

Information Structure

Theoretical and Empirical Aspects

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Anita Steube



Walter de Gruyter · Berlin · New York

Britta Stolterfoht (Leipzig) and Markus Bader (Konstanz)

Focus Structure and the Processing of Word Order Variations in German*

1 Introduction

In contrast to English, German has a relatively free word order. The arguments of the verb can appear at different structural positions in a sentence. In our paper, we will focus on one specific type of word order variation, namely *scrambling*. One example is the scrambling of the object in front of the subject as illustrated in (1):

- (1) (a) subject before object (SO)

Maria hat behauptet, dass **der** Onkel **den** Neffen begrüßt hat.

Mary has claimed that the uncle_{nom} the nephew_{acc} welcomed has

- (b) object before subject (OS)

Maria hat behauptet, dass **den** Onkel **der** Neffe begrüßt hat.

Mary has claimed that the uncle_{acc} the nephew_{nom} welcomed has

'Mary claimed that the nephew welcomed the uncle.'

In (1a) the canonical word order, subject before object (SO), can be seen. (1b) shows the non-canonical, scrambled word order, object before subject (OS). In these examples, the syntactic functions are explicitly signalled by the case marking at the determiners, *der* versus *den*. But this is only the case for masculine singular determiner phrases (DPs). Feminine or neuter DPs can be globally or locally ambiguous, as can be seen in examples (2) and (3).

- (2) SO and OS (globally ambiguous)

Maria hat behauptet, dass die Tante die Nichte begrüßt hat.

Mary has claimed that the aunt_{nom/acc} the niece_{nom/acc} welcomed has

'Mary claimed that the aunt welcomed the niece.'

'Mary claimed that the niece welcomed the aunt.'

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(3) (a) SO (locally ambiguous)

Maria hat behauptet, dass die Tante die Nichten begrüßt hat.

Mary has claimed that the aunt_{nom/sg} the nieces_{acc/pl} welcomed has_{sg}

'Mary claimed that the aunt welcomed the nieces.'

(b) OS (locally ambiguous)

Maria hat behauptet, dass die Tante die Nichten begrüßt haben.

Mary has claimed that the aunt_{nom/sg} the nieces_{acc/pl} welcomed have_{pl}

'Mary claimed that the nieces welcomed the aunt.'

In (2), there is no explicit case marking at the determiners. Both singular DPs can be either nominative or accusative; this results in a globally ambiguous sentence.

In the examples in (3), the DPs are also case ambiguous, but the first DP is marked for singular, the second for plural. The sentences are not ambiguous as a whole, but locally ambiguous. If we take the perspective of a person who reads the sentence in (3b) successively word by word, the sentence is ambiguous with respect to word order until the number information of the finite verb (the auxiliaries *hat* vs. *haben*) has been read. Prior research has established that processing difficulties arise at the auxiliary. Readers have a strong preference for the SO word order (e.g., Bader & Meng, 1999; Hemforth, 1993; Schriefers, Friederici & Kühn, 1995, among many others). What is the reason for this processing preference? In the following, it will be shown that different types of linguistic representations are responsible for this phenomenon. Not only syntactic, but also focus structural and prosodic information play a crucial role in the processing of scrambled word order.

Section 2 introduces the theoretical background for syntactic, focus structural and prosodic characteristics of scrambling. Section 3 briefly reviews the large number of studies that report evidence for the SO-preference in German. In addition, the few studies, including our own, that investigated focus structural aspects of scrambling in processing will be reported. In section 4, characteristics of focus particles will be discussed and used to formulate hypotheses for an experiment which is also described in this section. The last section will provide a summary of the results and some conclusions.

2 Syntactic, focus structural and prosodic characteristics of scrambling

Scrambling can be syntactically described as the optional change of the base order of phrases within the middlefield, the domain between the complementizer and the verbal head (e.g., Haider & Rosengren, 1998, among many others). If we look at the syntactic representations of the sentences in (3), the difference between the canonical and the scrambled word order in embedded

clauses can be described as follows¹: In (4b), the scrambled object is moved in front of the subject and leaves a trace in its base position. (4a) illustrates the base generated order without an empty category².

