Some and All in Bilinguals: Priming and Linguistic Effects

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1. Introduction

Children’s (in)ability to cope with pragmatic inferences has been extensively studied in the past, and the source of children’s difficulties is lively debated both in theoretical linguistics and psycholinguistic (Chemla & Singh, 2014a,b; Chierchia, 2017). One of the most studied phenomenon is the derivation of the Scalar Implicature (SI) associated to the scalar quantifier some, that typically arises in contexts in which the alternative description with all would be more appropriate and informative (Grice, 1975). For example, adults typically interpret (1) as in (2), deriving the SI some but not all, and tend to reject (1) as infelicitous in a scenario in which all cookies are in the box.

(1) John moved some of the cookies into the box

(2) John moved some but not all of the cookies into the box

A growing body of research has shown that typically developing children have difficulties in the derivation of this kind of pragmatic inference, and that difficulties remain for some children even when they are tested in the most facilitating and ecological settings. Understanding the source of the observed difficulty is currently the topic of an intense debate, with researchers trying to describe the factors involved in the generation of a SI as well as their developmental trajectory (Barner, Brook & Bale, 2011; Foppolo, Guasti & Chierchia, 2012; Katsos & Bishop, 2011; Pouscoulous, Noveck, Politzer & Bastide, 2007; Skordos & Papafragou, 2016; Tieu, Romoli, Zhou & Crain, 2016). Recent evidence suggests that linguistic competence may be a better predictor than other general cognitive abilities to explain children’ success with SIs in monolingual children (Foppolo & Panzeri, 2017). Foppolo & Panzeri (2017) tested monolingual Italian preschoolers using a computerized version of a Truth Value Judgment Task (Foppolo, Guasti & Chierchia, 2012) and a novel picture selection task. They showed a significant impact of lexical and morphosyntactic abilities on the rate of derivation of SIs, and no correlation with measures of non-verbal IQ and Theory of Mind (cf. also Foppolo, Mazzaggio, Panzeri & Surian, 2017). Our main goal in this paper is to further investigate the role of lexical, morphosyntactic and general cognitive abilities in the rate of derivation of SIs. We test here a group of Spanish-English bilingual children,
whose variability in the rate of acquisition of the L2 (English) will provide novel data towards a better understanding of the components required for SI derivation.

Only recently the investigation of SI derivation has been extended to bilingual, multilingual and bilectal children, yielding mixed results. Some pioneer work by Siegal and colleagues has showed an advantage of bilingual preschool-children over monolinguals in several pragmatic tasks. For example, Siegal, Iozzi & Surian (2009) and Siegal, Surian, Matsuo, Geraci, Iozzi, Okumura & Itakura (2010) found that bilingual children outperformed monolinguals in a task designed to test the detection of a violation of the pragmatic (Gricean) maxims. In the task, one puppet asks a question (e.g. “What did you get for your birthday?”) and two dolls provide an answer to this question; while one doll gives a felicitous answer (e.g. “A bicycle”), the other doll replies with an underinformative response, i.e., a pragmatic infelicitous answer that violates the maxim of Quantity I (e.g., “A present”). Siegal, et al. (2009) compared Slovenian-Italian bilingual kids matched on executive functions abilities, as measured by a card sorting task, to monolingual age-matched controls. The authors showed a bilingual advantage of bilingual children’s conversational understanding in comparison to monolingual children, that was later replicated for English-Japanese and German-Italian bilinguals by Siegal et al. (2010). Additionally, Siegal, Matsuo, Pond & Otsuo (2007) found that English-Japanese bilingual children aged 4 to 6 who had lower vocabulary scores than monolingual controls, were more prone than their monolingual peers to reject underinformative sentences like (1) in situations that would have been more appropriately described with the more informative quantifier all. According to Siegal et al., bilingualism confers an advantage on children’s understanding and appreciation of messages as intended by speakers in conversation, showing that exposure to more than one language facilitates children’s metalinguistic awareness.

More recently, studies comparing monolingual and bilingual’s derivation of SI have not replicated the bilingual advantage reported in previous studies (Antoniou & Katsos 2017; Ladas, Carroll & Vivas, 2015; Syrett, Lingwall, Perez-Cortes, Austin, Sánchez, Baker, & Arias-Amaya, 2017; Syrett, Austin, Sánchez, Germak, Lingwall, Perez-Cortes, Arias-Amaya, A., & Baker, 2017).

