How the Understanding of Focus Particles Develops: Evidence from Child German

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1. Introduction

The aim of this study was to investigate German-speaking children's understanding of the focus particle *nur* ('only'). Focus particles (FP) behave like semantic operators, which quantify over a specific constituent - usually the focus of the sentence. Previous research indicates that children have difficulties in interpreting sentences with FPs up to school age (for English: Crain, Ni & Conway, 1994; Philip & Lynch, 1999; Gualmini, Maciukaite, & Crain, 2003; Paterson, Liversedge, Rowland, & Filik, 2003; for Dutch: Bergsma, 2002; Szendrői, 2004; for Portuguese: Costa & Szendrői, 2006; for Mandarin: Zhou & Crain, 2010). Different accounts have been proposed to explain children's non-target-like comprehension. Crain et al. (1994) and Zhou and Crain (2010) suggest that children have difficulty with the syntactic analysis of the *only*-sentence. As a consequence, children assign focus to the incorrect constituent. In contrast, Paterson et al. (2003) assume that children have not mastered the semantic-pragmatic function of *only* and thus ignore the FP when interpreting *only*-sentences.

The present comprehension study explored how 4- and 6-year-old German-speaking children interpret sentences with the FP *nur*. In line with the previous results, we expected German-speaking children to have difficulty with FP-sentences as well. By comparing the data of the 4- and 6-year-olds we investigated how the understanding of sentences with *nur* develops. Furthermore, we aimed at evaluating the existing accounts of the difficulty reported for FPs.

The paper is structured as follows: In Section 2 we introduce the information structural properties of the FP *nur*. Previous acquisition studies on the comprehension of FPs are reported in Section 3, and our experiment is presented in Section 4. We conclude with a discussion of our results in Section 5 and suggest that the information-structural explanation for children's non-target-like interpretation of FPs may account best for the findings.

2. The focus particle *nur* ('only')

According to the Alternative Semantic Account by Rooth (1992), FPs are semantic operators. They take scope over that part of a sentence they c-command in the parse tree (Jacobs, 1983; König, 1991). Within their scope domain FPs quantify over a specific constituent (Jacobs, 1983, König, 1991) called *related constituent* (Reis & Rosengren, 1997; Dimroth, 2004). Generally, the related constituent is the focus of the sentence, which is highlighted by the FP.

A sentence containing a FP has to be interpreted in relation to a so-called *set of alternatives* (SoA), which is usually given in the actual discourse. The semantic meaning of the FP determines the relation between the related constituent and the SoA. *Nur* is a restrictive FP, that is, it indicates an exclusive relation between the related constituent and the SoA. Consider example (1).

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(1) a. Haben Peter, Bob und Justus Eis bestellt?
   'Did Peter, Bob and Justus order ice-cream?'
   b. Nein. **Nur** Justus hat ein Eis bestellt.
   'No. **Only** Justus ordered ice-cream.'

In (1) the FP occurs in a pre-subject position. In this case only the subject preceded by the FP can be the related constituent (e.g., Jacobs, 1982; König, 1991). The use of *only* indicates that in this context nobody else besides Justus ordered ice-cream. Put differently, the SoA consists of Peter and Bob, and it is not true that the members of the SoA ordered ice-cream. The focus restriction in example (1) holds for English as well as for German. However, with respect to the focus restriction for the non-pre-subject positions of the FP English and German differ. Consider example (2).

(2) Does Justus order ice-cream and a piece of cake?
   a. Nein. Justus bestellt **nur** ein Eis.
      Justus orders only an ice-cream.
   b. No. Justus **only** orders ice-cream.
   b'. No. Justus orders ice-cream **only**.
   b''. No. Justus orders **only** ice-cream.