- (4) (a) [_{CP} Maria hat behauptet, [_{CP} dass [_{VP} die Tante [_V die Nichten [_V begrüßt hat]]]...
Mary has claimed that the aunt the nieces welcomed has
- (b) [_{CP} Maria hat behauptet, [_{CP} dass [_{VP} die Tante_i [_{VP} die Nichten [_V t_i [_V begrüßt haben]]]]...
Mary has claimed that the aunt the nieces welcomed have

The focus structural and prosodic representations of the two different word orders can be directly derived from the syntactic structure. It is assumed that the whole utterance can only be focused (maximal or *wide focus*) if the constituent carrying the nuclear accent (*focus exponent*) is in its base position and in the sister position of the verbal head (e.g., Haider & Rosengren 2002). According to the *Null Theory of Phrase Stress* (Cinque, 1993), a phrase's main stress is assigned to its most deeply embedded constituent. If there is no other focus structural information given (e.g., context), the focus projects. This stress pattern is associated with a wide focus reading. At least, the whole complement clause is in focus like in (5a).

- (5) (a) Maria hat behauptet, dass [die Tante die NICHTen begrüßt hat]_F.
 (b) Maria hat behauptet, dass [die TANTE]_F die Nichten begrüßt hat.
Mary has claimed that the aunt the nieces welcomed has
- (c) Maria hat behauptet, dass die Tante_i [die NICHTen]_F t_i begrüßt haben.
Mary has claimed that the aunt the nieces welcomed have

If the phrasal stress falls on a constituent higher in the structure, the focus does not project (Haider 1993, 2000). The sentence receives a narrow focus reading like in (5b). In (5c), which also has a narrow focus reading, the focus exponent is not the argument closest to the verb³. The most deeply embedded constituent has moved in front of the subject and has left behind a trace in its base position. Therefore, the stressed constituent takes a higher position in the structure.

¹ The examples are the same as the sentences in (3), where the reader is referred to for translations.

² Following Haider (1993), we adopt a movement account of scrambling. Furthermore, we assume that scrambling is an instantiation of adjunction and results in an A-chain. Note that these assumptions are not crucial for the development of our empirical hypotheses (for a base generation account of word order variation, cf. Fanselow, 2001).

³ Sentences containing a narrow focus are contextually more constrained than sentences with a wide focus reading (see e.g. Höhle, 1982). (5b) is only possible with a specific context like the focus question *Wer hat die Nichten begrüßt?* ('Who welcomed the nieces?'). (5c) is a suitable answer to the question *Wer hat die Tante begrüßt?* ('Who welcomed the aunt?') (see also footnote 5).

It c-commands the trace in the base position of the scrambled object. Accordingly, the focus does not project.⁴

But there are also cases of scrambled constituents that bear the nuclear accent. In (6), the focus also does not project.

- (6) (a) Wen haben die Nichten begrüßt? 'Who was welcomed by the nieces?'
 (b) Maria hat behauptet, dass [die TANte_i]_F die Nichten t_i begrüßt haben.
Mary has claimed that the aunt the nieces welcomed have

As far as example (6b) is grammatical, it contradicts the commonly held opinion that a focused object cannot precede the subject (see e.g., Abraham, 1992; Lenerz 1977). In accordance with Neeleman (1994), we assume that focus scrambling is possible and that (6b) is a grammatical sentence and an appropriate answer to the question (6a). Experimental support for this assumption comes from an ERP study by Bornkessel et al. (2003).

What this example shows, is the fact that the focus structure of a sentence cannot be fully determined by its syntactic structure⁵. Another example, which is not predicted by focus projection based on syntactic structure only, is illustrated in (7):

- (7) (a) Maria hat behauptet, dass sie [die Nichten begrüßt hat]_F.
Mary has claimed that she the nieces welcomed has
 (b) Maria hat behauptet, dass sie_i [die Nichten t_i begrüßt haben]_F.
Mary has claimed that she the nieces welcomed have

(7a) and (7b) do not differ in terms of focus structure. Both sentences have a wide focus reading. The pronoun itself belongs to background information. It co-refers with the first DP of the sentence (*Maria*). In this case, the focus structural representation cannot be derived from the syntactic structure in the way just described. According to the *Null Theory of Phrase Stress*, the focus should not project. The theory wrongly predicts narrow focus on the constituent c-commanded by the dislocated pronoun.

