Children's sensitivity to prosody and discourse-pragmatic conditions: the case of corrective focus in Italian.

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ABSTRACT
In this experiment we tested the sensitivity to corrective focus intonation with non-canonical word order in Italian adults and children at age 5. Italian permits DP DP V strings allowing both a SOV and a OSV interpretation. The interpretations are not free, but are determined by focal intonation: the DP that is focused is interpreted as the object, and the other DP as the subject; if neither DP is focused, the string is ungrammatical. Capitalizing on these syntactic and interface properties of the language, we tested subjects' sensitivity to focus prosody and preference for SOV or OSV interpretation in DP DP V strings. Both adults and children showed preference for the SOV interpretation in the adopted experimental conditions. Both adults and children showed sensitivity to the presence or absence of the correct prosody, but in different ways: adults were at ceiling in the preferred SOV interpretation (regardless of prosody), and showed sensitivity to focus prosody in the dispreferred OSV interpretation; children could not analyze the dispreferred OSV order, but showed sensitivity to focus prosody in the preferred SOV order.

1. Introduction

The Left Periphery of Italian allows constituent fronting when relevant discourse-pragmatic conditions are met and a dedicated, appropriate intonation is assigned to the fronted constituent As a consequence, in a number of contexts the typical SVO word order of Italian "all new" sentences is modified. In particular, when the object is contrastively/correctively focalized it can be moved from its canonical clause internal position to a dedicated Focus position of the Left Periphery (Rizzi 1997). This generates non-canonical word orders, such as OSV and SOV (with the subject also moved to a left-peripheral topic position). In the resulting constructions, various syntactic, pragmatic and prosodic factors come into play. It is a significant question for acquisition studies to ask when and how these factors develop in children's grammar and interact with each other. More specifically, raising the question in cartographic terms (Cinque & Rizzi 2010), it is interesting to see when and how children are able to exploit the relevant left peripheral focus position and do so with the associated dedicated prosody.

In this paper, we will investigate a special type of contrastive focus, dubbed Corrective-Focus in Bocci, Bianchi & Cruschina (2015). This type of Focus fronting is exemplified in the discourse exchange in (1)

(1) (Context: An apple and a pear were on the table)
  a. Speaker A: Gianni ha mangiato la pera
    Gianni has eaten the pear
  b. Speaker B: No! LA MELA Gianni ha mangiato
    No! THE APPLE Gianni has eaten

In correcting Speaker A, Speaker B adopts the strategy shown in (1b) in which the correctively stressed object is fronted. The OSV order in (1b) sounds natural, since it shows the fundamental pragmatic (2a), syntactic (2b) and prosodic (2c) properties that characterize the corrective type of Focus (Bocci, Bianchi & Cruschina 2015 for detailed discussion):

(2) Properties of Corrective-Focus Constructions
  (a) CF is employed to correct part of a previous statement
  (b) CF can trigger A'-movement to the sentence left-periphery
  (c) CF constituent is marked by a distinctive L+H* pitch accent

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Given the basic properties illustrated in (2), the study of OSV and SOV sentences could help us to reach a better understanding of children's ability to form A'-chains triggered by a focus feature as well as of their mastery of the associated prosody. These points are still controversial and to date the existing literature does not provide a clear picture. One main reason for this is to be recognized in the fact that the (relatively few) available acquisition results in the domain of focus are hardly comparable as often different types of foci such as e.g. corrective focus vs new information focus, and, consequently, different appropriate associated prosodies, have been put into test. The picture is further complicated by the fact that children' sensitivity to focus prosody seems to be variable across languages. For example, while experimental evidence (Wieman 1976, Hornby 1971, Hornby and Hass 1970, Wells at al. 2004) suggests that English-speaking children are sensitive to the prosody associated with *pragmatic focus* (a label provided in Krifka & Fery 2008 that includes Corrective Focus) from early on, in other languages the acquisition of focus prosody seems to be more delayed (MacWhinney and Bates 1978, Chen 2011, Sekerina & Trueswell 2012). Setting aside the issue of cross-linguistic variation, we capitalize here on results from much theoretical work on syntactic cartography (Bocci & Rizzi forthcoming, Cruschina 2012, Belletti 2004, Bocci, Bianchi & Cruschina 2015), and limit our investigation to the type of corrective focalized constructions illustrated above and to their well defined prosodic contour in Italian.

