

# Intonational Marking of Focus in Different Word Orders in German Children

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## 1. Introduction

### 1.1. Focus marking

It has been argued in the linguistic literature that focus can highlight new or contrastive information (Kiss, 1998; Krifka, 2008). Moreover, focus may range from having narrow scope over one constituent to having broad scope over the whole sentence (Ladd, 1996). In the example in 1a), focus has broad scope and usually indicates new information, whereas in 1c) focus has narrow scope and highlights contrastive information (Kiss, 1998; Katz & Selkirk, submitted). Narrow focus as in 1b) seems to be ambiguous because it can be seen as contrastive or non-contrastive focus, depending on whether contrastive focus is restricted to exhaustiveness (see also Zimmermann, 2008).

- 1) a) What happens? (broad focus)  
[The man strokes the dog]<sub>F</sub>.  
b) Who did the man stroke? (narrow focus)  
The man stroked [the dog]<sub>F</sub>.  
c) Did the man stroke the cat? (contrastive focus)  
(No), the man stroked [the dog]<sub>F</sub>.

Two common strategies used by languages to mark focus are intonation and word order variation. Intonational marking of focus involves the use of intonational prominence, which is achieved via pitch accent in West Germanic languages. That is, focused constituents are typically accented and non-focused constituents typically deaccented (Gussenhoven, 1983; Selkirk, 1995). While accent placement can distinguish focused from non-focused constituents, phonetic variation, such as variation in pitch and duration, have been shown to be used to distinguish different types of focus (e.g., Baumann, Becker, Grice & Mücke, 2007; Kügler, 2008; Hanssen, Peters & Gussenhoven, 2008; Katz & Selkirk, submitted). In addition to prosody, word order variation such as the use of cleft-constructions or the reordering of arguments (e.g., moving a constituent to the left periphery) can be used to mark focus (Rizzi, 1997; Kiss, 1998). While clefted constituents have been linked to (exhaustive) contrastive focus (Kiss, 1998), the left periphery has been linked to contrastive focus and topic (Rizzi, 1997).

In German, a language with a relatively free word order, both intonation and word order variation are used to mark focus. In respect of intonational focus-marking, recent research (Baumann et al., 2007; Kügler, 2008) revealed phonetic differences between the realization of contrastive and broad focus (f<sub>0</sub>-maxima, f<sub>0</sub>-range, and duration), but less clear distinctions in the realisation between narrow and

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contrastive focus and between narrow and broad focus. As to word order, the non-canonical word order OVS can be used to mark focus on the object (Frey, 2006) such that the focused object can be moved to the left periphery (2a/2b), although usually the non-canonical word order is less preferred than the canonical word order in a broad focus context (Weskott, 2003 and references therein). While a focused object can be moved to the left periphery, the non-canonical word order per se does not indicate that the initial object is focused because the initial object in the OVS order may also be a topic. In this case the focused subject follows (3b) rather than precedes the object (3a).

- 2) Wen streichelt der Mann? ('Who does the man stroke?')
- |    |         |                    |            |         |                      |       |
|----|---------|--------------------|------------|---------|----------------------|-------|
| a) | Der     | Mann               | streichelt | [den    | Hund] <sub>F</sub> . | (SVO) |
|    | the.nom | man                | strokes    | the.acc | dog.                 |       |
| b) | [Den    | Hund] <sub>F</sub> | streichelt | der     | Mann.                | (OVS) |
|    | the.acc | dog                | strokes    | the.nom | man                  |       |
- 3) Wer streichelt den Hund? ('Who strokes the dog?')
- |    |         |                    |            |         |                      |       |
|----|---------|--------------------|------------|---------|----------------------|-------|
| a) | [Der    | Mann] <sub>F</sub> | streichelt | den     | Hund.                | (SVO) |
|    | the.nom | man                | strokes    | the.acc | dog.                 |       |
| b) | Den     | Hund               | streichelt | [der    | Mann] <sub>F</sub> . | (OVS) |
|    | the.acc | dog                | strokes    | the.nom | man                  |       |

Although there is variation across languages regarding the use of different means to mark focus, Fanselow and Skopeteas (in press) argued recently that using intonation to mark focus in the canonical word order is preferred over applying structurally more complex devices such as word order variation (a prediction that follows from their *Minimality Condition*). This suggests that children may prefer intonation over word order as a means to mark focus and that adult-like prosodic focus-marking may be easier to acquire than adult-like use of word order in focus marking.