In sum, we have seen that scrambled word order compared to canonical word order does not exhibit syntactic differences alone. The movement of a constituent goes along with a change of focus structure. We assume that focus structure is not constituted by syntactic structure alone. Contextual factors as

⁴ This seems to be evidence for a movement account in contrast to a base generation account. The trace in the base position accounts for the fact that the nuclear accent in (5c) gives rise to a narrow focus (see Haider, 2000).

⁵ We ignore the huge literature on the interaction of context with the syntax and focus of a sentence. We hope that this is justified by the fact that our experimental work investigated processing on sentence level only. We have nothing to say about processing of sentences in context (but see Weskott, 2004).

in (6) and the type of the moved constituent as in (7) also play a crucial role in determining the focus structure of a sentence. Additionally, we expect that the interaction of the described factors (and perhaps other types of linguistic information) leads to a focus structural representation of its own right.

What does that mean for the online process of sentence comprehension? How does the human sentence processor deal with scrambled structures? The following section introduces some assumptions on the processing of word order variations and presents psycholinguistic evidence.

3 The processing of word order variations

3.1 Syntactic processes

It is a commonly accepted assumption that the human parser is working *incrementally*. Incremental processing is best described by a constraint suggested by Frazier & Rayner (1987, 263):

(8) *Left-to-Right Constraint*

Each item is incorporated into a constituent structure representation of a sentence (essentially) as the item is encountered.

If the parser is integrating incoming constituents immediately, how does it deal with local ambiguities? One prominent view in parsing research, starting with Frazier & Fodor (1978), is the assumption that the parser assigns something like a *default* analysis to the ambiguous material. For ambiguous scrambled sentences, the default syntactic analysis could be specified as follows

(9) (a) [_{CP} Maria hat behauptet, [_{CP} dass [_{VP} die Tante [_{V'} die Nichten [_{V'} begrüßt ...
Mary has claimed that the aunt the nieces welcomed

(a') [_{CP} Maria hat behauptet, [_{CP} dass [_{VP} die Tante_i [_{VP} die Nichten [_{V'} t_i [_{V'} begrüßt haben]]...
Mary has claimed that the aunt the nieces welcomed have

The parser analyses the sentence fragment (9a) as a subject-before-object structure. When it arrives at the auxiliary, a reanalysis takes place. To arrive at the right interpretation of the sentence in (9a'), a scrambling chain has to be established. As it were, there is evidence that this could be the correct description of how the parser deals with ambiguities in scrambled orders. Several studies indicate that the parser prefers the subject before object reading in ambiguous regions and has severe problems with scrambled sentences like (9a'). This subject-first preference seems to be a very robust effect and was shown with different methods (self-paced reading: Bader, 1996; grammaticality judgements: Bader & Meng, 1999; eye movements: Hemforth, 1993;

Scheepers, 1996; and event-related potentials (ERPs): Bornkessel et al., 2002; Friederici, 1998; Friederici et al., 2001; Rösler et al., 1998; Schlesewsky et al., 2003).

To explain this parsing preference, different principles were formulated which can be combined in terms of *minimal structure building*⁶. The preferred syntactic representation determines the occurrence of reanalysis processes at the point of disambiguation. Most explanations of the subject-first preference consider only phrase structural differences between the canonical word order and the scrambled order. In the next section, an experiment will be introduced that investigated the influence of focus structural differences in word order variations and describes the starting point for the two experiments that will be discussed in more detail in the following sections.

3.2 Focus structural processes

Bader & Meng (1999) looked into the processing of scrambled sentences in comparison to sentences with moved pronouns.

- (10)(a) Die Direktorin hat erzählt, dass die neue Lehrerin einige der Kollegen angerufen hat.
The director has said that the new teacher_{fem} some of the colleagues phoned has
 'The director said that the new teacher phoned some of the colleagues.'
- (b) Die Direktorin hat erzählt, dass die neue Lehrerin_i einige der Kollegen t_i angerufen haben.
The director has said that the new teacher_{fem} some of the colleagues phoned have
 'The director said that some of the colleagues phoned the new teacher.'
- (11)(a) Die Direktorin hat erzählt, dass sie einige der Kollegen angerufen hat.
The director has said, that she some of the colleagues phoned has
 'The director said that she phoned some of the colleagues.'
- (b) Die Direktorin hat erzählt, dass sie_i einige der Kollegen t_i angerufen haben.
The director has said, that she some of the colleagues phoned have
 'The director said that some of the colleagues phoned her.'