Anticipating the experimental procedure, described in section 3, in our experiment we tested strings of the form DP DP V in a context in which either the first or the second DP could count as the correctively focused object. This string is thus potentially ambiguous between the two reading SOV and OSV. Consider the string in (3):

(3) [la tigre^{DP1}] [la zebra ^{DP2}] ha battuto (either SOV or OSV)

In order to assess how different factors could drive children's correct individuation of the fronted object selecting one of the two pre-verbal DPs in (3), we manipulated the quality and the position of the prosody normally associated with corrective focus; the main aim is that of highlighting whether the OSV and the SOV are equally accessible to children at age 5 and what the role of prosody in driving the correct interpretation turns out to be.

2. The experiment

We designed a new experiment to investigate whether 5 year-olds are sensitive to the specific L+H* prosodic contour that marks fronted correctively focused constituents. We also wanted to determine whether there is any preference toward constructions in which a focused object follows or precedes a topical subject. Assuming with Rizzi (1997) the following structure for the Italian Left Periphery (Rizzi & Bocci to appear for an overview of work on the rich layered organization of this area), a focus constituent is expected to be acceptable to the left or to the right of a topic:

(4) Force > TopP* > FocP > TopP* > FinP

Given the organization in (4), a string like (3) - repeated below in (5) - is compatible with at least two structural analyses, with focus intonation disambiguating the string (following standard practice, we capitalize the DP bearing corrective focal stress):

(5) [la tigre^{DP1}] [la zebra ^{DP1}] ha battuto
a. [$_{TopP}$ la tigre$_a$ [$_{FocP}$ LA ZEBRA$_b$ [$_{IP}$ t$_a$ ha battuto t$_b$]]] SOV
b. [$_{FocP}$ LA TIGRE$_b$ [$_{TopP}$ la zebra$_a$ [$_{IP}$ t$_a$ ha battuto t$_b$]]] OSV

For simplicity, we make the assumption here that the subject in (5b) is in a Topic position, like in (5a). In a natural conversation, the appropriate structure of (5) is assigned on the basis of a number of factors, including the contextual information and, crucially, the prosody that necessarily marks the constituent in focus.

In order to determine what type of information drives children's choice between (5a) and (5b), in this experiment we manipulated two factors. The first is the position of the constituent that receives the corrective focus prosody, DP1 as in (5b) or DP2 as in (5a). If both representations in (5a) and (5b) are equally accessible to children, we expect that their interpretation will vary according to the prosody assigned to the fronted constituents. The second manipulation is the presence or absence of the focus prosody altogether. We had two

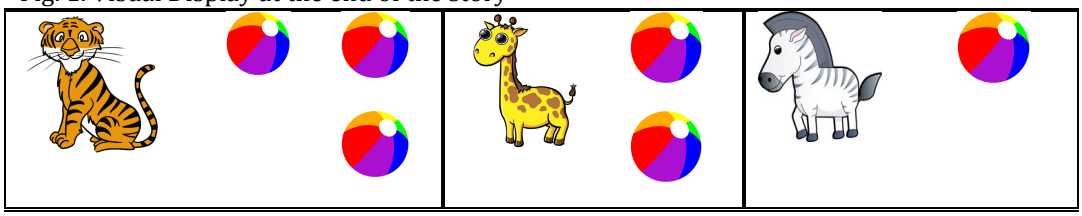
conditions, in one condition the focus prosody is absent and both constituents receive a flat topic-like intonation. Note that this manipulation introduces ungrammaticality. In Italian a fronted direct object associated with topic prosody requires that a clitic pronoun be present in the sentence following it, yielding the construction known as Clitic Left Dislocation CLLD (Cinque 1990, 1999). We expect that, if children are sensitive to the violation induced by having two 3rd person topical DPs without a clitic resuming the direct object, they will be less ready to accept those sentences regardless of whether the first DP is interpreted as the subject (SOV) or as the object (OSV).

In what follows, we describe the task and the materials in further details. We introduced the experimental sentences by narrating to children brief stories that make true and felicitous either the OSV or the SOV interpretation. In order to make the corrective-focus interpretation appropriate, we also provided a short exchange in support of this structure. We did so by introducing two characters: Alien and Pinocchio. Alien is an extra-terrestrial who has just landed on earth and who knows nothing about our planet. For this reason, Alien asks for Pinocchio's help, whose task is to correct him whenever he says something incorrect. However, the experimenter also warned the participants that Pinocchio is not fully reliable and that his corrections are sometimes wrong. Thus, participants' task was to signal if Pinocchio's corrections were right or wrong. To illustrate the procedure, consider the following scenario that was narrated with the aid of a series of pictures appearing on the computer screen.

