

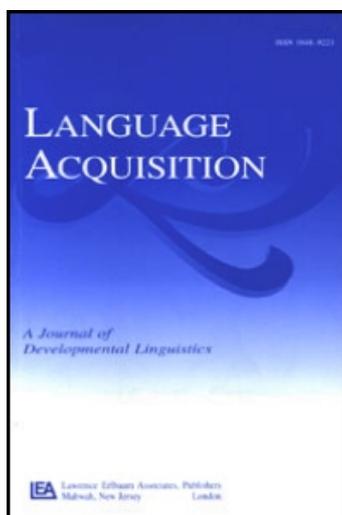
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### Focus Particles in Children's Language: Production and Comprehension of Auch 'Also' in German Learners from 1 Year to 4 Years of Age

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ARTICLE

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Focus Particles in Children's Language:  
Production and Comprehension of *Auch* 'Also'  
in German Learners from 1 Year  
to 4 Years of Age

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This article investigates the acquisition of the focus particle *auch* 'also' by German-learning children. We report data from spontaneous and elicited production of utterances with the focus particle *auch* by 1- to 4-year-olds complementing earlier findings of a delayed production of the unaccented *auch* compared to the accented one. But in contrast to previous studies showing that children have problems interpreting sentences with accented and unaccented *auch*, we found indications for adult-like comprehension in an eye-tracking experiment by children from 3 years on. These results reflect early availability of adult-like linguistic competence with respect to both *auch*-variants which does not always lead to adult-like performance. This variation in children's performance across tasks is considered to be due to additional modality and task specific constraints. Development in this area thus reflects not a change in underlying knowledge, but rather a change in the constraints on its behavioral manifestation.

1. INTRODUCTION

One specific characteristic of focus particles such as *auch* 'also' is that they are associated with a certain constituent which is usually the focus of the sentence. That constituent is also called the *domain of application* (Nederstigt 2003) and must be interpreted in relation to a set of alternatives that is given in the discourse model (Altmann 1976; Jacobs 1983; König 1991; Rooth 1992).<sup>1</sup> This requires not only a linguistic interpretation of the given sentence,

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<sup>1</sup>There are other meaning variants of *auch* that we cannot discuss here (e.g., Dimroth & Klein 1996).

but the additional access to shared information between the speaker and listener, which can be provided by the verbal context, the situational context, or shared world-knowledge. For example, sentence (1) presupposes that another contextually given person in addition to Toby has a pen:

- (1) Auch Toby hat einen Stift.  
 also Toby has a pen  
 'Toby has a pen, too.'

In languages like German, English, or Dutch, the focus particle usually occurs adjacent to the constituent with which it is associated. It may precede or follow this constituent, although different word orders may engender differences in meaning. Furthermore, the identification of the constituent that is to be interpreted in relation to a set of alternatives depends not only on positional but also on prosodic information. Compare sentences (2a) and (2b), which are identical in meaning (the subject of both sentences, *Toby*, is the domain of application of the focus particle *auch* in both cases).<sup>2,3</sup>

- (2) a. Auch [TOBY] hat einen Stift.  
 also TOBY has a pen  
 'Toby ALSO has a pen.'
- b. [Toby] hat AUCH einen Stift.  
 Toby has ALSO a pen  
 'Toby ALSO has a pen.'

Besides the differences in word order, the two sentences are different with respect to their prosodic structure. In (2a) the focus particle precedes its domain of application. In this case the particle itself is unaccented and the element constituting the domain of application carries a pitch accent. In (2b) the focus particle follows its domain of application. In this case the particle itself is accented.

Sentences such as (3a) are ambiguous in written form:

- (3) a. Toby hat auch einen Stift.  
 Toby has also a pen

In the absence of other contextual information only the prosodic realization can disambiguate the sentence. Depending on the accentuation of either the focus particle itself or of the object noun phrase, the sentence can be interpreted in at least two ways (cf. e.g., König 1991; Reis & Rosengren 1997):

- (3) b. [Toby] hat AUCH einen Stift.  
 Toby has ALSO a pen (in addition to someone else having a pen)
- c. Toby hat auch einen [STIFT].  
 Toby has also a PEN (in addition to having something else)

<sup>2</sup>Accented elements are indicated by uppercase letters.

<sup>3</sup>The domain of application is indicated by square brackets.

In (3b) the subject of the sentence, *Toby*, is the domain of application of the focus particle, adding the information to the proposition that the subject *Toby* is an entity that is added to a set of contextually given alternatives. In contrast, in (3c) the object of the sentence, *pen*, is the domain of application of the focus particle, entailing that the object *pen* is only one of several items that Toby possesses. Towards a differentiation of the functions of the accented and the unaccented *auch*, it has been suggested that in the case of the accented *auch* the domain of application of the particle is a contrastive topic, while the domain of application of the unaccented *auch* is the focus of the sentence (Krifka 1999; Dimroth 2004).

Learning to use the focus particle *auch* and to understand sentences containing this focus particle thus requires the establishment and integration of specific knowledge in different domains. First, a specification of its lexical semantics, that is, the additive meaning of the particle, must be learned. Second, its syntactic properties, ensuring its correct distribution, must be acquired. Finally, in order to correctly associate the focus particle with its domain of application, knowledge of the interaction of syntactic and prosodic features (in the case of overt marking of its associate) and of pragmatics (in case the associate is formally unmarked) is required.

The fact that different linguistic domains and interfaces are relevant for the use of focus particles and their correct interpretation during sentence comprehension suggests that this should be an area of relatively late acquisition. But, challenging this assumption, the focus particle *auch* has already been observed in the early multi-word utterances produced by German learners during their second year of life (Nederstigt 2003; Penner, Tracy & Weissenborn 2000). Questioning whether this reflects adult-like competence from the start, the aim of this article is to develop a more detailed picture of the acquisition of the focus particle *auch* by German learners, taking production as well as comprehension skills into account.

## 2. CHILDREN'S PRODUCTION OF *AUCH*

### 2.1. Previous Research

Nederstigt (2001, 2003) examined the use of *auch* by a single German child from age 0;10 to 3;04 by analyzing the utterances from the original recordings of the Caroline Corpus which is available in the CHILDES database (MacWhinney 2000). In the 23,595 child utterances of this corpus, Nederstigt (2003) found 868 utterances containing the particle *auch*. According to these data, the child's first productions of the additive focus particle occurred at the age of 1;06. The particle initially appeared in single-word utterances. From 1;09 years of age on, a considerable increase of the use of *auch*—now also within multi-word utterances—was observed.

In a more detailed analysis of the multi-word utterances of the same corpus, Nederstigt (2003) found that *auch* appeared in both syntactically possible positions, namely, preceding and following its domain of application. In addition, all utterances showed the stress pattern appropriate for the position of the focus particle with respect to its domain of application, that is, the focus particle was accented when it followed its domain of application and not accented when it preceded its domain of application. However, the data provided evidence for the existence of a temporal gap in the acquisition of both *auch*-variants. Whereas the accented variant was first produced around 1;09 years of age, first instances of the unaccented *auch* were observed around 2;01 years of age.

- (4) a. [dis] AUCH 1;09.03  
       'this ALSO'  
       b. auch [MAMI] 2;01.14  
       'also MUMMY' (Nederstigt 2003, 344, 340)

Nederstigt's (2003) analyses suggested that the early utterances of the focus particle *auch* are still restricted to a subset of the possible structures allowed by the target language, and that full competence in this area develops in a gradual fashion. But before taking this as a general developmental trajectory we have to ask whether the pattern observed in Caroline's data can be generalized to other children of the same age. To test this, we analyzed the use of *auch* in the utterances of a group of 18 German-learning children collected within a more comprehensive longitudinal study on the development of markers of information structure.

## 2.2. Spontaneous Production of *Auch*: Data from a Longitudinal Group Study

In this longitudinal study, the spontaneous speech of 18 monolingual German children was recorded every 2 to 4 months when the children were 1;00, 1;04, 1;06, 1;08, 2;00, 2;04, 2;08, and 3;00 years old. The recordings were made in our lab during a period of free parent-child interaction that was part of a longer session, which also included an experimental part. In order to get a more substantial picture of the children's first use of focus particles that was not based only on the restricted corpus of utterances recorded during the lab visit, a specific parents' questionnaire was designed. In this questionnaire, parents were given a list of focus particles and were asked to indicate whether their child already produced these particles. This questionnaire was filled out by the parents in all sessions from 1;04 to 2;04.

According to the data from that questionnaire, one child had already started to use *auch* before the age of 1;04. At 1;06, 22% of the children were reported by their parents to produce *auch*. This number increased to 83% at 1;08 and 88% at 2;00. According to the questionnaire filled out at 2;04, all children produced the particle at this age.

The analyses of the children's spontaneous utterances from the recording sessions support the data from the questionnaires. They revealed that occurrences of *auch* appeared in the recordings of single children from 1;06 on. In the recordings from 1;08 and 2;00, about half of the children showed the usage of *auch* in their spontaneous utterances; at 2;04 and 2;08 utterances of *auch* were observed for about 90% of the children. In the last recordings from 3;00 all children produced the particle. The first uses of *auch* at 1;06 and 1;08 were either single-word utterances of the focus particle or contained the accented version of the particle (e.g., *ich AUCH* 'me too'). The first utterance containing an unaccented *auch* was found in the transcripts from the recordings at 2;00 (e.g., *hier oben ist auch eine PUPPE* 'there is also a DOLL up here').