In a reading experiment with a speeded grammaticality judgement task, the authors found a significant difference in the error rates between OS-sentences with referential DPs (10b) and sentences with pronouns (11b)⁷.

⁶ Starting from the *Active Filler Hypothesis* (Frazier, 1987, Clifton & Frazier, 1989), De Vincenzi (1991) formulated a parsing principle that applies also to subject-object ambiguities in German embedded clauses: *Minimal Chain Principle* – 'Avoid postulating unnecessary chain members at Surface-Structure, but do not delay required chain members.'

⁷ Further evidence for DP type effects in the processing of word order variations comes from studies by Kaan (1998, 2001) who investigated ambiguous relative clauses in Dutch.

The authors interpret this difference as the result of an additional focus structural revision for the sentences with referential DPs. They assume that the sentence processor not only assigns a default syntactic structure to the incoming material, but, additionally, assigns a default focus structural representation which should be the widest focus possible.

- (12)(a) ..., dass [die neue Lehrerin einige der Kollegen angerufen ...]_F.
 ..., that the new teacher_{em} some of the colleagues phoned ...
- (b) ..., dass die neue Lehrerin [einige der Kollegen]_F t_i angerufen haben.
 ..., that the new teacher_{em} some of the colleagues phoned have

- (13)(a) ..., dass sie [einige der Kollegen angerufen ...]_F.
 ..., that she some of the colleagues phoned ...
- (b) ..., dass sie [einige der Kollegen; t_i angerufen haben]_F.
 ..., that she some of the colleagues phoned have

In (12b), the default wide focus reading has to be changed into a narrow focus when the human sentence processor arrives at the point of disambiguation. This is not necessary for sentences with pronouns like (13b). The default wide focus assignment is compatible with the OS structure.

To get further evidence for this focus structural explanation, it may be assumed that the measurement of event-related brain potentials (ERPs) is a useful method. ERPs are measures of electrical activity in the brain obtained using electrodes placed on the scalp. ERPs are a continuous on-line measurement with high temporal resolution. In addition, ERPs are multidimensional. It is possible to differentiate ERP patterns along the following parameters: polarity (negative vs. positive), topography (electrode site at which an effect appears) and latency (time at which an effect is visible).

Figure 1 shows an idealized waveform. You can see different negative and positive language related ERP components which appear at different time points. Note that negativity is plotted upwards and positivity is plotted downwards. The N400 correlates with different types of semantic processing (for a neurophysiologically based model of language comprehension, see Friederici, 2002). But let us concentrate on the positivity around 600 ms (P600). This component has been correlated with syntactic reanalysis during the processing of garden-path sentences (Hagoort et al., 1993; Osterhout & Holcomb, 1992). A P600 has also been observed in German scrambled sentences (Friederici, 1998; Friederici et al., 2001). Under the assumptions that (a) the focus structure of a sentence has a representation of its own and (b) the processing cost connected to scrambled sentences is the result of two different processes, namely syntactic reanalysis and focus structural revision, different ERP effects should be observed: beside the ERP correlate of syntactic processing (P600), there should be another, qualitatively different ERP effect.

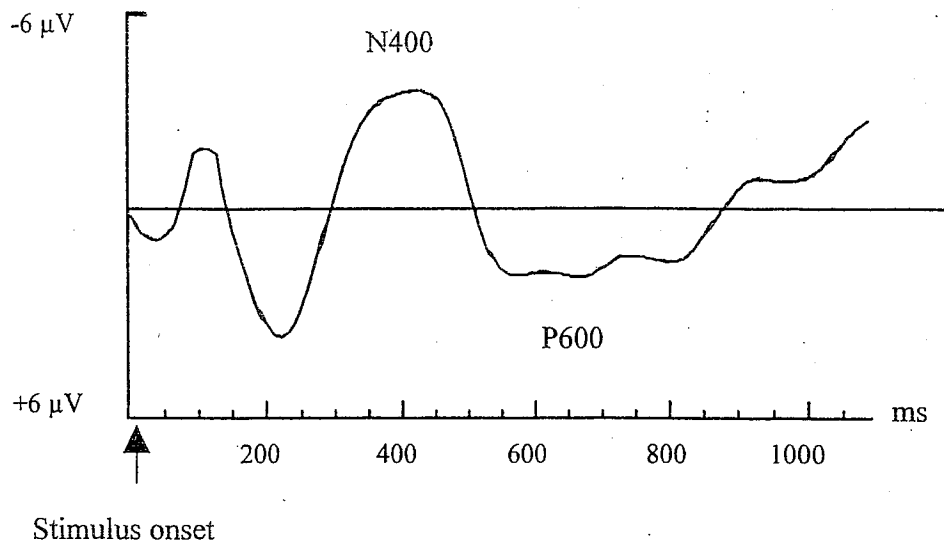


Figure 1: ERP correlates of language comprehension.