(6) Experimenter: *in this story the Giraffe sees some balls and she thinks that it will be fun to have a competition. So she challenges a Tiger and a Zebra, saying that the winner is the one who will push more balls. The Giraffe goes first and she pushes two balls. The Tiger comes next and she pushes three balls. The Zebra comes last and she manages to push only a single ball.*

At this point, the final visual display was like in figure 1:

Fig. 1. Visual Display at the end of the story



To be sure that participants correctly understand the story, the experimenter asked who was the winner, who was the second and who was the worst one. At this point, Alien appeared on screen and gave his version of what happened. Immediately after, Pinocchio popped out on screen and corrected Alien. In one condition, he uttered the sentence with the first DP being the corrective-focalized object:

Condition 1: O^{foc} S V

(7) a. Alien. La giraffa ha battuto la tigre
b. Pinocchio. No! LA ZEBRA$_{sing}$ la giraffa$_{sing}$ ha$_{sing}$ battuto
(OSV, TRUE, CORRECTIVE PROSODY)

In the second condition, Pinocchio corrected Alien but this time the corrective-focalized object was the second DP:

Condition 2: S O^{foc} V

(8) a. Alien. La giraffa ha battuto la tigre
b. Pinocchio. No! la giraffa$_{sing}$ LA ZEBRA$_{sing}$ ha$_{sing}$ battuto
(SOV, TRUE, CORRECTIVE PROSODY)

We expect that if both the OSV and SOV word order are accessible, in which the focused object can either precede or follow a contextually given subject, children's acceptance rate should not vary between condition 1 and 2.

The second manipulation was between-subjects. We presented the same task to another group of children, but this time we removed focus prosody and we assigned to both

DPs a flat topic-like intonation. We left everything else unchanged apart from the intonation of the target sentences uttered by Pinocchio. Therefore, the context was still supporting the correction distinction that helps in identifying the focused object. However, if children are sensitive to the ungrammaticality of these sentences, due to the absence of the object clitic described above, they are expected to accept the target sentences, i.e. those corresponding to the picture they had been shown, to a lesser extent than children in the other group who heard the same string with its natural, appropriate corrective prosody. Below we illustrate the conditions without focus prosody:

Condition 3: OSV

(9) a. Alien. La giraffa ha battuto la tigre
b. Pinocchio. No! la zebra$_{sing}$ la giraffa$_{sing}$ ha battuto
(OSV, TRUE, PROSODIC VIOL.)

Condition 4: SOV

(10) a. Alien. La giraffa ha battuto la tigre
b. Pinocchio. No! la giraffa$_{sing}$ la zebra$_{sing}$ ha battuto
(SOV, TRUE, PROSODIC VIOL.)

Among the experimental conditions, we also added SVO control sentences and some fillers with a number mismatch between DP1 and DP2 so as to provide a morphological disambiguation by means of S-V agreement, a type of agreement that is already mastered at age 5 (Moscati & Rizzi 2014).

Method & Materials

All the stories were presented on a computer screen showing a series of pictures that accompanied the narration. Before beginning the task, participants heard a short introduction that provided a plausible frame for the exchange between two characters, Alien and Pinocchio. In the introduction, participants were familiarized with the procedure by a preliminary naming task. Alien saw an animal and then he incorrectly named it. For example, he saw a hippopotamus and said "*this is a giraffe*". At this point, Pinocchio appeared on the screen and tried to correct Alien, naming the animal either correctly "*No! This is a hippo*" or incorrectly "*No! This is a zebra*". Six familiarization trials of this sort preceded the experimental trials.

In the experimental session, in the first two stories Pinocchio always used a SVO sentence to correct Alien. These two sentences served as a warm-up and were inserted to be sure that children correctly understood the task. Successively, participants heard 20 stories. 4 stories were used for the SVO controls and 16 for SOV or OSV sentences, of which 8 matched the picture (true) and 8 did not match the picture (false). Prosody was manipulated between subjects, so that each subject saw 4 SOV and 4 OSV true sentences, with or without focus prosody. Table 1 reports the sentences heard by subjects assigned either in the [+focus prosody] condition or in the [-focus prosody] condition:

Table 1. Type of sentences in the [+Prosody]condition

Conditions	Focus Prosody	WO verifying the sentence	Test sentences
1	+	SOV	No! la giraffa$_{sing}$ LA ZEBRA$_{sing}$ ha$_{sing}$ battuto
2	+	OSV	No! LA GIRAFFA$_{sing}$ la zebra$_{sing}$ ha$_{sing}$ battuto
3	-	SOV	No! la giraffa$_{sing}$ la zebra$_{sing}$ ha$_{sing}$ battuto
4	-	OSV	No! la giraffa$_{sing}$ la zebra$_{sing}$ ha$_{sing}$ battuto

For subjects assigned to the [-focus prosody] condition, in order to remove the L+H* intonation, the constituent in focus was cut and replaced by the same constituent but this time recorded with a flat, topic-like intonation. The sentences so generated were then inspected using Praat, checking for the intonation and any unwanted interruption or noise in the flow of sounds. The experimental design was a 2 (Group: children, adults) X 2 (word order: SOV, OSV) X Prosody (+/-).

Participants

33 adults (Age > 22) and 41 children (mean = 5;7, SD = 2,9 months) recruited at the Kindergarten Mameli in Florence. From the children's group we excluded 7 children: four decided to interrupt the task right after the preliminary naming task and three paid little attention to the task giving random answers to both the warm-up items and to the SVO sentences. In table 1 we report the total of the participants that did complete the task and that responded correctly to all the items in the preliminary warm-up phase. Subjects in the two age groups were randomly assigned either to the[+prosody] or the [-prosody] condition.

Adults		Children	
+ prosody	- prosody	+ prosody	- prosody
16	17	17 (mean 5;6)	17 (mean 5;7)

Table 1. Participants in the two age groups who respond correctly to warm-ups and to all the SVO sentences, assigned to each experimental condition.

Results

Let us consider first how subjects responded to the SVO controls. We report in figure 3 the proportion of correct answers in the adults and in the children group. As the figure shows, participants in both groups had no trouble in accepting the SVO sentence when they were true in the context and rejecting them when they were false. We take this as indicating that whenever the sentence's theta-structure is clear, as in canonical SVO sentences, children had no trouble in understanding the experimental task. Figure 3 also shows the absence of any positive bias: the proportion of correct acceptances is comparable to the one of correct rejections.

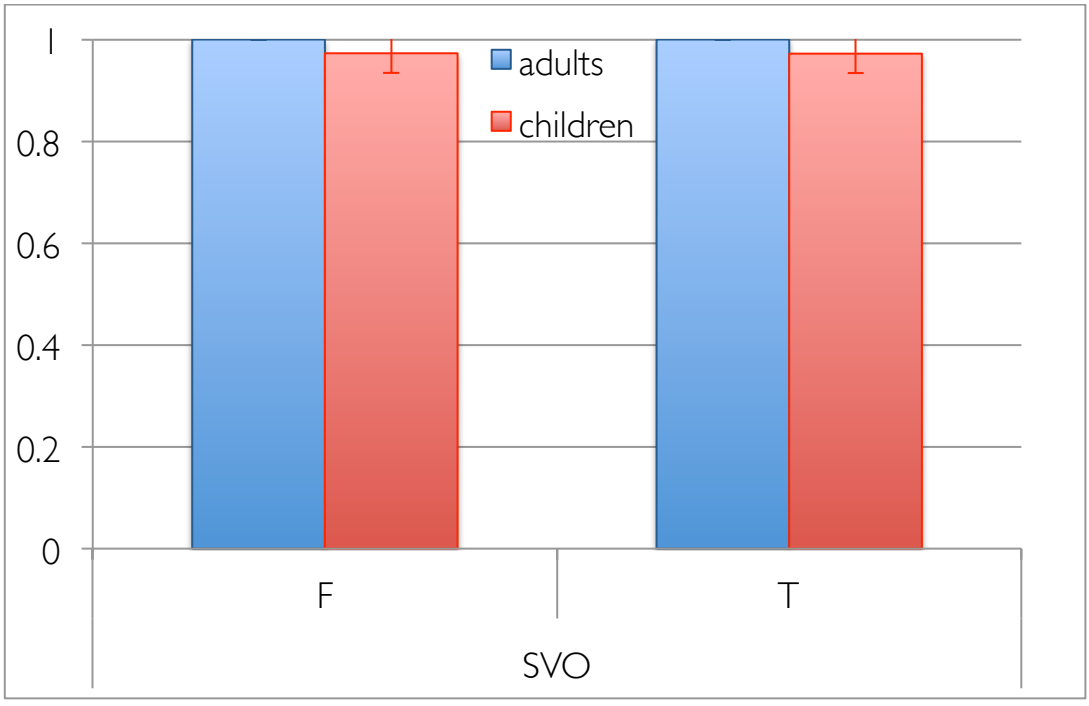


Fig. 3. Proportion of correct answers for control SVO sentences. Error bars = 2.S.E.