In German (2a) the FP follows the finite verb in V2 position.[1] Within the given context , the object-NP is the related constituent. (2a) means that Justus orders nothing else but ice-cream. Hence, the SoA consists of 'a piece of cake'. In contrast, in English the FP *only* can occur in three different post-subject surface positions: preceding the VP (2b), sentence-finally (2b'), and – like German – in pre-object position (2b''). Sentences with a pre-VP FP are assumed to be ambiguous (König, 1991), as the related constituent could be the VP (i), the object (ii), or the verb (iii). Thus (2b) could mean (i) that Justus does nothing else but order ice-cream, (ii) that Justus orders nothing else but ice-cream, (iii) that the only action that Justus performs with the ice-cream is to order it. Sentences with a FP in pre-VP position can be disambiguated via context or prosody. The natural reading of both (2b') and (2b'') is (ii). Note, however, that (2b') seems to be more marked than (2b'').

In sum, in order to interpret sentences with exclusive FPs like *nur* and *only* the child has to master the following tasks: She has to identify the sentence position of the FP and the related constituent. In addition, she must build the SoA and integrate it into the current discourse model. Furthermore, the child has to establish an exclusive contrast between the FP and the SoA and has to take this contrast into account when interpreting the FP-sentence.

3. Previous research on children's comprehension of sentences with *only*

In the following overview, we concentrate on studies testing intransitive sentences with *only* because we focused on these structures in our study.[2] In one of the first studies on children's comprehension of *only*, Crain, Ni, and Conway (1994) found that 3- to 6-year-old English-speaking children assigned to sentences with *only* in pre-subject position (3a) the meaning of (3b).

(3) a. Only the cat is holding a flag.
   b. The cat is only holding a flag.

In a sentence-picture-matching task, the majority of the children accepted sentences like (3a) and (3b) as a true description of a picture showing a cat holding a flag, a duck holding a flag and a balloon,

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[1]   Besides the pre-subject and pre-object positions in main clauses like in examples (1) and (2) further sentence positions for FPs in German are discussed in the literature (c.f. Bayer, 1996; Jacobs, 1983; König, 1991), for example, in subordinate clauses *..., dass Justus nur ein Eis gegessen hat* ('…that Justus only ate ice-cream.').
[2]   For research which investigated children's comprehension of FP-sentences with double object constructions see Crain et al. (1994), Gualmini, Maciukaite, and Crain (2003), and Paterson, Liversedge, White, Filik, and Jaz (2006) among others.

and a frog holding a balloon. To account for this error pattern, Crain et al. suggest that children have difficulty with the scope restriction of *only* and associate the FP with the VP of the sentence regardless of the surface position of the FP. Studies by Philip and Lynch (1999) and Zhou and Crain (2010) seem to further support Crain et al.'s proposal. Philip and Lynch found that 3- to 5-year-old English-speaking children did not accept the sentence *Only the dog is holding a starfish* as a true description of a picture showing a dog holding a starfish and an octopus and two cats not holding anything. Zhou and Crain tested 4-year-old Mandarin-speaking children with a truth-value-judgement task, in which two experimenters acted out a story with toy characters and props. At the end of the story the scene showed for instance a pig with a silver coin and a gold coin and a horse with a gold coin. Zhou and Crain reported that in this context children incorrectly rejected the sentence *Only Mr. Pig got a silver coin*. The authors conclude that the children analysed the whole VP as a related constituent of the FP instead of the subject-NP. Note that under the account of Crain et al. (1994), it remains unclear why children have difficulty with scope restrictions.

Paterson, Liversedge, Rowland, and Filik (2003) proposed an alternative account for children's non target-like interpretation of *only*-sentences. They suggest that due to an instable representation of the SoA children neglect the meaning of the FP and thus interpret sentences with and without FP alike. Using a picture-selection task, Paterson et al. presented children with sets of six pictures and with one of the following three test sentence types, illustrated in examples (4a) to (4c).