### 1.2. Focus marking in child language

Past work on focus marking in child language investigated phonological and phonetic means of focus marking and the impact of focus on word order variation. With respect to intonational means of focus marking, Wieman (1976) observed in recordings made during natural play sessions that already two-year old English-speaking children could use accentuation to mark focus. Hornby and Hass (1970) found that when describing a sequence of two pictures differing by only one feature, children frequently used 'contrastive stress' (i.e. emphatic accentuation) to pronounce the word that carried the contrastive information in the description of the second picture (e.g. a boy vs. a GIRL is riding a bike), especially in sentence-initial position. Using a similar method, MacWhinney and Bates (1978) found that the use of contrastive stress was well established around the age of three but became increasingly more frequent over time in English-speaking children aged between three and six. These findings indicate that children can use accentuation to mark contrastive focus; however, more recent research showed that adult-like use of different accent types to mark focus is acquired later. Chen (accepted) examined the intonational realization of focus and topic in SVO sentences in 4- to 5-year old Dutch-speaking children via an answer-reconstruction task. She found that children were adult-like in accenting sentence-initial focus and topic mostly with a falling accent, but realized sentence-final focus with accentuation and sentence-final topic with no accent at the age of four or five and only became adult-like in the choice of accent type in sentence-final focus at the age of seven or eight. These results were confirmed in an analysis of German children's productions from short narrations elicited by a picture-story telling task (de Ruiter, 2010). She found that 5-year-olds consistently marked new information by accentuation but that the accent types still differed in their distribution from those used by adults.

Recent studies investigating phonetic marking of focus have shown that 4-year old children can use phonetic means to capture the given vs. new distinction in sentences where the information structure was determined by a preceding narrative (Wonnacott & Watson, 2008), but have more problems with distinguishing focus from topic in sentences elicited as answers to narrow focus questions specifying

focus on either the subject or object (Chen, 2009). More specifically, Wonnacott and Watson (2008) analysed acoustic correlates of accentuation in subject nouns in SVO sentences produced by English-speaking 4-year olds in three conditions, i.e. new (i.e. not previously mentioned), given-non-shift (i.e. mentioned previously in the same grammatical role), given-shift (i.e. mentioned previously but in a different grammatical role). They found that the nouns were produced with a higher maximal pitch and a higher intensity in the new and given-shift conditions than in the given-non-shift condition; but no differences between the new and the given-shift condition were found. This pattern mirrored findings from English adults by Watson et al. (2005, reported in Wonnacott & Watson, 2008), but in contrast to the adults, children did not show differences in durational measures across the conditions. Chen (2009) analysed subject nouns in the subject-focus condition, and the object-focus condition, in which the subject was the topic, in SVO sentences. In contrast to Wonnacott & Watson's findings, Chen found that Dutch-speaking children used neither pitch-related nor duration-related cues to distinguish focus from topic at the age of four or five, and were able to use pitch-related cues for this purpose but not duration-related cues at the age of seven or eight. It is important to note that the answer sentences in Wonnacott & Watson's study always depicted a scene that formed a contrast with the previous scene. Hence, strictly speaking, their 'new' condition is both new and contrastive. The 'new' condition in Chen (2009), however, is confined to only newness. This difference in the nature of the 'new' conditions in the two studies may explain the different results. It may be inferred that the use of phonetic means to distinguish contrast from givenness (in the same grammatical role) is acquired earlier than the use of phonetic means to distinguish newness from givenness (in the same grammatical role).

While research into intonational marking of focus indicates that children can use some aspects of intonation to mark focus (though not always adult-like) by the age of five, studies on children's use of word order reveal a less coherent picture. In a crosslinguistic study, Hickmann, Hendriks, Roland and Liang (1996) analysed elicited narratives from Chinese, English, French, German and Italian 7- to 10-year old children and adults with respect to their ordering of new vs. given information in relation to the position of the verb. Overall, their data showed that new elements occurred more often postverbally than given elements but there was high variation across ages and languages.