Separate analyses for the two variants of *auch* revealed that the use of the accented *auch* outperformed the use of the unaccented *auch* by far: between 2;00 and 2;08, 80 to 90% of the *auch* utterances were productions containing the accented version. This difference was also reflected by the number of children using the two variants of the focus particle. The number of children producing the accented *auch* exceeded in all recording sessions the number of children producing an unaccented *auch*. This pattern still appeared in the last recordings at

3;00, in which all children produced accented *auch*, but only nine children were observed producing unaccented *auchs*.

In line with Nesterstigt's (2003) data for a single child, the results of our longitudinal study show that the focus particle *auch* is among the lexical items that German children produce already in the second half of their second year of life. But not all possible variants of this particle seem to be present at the same point in time: the use of an accented *auch* typically following its domain of application appears at a younger age than the use of the unaccented *auch* that typically precedes its domain of application. However, before taking this asynchronous pattern as indicating that German children acquire the linguistic skills underlying the production of the unaccented variant later than those underlying the usage of the accented *auch*, we have to ask whether the spontaneous data present a reliable picture of the children's competence. If a specific construction or a specific type of utterance does not occur in the speech sampled, the cause of the absence may not be an inability to produce them, but might instead be attributed to a lack of appropriate discourse contexts in the sample. Thus, it might be the case that the earlier appearance and the more frequent use of the accented variant of *auch* in our spontaneous data is due to specific communicative and narrative styles in early child-parent interactions. In order to test children's competence to produce the two variants of the focus particle more directly, an elicitation task providing contextual conditions for the production of both variants of *auch* was conducted.

## 2.3. Experiment 1

### 2.3.1. Participants

Thirteen children from our longitudinal study participated in the first experiment. The children were tested the first time at the age of 2;04 (mean age 2;04.14) and a second time at the age of 2;08 (mean age 2;08.15). The group consisted of eight girls and five boys. None of the children were reported by the parents as having a hearing deficit and they were developing normally.

### 2.3.2. Procedure and Materials

The aim of this experiment was to investigate whether we find the same differences in the production of accented and unaccented *auch* as in spontaneous production when we present the children with the situational and contextual conditions requiring the use of either of the two *auch*-variants. In order to elicit the target structure (focus particle + object-NP), a sentence completion task was designed. Keeping in mind the functions of additive particles as signaling the presence of a set of alternatives, we constructed a broader contextual and situational context for the sentences to be completed in order to fulfill the conditions for the felicitous use of the particle. We set up an experiment in which an increasing number of different objects were assigned one after the other to a depicted girl or boy. The child's task was to complete a sentence fragment presented by the experimenter by using the focus particle plus the name of the new object. Depending on the experimental condition, this required either the production of an accented or an unaccented *auch*. In order to create a more natural experimental situation, the two test conditions were presented in blocks: the experiment always started with a number of contexts for the elicitation of the unaccented *auch* followed by a number of contexts for the elicitation of the accented *auch*.

In order to investigate the occurrence of accented and unaccented *auch* in the elicitation task the same experimental procedure was used with both the 2;04- and 2;08-year-olds. To avoid memory effects two different sets of materials were used (see Appendix A and B).

At the beginning of the experiment the experimenter (E) showed a picture of a girl to the child (C) and introduced the picture with the following sentences:

- (5) E: Schau mal, das ist Anna. Anna hat heute alle ihre Spielsachen mitgebracht.  
 Und jetzt möchte Dir Anna alle ihre Spielsachen zeigen.  
 'Look, this is Anna. Today Anna brought all her toys with her.  
 And now Anna wants to show you all her toys.'

For the elicitation, the experimenter placed a set of pictures turned face down on the table in front of the child. Then she turned the first card over and named the depicted object, for instance a ball, twice within two short utterances:

- (6) E: Schau mal, das ist ein Ball. Anna hat einen Ball.  
 'Look, this is a ball. Anna has a ball.'

Then the picture was put next to that of *Anna* (see Figure 1a) and the experimenter took the next card and again named the depicted object as just described, for instance *das ist ein Auto* 'this is a car.' To demonstrate one example of the intended structure to the child, the experimenter presented the whole sentence containing the focus particle (see Figure 1b):

- (7) E: Anna hat nicht nur einen Ball, sondern auch ein Auto.  
 Anna has not only a ball, but also a car  
 'Anna not only has a ball, she also has a car.'

Now the experimenter asked the child to take the next card and to name the object (e.g., *ein Ballon* 'a balloon'). In case the child could not produce the name of the object, the experimenter named it. The picture was then put next to the other pictures (see Figure 1c) and the experimenter presented the beginning of the sentence which mentioned all the objects that had already been assigned to the girl except the new one (see (8)). After the word *sondern* 'but' the experimenter stopped to give the child the opportunity to complete the sentence:

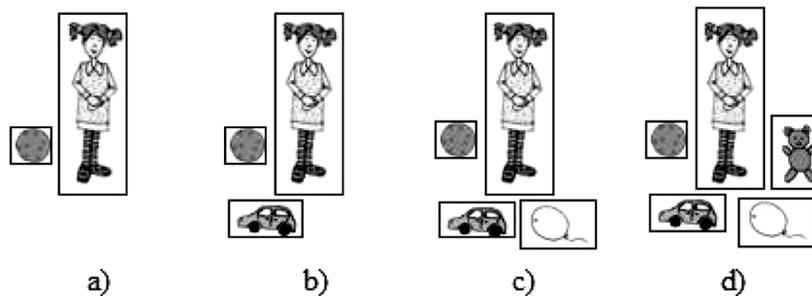


FIGURE 1 Sequence of picture arrangements during the unaccented *auch*-elicitation.

- (8) E: Anna hat nicht nur einen Ball und ein Auto, sondern...  
 Anna has not only a ball and a car, but...  
 'Anna not only has a ball and a car, she has...'

C: Ein Ballon  
 'A balloon'

After the response, the child was asked to take the next card and the next experimental trial started using the same procedure adding one object after the other to the set (see Figure 1d). This procedure was continued until all eight test trials had been completed leading to a situation in which the depicted girl was surrounded by 10 different objects (see Figure 2). Next, the experimenter presented the picture of a boy named *Tom*, and the whole experimental procedure was repeated. All objects, except one used with the boy, were the same as those that had been used with the girl. Thus, each child was presented with 16 test trials for eliciting an unaccented *auch*.

The final situation of the first part of the experiment (see Figure 2) served as the starting point for the second part of the experiment, namely, the elicitation of the accented *auch*. To elicit utterances containing an accented *auch*, the child and the experimenter compared the toys belonging to *Tom* and *Anna*. As in the first part of the study, the experimenter started with an introductory phrase and gave an example of the target structure by producing a whole sentence of the intended form (see Figure 3):

- (9) E: Ich glaube, dass Anna und Tom dieselben Spielsachen haben.  
 Lass uns doch die Sachen vergleichen.  
 Lass mal sehen, Anna hat einen Ball und Tom hat AUCH einen Ball.  
 'I think that Anna and Tom have the same toys.  
 Let us compare the toys.  
 Let's see, Anna has a ball and Tom ALSO has a ball.'

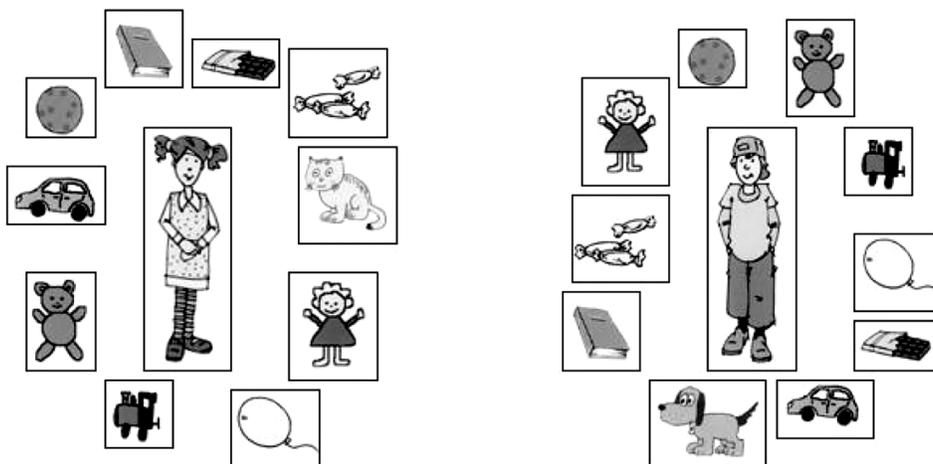


FIGURE 2 Picture arrangement at the end of the unaccented *auch*-elicitation.

After this, the experimenter took both cards depicting the balls and put them away. Then she looked to *Anna's* picture set and chose the next object. The experimenter presented the beginning of the sentence up to the position where the *auch* had to be produced (see (10)). The child was asked to search the corresponding picture in *Tom's* picture set and to complete the sentence:

- (10) E: Anna hat ein Auto und Tom hat. . .  
 Anna has a car and Tom has  
 'Anna has got a car and Tom has. . .'