For instance, Syrett, et al. (2017) showed no difference in the rate of derivation of SIs in Spanish monolingual and Spanish-English bilingual children tested on the Spanish quantifier algunos using a statement evaluation task and a forced choice picture selection task. Similarly, a study by Ladas et al. (2015) showed a comparable performance between Greek monolinguals and Greek-Albanian bilinguals in the derivation of the SI associated with the Greek variant of some, when controlling for the socio-economic status of bilingual and monolingual children. Finally, by comparing different groups of children with various linguistic backgrounds, Antoniou & Katsos (2017) found that multilingual and bilectal children performed at rates comparable to monolinguals in the derivation of the SI associated to the scalar quantifier some.
In their study, Antoniou & Katsos compared the performance of three different groups of children: (a) a group of bilectal children living in Cyprus and speaking Standard Modern Greek and Cypriot Greek; (b) a group of multilingual children that also spoke English, Modern Greek and Cypriot Greek, and attended an English school in Cyprus; (c) a group of monolingual Greek children living in Athens. The three groups were administered different tasks to test their linguistic and executive functions. Antoniou & Katsos found a positive correlation between the rate of SI computation, language proficiency and age in the three groups, but no correlation with measures of executive control.

To conclude, the study of pragmatic development in different bilingual populations has so far demonstrated either an advantage or comparable abilities in bilingual and monolingual children. Additionally, an increasing number of studies is highlighting a correlation between general lexical and morphosyntactic abilities and the successful derivation of SI in both monolingual (Foppolo & Panzeri, 2017; Foppolo et al., 2017) and bilingual children (Antoniou & Katsos, 2017). Within this framework, the present study aims at further investigating the linguistic and cognitive components that contribute to the rejection of implicature violations in preschool children, by presenting new results on bilingual children.

2. The study

In the present study, we test the impact of linguistic abilities, executive functions and non-verbal intelligence on the rejection of implicature violations in a group of Spanish-English bilingual preschoolers living in the US, and mostly dominant in Spanish. We assessed children’s language proficiency in the L2 (English) by means of a standardized test for receptive vocabulary and grammar, and we modelled proficiency in English as a predictor for children’s ability to derive SI in the L2. To assess children’s performance on SI we used the truth value judgment task used by Foppolo & Panzeri (2017). The SI task was administered in English. Furthermore, children were assessed with a task for non-verbal intelligence (Raven’s Progressive Coloured Matrices) and a task for executive functions (Flanker Task). These measures were included as predictors in our model. The analysis of non-verbal intelligence and executive functions has two aims. For non-verbal intelligence, this served to control for basic cognitive development of our participants, and to test for the impact of these skills on children’s performance in the implicature task, although little is known about the correlation between this measure and the ability to derive pragmatic inferences, or its correlation with the individuals’ degree of bilingualism (Diaz, 1985). For executive functions, previous studies have suggested that the children's low performance with SIs may be linked to the interplay of one or more of different factors, including the development of cognitive control abilities and processing constraints (e.g., Siegal & Surian,
2007; Huang & Snedeker, 2009). However, previous research that suggested a link between executive functions and the ability to generate implicatures in children did not test this component. So far, only one study has looked at the impact of executive functions on children’s difficulty in computing implicatures, showing no correlation between executive control (measured with a Simon task, a soccer task and a digit span task) and the derivation of SI (Antoniou & Katsos, 2017). In the present study, we use a conflict resolution task (Flanker task) to test the impact of executive control on children’s generation of scalar implicatures.

Furthermore, in the present study we designed a novel priming task in which children were exposed to a series of true and felicitous uses of some and all, later used in a task testing the computation of the SI. The aim of the priming task is twofold. The goals are testing (i) if the activation of scalar alternatives can be primed, and (ii) if such activation has an effect on the rate of SI computed by children in a task administered after the priming session. We know from previous studies that hearing an alternative description with all within the same experimental session is not enough to boost the rejection of underinformative some, despite the fact that children are able to recognize that all is better than some when these are provided as alternative descriptions of a situation in which “All x P” (Foppolo, Guasti & Chierchia, 2012). Nonetheless, no attempt has been made so far to systematically prime the activation of scalar alternatives, and to test the effect of such activation on the rate of SI. Additionally, to understand the impact of language proficiency on the activation of SI, we tested if and to what extent the impact of the priming effect was modulated by linguistic competence in English. To assess the priming effect, children were administered the task for SI twice in two separate sessions, allowing for at least two weeks in between the two. In the first session, children were tested with the SI task first, followed by the standardized tests that assess their linguistic and cognitive development. In the second session, children were first administered the priming task, followed by the SI task. A description of the experimental tasks is provided in the method section.