Narasimhan and Dimroth (2008) found an opposite effect of ordering old and new information in 4-year old German children. In their study, productions of coordinated NPs with one new and one given referent were elicited. In contrast to adults who followed the expected given-new order in most cases, children produced more new-given orders than given-new orders. Analysing the spontaneous data from seven 2- to 5-year old English children taken from the CHILDES corpus, de Marneff et al. (2007) did not find any effect of givenness on the order of the objects in double object constructions.

A first study that looked more closely at a potential interaction of word order and intonation as two possible markers of information structure was conducted by Müller, Höhle, Schmitz and Weissenborn (2006). Using an answer reconstruction task, in which 4- to 5-year old German children reconstructed SVO and OVS sentences from speech with no sentence-level intonation and rhythmic properties, they examined mean pitch in narrow focus compared to non-focus in the same position in both word orders. They found higher mean  $f_0$ -values for focused than for non-focused constituents independent of the grammatical role and the sentence position of the constituents. In addition, children showed a strong tendency to produce SVO sentences, irrespective of the presented word order or the grammatical role of the focused constituent.

Taken together, the research so far suggests that intonation seems to be a more robust means of focus marking than word order in children acquiring a West Germanic language, although children do not always show adult-like intonational marking of focus, especially when non-contrastive focus and topic are involved. The results for the word order variation are more contradictory. While parts of the heterogeneous patterns may be attributed to differences in the tasks employed and the language at issue, it is important to note that the studies on children's use of word order variation were concerned predominately with non-contrastive focus.

### 1.3. Goal of the present study

The present study aims to obtain a more comprehensive picture of the interface between intonation and word order in children’s focus marking than past work hitherto has shown. To this end, we investigated the use of word order and intonation in three types of focus (broad focus, narrow focus and contrastive focus) in German children, compared to adults. Our analysis of intonation is phonetically oriented as the distinction between three types of focus has been shown to be realised via phonetic means in German (Baumann et al., 2007; Kügler, 2008)

## 2. Experiment

### 2.1. Design and materials

An answer reconstruction task was used to elicit utterances with different word orders in different focus conditions (more in section 2.3). Three independent variables were varied: (1) the word order in the sentences to be reconstructed (SVO vs. OVS); (2) focus type (broad, narrow, contrastive); and locus of focus (focus on the subject NP, focus on the object NP). The target words were either the nouns of the focused subject NPs or focused object NPs. The focus types were determined by question contexts (see (1) above), which placed the target word in the answer sentences in broad focus (BF), narrow focus (NF) or contrastive focus (CF), as illustrated in Table 1 with target words in bold letters.

	Focus on Subject		Focus on Object	
	SVO	OVS	SVO	OVS
BF	[Das <b>Mädchen</b> fegt die Straße] <sub>F</sub> . <i>The girl sweeps the street.</i>	[Die Wiese mäht das <b>Mädchen</b> ] <sub>F</sub> . <i>The grass mows the girl.</i>	[Die Giraffe entdeckt die <b>Murmel</b> ] <sub>F</sub> . <i>The giraffe discovers the marble.</i>	[Die <b>Murmel</b> verschenkt die Polizistin] <sub>F</sub> . <i>The marble gives the cop.</i>
NF	[Das <b>Mädchen</b> ] <sub>F</sub> backt die Torte. <i>The girl bakes the cake.</i>	Die Zeitung liest [das <b>Mädchen</b> ] <sub>F</sub> . <i>The newspaper reads the girl.</i>	Die Oma verschenkt [die <b>Murmel</b> ] <sub>F</sub> . <i>The granny gives the marble.</i>	[Die <b>Murmel</b> ] <sub>F</sub> verschluckt die Kröte. <i>The marble swallows the toad.</i>
CF	[Das <b>Mädchen</b> ] <sub>F</sub> baut die Mauer. <i>The girl builds the wall.</i>	Die Tür öffnet [das <b>Mädchen</b> ] <sub>F</sub> . <i>The door opens the girl.</i>	Die Taube klaut [die <b>Murmel</b> ] <sub>F</sub> . <i>The pigeon steals the marble.</i>	[Die <b>Murmel</b> ] <sub>F</sub> findet die Kröte. <i>The marble detects the toad.</i>