This procedure continued until all of the cards had been used. Eight contexts were presented for the elicitation of the accented *auch*. The smaller number of items compared to the elicitation of the unaccented *auch* are due to the pairwise use of the objects in the second part of the experiment. Each session was audio- and video-taped and lasted about 15 minutes.

### 2.3.3. Results

All the responses of the children were transcribed and analyzed. The responses were assigned to one of the following four categories:

- FP + Object-NP: the child completed a given sentence by producing the focus particle (FP) in combination with the object-NP with the correct intonation; e.g., *auch einen Ball* 'also a ball'
- Object-NP: the child completed a given sentence by producing only the object-NP e.g., *einen Ball* 'a ball'
- No Response: the child gave no response at all
- Other: the child pointed to a picture or gave a verbal response not related to the task e.g., *ja* 'yes'

As can be seen in Figure 4, in a majority of cases the children aged 2;04 did not produce a verbal response at all. Sentence completions using the intended target structure (FP + Object-NP) were found uniquely in the accented *auch*-condition (23.1%). In contrast, completions of the utterance by producing only the object-NP and leaving out the focus particle occurred significantly more often in the unaccented *auch*-condition than in the accented *auch*-condition (45% vs. 10.8%;  $t_{(df=12)} = 4.22$ ;  $p < .05$ ). Interestingly, we never observed that a child produced an accented *auch* in a context requiring an unaccented *auch*.

In the data of the children aged 2;08, the number of no responses decreased substantially in favor of more completions of the sentence (see Figure 5). This suggests that the task was more adequate for this age but the basic response pattern observed at 2;04 is still present at 2;08. Although the children produced the intended unaccented *auch*-utterances, they produced significantly more target structures in the accented *auch*-condition than in the unaccented *auch*-condition (77.1% vs. 18.9%;  $t_{(df=12)} = 5.26$ ;  $p < .01$ ). In the unaccented *auch*-condition, a single object-NP was given as an answer significantly more often than in the accented *auch*-condition (78.6% vs. 7.6%;  $t_{(df=12)} = 4.16$ ;  $p < .05$ ). In addition to the mentioned response types, we now observed a new response type (only FP), namely, the production of only the



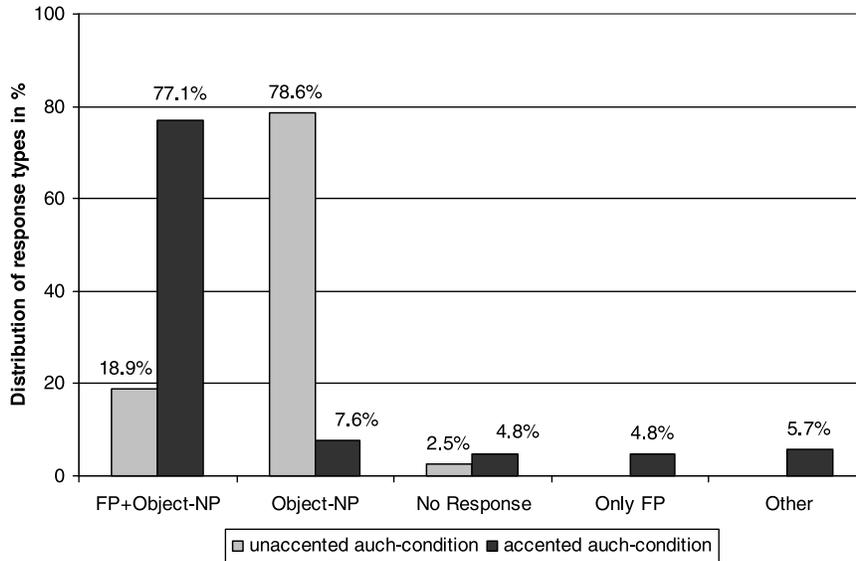


FIGURE 5 Distribution of response types for 2;08-year-old children.

accented *auch* without the accompanying object-NP (4.8%). Again, the children did not produce a single accented *auch* in a context requiring the unaccented variant.

We conducted an ANOVA comparing the production of the target structures for the two age groups. This analysis showed significant main effects for age ( $F_{(1,12)} = 8.12; p < .05$ ) and for type of context ( $F_{(1,12)} = 20.15; p < .01$ ), but no interaction between the two factors ( $F_{(1,12)} = 3.56, p > .05$ ). This suggests that overall the 2;08-year-old children produced the target structures in both experimental conditions more often than the same children at the age of 2;04, and that at both ages the target structure was more often produced when requiring the production of an accented *auch* than in the unaccented *auch*-condition.

Looking at the type of response that was most often used, namely, the production of the object-NP without the particle, we found no effect for age ( $F_{(1,12)} = 2.63; p > 0.05$ ) but a significant main effect for condition ( $F_{(1,12)} = 31.43; p < .01$ ). That is, at both ages the children used the response type *Object-NP* more often in the unaccented *auch*-condition than in the accented *auch*-condition.

To summarize, the experimental results suggest that the temporal delay in the production of utterances containing an unaccented *auch* that was observed in spontaneous speech is not simply due to sampling conditions. Rather, the structures containing the unaccented *auch* seem to be more difficult for the children than that containing an accented *auch*. This developmental pattern will be discussed in the next section.

### 2.3.4. Discussion

Our longitudinal study as well as the data from our elicitation experiment on the one hand basically confirm the findings of Nederstigt (2003), namely, that the systematic use of

unaccented *auch* is delayed by about 6 months as compared to the use of accented *auch*, that is, at 1;06 vs. 2;00. On the other hand, the observation of isolated but appropriate uses of unaccented *auch*, which are almost contemporaneous to the first uses of accented *auch*, that is, at age 1;08, by other researchers (e.g., Penner, Tracy & Weissenborn 2000), as well as the finding that the responses of the children in the unaccented *auch*-condition, except for the omission of the unaccented particle, are information structurally target-like, clearly indicate that the omission of the unaccented particle in the elicitation experiments cannot be attributed to a problem related to the integration of the lexical, prosodic, and syntactic constraints determining the use of the particle. The fact that the children produce the focused NP in this condition suggests that they relate this element to a set of categorically identical alternatives (cf. Rooth 1992). What is missing is only the overt lexical expression of this relation by the unaccented particle *auch*.

The central question then is: What could be the reason for the delayed overt realization of the unaccented particle *auch* in the relevant contexts, that is, as an adjunct to a syntactic constituent XP carrying contrastive focus stress. With respect to the results of our elicitation task one could argue that the sentences providing the context for the unaccented *auch* were harder to process for the children than the sentences providing the context for the accented *auch*. More precisely, in the sentences containing the unaccented *auch* the particle is an element of the complex discontinuous connective *nicht nur ... sondern auch* 'not only ... but also,' in which the presence of the negated focus particle *nur* 'only' in the first element of the connective, that is, *nicht nur*, makes the use of unaccented *auch* after *sondern* in the second element obligatory. A possible explanation for the poorer performance regarding the unaccented *auch* in our task then would be that the children of the tested age are not able to process the complex relations within this complex connective. However, there are two observations that weaken the assumption that the asymmetry between the production of the accented and the unaccented *auch* we found in the elicitation task is only due to this difference in the materials used for elicitation. First, the results clearly mirror the ratios found in spontaneous speech in our own as well as in Nesterstigt's (2003) data. Second, a follow-up study in which less complex sentence fragments were used, which were identical for the elicitation of the accented and unaccented *auch*, replicated the pattern of better performance with the accented than with the unaccented particle (Müller, Höhle, Schmitz & Weissenborn, in press).<sup>4</sup>

A further assumption, namely, that the children have not been able to process unaccented *auch* in this position for perceptual reasons, and consequently, also have not been able either to build up a lexical representation for *auch* or a syntactic cooccurrence frame "(unaccented) *auch* + (focus stressed) XP;" is excluded by the following kind of evidence. Recent findings show that infants as young as 7 months of age are able to detect unstressed closed-class elements in continuous speech (Höhle & Weissenborn 2003), that soon after they have built up stable lexical representations for them, and that subsequently they use them for recognizing and acquiring the morpho-syntactic regularities of the target language (Höhle, Weissenborn, Kiefer, Schulz & Schmitz 2004; Pelzer & Höhle 2006; Kedar, Casasola & Lust 2006; Shi, Werker

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<sup>4</sup>One of the reviewers pointed out that the results of the elicitation study might also be due to the children's inability to reproduce the target pattern as presented by the experimenter during the introductory phase of the experiment. In fact, this might have had an impact on the results, but still the question remains why it is harder for the children to reproduce the pattern with the unaccented compared to the accented *auch*.

& Cutler 2006; Soderstrom, White, Conwell & Morgan 2007; Zangl & Fernald 2007). Even though the processing of the focus particle *auch* has not directly been tested in one of these studies, a transfer of these findings to this specific word form seems plausible. Evidence that children at the beginning of their third year of life must have acquired the meaning of closed-class functional elements, still before reliably producing them, is provided by work of, for instance, Gerken & McIntosh (1993), who show that children perform better in sentence-picture identification tasks when the test sentences contain the correct closed-class items than when they do not. This provides evidence that children typically have acquired lexical and syntactic knowledge about closed-class elements long before they appear in their own utterances. Gerken (1991, 1994) interprets this dissociation between children's comprehension and production skills within a prosodic framework by proposing that English-learning children's production is initially constrained by a trochaic template according to which children only produce unstressed elements when they are part of a trochaic foot. This account may also hold for German, as it is a trochaic language as well. As the accented *auch* forms a foot of its own, the production of this variant would not be affected by this constraint. But according to this hypothesis children would not be expected to produce the unaccented *auch* when it cannot be metrically attached to a preceding strong element. We will come back to this issue in our general discussion at the end of the article. First, we have to ask whether a corresponding dissociation between productive and receptive skills with better performance in the receptive modality holds for the additive focus particle *auch* as well. This will be the topic of our next section.