3.3 Experiment 1

We investigated ambiguous sentences with scrambled referential DPs and moved pronouns in comparison to their canonical counterparts in a reading study (see Table 1).

referential DP, subject before object (SO)

Maria hat behauptet, dass die Tante die Nichten begrüßt hat als die Schule zuende war.

Mary has claimed, that the aunt the nieces welcomed has when the school over was

referential DP, object before subject (OS)

Maria hat behauptet, dass die Tante die Nichten begrüßt haben als die Schule zuende war.

Mary has claimed, that the aunt the nieces welcomed have when the school over was

pronoun, subject before object (SO)

Maria hat behauptet, dass sie die Nichten begrüßt hat als die Schule zuende war.

Mary has claimed, that she the nieces welcomed has when the school over was

pronoun, object before subject (OS)

Maria hat behauptet, dass sie die Nichten begrüßt haben als die Schule zuende war.

Mary has claimed, that she the nieces welcomed have when the school over was

Table 1: Example of different versions of one experimental sentence

To avoid wrap-up effects in the ERP, the sentences continued after the auxiliary with a local or temporal modifier.

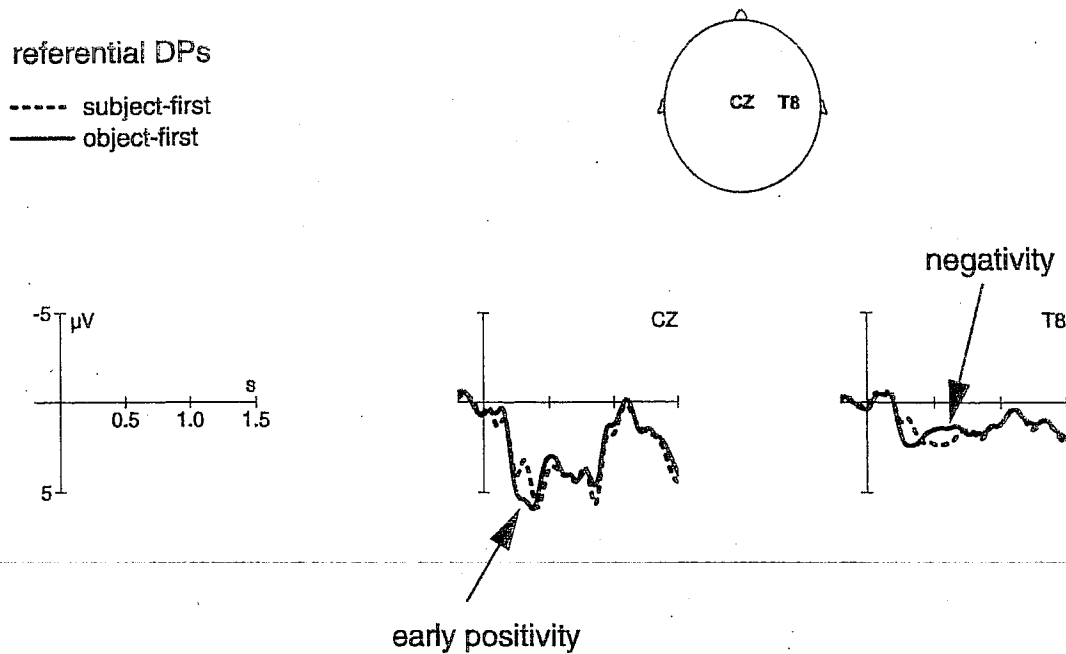


Figure 2: Referential DPs: grand averages for sentences with subject-first vs. object-first word order, time-locked to the disambiguating auxiliary (*hat* vs. *haben*, 1500 ms post onset).