Table 1: Sample subject and object target word, each in the six conditions (focus type x word order)

There were 4 subject and 4 object target words, which were presented in two word orders and three focus conditions to allow for an acoustic analysis of the same segmental material across the six different experimental conditions (3 focus types x 2 word orders). All target words were disyllabic, most of them with lexical stress on the first syllable and involving mostly sonorants. The subjects and objects in each sentence were realized by definite NPs. The subject target words were animate and the object target words were inanimate words. Each subject and object target word was combined with different lexical material in each of the six experimental conditions such that each target word could be elicited from the same child in the different conditions without repeating the same sentence. The dependent variables comprised the word order produced by the children and four phonetic measures. The word order considered was SVO and OVS, other constructions and elliptic answers were excluded from the analysis of both measures. The phonetic analyses were conducted in Praat. The phonetic variables include the duration of the target noun in msec, the f<sub>0</sub> maximum of the target noun, the f<sub>0</sub>-minimum, i.e. the lowest f<sub>0</sub>-minimum from either the rising or falling proportion in the target noun, and the f<sub>0</sub>-range, i.e., the difference between f<sub>0</sub>-maximum and f<sub>0</sub>-minimum.

The analyses for the word order variation investigated the impact of focus condition, the word order presented to the children and the locus of focus on the word order produced by the children. While we expect no effect of locus of focus in the broad focus condition, difference in the narrow and

contrastive focus condition are expected if children follow the new-before-given strategy (Narasimhan & Dimroth, 2008). The analyses for the phonetic variables did not include locus of focus because different lexical material was used as subject and object target words, making a comparison between subjects and objects difficult.

## 2.2. Participants

Twenty monolingual German children (mean age: 4;5, range: 4;1-4;9) were tested. None of the children had indications of delay or impairment in language development. In addition, thirteen adult native speakers of German, students from the University of Potsdam, participated as a control group.

## 2.3. Procedure

In the answer reconstruction task, each target sentence was presented together with a picture showing the event described by the sentence. The focused part of the sentence was initially covered in the picture in the narrow focus and contrastive focus conditions. The complete picture was initially covered in the broad focus conditions. The pictures and sentences were combined in question contexts (see 1) above), so that the experimenter asked questions about the occluded part in the picture, in this way asking the focus questions in a “natural” context.

The experiment started with a cover story, explaining to the participants that they were going to teach a robot proper natural language. Teaching took place in terms of a game. In this game, the experimenter first showed the participants the pictures with the occluded parts. The experimenter then asked the robot questions about the occluded part of the picture. The robot was supposed to have X-ray vision and could see the complete pictures, but could not speak proper German. The robot answered the questions with sentences like those shown in Table 1. Crucially, the robot’s answers lacked both sentence-level intonation and rhythmic properties. After the robot gave his answer, the experimenter always repeated the focus question to ensure that the intended focus condition for the target word was still available to the participants. Participants then reconstructed the robot’s answer in their own intonation. The experimenter encouraged the participants to produce the complete answer in a natural way to avoid elliptic answers and utterances produced in disfluent robot-language. Finally, the experimenter removed the cover to check whether the robot has got the picture right.

## 2.4. Analyses and Results

The data of four of the twenty children were excluded because they either spoke with flat intonation, somewhat like the robot, or predominantly gave elliptic answers to the narrow and contrastive focus questions. For the remaining sixteen children, trials in which the information structure was not correct (focus question was not produced before the child answered), or trials in which children’s answers were not the target constructions (e.g., elliptic sentences, use of personal pronouns) or produced in a disfluent or unnatural manner were removed. The phonetic analyses further excluded data in which the sentence was not produced as one intonational phrase. The data of all adults was used for the analysis of the word order, while a sample of ten adults’ data was included for the phonetic analyses. Generalized linear mixed models (GLMM) were used to conduct inferential statistical analyses in the R environment. P-values were generated using Markov chain Monte Carlo sampling provided by the `pvals.fnc` function of the language package (Baayen, Davidson, & Bates, 2008). For the analyses of the word order results, separate linear mixed models were calculated for children and adults to estimate the fixed effects of word order used by the robot (hereafter ‘given’ word order: SVO, OVS) in the reconstructed answer sentences, focus type (BF, NF, CF) and locus of focus (subject vs. object) for the probability of producing the canonical word order SVO. The variables Participant and Item were treated as random factors.