### 3. CHILDREN'S COMPREHENSION OF *AUCH*

#### 3.1. Previous Research

Previous studies on comprehension found that children up to school age still have difficulties in accessing the target-like interpretation of sentences that contain focus particles (for *only*: Szendrői 2004; Gennari, Gualmini, Crain, Meroni & Maciukaite 2001; Gualmini, Maciukaite & Crain 2003; Crain, Ni & Conway 1994; Paterson, Liversedge, Rowland & Filik 2003; for *alleen* (Dutch) 'only': Drozd 2007; Bergsma 2002; for *mo* (Japanese) 'also': Matsuoka 2004; for *ook* (Dutch) 'also': Bergsma 2006; for *auch* (German) 'also': Hüttner, Drenhaus, van de Vijver & Weissenborn 2004). In the current section, we will describe some of these studies in more detail. With respect to the German particle *auch*, work by Hüttner et al. (2004) with 3- to 7-year-olds and adults is most relevant. They conducted a study using a picture selection task in which three pictures per trial were presented simultaneously to the participant, while a sentence with either accented *auch* (as in (11a)), with unaccented *auch* (as in (11b)), or a control sentence lacking the focus particle (as in (11c)) was presented.

- (11) a. Max will AUCH Boot fahren.  
       'Max TOO wants to drive a boat.'  
       b. Max will auch BOOT fahren.  
       'Max too wants to drive a BOAT.'  
       c. Max fährt Boot.  
       'Max drives a boat.'

(Hüttner et al. 2004, 3)

Each of the three different pictures presented were appropriately described by only one of the three sentences. The target picture for sentence (11a) displayed one boy, standing in the front and another boy sitting in a boat in the back of the picture. The content of sentence (11b) was visually illustrated by the display of a boy sitting in a car in the front of the picture, while an unmanned boat was placed in the back. The target picture for sentence (11c) only showed a boy sitting in a boat. Participants had to pick the picture that fitted the presented sentence.

Their results indicate that the correct interpretation of sentences with the focus particle *auch* is acquired relatively late since even in the oldest group of 5- to 7-year-old children, the performance was far from adult-like. Furthermore, a detailed error analysis of the data suggested that German children tend to interpret sentences with unaccented post-verbal *auch* as if the particle were accented. The authors suggested that the accented *auch* reading is the default interpretation of the focus particle.

Bergsma's (2006) results concerning the Dutch focus particle *ook* 'also' (which operates exactly like the German *auch*) might strengthen this conclusion. She tested 4- to 7-year-olds' interpretation of Dutch sentences with the additive particle *ook* in accented and unaccented versions:

- (12) a. Ook [de jongen] aait de hond.  
       'The boy too is petting the dog.'  
       b. De jongen aait ook [de hond].  
       'The boy is also petting the dog.'  
       c. [De jongen] aait OOK de hond.  
       'The boy too is petting the dog.'
- (Bergsma 2006, 338)

The children were asked to choose the corresponding picture out of three options: One picture showed a boy and a girl petting the same dog (= target picture for (12a) and for (12c)); the second one showed a boy petting a cat and a dog (= target picture for (12b)); and a third picture showed a boy petting a dog (= distractor to test if children adhere to the presuppositional contribution of *ook*). The results indicated that the children performed best when presented with *ook*-initial sentences (12a). When presented with sentences that contained *ook* in post-verbal position as in (12b) and (12c), children randomly selected either a picture that corresponded to a subject interpretation or a picture that corresponded to an object interpretation. Among other possible explanations, Bergsma (2006) assumed that children ignore the stress on the focus particle.

Furthermore, like Hüttner et al. (2004) for German, Bergsma (2006) found that about half of the 4-year-olds ignored the additional information that the focus particle contributes to the sentence meaning. This is comparable to what Paterson et al. (2003) discovered about English children's interpretation of sentences containing the focus particle *only*. They suggest that children tend to interpret sentences with focus particles in the same way as the corresponding sentences without focus particles, and suggest by way of explanation that they may not yet be able to establish alternative sets in the discourse model.

These results suggest that children's problems with focus particles are not restricted to the production domain but that production as well as comprehension skills are developing relatively

late. The fact that children have been shown to prefer a default interpretation corresponding to the meaning of sentences with accented *auch* fits with the findings in the production studies according to which the production of sentences with accented *auch* precedes the production of utterances with unaccented *auch*. Before concluding that the acquisition of focus particles is a late phenomenon in production as well as in comprehension, some methodological considerations seem warranted.

All previous studies used isolated sentences without further verbal context in which the use of a focus particle was not always reasonable. Furthermore, so far the only tasks that have been used are those that demand decisions be made by the child, either in picture selection tasks or in felicity judgment tasks, which may involve extra-linguistic cognitive skills. It is thus appropriate to wonder to what extent the children's attested behavior is influenced by different factors that might mask their linguistic competence. That is, solving a sentence picture selection task depends heavily on the child's abilities in parallel storage, comparison, and making conscious decisions about the presented pictures. In turn, making judgments about the felicity of a sentence demands sophisticated metalinguistic skills. In addition, both kinds of tasks require an explicit awareness about the (non-)felicity of a visual and a linguistic representation. These cognitive skills might not be fully developed in children of the tested age and might influence to some degree their performance. Therefore, we were interested in testing children's processing of sentences containing the focus particle *auch* with a technique that does not require an explicit decision based on a comparison between a linguistic representation and the representation of a depicted scene. Furthermore, we wanted to use a technique that provides information about the processing of these sentences rather than simply uncovering the result of the child's interpretation process that—as suggested—might be influenced by different kinds of linguistic and nonlinguistic factors.

The visual world eye-tracking paradigm (Cooper 1974; Tanenhaus, Spivey-Knowlton, Eberhard & Sedivy 1995) fulfills the standards just mentioned since it allows us to collect data from unconscious gaze movements on a picture, while the child is listening to a sentence that describes aspects of the scene. Due to the excellent time resolution of this technique, children's eye gaze behavior can be linked closely to the appearance of single elements in the sentence, which provides deeper insight into the issue of whether children process the information given by the focus particle at all and whether they process sentences with accented *auch* differently from sentences with unaccented *auch*.

## 3.2. Experiment 2

### 3.2.1. Participants

Sixty-three children between 2;11 and 4;11 years of age (mean age 3;10) participated in the experiment. Four additional ones were excluded, because they were talking during trials ( $n = 2$ ), because of wrong monitor resolution ( $n = 1$ ), or because of tracking delays ( $n = 1$ ). All children were monolingual native speakers of German without language deficits and were not born prematurely. They were divided into two groups: an experimental group and a control group. The experimental group consisted of 21 boys and 11 girls (mean age 3;11) and the control group consisted of 18 boys and 13 girls (mean age 3;10).



FIGURE 6 Example of a visual scene.

### 3.2.2. Material

As visual stimuli, two persons (a boy and a girl) were displayed on a monitor (see Figure 6). One child had one object (e.g., a doll), the other child had two objects, one of them being identical to the other child's object (e.g., a doll and a duck). The person possessing two items (here: *Toby*) served as subject in all sentences. The subject's referent (boy/girl) was counterbalanced throughout the stimulus sentences.

The verbal stimuli for the experimental group (see Appendix C) consisted of eight test sentences with accented *auch*, as exemplified in (13a). The object noun phrase of these sentences always referred to the item that occurred twice in the picture (here: the doll). In addition to the eight accented *auch*-sentences, eight test sentences with unaccented *auch* as in (13b) were presented to the experimental group, in which the object noun phrase always referred to the item in the picture that occurred only once (here: the duck). This systematic correspondence between the choice of accent pattern and single vs. double occurrence of the referred object could not be avoided in the design of the experiment. In order to control for this potential confound, a control group was included. Control stimuli that were designed for this group (see Appendix C) consisted of 16 test sentences without *auch* as in (14a) and (14b) that otherwise were lexically identical to the experimental stimuli.<sup>5</sup> This allowed us to determine the effect of double versus single occurrence of the referred objects in the scene.

Sentence types presented to the experimental group:

- (13) a. accented *auch*-condition  
 Schau mal, Toby hat AUCH eine Puppe.  
 look, Toby has ALSO a doll
- b. unaccented *auch*-condition  
 Schau mal, Toby hat auch eine ENTE.  
 look, Toby has also a DUCK

<sup>5</sup>The onset of the determiner of the object noun phrase was held constant at 2000 ms after the beginning of the visual presentation in all four kinds of sentence conditions.