(4) a. The fireman is holding a hose.   Sentence without *only*
    b. Only the fireman is holding a hose.   Sentence with pre-subject *only*
    c. The fireman is only holding a hose.   Sentence with pre-VP *only*

The participants were asked to point to all pictures that matched the given sentence. Paterson et al. hypothesized that children should select the same pictures for sentences with and without *only* if they do not process the information triggered by *only*. Paterson et al. found that in the majority of the cases 6- to 7-year-old English-speaking children pointed to the pictures that were a true description of the sentences without a FP regardless of the sentence type used. Paterson et al. interpret these findings as evidence for their hypothesis that children tend to ignore the contrast information given by *only*. They assume that children are not able to consistently instantiate the SoA in the actual discourse model, if only triggered by the presence of the FP in the sentence. According to Paterson et al. this inability is caused by the still insufficiently developed pragmatic knowledge of the children. In a replication study of Paterson et al. with 6-year-old German-speaking children, Müller, Schulz, and Höhle (2011) found the same error pattern. However, based on the results from a follow up experiment Müller et al. suggest that the non-target-like performance may not be caused by insufficiently developed pragmatic knowledge, but by an infelicitous presentation of the FP-sentences. In the study of Paterson et al. (as well as in the study of Crain et al. (1994)) FP-sentences were presented in an out-of-the-blue context, that is, the FP-sentences were not embedded in a verbal context motivating the use of the FP and introducing the SoA. Instead, the motivation for using the FP and the set up of the SoA was part of the information given visually in the six pictures. Müller et al. (2011) argue that in this context, the FP in the sentences may not have served as a cue for the children to search for the SoA. Consequently, children did not establish the discourse model intended by the experimental set up. The authors conclude that findings on children's ability to interpret sentences with *only* so far have been possibly confounded by the additional requirement to (re)construct an appropriate discourse model.

In sum, previous comprehension studies (focusing mostly on English) provide evidence that children have difficulty interpreting FPs like *only*. Up to date little is known about the acquisition of the understanding of FPs in German (for an overview see Müller, 2010). Therefore, we designed an experiment that investigated 4- and 6-year-old German-speaking children's interpretations of sentences with *nur* in different sentence positions. In previous English studies the test sentences were pre-subject *only*-sentences and pre-VP *only*-sentences (cf. examples 3a and b). As illustrated in Section 2, the pre-VP sentence is ambiguous in English. As we were interested in the interpretation of the FP *nur* in the absence of ambiguity in the adult grammar, we tested the FP *nur* in pre-subject position (cf. example 1), and in pre-object position (cf. example 2a).

Previous studies reported that up to age 6 children did not interpret sentences with FPs target-like. Given these findings we hypothezised that German-speaking 4- and 6-year-old children show a non target-like interpretation for sentences with *nur* (H1). Following Crain et al. (1994), we hypothesized that both groups of childrens show a better performance for pre-object *nur* than for pre-subject *nur* (H2). Moreover, we explored whether the asymmetry in performance between pre-subject and pre-object *nur*-sentences is found across both age groups.
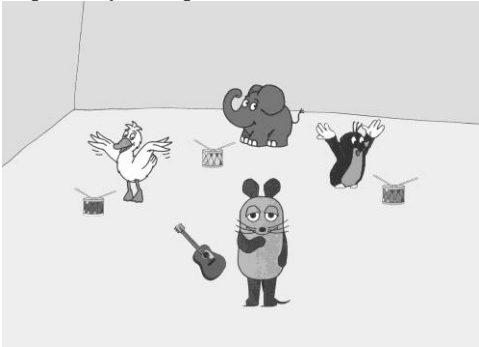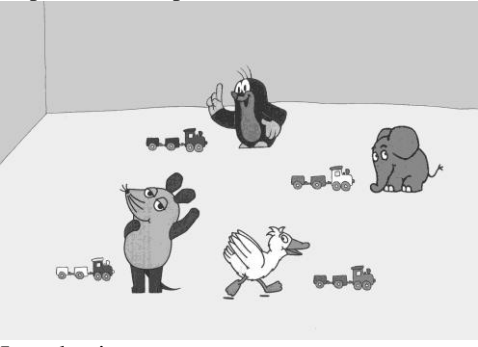
4. Our Study

4.1. Participants

Seventeen 4-year-old (12 girls and five boys; mean age 4;8 years; range 4;00 – 4;11 years) and 30 6-year-old German-speaking children (17 girls and 13 boys; mean age 6;8 years; range 6;1 – 7;0 years) participated in this experiment. All children were monolingual speakers of German with typical language development. The 4-year-old children were recruited from several kindergartens in Frankfurt, Hessen. The 6-year-olds were recruited from several schools in Potsdam, Brandenburg. In addition, 30 adults were tested as a control group.

