also, compatibly with other findings in the literature, children's performance is not adult-like, even in the case of the older group (accuracy=68%). Note also that almost all the wrong answers constituted clicks towards the compatible *all*-competitor, showing that children were not answering at random. By means of mixed models (Jaeger, 2008) performed with R, we modelled children's accuracy in the Implicature task (coded as a dichotomous variable) as a function of Age and of the score at the grammatical test (BVL). Analyses reveal that the score at the grammatical test is a better predictor of children's performance at the Implicature task than Age (although an age effect is found in isolation). Fixed effects are reported in Table 1.

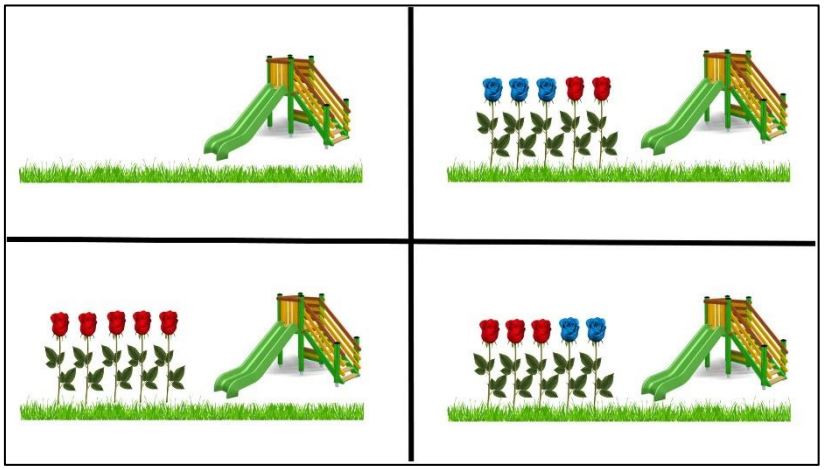
Our findings add an additional piece to the understanding of children's failure and success with scalar inferencing. Although a role of the activation/availability of scalar alternatives and a role of contextual relevance have been proved by previous studies (a.o. Barner et al., 2011; Skordos & Papafragou, 2016), we argue that these factors are not the only one at play in the computation. In our task, children were exposed to salient alternatives, both visually and linguistically. This was not sufficient, though, to make children perform adult-like (and the same is true for Skordos & Papafragou as well, provided that children were not adult-like either). Our analyses reveal an interesting correlation between the ability to compute implicatures and the maturity of language competence, independently of age. This factor has never been explored and suggests an interesting link between Grammatical and Pragmatic abilities, which is best captured by a grammatical approach to Scalar Implicatures (Chierchia, 2013).



Lead-in sentence
Guess which one is my birthday cake, I give you a cue.

Target sentence
On my birthday cake, some of the candles are burning

Figure 1. Visual scenario showing (clockwise): none competitor; distractor; target; all competitor. Position was counterbalanced.



Lead-in sentence
Guess which is my favourite playground, I give you a cue.

Target sentence
In my favourite playground, all the flowers are red

Figure 2. Visual scenario showing (clockwise): none competitor; some-competitor1 and 2; target Position was counterbalanced.

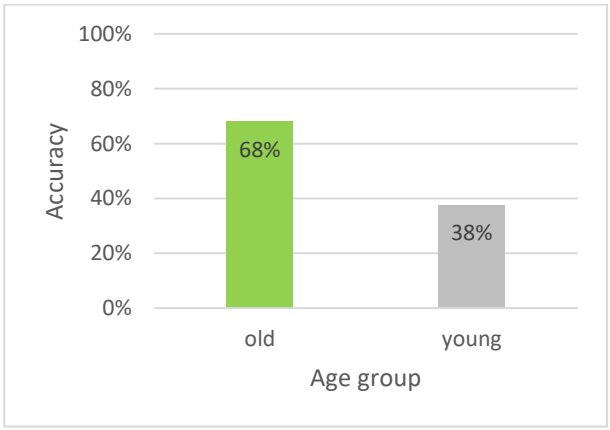


Figure 3. Children's accuracy (by age group)

Fixed effects	Estimate.	Std Error	z value	p
(Intercept)	-2.11261	-1.535	1.37595	0.1247
AGE	-0.67225	0.64910	-1.036	0.3004
BVL	0.11302	0.05567	2.030	0.0423 *

Table 2. Output of main effects of logistic regression. Data were analyzed with generalized mixed models, Package LM4 in R