Sentence type presented to the control group:

- (14) a. no accented *auch*-condition (double occurrence of object-NP)  
 Schau mal, Toby hat eine Puppe.  
 look, Toby has a doll
- b. no unaccented *auch*-condition (single occurrence of object-NP)  
 Schau mal, Toby hat eine Ente.  
 look, Toby has a duck

### 3.2.3. Procedure

We used a table-mounted Tobii 1750 (Tobii Technology AB, Karlsrovägen 2D, S-182 53 Danderyd, Sweden) eye-tracking system which tracks at 50Hz in a double computer solution. Stimuli were presented in avi-format with the Clearview 2.5.1 (Tobii Technology AB) software package, which was used for data collection as well.

Participants were placed in a leaned back chair in front of the monitor. Through the chair's particular position we were able to reduce back and forth movements of children's heads as well as down-drift effects resulting from children's relaxing over time. Before starting the experiment, we performed a two-point calibration with children's eyes.

Prior to the presentation of the trials, the children were introduced to the two main characters of the plot by being presented to a picture of the two in combination with the spoken text in (15). The last sentence of the text was the only task-instruction that the children received:

- (15) Schau mal, hier sind zwei Kinder:  
 Das Mädchen heißt Anna und der Junge heißt Toby.  
 Anna und Toby haben ganz viele Sachen.  
 Mal sehen, was Anna und Toby so alles haben.  
 'Look, here are two children:  
 The girl is called Anna and the boy is called Toby.  
 Anna and Toby have a lot of things.  
 Let's see what they have.'

Sixteen test trials and two practice trials were presented to each group. Each trial consisted of the presentation of a new visual scene for 6 seconds in combination with an auditorily presented sentence. The onset of the determiner of the object NP was held constant at 2000 ms after the beginning of the visual presentation in all four kinds of sentence conditions. Prerecorded verbal stimuli were spoken by a female person in a child-directed manner. Between trials, three different animated cartoon figures were presented at the center of the monitor for recapturing or increasing children's attention. These presentations gave way to the next trial as soon as the child focused on the monitor. The entire experiment took about 4 minutes.

### 3.2.4. Predictions

With respect to the previously mentioned examples (3b) and (3c), we hypothesized that the processing of the different kinds of information structure in sentences with accented and unaccented focus particle *auch* should result in different fixation preferences with respect to the objects in a presented visual scene. More precisely, we assumed that participants are likely to fixate to some degree on the alternative of the constituent to which the focus particle applies.

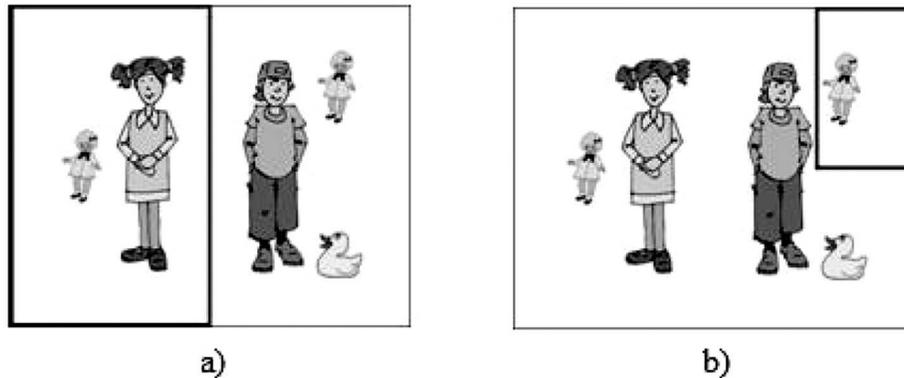


FIGURE 7 Spatial areas representing: a) subject alternative, and b) object alternative (framed in black).

Using Figure 7a as an example, we would expect that listening to a sentence in which the particle is accented (13a) should result in a higher probability to fixate the person that was not mentioned in the sentence (i.e., the girl) and her belongings than in the case of listening to a sentence that contains an unaccented focus particle. This is motivated by the fact that this other person possessing the same item (namely, a doll) is in the alternative set to the subject *Toby* of the stimulus sentence, to which the accented post-verbal particle *auch* applies.

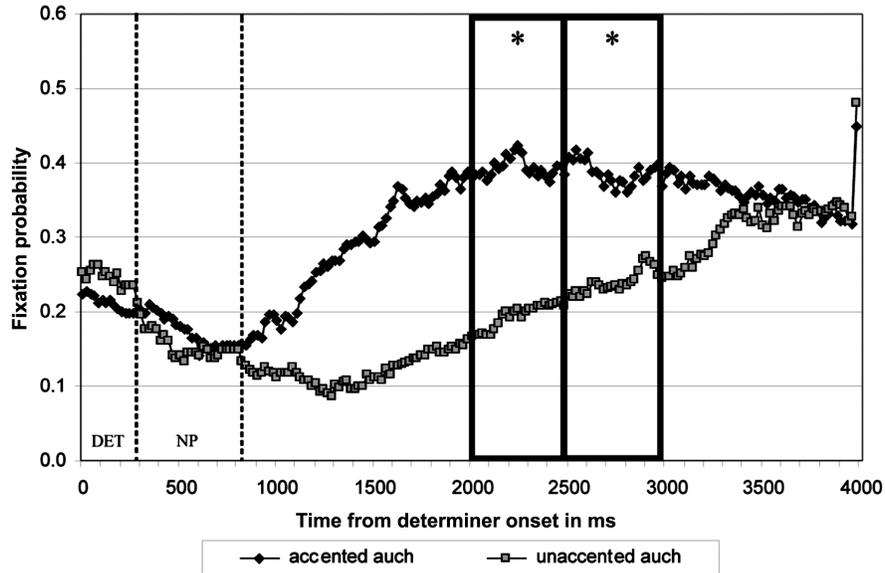
Correspondingly, we hypothesized that a sentence in which the post-verbal particle is unaccented (13b) should result in a higher fixation probability for the other item that Toby possesses (i.e., the duck). This assumption is based on the fact that this other possession is an alternative to the object of the stimulus sentence (namely, the duck), to which the unaccented post-verbal particle *auch* applies (see Figure 7b).

### 3.2.5. Results

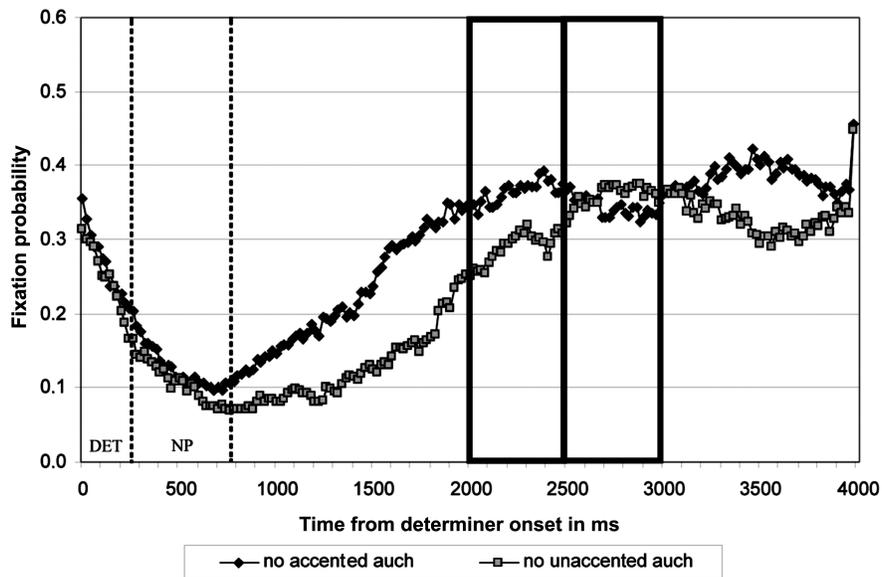
Figure 8 shows the observed averaged fixations of the subject alternative set for each of the four conditions, namely, accented *auch* and unaccented *auch* in Figure 8a, and as a control, no accented *auch* and no unaccented *auch* in Figure 8b.

The graphs cover a time-window of 4000 ms starting from the onset of the determiner of the object NP in the stimulus sentence at 2000 ms after the beginning of each trial, which coincides with the offset of the focus particle *auch* in sentences that contain it. The time window closes down at the end of each trial at 6000 ms. Since gaze information from the left eye is obtained every 20 ms, the graphs entail 200 successive datapoints that represent the mean proportion of fixations in the specific target region (= alternative set) across subjects. Upon first sight, it can be observed that the graphs for accented *auch* and unaccented *auch* in Figure 8a are drifting apart from each other over time much more than the graphs for the control conditions in Figure 8b.

In order to analyze the data statistically, we broke down the time-window into eight segments, each with a duration of 500 ms. This type of data analysis is a common way to deal with gaze data (e.g., Arnold, Novick, Brown-Schmidt, Eisenband & Trueswell 2001). Within each



a)



b)

FIGURE 8 Fixation probability for the subject alternative: a) experimental group, b) control group.

segment, the average of the 25 successive datapoints per participant served as input data for the repeated-measurement ANOVA. An interaction between segments, accent pattern, and group of children proved to be significant ( $F_{(7,427)} = 2.979$ ;  $p < .01$ ). Significant interactions between accent pattern and group of children appeared in the time spans between 2000–2500 ms and 2500–3000 ms ( $F_{(1,61)} = 4.456$ ;  $p < .05$  and  $F_{(1,61)} = 8.015$ ;  $p < .01$ , respectively).