2.1. Method
2.1.1. Participants

Twenty-seven Spanish-English bilingual children were recruited in public schools in the El Paso area (mean age: 5.9 years; SD: 0.4). El Paso is a Spanish-English bilingual community on the US-Mexico border. Children were born in the US from Spanish-monolingual or Spanish-English bilingual families. Additional information about the children’s age and amount of exposure to English and Spanish was collected through a parental questionnaire (Table 1).

Two subtests of the Test for Auditory Comprehension of Language–Fourth Edition (TACL-4) were used to assess children’s vocabulary and syntactic abilities in English. In comparison to the norms for monolingual English-speaking children, participants’ performance corresponded to the 5th percentile
on vocabulary and to the 9th percentile on syntax. Participants nonverbal IQ was assessed through the Raven’s Colored Progressive Matrices (Raven, 1995).

Table 1. Participant information: Mean (SD)

<table>
<thead>
<tr>
<th></th>
<th>Spanish</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of exposure (in months)</td>
<td>19.4 (19)</td>
<td>16.2 (16)</td>
</tr>
<tr>
<td>Amount of exposure to languages (1-4)</td>
<td>3.1 (1.2)</td>
<td>2.7 (1.6)</td>
</tr>
<tr>
<td>Child knows the language (0-1)</td>
<td>0.89 (0.3)</td>
<td>0.71 (0.45)</td>
</tr>
</tbody>
</table>

2.1.2. Materials

Truth value Judgment Task

Bilingual children were tested with a Truth Value Judgment Task (TVJT) in English adapted from Foppolo & Panzeri (2017). Children were introduced to a female (Susy) and a male (John) character. Participants saw a set of six objects of the same type lined-up below an empty box (Figure 1-left panel). In each trial, either some, all or none of the objects were moved into the box by one of the characters. Then, participants heard a description of the scene being uttered by the other character. After hearing the description, children had to judge if the statement uttered by the second character was a correct description of the scene or not. The experimental materials consisted of twelve scenes. Four of the scenes were followed by statements containing the scalar term some, that were logically true but pragmatically inappropriate in the context used (scalar implicature condition), as illustrated in Figure 1. Eight control conditions tested true/false some statements and true/false all statements. For the TVJT, we measured children’s accuracy on rejecting the false/pragmatically inappropriate statements and accepting the true statements.

Figure 1. TVJT: Example of infelicitous-some condition.

John moved some of the cookies into the box

The TVJT was administered twice in two separate sessions, one preceding (Session 1) and one immediately following (Session 2) the priming task. The two sessions were held at least two weeks apart.
**Priming Task**

The task consisted of visual displays showing four characters that always appeared in the same of four quadrants on the screen: Brian, Susan, John, and Mary, as shown in Figure 1. Participants heard a short story in which two types of objects were distributed to the characters on the screen, as illustrated in the example in Figure 1. Each time, one set of four items was split evenly between a male and a female character and another set of three items was distributed to one of the two remaining children. The task was adapted from Huang & Snedeker (2009) and Panizza, Huang, Chierchia & Snedeker (2011). After listening to the short story, the participant heard a sentence in which either the quantifier *some* or *all* was used, prompting the child to point to one of the four characters’ picture, as shown in the example in Figure 1. Children were exposed to sixteen items containing the quantifier *all* and sixteen items containing the quantifier *some* in a pseudo-randomized order. Differently from the TVJT, all uses of *some* in this task were true and felicitous. Participants’ accuracy in choosing the correct picture was at ceiling (95%). The aim of the priming task was to activate the lexical alternatives on the scale < *some, all* > and to emphasize their contrastive uses in the given scenario.

**Figure 1. Example of Priming Task**

![Figure 1](image)

Story: *The boys and girls were getting apples and bananas from the teacher. The teacher knew that Brian does not like fruit. So, the teacher gave apples to Mary and apples John. Then the teacher gave bananas to Susan.*

Comprehension sentence:  
*Point to the girl that has some of the bananas/all of the apples*

**Flanker/No-go Task**

A Flanker/No go task was used to examine children’s inhibitory control (e.g., Engel de Abreu, Cruz-Santos, Tourinho, Martin, & Bialystok, 2012). Children saw a row of fishes on the screen, and depending on the direction of the middle fish, they had to press either a left or a right button on the keyboard. In twelve trials the fishes in the row including the middle fish pointed in the same direction (congruent condition). In twelve trials the middle fish pointed the direction opposite of the other fishes (incongruent condition). In twelve no-go trials fishbowls appeared on the screen, and children were instructed not to press any of the two keys.
Each trial remained on the screen for a maximum of 5000ms. Reaction times (RTs) on button presses and accuracy were recorded using the Eprime software. Accuracy was also calculated on each of the trials (i.e., button press on correct arrow-direction). After completing a set of practice trials with feedback, the children completed the thirty-six experimental trials divided in three conditions automatically randomized in each session.