4.2. Materials and Procedure

Using a truth-value judgement task, each participant saw one picture at a time and had to decide whether the sentence matched the picture or not. Each picture depicted four characters and their belongings (Figure 1). There were three experimental conditions: 1) sentences with pre-subject *nur*, 2) sentences with pre-object *nur* and 3) control sentences without *nur*. The sentences without a FP were included to verify that the children could answer the yes- and no-condition of the task correctly.

Each test sentence was preceded by a verbal context introducing all characters and their belongings depicted on the picture (i.e., the possible SoA was introduced verbally and not only visually). A total of 24 test items were presented to each participant, eight sentences of each condition. In each condition, half of the sentences matched the picture and the expected response was a yes response. The other half of the sentences did not match the picture expecting a no response. The following Figure 1 illustrates the test items for each sentence type and response condition.

Pre-subject *nur* condition

Expected yes-response

Expected no-response

Introductionary sentence
The duck, the mole and the elephant have a drum.

Introductionary sentence
The duck, the mouse and the elephant have a train.

Test sentence
Nur die Maus hat eine Gitarre.
'Only the mouse has a guitar.'

Test sentence
Nur der Elefant hat eine Eisenbahn.
'Only the elephant has a train.'

Pre-object *nur* condition
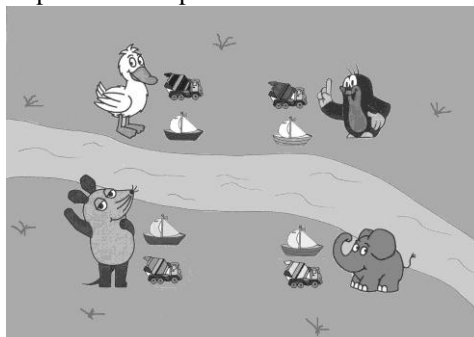Expected yes-response

Introductionary sentence
The elephant, the duck and the mouse have a bucket and a shovel.

Test sentence
Der Maulwurf hat nur eine Schaufel.
'The mole has only a shovel.'

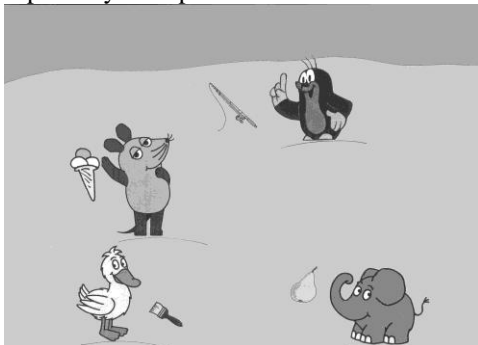Expected no-response

Introductionary sentence
The mole, the elephant and the mouse have a truck and a boat.

Test sentence
Die Ente hat nur ein Boot.
'The duck has only a boat.'
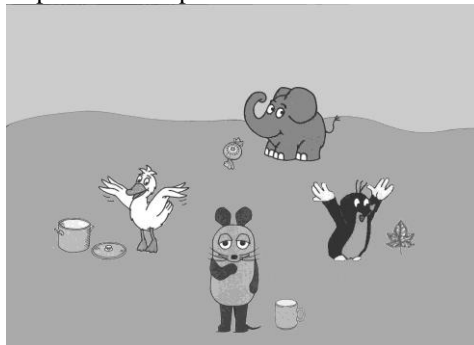
Without *nur* condition
Expected yes-response

Introductionary sentence
The mouse has icecream, the mole has a fishing pole and the elephant has a pear.

Test sentence
Die Ente hat einen Pinsel.
'The duck has a brush.'

Expected no-response

Introductionary sentence
The duck has a cooking pot, the elephant has candy and the mole has a leaf.

Test sentence:
Die Maus hat eine Mütze.
'The mouse has a cap.'

Figure 1. Test material (pictures and test sentence examples) used in the experiment.