We turn now to the target sentences. In figure 4 we plot correct acceptances in each condition, for the two age groups (i.e. Alien says that Pinocchio is right since the sentence corresponds to the picture).

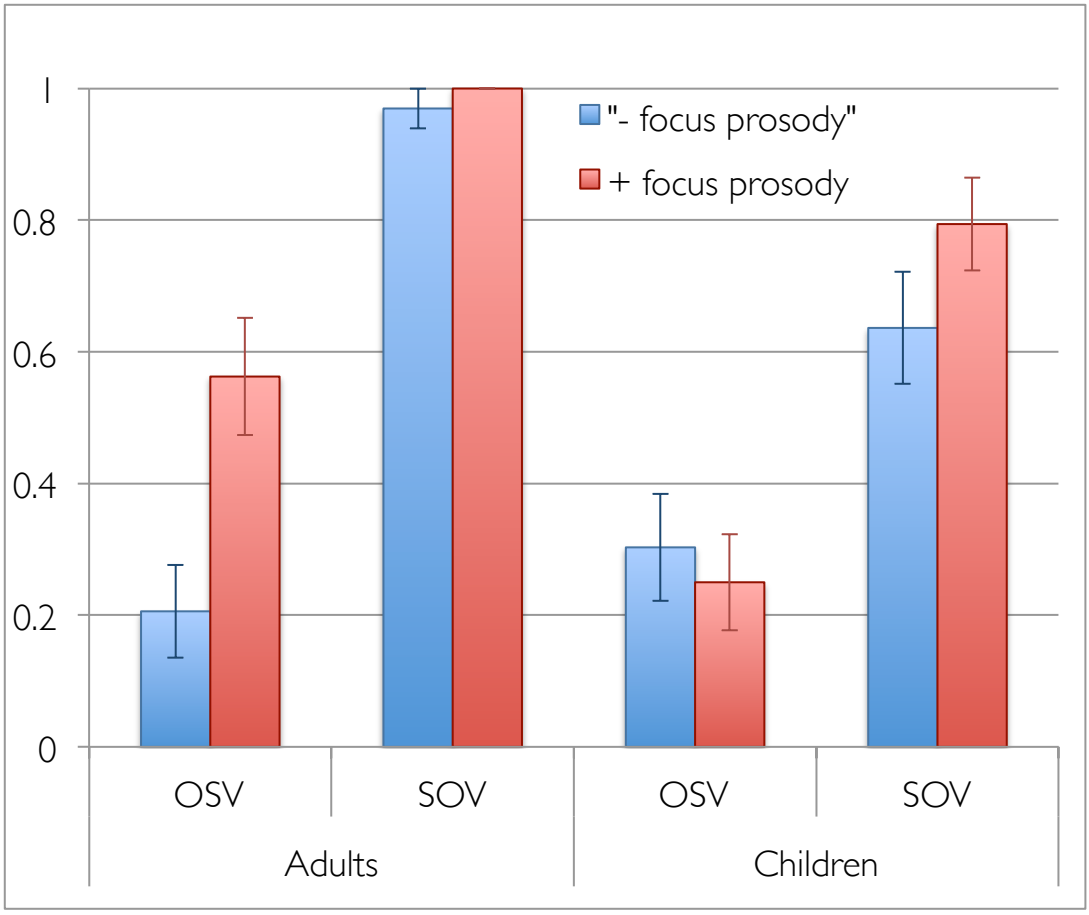


Fig. 4. Proportion of correct acceptances in each experimental condition. Error bars = 2.S.E.

Let us inspect the results by looking at the adult group first. Adults had no trouble with SOV sentences and they almost always accepted the sequence DP DP V when it was consistent with a true SOV interpretation. This regardless of the prosody associated with the second DP. In fact, even participants that heard the sentences with an unnatural flat/topic-like intonation had no trouble in accessing the SOV interpretation that verified the sentence. This sharply contrasts with the adult's result obtained in the OSV condition. Here adults had trouble in analysing the sequence according to the OSV interpretation and they accepted them only at 56% when the object was uttered with the correct focus prosody. This proportion is much higher than in the group that heard the sequence without focus prosody: this group largely failed to accept the OSV interpretation, and acceptance rate here is as low as 20%. In general, we observed in adults a sharp preference for the SOV interpretation; the appropriate focus prosody helps in making the relevant interpretation available in the less accessible OSV condition.