For the Flanker task we analyzed two congruency measures and two switch measures. For the congruency measures, we calculated an accuracy score and a difference score in reaction times (RTs) between the congruent and incongruent conditions. The combined z-score of these two measures is labelled Flanker Congruency. For the switch measure, we calculated the difference in accuracy and RTs between the switch and non-switch trials. Combined z-score of RTs and error difference between switch and non-switch trials were included in the model as Flanker Switch. The Flanker Congruency and Flanker Switch measures have been used in previous studies to assess children’s ability to focus in on relevant information and suppress irrelevant information (e.g., Woodard, Pozzan, & Trueswell, 2016).

2.2. Results

Children’s performance on controls was at ceiling in both sessions, while their performance on infelicitous-some condition was much lower, especially in the session before the priming. This is evident in Figure 2, that shows the proportion of correct responses on the TVJT before (Session 1) and after the priming task (Session 2).

Figure 2. Proportion of correct responses on the English TVJT in Session 1 (before the priming task) and Session 2 (immediately after the priming task), by condition. Error bars represent 95% CI.
In the analysis of the implicature and control conditions, we used a number of independent measures to test for effects of language proficiency (accuracy on English vocabulary and morphosyntax), non-verbal intelligence (accuracy on Ravens Colored Matrices) and inhibition (Flanker switch scores, Flanker Congruency score). The full model is presented in Table 2. The statistical analysis revealed a main effect of Condition, indicating higher accuracy on the control items compared to the implicature items. Additionally, we observed a main effect of English morphosyntax (measured with TACL-4). Neither vocabulary nor non-verbal intelligence (Ravens) or cognitive control (Flanker) measures contributed significantly to the model. The model did not reveal a main effect of Session or an interaction between Session and Condition. However, considering the difference in scores between the implicature condition in session 1 and 2, we used planned comparisons to explore the presence of a priming effect in the two conditions (implicature vs. controls) separately. The planned comparisons revealed a main effect of Session in the Implicature condition, with children being significantly more accurate in the TVJT immediately after the priming (Session 2), in comparison to session 1 (Table 3). No difference was found between the scores in session 1 and 2 for the control conditions instead (Estimate = 0.24, SD = 0.34, t=0.692, p=0.489).

Table 2. Full model statistics for the priming experiment

<table>
<thead>
<tr>
<th>Fixed effects</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>z Value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>0.2</td>
<td>2.2</td>
<td>0.1</td>
<td>0.9</td>
</tr>
<tr>
<td>Condition</td>
<td>-2.9</td>
<td>0.5</td>
<td>-5.723</td>
<td>0.0001</td>
</tr>
<tr>
<td>Session (Priming)</td>
<td>0.2</td>
<td>0.3</td>
<td>0.724</td>
<td>0.4</td>
</tr>
<tr>
<td>English Vocabulary</td>
<td>-0.04</td>
<td>0.05</td>
<td>-0.807</td>
<td>0.4</td>
</tr>
<tr>
<td>English Morphosyntax</td>
<td>0.2</td>
<td>0.07</td>
<td>3.002</td>
<td>0.002</td>
</tr>
<tr>
<td>Ravens Colored Matrices</td>
<td>-0.00</td>
<td>0.1</td>
<td>-0.067</td>
<td>0.9</td>
</tr>
<tr>
<td>Flanker Congruency</td>
<td>-0.6</td>
<td>0.3</td>
<td>-1.581</td>
<td>0.1</td>
</tr>
<tr>
<td>Flanker Switch</td>
<td>0.4</td>
<td>0.4</td>
<td>1.193</td>
<td>0.2</td>
</tr>
<tr>
<td>Condition*Session</td>
<td>0.7</td>
<td>0.5</td>
<td>1.345</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Note: The maximal random effect structure leading to convergence includes by subject and by item random intercepts, and by subject random slopes.
*p <.05; **p<.01; ***p>.001
To evaluate the role of English morphosyntax (measured with TACL-4) in each of the two conditions (implicature vs. control), we used two separate models that included the language proficiency measures, the Flanker and Ravens measures as main factors. The model for the implicature condition is presented in Table 3 and the model for the control condition is presented in Table 4.