We found two different ERP effects for the OS-sentences with referential DPs: an early positivity around 300 ms and a negativity around 550 ms (see Figure 2). For the sentences with moved pronouns, two positive effects were found: An early positivity around 300 ms like for the scrambled sentences and a late positivity around 700 ms (see Figure 3).

The early positivity, found for both DP types, was interpreted as an instantiation of a P600 and, therefore, as a correlate of syntactic reanalysis of the preferred SO-structure⁸. The late positivity, which was only observed for the sentences with moved pronouns, could not explicitly be correlated with a specific process so far. This effect will be evaluated and discussed in the context of Experiment 2 in section 4.

⁸ For an explanation of the particular latency of the positivity, see Stolterfoht et al., 2003b).

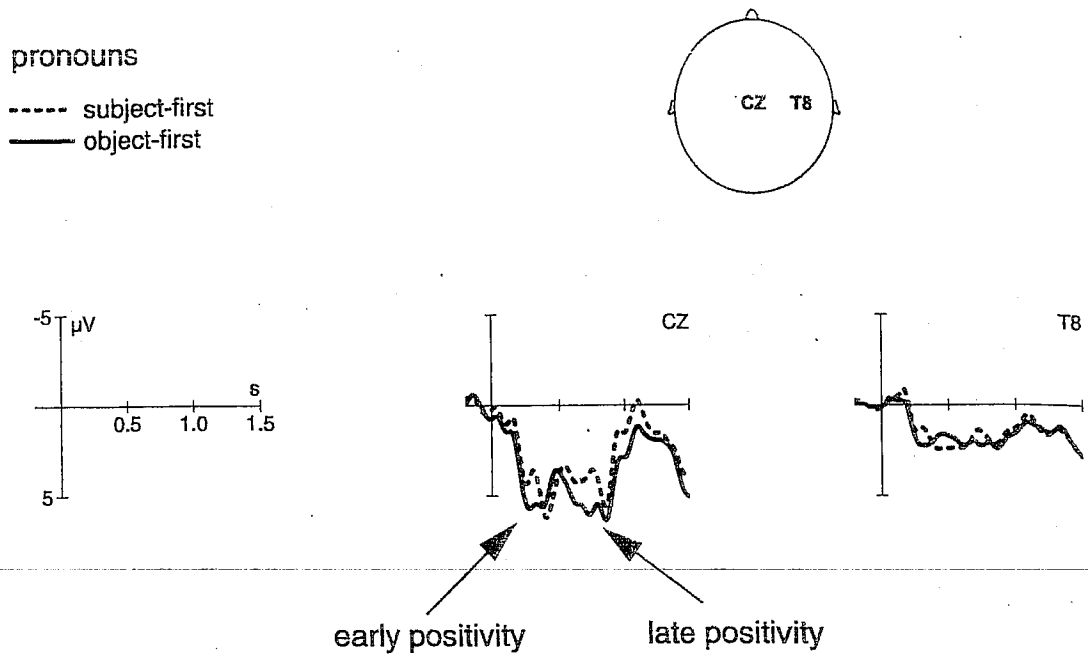


Figure 3: Pronouns: grand averages for sentences with subject-first vs. object-first word order, time-locked to the disambiguating auxiliary (*hat* vs. *haben*, 1500 ms post onset).

The negativity, clearly dissociated by latency and polarity from the positive effects, was only found for scrambled sentences (and not for sentences with pronoun movement), that is, for sentences for which a focus structural revision has to be done. Therefore, this could be the correlate of focus structural processing. The default wide focus reading in (14) has to be changed into a narrow focus in (15a).

default focus structure

- (14) Maria hat behauptet, dass [die Tante_i; die NICHTen_t; begrüßt ...]_F.

focus structural revision

- (15)(a) Maria hat behauptet, dass die Tante_i [die NICHTen]_F t_i begrüßt haben.
 Mary has claimed that the aunt the nieces welcomed have

focus structural and prosodic revision

- (b) Maria hat behauptet, dass [die TANte_i]_F die Nichten_t begrüßt haben.
 Mary has claimed that the aunt the nieces welcomed have

In section 2, we argued that (15b) is also a possible focus structural representation of a scrambled sentence. If we compare (14) and (15b), not only a focus structural revision has to take place, but also a prosodic change has to be done: The sentence accent on *die Nichten* has to be shifted to the scrambled object *die Tante*. As a result, the negativity that was found in Experiment 1 could also be the correlate of focus structural **and** prosodic revision. Evidence for the latter interpretation comes from a study in which we could differentiate between focus structural and prosodic revision processes by using bare argument ellipses. We found a negativity with similar temporal and topographical characteristics for sentences that required a focus structural as well as a prosodic revision (Stolterfoht et al., 2003a).