For the children, the models revealed significant main effects for all three factors (‘given’ word order:  $p < .001$ , focus type:  $p < .001$ , locus of focus:  $p < .01$ ) on the word order produced by the children. The effects are illustrated by Figure 1. As can be seen, children generally produced more SVO than OVS sentences, however, children produced more OVS utterances when the robot had presented the OVS than the SVO order ( $b: 3.85, SE: 0.41, z: 9.28, p < .001$ ).

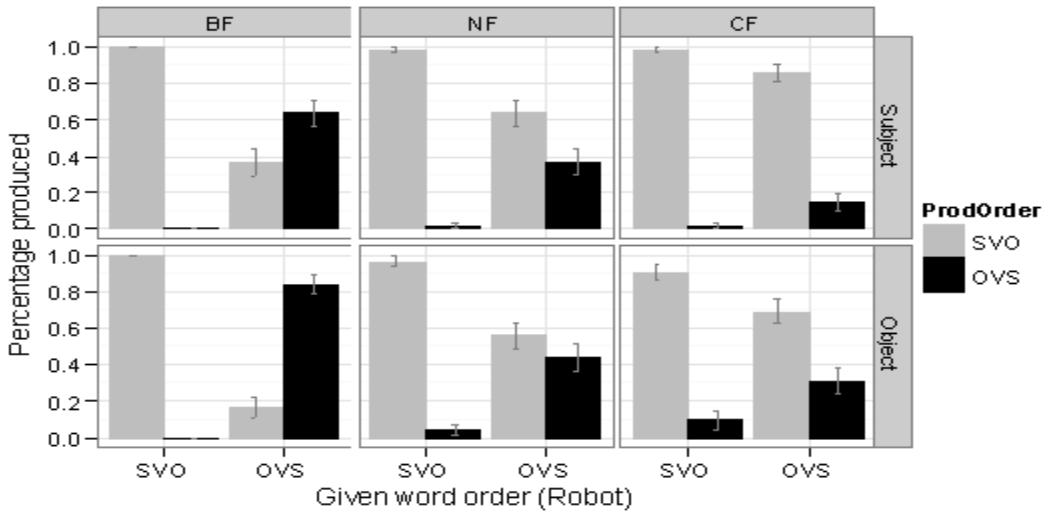


Figure 1: Proportion of word order produced (with  $\pm 1$  SE) by the children (ProdOrder), broken down by focus type (BF, NF, CF), locus of focus (subject, object) and word order in the robot's speech

Separate models for each word order presented by the robot revealed no effects of focus type ( $p > .157$ ) or locus of focus ( $p > .995$ ) when the SVO word order was presented. However, when the OVS word order was presented, children were more likely to produce the OVS order in the broad focus condition than in the narrow focus ( $b: 1.67, SE: 0.53, z: 3.14, p < 0.01$ ) and contrastive focus condition ( $b: 2.71, SE: 0.48, z: 5.68, p < .001$ ), and in the narrow than contrastive focus condition ( $b: 1.05, SE: 0.39, z: 2.71, p < .01$ ), indicating that focus type influenced word order variation. Moreover, children were more likely to produce the OVS order when the object NP was focused than when the subject NP was focused ( $b: 0.81, SE: 0.29, z: 2.81, p < .01$ ), although this effect predominantly arose from the differences in the broad focus condition.

In contrast to children, adults always almost produced the canonical word order (99%) independent of the word order of the sentence presented by the robot. The GLMMs thus did not reveal any effect of focus type or location of focus on the probability to produce the SVO order.