Note that the test items in the expected yes condition do not indicate whether the child takes the FP into account when interpreting the *nur*-sentence. If the child ignores the FP, she would still respond correctly with yes, because an interpretation without *nur* matches the picture as well. Therefore, only the expected no-responses were relevant for analyses.

The experiment was presented on a computer. The verbal stimuli were prerecorded by a female speaker in a child-directed manner. The children were tested in the kindergarten or after school in their day care center, respectively, in a separate room. At the beginning of the experiment the experimenter

introduced a hand puppet to the child saying that the puppet knows the characters (a mouse, an elephant, a mole, and a duck) taken from the well-known children TV-show "The Program with the Mouse". The child was told that the puppet had spent a whole day with the mouse and their friends and took a lot of pictures which the puppet wanted to show the child and talk about. The experimenter informed the child that the puppet sometimes made mistakes when describing pictures and asked the child to judge whether the puppet's descriptions were right or wrong. Four practice items preceded the experimental trials. Two of the practise items elicited a yes-response. The other two practise items were clearly false, so children knew that the puppet could say something wrong. The children showed no difficulty with the practice items. Hence the data of all children was included in the analysis. After the practice items the test items were presented in a pseudo-random order. An experimental session lasted for about ten to 15 minutes. The participants of the adult control group were also tested individually.

4.3. Results

As expected, children and adults showed high numbers of yes-responses in the yes-response conditions (4-year-olds ranging between 91% and 99%; 6-year-olds ranging between 99.2% and 100%; adults 100%). As mentioned before, for the following analysis only the expected no-responses were taken into account. Figure 2 shows the proportion of correct no-responses for children and adults.
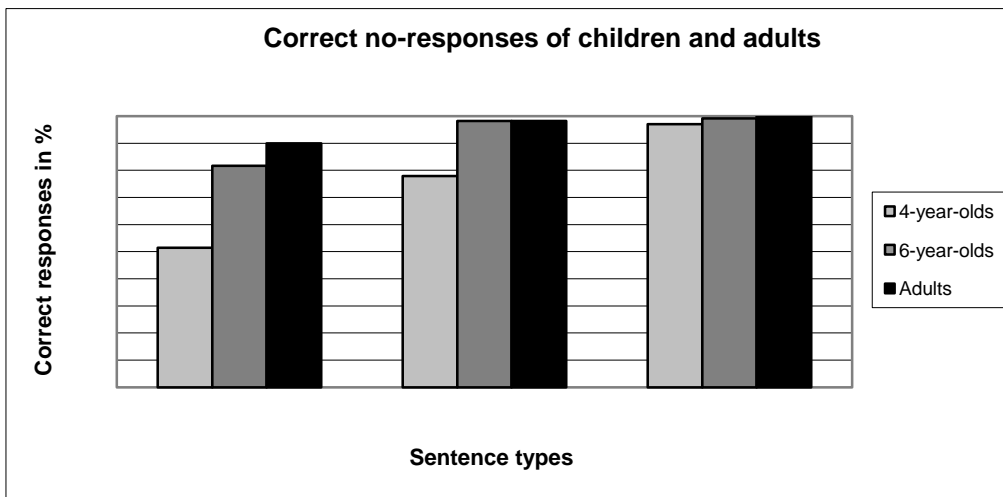

Figure 2. Results for 4- and 6-year old children and adults

As shown in Figure 2 children and adults had no difficulties with the interpretation of the control sentences. In the pre-subject condition, 4-year-olds gave the expected responses in 51.5% of the cases, and the 6-year-olds in 81.7% of the cases. In the pre-object condition, 4-year-olds responded correctly in about 80% of the cases and the 6-year-olds in 98.3% of the cases. The adult group performed at ceiling in both test conditions (pre-subject: 91% pre-object condition: 98.3%). The number of correct no-responses for the pre-subject and the pre-object *nur*-sentences for the three age groups was analysed using the Kruskal-Wallis-Test. There was a significant effect for both *nur*-sentence conditions (pre-subject: $H_{(df=2)}=13.661$; p< .05; pre-object: $H_{(df=2)}=10.236$; p< .05). A Mann-Whitney-U-test revealed that the adult group gave significantly more correct responses in both *nur*-sentence conditions than the 4-year-olds (pre-subject: $Z=3.519$; p< .001; pre-object: $Z=2.574$; p< .05). The 6-year-olds showed a significantly better performance on both *nur*-sentence types than the 4-year-olds (pre-subject: $Z=2.580$; p< .05; pre-object: $Z=2.574$; p< .05). The analysis revealed no significant differences between the adults and the 6-year-old children, neither in pre-subject *nur*-condition nor in the pre-object *nur*-condition (pre-subject: $Z=1.010$; p= .313; pre-object: $Z=0$; p= 1).