Furthermore, in the experimental group we found a higher probability of fixations for the subject alternative while listening to a sentence with accented *auch* compared to a sentence with unaccented *auch* in the time spans between 2000–2500 ms and 2500–3000 ms after the determiner onset ( $t_{(df=31)} = 5.397$ ;  $p < .01$  and  $t_{(df=31)} = 4.076$ ;  $p < .01$ , respectively). For the control group we didn't see any significant differences between the probabilities of fixations within the time spans that had shown a significant interaction.

We further hypothesized that a sentence with unaccented *auch* should cause a higher probability of fixations on the alternative object that is possessed by the child mentioned in the sentence (i.e., on the object alternative set). The performance of the control group should not show any significant effects.

Figure 9 shows the corresponding results for each of the two groups of children separately. An interaction between segments, accent pattern, and group of children was proven to be significant ( $F_{(7,427)} = 2.186$ ;  $p < .05$ ). Within the segments, we found a significant interaction between accent pattern and group of children in the time spans between 2000–2500 ms, and 3500–4000 ms after the onset of the determiner ( $F_{(1,61)} = 5.553$ ;  $p < .05$  and  $F_{(1,61)} = 4.347$ ;  $p < .05$ , respectively), with a marginal significance between 2500–3000 ms after the determiner onset ( $F_{(1,61)} = 3.649$ ;  $p = .06$ ).

Furthermore, the experimental group showed a significantly higher probability of fixations for the alternative object while listening to sentences with unaccented *auch* as compared to sentences with accented *auch* in the time spans between 2000–2500 ms and 2500–3000 ms after the onset of the determiner ( $t_{(df=31)} = 3.480$ ;  $p < .01$  and  $t_{(df=31)} = 2.378$ ;  $p < .05$ , respectively).

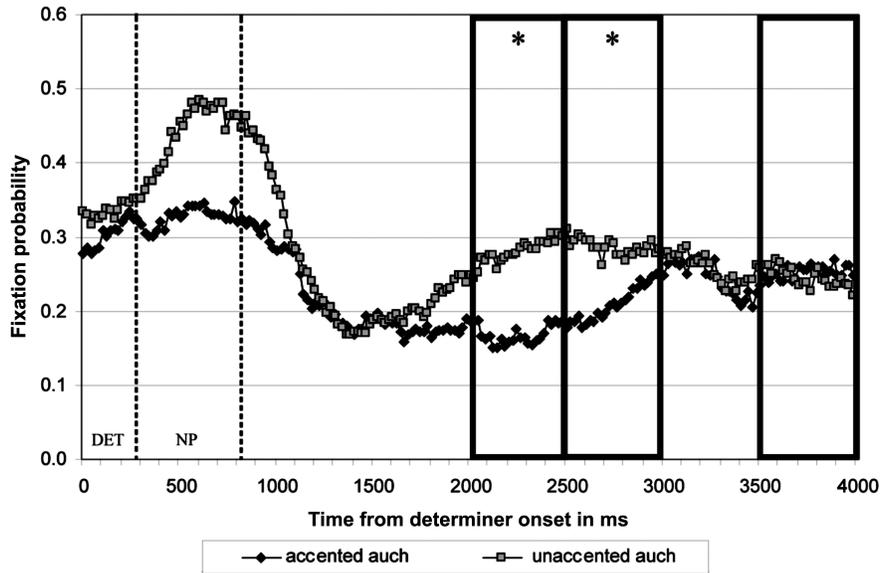
In the control group, there was a significant difference between the two conditions ( $t_{(df=30)} = 2.576$ ;  $p < .05$ ) with a higher probability of fixations to the alternative object at a late time-window between 3500–4000 ms after the onset of the determiner when children were presented with control trials for the unaccented *auch* type than with control trials for the accented *auch* type.<sup>6</sup>

### 3.2.6. Discussion

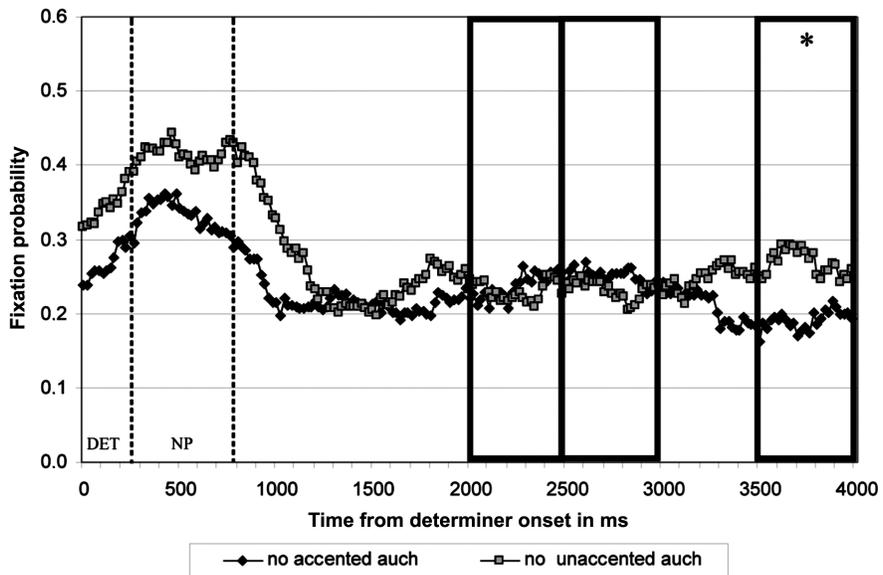
In sum, the main results of our study show that there is a higher probability of fixations for the subject alternative set when children listen to sentences with accented *auch* than when listening to sentences with unaccented *auch* in the time span between 2000 to 3000 ms after the onset of the determiner of the object NP. This difference did not show up in the control group when listening to the same sentences without the focus particles. This suggests that the effects we found in the experimental group in this particular time window cannot be reduced

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<sup>6</sup>One of the reviewers proposed an additional statistical analysis comparing the fixations to the object and the subject alternative sets when one sentence was presented. The design of our experiment does not allow for such an analysis as the areas of interest corresponding to the subject and the object alternative sets on the visual display are very different in size (see Figure 7).



a)



b)

FIGURE 9 Fixation probability for the object alternative: a) experimental group, b) control group.

to an influence of the double or single occurrence of the object mentioned in the sentence, but are related to differences in the information structure of the stimulus sentences.

Correspondingly, within the same time span, we found a higher probability of fixations for the object alternative set when children listened to sentences with unaccented *auch* than when listening to accented *auch* in the same time span. Again, this effect did not show up in the control group. Combined with the pattern of results concerning the subject alternative set, the data suggest that this time span is crucial to effects that might be due to semantic and pragmatic differences between the stimulus sentences with accented or unaccented *auch* on one side and between sentences with and without the additive particle on the other side.

In addition we found differences between the experimental and control group in a later time window of 3500 to 4000 ms with a significantly higher probability of fixations to the object alternative set when listening to the control sentences of the unaccented *auch*-condition. This late effect for the control group provides further evidence that sentences with and without focus particles lead to different fixation behavior with respect to a visual representation. The late fixations of the object alternative by the control group can be explained within Rooth's (1992) account of alternative semantics. A central claim of this proposal is that focus in general indicates the presence of alternatives that are relevant for the interpretation of a linguistic expression. In the sentences presented to the control group in this condition the object clearly represents the focus of the utterance as the subject and the verb remain constant across the sentences. This fits with our finding that the control sentences—like their counterparts with the unaccented focus particle—evoke a higher fixation probability for the alternative set but in a later time window. The fact that the crucial time window is earlier for the experimental group suggests that the additive focus particle—as an explicit marker indicating that an alternative set has to be taken into account—initiates the search for this set in the referential context provided by the visual presentation early during sentence processing. In contrast, in the case of sentences without the focus particle, this search for alternatives in the referential contexts is only initiated later on. But obviously, this process is not independent of characteristics of the referential context, as we do not see the same effect in the control group for the sentences with accented *auch*.

Thus, our data indicate that fixation patterns reflect aspects of the information structure of input sentences that contain or do not contain the additive focus particle *auch*. More precisely, we were able to show that differences in the information structure of sentences can lead to differences in gaze fixation on depicted items which are not explicitly mentioned in a stimulus sentence, but which are essential for the sentence's felicity. This is an important new finding, as previous eye-tracking studies with children in the visual world paradigm focused solely on measuring the fixations on objects that were explicitly mentioned in a stimulus sentence (Trueswell, Sekerina, Hill & Logrip 1999; Arnold et al. 2001; Snedeker, Thorpe & Trueswell 2001). Hence, eye-tracking is an alternative to previously used methods to test children's comprehension of sentences containing the focus particle *auch*, that is, whether they are able to construct the alternative sets required by accented and unaccented *auch*, respectively.

The differences we found in the fixation behavior of the experimental and control groups are neither in line with Paterson et al.'s (2003) and Bergsma's (2006) proposal that focus particles are ignored by children up to school age, nor do they show any evidence for the assumption of a default interpretation, as claimed by Hüttner et al. (2004) and Gualmini et al. (2003). Consequently, these previous assumptions may have to be modified in the case

of the German additive particle *auch*. Therefore, Hüttner et al.'s (2004) assumption about children's interpretation of the unaccented German focus particle *auch* as if it were stressed is not supported by our results. Rather, our data suggest that children are able to use prosodic information from at least 3 years of age onwards to identify the correct domain of application of the focus particle in its accented and unaccented versions, and to put it into relation with its corresponding alternative set.