### Table 3. Full model statistics for the implicature condition

<table>
<thead>
<tr>
<th>Fixed effects</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>t value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>-6.2</td>
<td>4.8</td>
<td>-1.296</td>
<td>0.1</td>
</tr>
<tr>
<td>Session (Priming)</td>
<td>1.8</td>
<td>0.6</td>
<td>2.953</td>
<td>0.003</td>
</tr>
<tr>
<td>English Vocabulary</td>
<td>-0.1</td>
<td>0.1</td>
<td>-1.503</td>
<td>0.1</td>
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<tr>
<td>English Morphosyntax</td>
<td>0.5</td>
<td>0.1</td>
<td>2.883</td>
<td>0.003</td>
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<td>Ravens Colored Matrices</td>
<td>0.02</td>
<td>0.2</td>
<td>0.085</td>
<td>0.9</td>
</tr>
<tr>
<td>Flanker Congruency</td>
<td>-1.05</td>
<td>0.8</td>
<td>-1.297</td>
<td>0.1</td>
</tr>
<tr>
<td>Flanker Switch</td>
<td>0.6</td>
<td>0.8</td>
<td>0.804</td>
<td>0.4</td>
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</table>

Note: The maximal random effect structure leading to convergence includes by subject and by item random intercepts, and by subject random slopes.

*p < .05; **p < .01; ***p < .001
Table 4. Full model statistics for the control condition

<table>
<thead>
<tr>
<th>Fixed effects</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>t value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>1.4</td>
<td>1.7</td>
<td>0.862</td>
<td>0.3</td>
</tr>
<tr>
<td>Session</td>
<td>0.2</td>
<td>0.3</td>
<td>0.692</td>
<td>0.4</td>
</tr>
<tr>
<td>English Vocabulary</td>
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<td>0.03</td>
<td>0.553</td>
<td>0.5</td>
</tr>
<tr>
<td>English Morphosyntax</td>
<td>0.08</td>
<td>0.05</td>
<td>1.612</td>
<td>0.1</td>
</tr>
<tr>
<td>Raven’s Colored Matrices</td>
<td>-0.05</td>
<td>0.09</td>
<td>-0.545</td>
<td>0.5</td>
</tr>
<tr>
<td>Flanker Congruency</td>
<td>0.2</td>
<td>0.2</td>
<td>0.966</td>
<td>0.3</td>
</tr>
<tr>
<td>Flanker Switch</td>
<td>-0.4</td>
<td>0.3</td>
<td>-1.461</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Note: The maximal random effect structure leading to convergence includes by subject and by item random intercepts, and by subject random slopes.

*p <.05; **p<.01; ***p>.001

For the implicature condition, the model showed a main effect of morphosyntax, and no main effects for the other variables. As illustrated in Table 4, for the control condition we did not observe any main effect. Since English Morphosyntax was used as a continuous variable in the model, to evaluate the main effect of morphosyntax found in the implicature condition, we divided participants in two groups, based on a median split of the comprehension score measured with the morphosyntactic subtest of the TACL-4. Participants that had a raw score of 10-15 were classified as low-comprehenders and participants that had a raw score of 16-30 were classified as high-comprehenders. In Figure 3, the results of the TVJT are plotted based on participants’ morphosyntactic abilities (low vs. high comprehenders). As clearly shown in Figure 3, children with higher morphosyntactic skills outperformed children with lower skills on the implicature condition, despite the variability found in the two groups.
3. Discussion

The analysis of the SI task revealed that Spanish-English bilingual children performed at ceiling in the control conditions, demonstrating a good knowledge of the quantifiers involved in the derivation of the SI: in fact, they were able to provide correct judgments when these quantifiers were used in genuinely true or false situations. Conversely, children’s performance in the implicature condition was far from being optimal: despite their knowledge of the semantics of some and all demonstrated in the control condition, children struggled in rejecting some when it was used infelicitously to describe a situation in which all would have been more appropriate and informative.

Furthermore, the model revealed a main effect of morphosyntax, showing that children with higher scores on the morphosyntax test of the TACL-4 performed overall better on both implicature and control conditions. This was the only factor that emerged as a significant predictor of children’s performance in the TVJT. No other measure of general intelligence (Ravens Colored Matrices) or executive function (Flanker) contributed significantly to the models.