In a next step we compared the performance on the pre-subject and pre-object *nur*-sentences for each age group using the Wilcoxon-Test. For the 4-year-olds and 6-year-olds we found that

performance on the pre-subject *nur*-sentences was significantly lower than on the pre-object *nur*-condition (4-year-olds: $Z=2.232$; $p< .05$; 6-year-olds: $Z=2.130$; $p< .05$). For the adults there was a marginally significant difference between both *nur*-conditions ($Z=1.857$; $p=0.063$).

Additionally, we analyzed the individual response pattern of the children (i.e., we classified the children as *passers* or *failers* depending of the number of correct no-responses). There were four test items in the expected no-response condition for both *nur*-sentence types. If the child gave at least three correct responses she was classified as a passer (i.e., she was assumed to have mastered the interpretation of this sentence type). Otherwise she was classified as a failer. Tables 1 and 2 illustrate the number of passers and failers in the group of 4-year-olds and 6-year-olds, respectively.

Table 1
Classification of the 4-year-olds as passers or failers for sentences with pre-subject and pre-object nur

| | | Pre-object *nur* | | |
		Passers	Failers	Total
Pre-subject *nur*	Passers	9 (53%)	0	9 (53%)
	Failers	5 (29%)	3 (18%)	8 (47%)
	Total	14 (82%)	3 (18%)	17 (100%)

Table 2
Classification of the 6-year-olds as passers or failers for sentences with pre-subject and pre-object nur

| | | Pre-object *nur* | | |
		Passers	Failers	Total
Pre-subject *nur*	Passers	25 (83%)	0	25 (83%)
	Failers	5 (17%)	0	5 (17%)
	Total	30 (100%)	0	30 (100%)

As Table 1 shows, nine out of the 17 4-year-old children mastered both sentence types with *nur*. Five children mastered the pre-object *nur*-sentences but not the pre-subject *nur*-sentences. The remaining three children failed in both *nur*-sentence types.

As indicated in Table 2, 25 out of the 30 6-year-old children mastered both sentence types with *nur*. The remaining five children were classified as object-passers and subject-failers. Neither among the 4-year-olds nor among the 6-year-olds there was a child who mastered the FP *nur* in pre-subject but not in pre-object condition.

In sum, the experiment revealed that the 6-year-old but not the 4-year-old children interpreted the pre-subject and the pre-object *nur*-sentences in a target-like manner. Furthermore, both groups of children showed a better performance on pre-object than on pre-subject *nur*-sentences – an effect that could also be observed in the adult data.

5. Discussion and Conclusion

The aim of the present study was to investigate how 4- and 6-year-old German-speaking children interpret sentences with the FP *nur* in pre-subject and pre-object position. Based on the findings of previous studies we predicted that children do not interpret sentences with *nur* in a target-like manner (H1). This prediction was partly confirmed by our results. In contrast to the 4-year-old children, the 6-year-olds showed a nearly target-like interpretation of both sentence types with *nur*. However, an analysis of the individual response patterns revealed that 53% of the 4-year-olds mastered the FP-sentences in both the pre-subject and the pre-object condition. Furthermore, the data showed that both groups of children interpreted the pre-object *nur*-sentences more often in a target-like manner than the pre-subject *nur*-sentences, confirming H2.