While our data are not in line with the general conclusions about children's competence that previous studies have drawn, the differences between the results of our study and the results of previous studies do not necessarily exclude each other: Even though the results of our eye-tracking experiment indicate that 3- to 4-year-olds react differently to sentences containing accented and unaccented *auch*, one cannot predict from that what particular kind of interpretation these children would assign to these sentences in tasks that demand conscious decisions from them. That is, even if the gaze of the children suggests that they already process the two types of sentences in different manners indicating a target-like comprehension, it might still be the case that they assign "wrong" interpretations to the sentences, for instance, because they tend to favor certain interpretations in decision or judgment tasks.

A similar dissociative pattern between performances in different kinds of tasks has been reported in various other areas which are considered to be a domain of relatively late development, including pronoun interpretation (Sekerina, Stromswold & Hestvik 2004) and theory of mind. For the latter, classical off-line tasks, such as the Sally-Ann Task (a.k.a. Maxi Task) (Wimmer & Perner 1983), suggest that children up to 4 years of age have problems understanding that other people might have representations that are different from their own. However, tasks that take gaze as a dependent variable provide evidence that infants as young as 15 months possess some sort of theory of mind (Clements & Perner 1994; Onishi & Baillargeon 2005).

Thus, the discrepancy between our findings using the eye-tracking method and previous findings with other experimental tasks is consistent with parallel findings in other areas of research emphasizing that the performance of a child in a given task varies, depending on the specific task demands and the amount and kind of information that is available to the listener to support the correct interpretation of an utterance (Hurewitz, Brown-Schmidt, Thorpe, Gleitman & Trueswell 2000; Meroni & Crain 2003; Trueswell & Gleitman 2004). So far, we can only speculate about the specific reasons why our study revealed a higher degree of children's competence to interpret sentences with the focus particle *auch* than the studies by Hüttner et al. (2004) and Bergsma (2006). To mention only some possibilities, differences in the materials used for the studies (one vs. multiple pictures), in the task demands (looking while listening without any instruction vs. picture selection), or the kinds of dependent variables that might reflect effects of different stages of sentence processing (on-line vs. off-line measurement) may be relevant here. Further research is clearly necessary to understand the exact mechanisms invoked in the tasks that are typically used to study children's sentence comprehension, and to quantify their impact on the performance of participants.

#### 4. GENERAL DISCUSSION

In line with previous findings, our studies concerning German children's production of the focus particle *auch* show that this focus particle is among the lexical elements that children frequently

produce already in their early multi-word utterances but that the systematic overt realization of unaccented *auch* is delayed by at least 6 months as compared to the realization of accented *auch*. In contrast to former studies using off-line methods, the results of our comprehension experiment using the eye-tracking paradigm suggest that children from 3 years on respond differently to sentences with unaccented or accented *auch* with these differences showing a systematic correlation to the correct interpretation of the sentences. We claim that this pattern of findings can be interpreted as evidence that the accented, as well as the unaccented variant of the focus particle *auch*, are both processed in either modality and that the children have already built up adult-like meaning representations for both variants of the focus particle—although in both modalities these abilities do not always translate into adult-like overt behavior. Thus, the question that remains to be answered is how the observed differences between the children's supposed almost adult-like linguistic knowledge and their nonadult-like behavior in the production and off-line comprehension of the particle might be explained. In the following we will first present our proposal for an explanation of these differences. We will conclude by making some suggestions as to how the children's further development from nonadult- to adult-like overt behavior may be conceived.

How might we explain the fact that, even under the condition of the elicited production task, the unaccented particle is not produced despite the fact that the context explicitly provides the child with the elements of the two sets which the focus particle puts into an additive relation, but that instead the children only produce the focused NP always correctly contrastively stressed? As already mentioned in the discussion of the results of the first experiment, one possible explanation for the omission of the unaccented *auch* would be a prosodic constraint on children's productions as proposed by Gerken (1991, 1994). Under this constraint, unstressed lexical elements should only be produced when they form a trochaic foot together with a preceding stressed syllable or by themselves. As the accented *auch* forms a foot on its own, the production of this variant of *auch* would not be affected by this constraint, whereas the observed omission of the unaccented *auch* may be explained by it as the elicitation context after which the child was expected to produce the particle consisted of the unstressed final syllable of the adversative connective *són-dern* 'but' with which the unaccented *auch* could not have formed a trochaic foot.

But some further observations from our data contradict this explanation. If children strictly followed this metrical constraint, we would not expect the children to produce NPs with an initial monosyllabic unstressed determiner. But cases like these appear in our data. Leaving out the unaccented focus particle *auch* children often started their completion by the production of the unstressed determiner *ein* (e.g., E: *Anna hat nicht nur einen Ball, sondern...* 'Anna has not only a ball, but...'; C: *ein Auto* 'a car'). Given that the proposed metrical constraint should hold across the board for the production of any unstressed lexical element, this finding thus rules out the proposed constraint as a possible general explanation for the omission of unaccented *auch* in the present elicitation experiment.

We would like to propose an alternative account that relates the omission of the unaccented *auch* to a general property of children's early language production, namely, that topic elements, that is, elements which from the child's point of view are considered to constitute shared knowledge with the hearer, tend to be dropped when their contribution to the meaning of the utterance can be recovered through discourse licensing (Hyams 1992). A characteristic case of topic-drop is given by missing subjects in nonpro-drop languages like German, which

are much more frequently omitted by children than by adults (e.g., Weissenborn 1992). The general prediction would be that what is minimally realized in the children's early multi-word utterances are the elements constituting new, that is, focused, information.

In the following argumentation we will draw, among others, on the information structural analysis of the difference between accented and unaccented *auch* as proposed for instance by Dimroth and Klein (1996), Reis and Rosengren (1997), Krifka (1999), Féry (2006), and Sudhoff (in press). In the case of accented *auch*, the particle establishes the identity of the predication over at least two contextually given variables. Thus the sentence *Tom hat AUCH einen Ball* can be paraphrased as 'X has a ball, as does Y,' where the new information is the assertion of the identity of the predications effected by the particle that receives the focal stress. Consequently, the particle is the element that minimally has to be realized, whereas depending on the (preceding) linguistic and/or nonlinguistic context, all the other elements can be omitted as indicated by parentheses in (16):

- (16) A: Anna hat einen Ball. Und (was hat) Tom?  
 'Anna has a ball. And (what does) Tom (have)?'  
 B: (Tom hat) AUCH (einen Ball).  
 (Tom hat) AUCH einen Ball.  
 (Tom) hat AUCH einen Ball.  
 Tom (hat) AUCH (einen Ball).  
 Tom has ALSO a ball

An utterance with unaccented *auch*, like *Tom hat auch einen BALL* can be paraphrased in the following way: "Tom hat X und dazu (hat er) Y" 'Tom has X and in addition to this (he has) Y.' In these cases *auch* behaves like an anaphor *dazu*, relating Y, which is new information and, consequently, receives nuclear stress, to a contextually given set of Xs which Tom possesses. This set constitutes old, that is, topic, information a property that is then necessarily shared by the anaphoric operator *auch*.

Independent evidence for our analysis of unaccented *auch* as a topic element is provided by the observation that unaccented *auch* (as in (17a)) but not accented *auch* (as in (17b)) can occur in preverbal position in German matrix clauses, a position that is generally analyzed as hosting, by default, topical elements:<sup>7</sup>

- (17) a) Auch hat Tom ein AUTO. / Auch ein AUTO hat Tom.  
 also has Tom a CAR / also a CAR has Tom  
 b) \*AUCH hat Tom ein Auto. / \*Tom AUCH hat ein Auto.  
 \*also has Tom a car / \*Tom ALSO has a car.

Thus, in the case of unaccented *auch*, we would predict that in children's language the particle could be omitted—similar to the topical elements in the utterances with accented *auch*—given that its meaning can be recovered on the basis of the preceding discourse. The prediction that there should be no utterances consisting only of an unaccented *auch* because

<sup>7</sup>We leave aside the possibility of a secondary accent on preverbal *auch* (cf., Reis & Rosengren 1997), although we would argue that this possibility may be expected under our analysis of unaccented *auch* as an anaphor which, given its topical nature, should then become contrastive: *AUCH hat Tom ein AUTO*.

every utterance in context should contain a focus element would also follow from the topic character of unaccented *auch*.

A further prediction is that we should find contrastively focus-stressed XPs in spontaneous child speech at the same time as accented *auch* starts to occur, as in:

- (18) Adult: Tom hat ein Auto.  
           ‘Tom has a car.’  
       Child: ... und ein MOTORRAD.  
           ‘... and a MOTORCYCLE.’

The utterance of the child in the discourse above may be considered as containing an implicit unaccented *auch* which has been left out given its anaphoric topic properties. This is one of the investigations that will have to be carried out in the future in order to test our hypothesis of the optionality of unaccented *auch*, which we claim follows from its anaphoric topic properties.