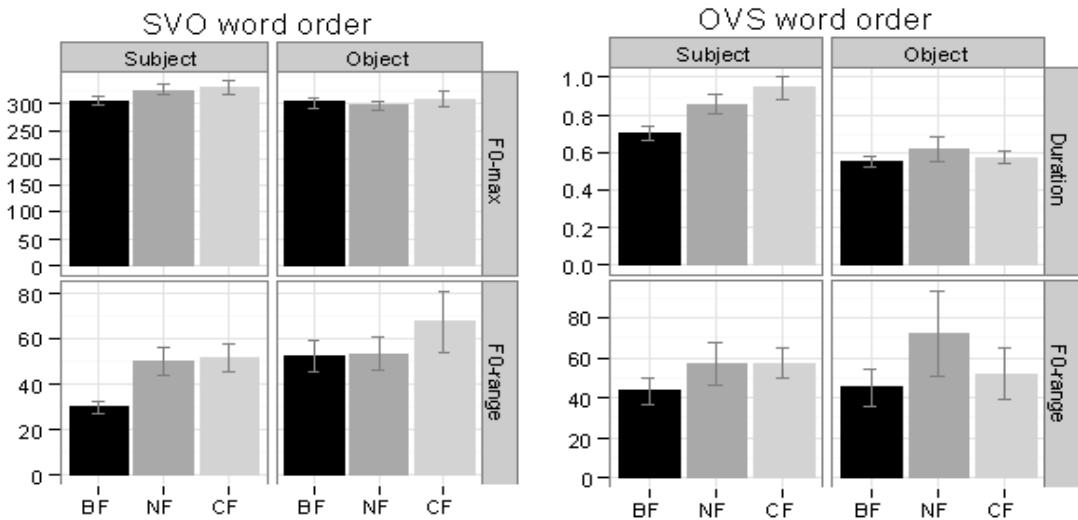


Figure 2: Mean f0-maximum and f0-range in Hz (with  $\pm 1$  SE) on subjects and objects in the SVO order (left panel), and mean duration in msec and f0 range in Hz (with  $\pm 1$  SE) for subjects and objects in the OVS order (right panel), depending on focus type (BF, NF, CF) (child data)

For the analyses of the intonation results, linear mixed models for children and adults were calculated to estimate the fixed effects of focus type on each dependent variable (f0-maximum, f0-minimum, f0-range, duration) for subject and object target words. Again the variables Participant and Item were treated as random variables. The phonetic analyses for children and adults included only trials in which the word order in the robot's speech was maintained such that any differences found could be attributed to the effect of focus type.

In respect of the data obtained from the canonical word order conditions, the GLMMs for the children revealed significant effects of focus type on the f0-maxima and f0-range, but not on the duration or f0-minima (see Figure 2 left panel). However, these effects were restricted to the subject nouns, with the results on the object only being non-significant tendencies ( $p > .1$ ). The subject nouns were spoken with a lower f0-maximum and a smaller f0-range in the broad focus condition than in the narrow focus condition (f0-maximum:  $b: 18.28, SE: 7.97, t: 2.29, p < .05$ ; f0-range:  $b: 24.78, SE: 7.85, t: 3.16, p < .01$ ) and in broad focus than contrastive focus condition (f0-maximum:  $b: 19.81, SE: 7.89, t: 2.51, p < .05$ ; f0-range:  $b: 23.40, SE: 7.66, t: 3.05, p < .01$ ).

In the non-canonical word order OVS (see Figure 2, right panel), the subject nouns were produced with a smaller f0-range in broad focus than in narrow focus ( $b: 25.81, SE: 11.46, t: 2.25, p < .05$ ) and with marginally shorter duration in broad focus than in contrastive focus ( $b: 0.16, SE: 0.09, t: 1.86, p < .07$ ). Objects only had a non-significant tendency for longer duration in the narrow focus than broad focus condition ( $b: 0.12, SE: 0.07, t: 1.69, p = .10$ ).

The GLMMs for the adults were confined to data obtained from the canonical word order because adults almost always changed the word order in the OVS condition to SVO. The analyses revealed an effect of focus type on the f0-range and f0-minimum but not on f0-maximum or duration (see Figure 3). The subject nouns were spoken with a significantly higher f0-range in the contrastive focus condition than in the broad focus ( $b: 18.06, SE: 5.55, t: 3.26, p < .01$ ) and narrow focus condition ( $b: 12.47, SE: 5.33, t: 2.34, p < .05$ ), and with a lower f0-minimum in the contrastive than broad focus condition ( $b: 9.82, SE: 3.52, t: -2.79, p < .01$ ). The object nouns were spoken with a marginally higher f0-range in the contrastive focus condition than in the broad focus condition ( $b: 7.20, SE: 3.92, t: 1.84, p = .07$ ).