Despite the fact that we did not find a main effect of Session, nor did we find an interaction between Session and Condition in the main model, a trend was observed in the numerical data. This suggested an increase in accuracy in the implicature condition in session 2 compared to session 1. Subsequent analyses conducted only in the implicature condition showed a main effect of Session, revealing an effect of priming in the rate of rejection of implicature violations: bilingual children derived more implicatures in the post-priming than in the pre-priming session. Interestingly, the effect of morphosyntax that
emerged in the main model was replicated in the implicature condition, but not in the control condition.

The first aim of the present study was to investigate the linguistic and cognitive components that may have an impact on the rejection of implicature violations in preschool children. We selected a group of participants that have variable proficiency in English, i.e., Spanish-English bilingual preschool-children whose dominant language is Spanish. We selected this population with the aim of testing if and to what extent their language proficiency had an impact on their pragmatic performance in the L2. The analysis revealed that children’s rate of rejection of implicature violations was significantly linked to the proficiency in the L2: the more accurately bilingual children performed on English morphosyntax, as measured with the TACL-4, the more likely they were to reject infelicitous some statements in the TVJT. These results are in line with recent studies that report a correlation between language proficiency (measured with different morphosyntactic and vocabulary tests) and the successful derivation of SI in monolingual and multilingual preschool children (Foppolo & Panzeri, 2017; Foppolo, et al., 2017; Antoniou & Katsos, 2017).

Additionally, our results confirm that non-verbal intelligence and executive functions are not good predictors of rejection of implicature violations. As previously found by Antoniou & Katsos (2017) with a different population of multilingual children using various executive function measures, our findings do not support the hypothesis that the rejection of implicature violations may be linked the development of cognitive control abilities (e.g., Siegal & Surian, 2007; Huang & Snedeker, 2009).

Furthermore, we found a priming effect in the rate of rejection of implicature violations. Previous studies have demonstrated that by manipulating the experimental design of a TVJT by making children more aware of the ambiguity of some, an improvement can be observed on the rejection of under-informative some by age 5 (e.g., Foppolo, Guasti, & Chierchia, 2012). However, in an experimental context in which children were given a scalar alternative to prime the scale associated with the scalar term some, no facilitation was observed (Foppolo, Guasti, & Chierchia, 2012). Here, the methodology employed in the priming task was different than Foppolo and colleagues. Our priming task consisted of exposing children to a set of felicitous uses of some and all. This, in turn, successfully improved the amount of children’s rejections of under-informative some in the TVJT. There are several possible factors that could explain the priming effect.

In one case scenario, the consistent exposure to picture-sentence pairs that supported the strengthened interpretation of some, may have lead children to associate the sentences with some to a felicitous context in which the target character has a subset of the relevant objects (and, analogously, the concurrent exposure to picture-sentence pairs with all could have led them to associate this quantifier with the situation in which the target character has the whole set of the relevant objects). Alternatively, it is possible that the exposure to some-felicitous and all-felicitous sentence-context pairs in the priming task may have rendered participants less tolerant to infelicitous uses of some in the TVJT.
In both of these cases, the effect of priming would simply be the result of a successful training towards expected “good” associations, that would have little to do on the actual ability to draw scalar inferences by children.

Another possibility is that priming had an effect in focusing children’s attention on alternative linguistic descriptions of subset/superset relations among sets of objects. By encountering different quantifiers in similar situations (i.e. all and some referred to the whole set), and hearing the same quantifier in different configurations (i.e. some referred to the subset or to the whole set) children might have focused their attention to alternative descriptions of the event, enhancing the activation of these descriptions, a step that is considered at the core of children’s failure with SI under some theoretical accounts (Barner, Brooks, & Bale, 2011; Foppolo, Guasti, & Chierchia, 2012).

Our results cannot exclude any of the possibilities illustrated, and additional research is needed to tease them apart.

Finally, the present study shows that morphosyntactic abilities, but not non-verbal intelligence or executive functions, significantly correlate with the rate of rejection of infelicitous some: the more proficient the children are in their L2, the more they provide pragmatic responses. These findings suggest that this special type of conversational implicature involves computational mechanisms that are more rooted in language rather than in general cognitive capacities.

Furthermore, our results clearly show that the significant effect of morphosyntactic abilities is neither modulated nor affected by the priming manipulation. This suggests that these two effects are independent, and thus that they do not operate at the same levels of representation involved in the computation of SIs.

References