With respect to our fourth research question, the data clearly indicated that this subject-object asymmetry is constant across both age groups. Taken together the data of the 4- and 6-year-old children, three stages of comprehension can be suggested (see Table 3):

Table 3

Stages of FP-comprehension

Stage 1	No understanding of FP *nur* in pre-subject and pre-object FP-sentences
Stage 2	Mastering FP *nur* in pre-object, but not pre-subject sentences
Stage 3	Target-like understanding of the FP *nur* in pre-subject and pre-object sentences

Table 3 shows how the understanding of *nur*-sentences develops. At stage 1 children show no target-like performance of *nur*-sentences; this holds for 18% of the 4-year-olds. The pattern of a subject-object asymmetry, which is characteristic for stage 2, was shown by 29% of the 4-year-olds and 17% of the 6-year-olds. The remaining 4- and 6-year-olds have reached stage 3 (i.e., they have mastered both *nur*-sentence types). Hence, the development of the understanding of *nur*-sentences is a complex process which seems to be loosely related to age.

The failure to understand *nur*-sentences in stage 1 might be attributed to different causes. It may be that children do not yet know the function and/or the semantic-lexical meaning of the FP, or it may be that children have difficulty with the identification of the related constituent.

Stage 2 is in line with the account of Crain et al. (1994), who suggested that the non-target-like performance in pre-subject FP-sentences is due to problems with scope restriction. Framed in an information-structural framework, we propose a focus-default account that can explain the results as well. We assume that the different performance on pre-subject and pre-object *nur*-sentences is caused by differences in the focus alignment in both sentence types. Generally, the subject is the topic of the sentence, while the object is the focus of the sentence (cf. Costa, 1998; Molnár, 1991). Frazier (1999) found that in online experiments listeners prefer the reading of a subject as topic and postulated for subjects a topic-default. Note that this unmarked subject-as-topic and object-as-focus classification holds for the FP-sentences in the pre-object condition. In contrast, in the pre-subject condition the subject-NP is the related constituent and thus the focus of the sentence. More specifically, we assume that children have difficulty with sentences with a focused subject, because this structure violates the topic-default for subjects. Thus, in pre-subject *nur*-sentences children are faced with the conflict of assigning topic or focus to the subject. We argue that in the case of conflicting assignment options children follow the topic-default for subjects and incorrectly analyse the subject as topic and the object as focus. Note that our account makes the general prediction that children's interpretation of FPs breaks down whenever this default assignment is violated. Consequently, in our account non-canonical pre-subject *nur*-sentences such as (5) are predicted to be difficult as well, because the subject is the focus of the sentence. This contrasts with Crain et al.'s (1994) account. In our understanding this account predicts that children have little difficulty with non-canonical pre-subject sentences because in this case the scope restriction is unambiguous.

(5) Eine Gitarre hat nur die Maus.
    A   guitar   has only the mouse.
    'Only the mouse has a guitar.'

In fact, we found no difference between performance on canonical and non-canonical pre-subject *nur* (Müller, 2010), providing additional support for our focus-default account.[3]

Unlike Crain et al., we argue that children's difficulty with focus particles does not result from incorrect scope restrictions, but from marked focus structures in sentences with a focused subject, independent of the surface position of the subject.

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[3]   The sentences type *Nur eine Gitarre hat die Maus.* ('Only a guitar has the mouse.') with a pre-object *nur* in sentence initial position was not tested by Müller (2010). Following the account of a topic default for the sentence subject, we would expect that children interpret this sentence in a target-like manner. The non-canonical word order should not influence the children's performance.

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Selected Proceedings of the 4th Conference on Generative Approaches to Language Acquisition North America (GALANA 2010)

edited by Mihaela Pirvulescu, María Cristina Cuervo, Ana T. Pérez-Leroux, Jeffrey Steele, and Nelleke Strik

Cascadilla Proceedings Project   Somerville, MA   2011

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This paper can be cited as:

Müller, Anja, Petra Schulz, and Barbara Höhle. 2011. How the Understanding of Focus Particles Develops: Evidence from Child German. In *Selected Proceedings of the 4th Conference on Generative Approaches to Language Acquisition North America (GALANA 2010)*, ed. Mihaela Pirvulescu et al., 163-171. Somerville, MA: Cascadilla Proceedings Project. www.lingref.com, document #2593.