We consider now children's performance. When they were asked to accept strings compatible with a true OSV interpretation, they showed a difficulty similar to that of adults. Notice that in children the acceptance rate is not very dissimilar if we compare the group that heard the sentence with focus prosody and the group that heard it without. The acceptance rate does not go beyond 30% in both subgroups. This result shows that, while for adults the OSV interpretation is very hard but prosody helps, in children the OSV interpretation seems to be hardly available, regardless of the prosodic contour. When we consider children's acceptance of the SOV sentences, we found that their proportion of adult-like responses raised. When the sentence was true under SOV and was uttered with the correct focus prosody, children accepted the sentence at 79%. A proportion higher than the 63% we found in SOV sentences without focus prosody. These proportions are in turn much higher than the proportions we found in children in OSV sentences, with (25%) or without focus prosody (30%).

In order to verify these observations, we analysed the results in R fitting the data into two Generalized Mixed Effect Models, one for children and one for adults. We used Prosody

and Word Order as fixed effects and Subject and Item as random effects. The analyses reported in tables 2 and 3 revealed a main effect of Word Order in both groups. In the adult group, also Prosody was a significant main effect, being associated with a higher proportion of correct answers in both the OSV and the SOV conditions. In the children group, instead, the model revealed a significant interaction between Word Order and Prosody, confirming that Prosody helps, but only in the easier SOV word order.

Table 1. Summary of fixed effects. GLMM for Children Group.

	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	-1.2162	0.7024	-1.732	0.0834 .
WOSOV	2.0079	0.8807	2.280	0.0226 *
prosody[+focus]:WOSOV	2.0499	0.9766	2.099	0.0358 *

correct ~ prosody * WO + (1 | item) + (1 | subject)

Table 2. Summary of fixed effects. GLMM for Adults Group.

	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	-1.4409	0.5844	-2.465	0.0137 *
prosody[+focus]	1.7112	0.5726	2.989	0.0028 **
WOSOV	5.0304	1.2771	3.939	8.19e-05 ***

correct ~ prosody * WO + (1 | item) + (1 | subject)

Discussion

The results of our experiment suggest that for non-canonical sentences in which both S and O precede the verb, both children and adults favour the SOV interpretation. This novel result is open to different interpretations. A first possibility is that there is a subject-first parsing preference. This is not implausible, given previous results supporting this interpretation in children (Sauermann, Höhle, Chen & Järvikivi 2011; Müller, Höhle, Schmitz and Weissenborn 2006) and adults (Schlesewsky, Fanselow, Kliegl, Krems 2000, De Vincenzi 1991). A second possibility is that the preference for SOV can be reframed in terms of a Topic–first preference, since in our study the subject was always given information. This topic-first hypothesis also finds support in previous literature (a.o. Narasimhan & C. Dimroth 2008). A way to distinguish between these two possibilities would be to run a follow-up experiment in which subjects are focussed and objects are topics. If the subject-first account is on the right track, a similar pattern of results is expected and SOV interpretations should still be favored. This new experiment is now in preparation.

For what concerns the effects of focus prosody and their role in facilitating the correct interpretation, our experiment confirmed the role of intonation in both adults and children, with a curious discrepancy: the role of prosody was only visible in the OSV sentences for adults, whereas in children it was only visible in SOV sentences. This opposite pattern might be due to a ceiling and a floor effect, respectively, in the two groups. The prosodic manipulation in adults had little effect in the SOV condition since adult participants were already at ceiling here, almost always accepting the SOV interpretation regardless of prosody. Adults were able to easily accommodate prosodic (and syntactic, i.e. lack of the object clitic) violations and to map the sentence in the readily accessible SOV reading. In children, instead, there was no effect of prosody in OSV sentences. Presumably, whatever factor disfavours the O_{Foc} S_{Top} V interpretation in adults (either a Subject first or a Topic first strategy), the same factor completely blocks this interpretation in children. Prosody is of little help here for children. In the SOV condition, instead, the role of prosody was visible in children, who showed a higher acceptance rate of correct SOV order when the correct focus prosody was assigned to the fronted object.

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