Our explanation within the broader account of topic-drop, which is specific for the productive modality, is in line with the results of our eye-tracking experiment that provided clear evidence for the conclusion that children between their second and third year of life have already acquired sufficient knowledge about the focus particle to correctly differentiate between its accented and unaccented variant. The question that needs to be answered—as in the case of the delayed production of the unaccented focus particle *auch*—is why this knowledge did not lead to a correct adult-like interpretation of sentences with unaccented *auch* in off-line sentence picture-matching experiments (Hüttner et al. 2004).

Before we deal in more detail with this question, we would like to explicitly point out the difference in the nature of the relation between the reactions of the children in the comprehension tasks and, the one between the supposed adult-like knowledge of the meaning of accented and unaccented *auch*, and the way they are effectively used in the language production of these children. In the case of off-line comprehension tasks, the relation is one between correct and incorrect performance, that is, unaccented *auch* is interpreted like accented *auch*—an error of commission. In the case of the nonrealization of unaccented *auch* in production by children who possess in principle the necessary linguistic knowledge for its overt realization, the relation between the tacit knowledge of the child and its behavior is one of omission, leading to utterances whose structure is prosodically and morpho-syntactically identical to the intended one minus the presence of the unaccented particle *auch*. An incorrect use, similar to the one in comprehension, should have resulted in utterances like *AUCH einen Ball* in the context of

- (19) Adult: Tom hat ein Auto.  
           ‘Tom has a car’  
       Child: ... und AUCH einen Ball.  
           ‘... and ALSO a ball’

with the intended meaning of *auch einen BALL*. But this kind of error is never observed.

We want to point out that the asymmetry we see between the children’s early production of focus particles and their restricted competence to interpret sentences containing these same particles as found in off-line studies (Bergsma 2006; Hüttner et al. 2004) can be interpreted as a consequence of the same mechanisms that cause asymmetries in the competence to solve

different experimental tasks within a single modality. According to the model proposed by Trueswell & Gleitman (2004), children's successful comprehension and production of a given structure is a function of the reliability and availability of lexical and grammatical information as well as features of the discourse and the referential context. This model suggests that children's performance should be best when the constraints posed by all these different evidential sources converge to a single representation which underlies either the semantic interpretation or the production of a sentence. Performance should be less optimal when some source of evidence is either missing or contradicts others, which might especially be true for sentences that are ambiguous within at least one of these domains. This assumption naturally predicts the variability of children's receptive and productive skills for the same kind of linguistic structure across different kinds of tasks or communicative situations. Hurewitz et al. (2000) provide evidence for this kind of cross-modal asymmetry. They found that children are able to produce modifier constructions (*put the frog on the napkin into the box*) in a discourse context that supports the use of this construction, while the same children do not assign a modifier reading to a locally ambiguous construction when tested on their comprehension. Intra-modal effects point in the same direction. Trueswell & Gleitman (2004) report that children are more likely to assign a correct modifier interpretation to the first PP in the above example, when a discourse context is provided that supports the modifier interpretation. Similar observations have also been made within the productive modality. Crain & Fodor (1993) showed that children's ability to produce by-passives increases when provided with appropriate discourse conditions.

We would like to suggest that our preceding argument may be extended to the explanation of other asymmetries between productive and receptive linguistic skills, with error-free production preceding nonadult-like comprehension of the corresponding structures, as tested with off-line tasks, like the asymmetry in performance for the production and comprehension of sentences with pronouns (De Villiers, Cahillane & Altreuter 2006; Hendriks & Spender 2005–2006), for the production and comprehension of contrastive stress including sentences with the restrictive focus particle *only* (Cutler & Swinney 1987; Hornby & Hass 1970; Gualmini et al. 2003) and for sentences involving local syntactic ambiguities (Trueswell & Gleitman 2004). A task for further research is to conceive of and carry out online comprehension tasks involving implicit linguistic knowledge for these areas of language development in order to verify the assumption that tapping this type of knowledge would reveal adult-like performance similar to that observed in production.

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#### APPENDIX A: MATERIALS USED IN EXPERIMENT 1 WITH 2;04-YEAR-OLD CHILDREN

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Main characters used in the sentence completion task:  
Schaf 'sheep' ; Schwein 'pig'

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List of objects used in the elicitation task:

Brot	'bread'	Gras	'grass'
Bananen	'bananas'	Blätter	'leaves'
Kartoffeln	'potatoes'	Möhren	'carrots'
Äpfel	'apples'	Birnen	'pears'

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#### APPENDIX B: MATERIALS USED IN EXPERIMENT 1 WITH 2;08-YEAR-OLD CHILDREN

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Main characters used in the sentence completion task:  
The girl Anna and the boy Tom

---

List of objects used in the elicitation task:

Auto	'car'	Ball	'ball'
Luftballon	'balloon'	Teddybär	'teddy bear'
Puppe	'doll'	Schokolade	'chocolate'
Lokomotive	'locomotive'	Hund	'dog'
Buch	'book'	Katze	'cat'
Bonbons	'candy'		

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APPENDIX C: SENTENCES USED IN EXPERIMENT 2

Sentences presented to the experimental group in practice trials:		Second kind of object in the corresponding visual scene:
Schau mal, Toby hat AUCH ein Herz.		Buch
'Look, Toby has ALSO a heart.'		'book'
Schau mal, Toby hat auch eine WURST.		Uhr
'Look, Toby has also a SAUSAGE.'		'clock'
Sentences presented to the experimental group in test trials:		
1)	Schau mal, Anna hat auch einen EIMER.	Löffel
	'Look, Anna has also a BUCKET.'	'spoon'
2)	Schau mal, Anna hat AUCH einen Ballon.	Schnuller
	'Look, Anna has ALSO a balloon.'	'pacifier'
3)	Schau mal, Toby hat AUCH einen Bus.	Topf
	'Look, Toby has ALSO a bus.'	'pot'
4)	Schau mal, Anna hat auch ein HAUS.	Brot
	'Look, Anna has also a HOUSE.'	'bread'
5)	Schau mal, Anna hat AUCH ein Auto.	Sofa
	'Look, Anna has ALSO a car.'	'sofa'
6)	Schau mal, Toby hat AUCH ein Glas.	Bett
	'Look, Toby has ALSO a glass.'	'bed'
7)	Schau mal, Toby hat auch einen STIFT.	Kamm
	'Look, Toby has also a PEN.'	'comb'
8)	chau mal, Toby hat auch eine BLUME.	Flasche
	'Look, Toby has also a FLOWER.'	'feeding bottle'
9)	Schau mal, Toby hat AUCH einen Schlüssel.	Kuchen
	'Look, Toby has ALSO a key.'	'cake'
10)	Schau mal, Anna hat auch einen TISCH.	Keks
	'Look, Anna has also a TABLE.'	'cookie'
11)	Schau mal, Toby hat auch einen STUHL.	Ball
	'Look, Toby has also a CHAIR.'	'ball'
12)	Schau mal, Toby hat AUCH eine Puppe.	Ente
	'Look, Toby has ALSO a doll.'	'duck'
13)	Schau mal, Anna hat auch ein EI.	Boot
	'Look, Anna has also an EGG.'	'boat'
14)	Schau mal, Anna hat AUCH ein Eis.	Blatt
	'Look, Anna has ALSO ice cream.'	'leaf'
15)	Schau mal, Toby hat auch einen APFEL .	Teddy
	'Look, Toby has also an APPLE.'	'teddy bear'
16)	Schau mal, Anna hat AUCH eine Schaukel.	Tasse
	'Look, Anna has ALSO a swing.'	'cup'

(continued)

APPENDIX C (*Continued*)

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Sentences presented to the control group  
in practice trials:  
Schau mal, Toby hat ein Herz.  
'Look, Toby has a heart.'  
Schau mal, Toby hat eine Wurst.  
'Look, Toby has a sausage.'

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- Sentences presented to the control group  
in test trials:
- 1) Schau mal, Anna hat einen Eimer.  
'Look, Anna has a bucket.'
  - 2) Schau mal, Anna hat einen Ballon.  
'Look, Anna has a balloon.'
  - 3) Schau mal, Toby hat einen Bus.  
'Look, Toby has a bus.'
  - 4) Schau mal, Anna hat ein Haus.  
'Look, Anna has a house.'
  - 5) Schau mal, Anna hat ein Auto.  
'Look, Anna has a car.'
  - 6) Schau mal, Toby hat ein Glas.  
'Look, Toby has a glass.'
  - 7) Schau mal, Toby hat einen Stift.  
'Look, Toby has a pen.'
  - 8) Schau mal, Toby hat eine Blume.  
'Look, Toby has a flower.'
  - 9) Schau mal, Toby hat einen Schlüssel.  
'Look, Toby has a key.'
  - 10) Schau mal, Anna hat einen Tisch.  
'Look, Anna has a table.'
  - 11) Schau mal, Toby hat einen Stuhl.  
'Look, Toby has a chair.'
  - 12) Schau mal, Toby hat eine Puppe.  
'Look, Toby has a doll.'
  - 13) Schau mal, Anna hat ein Ei.  
'Look, Anna has an egg.'
  - 14) Schau mal, Anna hat ein Eis.  
'Look, Anna has ice cream.'
  - 15) Schau mal, Toby hat einen Apfel.  
'Look, Toby has an apple.'
  - 16) Schau mal, Anna hat eine Schaukel.  
'Look, Anna has a swing.'
-