To find further evidence for an ERP correlate of focus structural and prosodic processing, we did an ERP study which will be described in section 4⁹. In this study, effects of focus structure were investigated by the use of focus particles. The following section also will discuss some characteristics of these elements in connection to word order variations.

4 Focus particles and scrambling

4.1 Some characteristics of focus particles

Focus particles like *nur* ('only'), *auch* ('also') and *sogar* ('even') interact with the focus structure of a sentence. (14) shows one type of focus structural pattern for sentences with focus particles.

- (14)(a) Ich glaube, dass Hans nur [ANna]_F besucht hat.
 (b) Ich glaube, dass Hans auch [ANna]_F besucht hat.
I believe that Hans only/also Anna visited has.
 'I believe that Hans visited only/also Anna.'

Here, the constituent to the right of the particle bears the nuclear stress of the sentence which is associated with narrow focus. This seems to be a typical pattern for sentences with focus particles (FPs). It can be described by two constraints formulated by Buring & Hartmann (2001, 236f):

- (15)(a) FPs must be left-adjoined to an f-node of their focus¹⁰.
 (b) FPs are as close to the focus as possible.

⁹ In the following, focus structural processing/revision shall be understood as synonymous with focus structural and prosodic processing/revision.

¹⁰ There are exceptions to this principle, e.g., the stressed additive particle AUCH ('also') has to appear to the right of the 'added' constituent (Reis & Rosengren, 1997):

(i) Ich glaube, dass Hans [Anna] AUCH besucht hat.

If we compare the processing of scrambled sentences with and without a focus particle, the following difference appears, illustrated in (16) and (17):

(16)(a) ..., [dass die Tante die Nichten begrüßt]_F.

..., *that the aunt the nieces welcomed*

(a') ..., dass die Tante_i [die Nichten]_F t_i begrüßt *haben*.

..., *that the aunt the nieces welcomed have.*

(17)(a) ..., dass die Tante nur [die Nichten]_F begrüßt

..., *that the aunt only the nieces welcomed*

(a') ..., dass die Tante_i nur [die Nichten]_F t_i begrüßt *haben*.

..., *that the aunt only the nieces welcomed have.*

(16a) again shows the preferred SO word order and the default wide focus assignment in the processing of ambiguous sentences. When the parser arrives at the point of disambiguation (the sentence final auxiliary), it has to reanalyse the syntactic structure (SO \Rightarrow OS). In addition, the sentence processor has to do a focus structural revision (wide focus \Rightarrow narrow focus) to arrive at the representation in (16a'). In the same processing scenario for (17), the sentence with a focus particle, only a syntactic reanalysis has to take place in order to arrive at the representation (17a'). The focus particle assigns narrow focus to the second DP, independently of word order. Consequently, there is no need for a focus structural revision¹¹.

This characterization of the focus structure of scrambled sentences with a focus particle leads us to the following hypotheses about the processing of such sentences measured by ERPs: If the negativity described in section 3.2 is indeed correlated with focus structural processes, it should disappear in scrambled sentences with focus particles. If focus structural processes are independent of syntactic processing, the correlate of syntactic processing (early positivity) should remain unaffected by the focus structural manipulation.

4.2 Experiment 2

We investigated ambiguous sentences with scrambled referential DPs in comparison to their canonical counterparts in a reading study¹². In contrast to Experiment 1, the second DPs were preceded by a focus particle (see Table 2).

¹¹ That focus particles can influence sentence processing was shown by Bader (2000) for German and by Ni et al. (1996), Clifton et al. (2000) and Sedivy (2002) for English.

¹² Sentences with pronouns were also included in this experiment. The results for these sentences are reported in Stolterfoht et al. (2001, 2002).

referential DP, subject before object (SO)

Maria hat behauptet, dass die Tante nur die Nichten begrüßt hat als die Schule zuende war.
 Mary has claimed, that the aunt only the nieces welcomed has when the school over was

referential DP, object before subject (OS)

Maria hat behauptet, dass die Tante nur die Nichten begrüßt haben als die Schule zuende war.
 Mary has claimed, that the aunt only the nieces welcomed have when the school over was

Table 2: Example of different versions of one experimental sentence

To avoid wrap-up effects in the ERP, the sentences continued after the auxiliary with a local or temporal modifier.