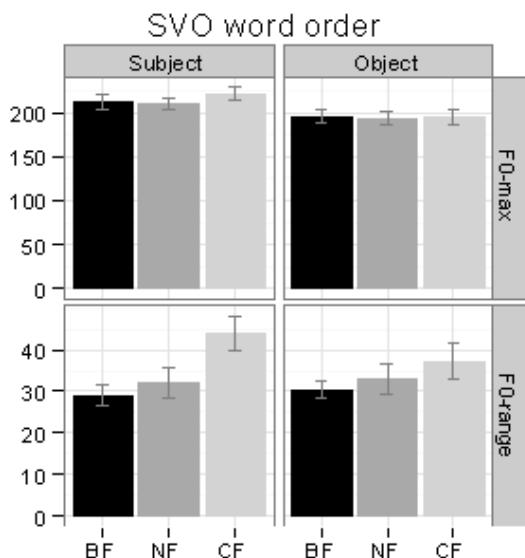


Figure 3: Mean f0-maximum and f0-range in Hz (with  $\pm 1$  SE) on subjects and object in the SVO order, separated by focus type (BF, NF, CF) (adult data)

### 3. Conclusion

The results for the word order variation showed that both children and adults rarely changed the canonical word order to the non-canonical word order. When the non-canonical word order was used in the robot's speech, adults always changed it to the canonical word order, indicating that focus had no

impact on the choice of word order by adults in this task. Children, however, did not always change the non-canonical word order to the canonical word order. This pattern was influenced by both type of focus and locus of focus.

Children produced more OVS orders in the broad focus condition than in the narrow and contrastive focus condition. This pattern is unexpected because the non-canonical word order is least appropriate in the broad focus condition. The relatively high number of OVS reconstructions in the broad focus condition may result from memory constraints imposed on the children, who did not see the action depicted in the robot's answer and thus had to remember the complete sentence without any visual cues. Conceivably, it may be easier to reproduce the answer in the word order used by the robot than changing the word order in the broad focus condition. While children generally changed the non-canonical word order more often to the canonical word order in the narrow and contrastive focus condition, this occurred less frequently in the narrow focus condition than in the contrastive focus condition. This difference might arise from the status of the non-focused element in these conditions. In the narrow focus conditions, the *wh*-questions specified the non-focused element as the topic both in the questions (e.g. for focused subjects, '*Who reads the newspaper?*') and in the corresponding answer sentences ('*The newspaper reads [the girl]<sub>F</sub>*'), which licensed the OVS order with sentence initial topical object (see 2) above) target words. In contrast to this, topichood was less transparent in the contrastive focus conditions (e.g. '*Does the boy open the door?*' – *The door opens [the girl]<sub>F</sub>*). While it remains to be determined how exactly the topicality of the non-focused constituent influenced choice of word order, our results suggest that children are sensitive to the differences between shifted (contrastive focus) and non-shifted (narrow focus) topics, in line with Wonnacott and Watson (2008).

The effect of locus of focus revealed that children more often changed from the OVS to the SVO word order when the subject rather than the object was focused. The new-before-given strategy (Narasimhan & Dimroth, 2008) might have influenced the production in the narrow focus and contrastive focus condition (in which the focused information was new). However, the effect of the locus of focus predominantly arose from differences in the broad focus condition. The differences in the broad focus condition cannot easily be explained by the new-before-given strategy because in these conditions the complete utterance was new. But the differences may be explained in terms of memory constraints. More specifically, when we inspected closely children's responses other than the reconstructed answers, we noticed that some children sometimes recognized some of the target nouns across trials and conditions and made remarks on having seen the same referent elsewhere. Importantly, this occurred far more frequently when the target nouns served as subject. Probably, the relatively frequent recognition of subject nouns has reduced the memory load and thus facilitated change in word order, leading to more changes from OVS to SVO.