We found two different ERP effects for the sentences with non-canonical word order: An early positivity around 300 ms and a late positivity around 700 ms.

As in Experiment 1, the early positivity is interpreted as the correlate of a syntactic reanalysis process. In line with our hypotheses, this process is not influenced by the focus structural manipulation. There seems to be no interaction of syntactic and focus structural processes.

referential DPs

----- subject-first
 ————— object-first

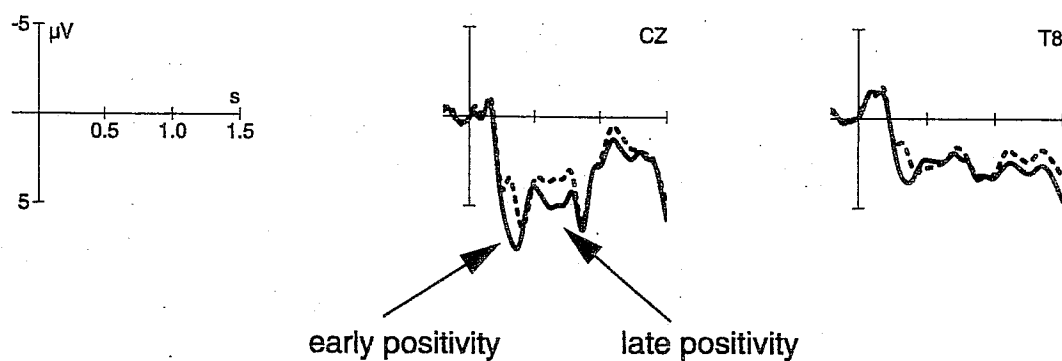
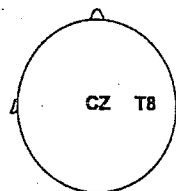


Figure 4: Grand averages for sentences with subject-first vs. object-first word order, time-locked to the disambiguating auxiliary (*hat* vs. *haben*, 1500 ms post onset).

In contrast, the late positivity seems to be influenced by the presence or absence of a focus particle. In the present study, scrambled sentences with focus particles revealed a late positivity. This process seems to interact with focus structural processing. In the previous study, the sentences with scrambled DPs

without focus particles did not show this effect. Instead, the sentences with moved pronouns evoked a late positivity. This seems to be an effect of word order which is only present if no focus structural revision is necessary.

There is an ongoing debate whether the late positivity is really a pure syntactic process. It is a late process that seems to be influenced by other types of linguistic information (for example semantic information, see Gunter et al., 2000) and also by experimental manipulations like the type of the task (see Hahne, 1998; Hahne & Friederici, 2002) or the proportion of a specific type of sentence (see Hahne, 1998; Hahne & Friederici, 1999). Further research is needed to clarify the exact interactions of this component with other kinds of linguistic and non-linguistic processes.

The focus structural manipulation of Experiment 2 appeared to be effective. According to our prediction, the negativity found in Experiment 1 did not occur. This result provides further evidence for the correlation of the negativity with focus structural processing.

6 Conclusions

The main result of our two experiments is that syntactic processing and focus structural processing can be differentiated during online sentence comprehension. In both studies, we found an ERP effect which was correlated with the reanalysis of syntactic structure. In Experiment 1, we found an additional negative effect which we interpret as the result of a focus structural revision for sentences with referential DPs. In Experiment 2, the manipulation of focus structure by the means of focus particles had the expected effect: the correlate of focus structural revision was not observed. This is explained by the fact that the presence of a focus particle, which assigns focus to its adjacent constituent, makes a focus structural revision unnecessary. These results provide further experimental evidence for the correlation of the negativity with focus structural processes. In addition, the observation that syntactic movement is accompanied by a change of the focus structural representation obtains experimental support.

Further research is needed to clarify whether the late positive ERP effect reflects the interaction of syntactic and focus structural processes.

All in all, our results indicate that, beside the construction of a syntactic representation, the assignment of focus structure to a sentence plays a crucial role in sentence processing.

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