Taken together, the results of the word order variation indicate no clear pattern in terms of a general given-before-new or new-before-given strategy (Narasimhan & Dimroth, 2008) which may reflect the fact that in German either topic or focus can be moved to the left periphery.

The results of the intonational focus marking showed that children were able to use phonetic means to mark focus in German, especially when the subject was focused. In these cases, they used *f*<sub>0</sub>-range and *f*<sub>0</sub>-maximum to distinguish the subject nouns in the broad focus condition from their counterparts in the contrastive and narrow focus condition and modified the same *f*<sub>0</sub>-variable (i.e. *f*<sub>0</sub>-range) as adults did. This indicates that German 4-year olds can use similar *f*<sub>0</sub>-measures to distinguish different focus types. Nevertheless, while children and adults distinguished contrastive from broad focus, they differed in whether narrow focus was distinguished from the two other focus types. More specifically, children distinguished narrow from broad focus, while adults distinguished narrow from contrastive focus.

The results were considerably weaker in both the children and adult data when the object was focused. In adults' production, the differences between contrastive and broad focus were marginally significant, whereas there was just a non-significant tendency for the same pattern in children. Possibly, the differences in the strength of the effects on subjects and objects arose from the fact that in the broad focus condition the object also received an accent (Gussenhoven, 1983; Selkirk, 1995). Moreover, when the object was focused, differences in the focus types may not only be realised on the object but also on the subject, for instance in terms of prenuclear accents or modifications of the *f*<sub>0</sub> (Baumann et al., 2007; Katz & Selkirk, submitted).

The results for the intonational focus marking in the non-canonical word order showed that children distinguished broad focus from contrastive and narrow focus in terms of duration and  $f_0$ -range. In the subject nouns, children also used different phonetic cues to distinguish broad focus from narrow ( $f_0$ -range) and from contrastive focus (duration), while there was no clear pattern in the object nouns. Given that the results in the non-canonical word order were based on a limited amount of data, further research is needed to clarify whether different phonetic variables were used to distinguish different focus types or whether individual differences (Baumann et al., 2007) can explain these effects.

The present study complements previous findings on the use of accentuation in marking contrastive focus (Hornby & Hass, 1970; MacWhinney & Bates, 1978) and on the use of phonetic means in marking contrast (Wonnacott & Watson, 2008) by showing that 4- to 5-year olds could also use phonetic means to distinguish contrastive focus from broad focus, especially in the subject nouns in both word orders. The present results also showed differences on subjects in the broad and narrow focus condition in the SVO word order. Given that the subject in the broad focus condition can be seen as topic (see Krifka, 2008), these findings disagree with results from Dutch 4- to 5-year olds, who used none of the phonetic means to distinguish narrow focus from topic (Chen, 2009). This difference might result from the fact that Chen (2009) examined the use of the phonetic means in subject nouns produced with the same accent (i.e. H\*L), whereas in the current study, subject nouns potentially produced by different accent types or unaccented were all included in the phonetic analyses. It is thus possible that the phonetic differences found between focus types in children's production here may actually be due to the use of different accent types as well as no accent in the current data.

Comparing the present study to the study by Müller et al. (2006), our results show that focus marking was affected by word order and the locus of focus (subject vs. object), and thus contradict Müller et al. who found no impact of locus of focus or word order. In our study, children used the same phonetic means ( $f_0$  range) to distinguish narrow and broad focus on subjects in both word orders, whereas this was not the case for objects. This discrepancy might arise from the facts that Müller et al. (2006) investigated the difference between focused and non-focused constituents, used a less sensitive phonetic measure (mean  $f_0$ ) and compared different lexical material in the focus and topic conditions nouns.

Taken together, our results for adults are in line with the prediction of the Minimality Condition (Skopeteas & Fanselow, in press), according to which simpler strategies (such as intonation) are preferred over more complex strategies (such as word order variation) to mark focus. The results from children revealed a clearer picture on the use of intonation than the use of word order to mark focus. This may indicate that intonational focus-marking was preferred by children as well, even though children showed some sensitivity to the use of word order in focus marking. Yet we cannot exclude the possibility that the specific task used in this study may be a less sensitive measure to investigate the use of word order in focus marking than investigate the use of intonation. Future work using different methods is needed to verify the limited use of word order found in both children and adults.

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