

Single prosodic phrase sentences^{*}

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A series of production and perception experiments investigating the prosody and well-formedness of special sentences, called Wide Focus Partial Fronting (WFPF), which consist of only one prosodic phrase and a unique initial accented argument, are reported on here. The results help us to decide between different models of German prosody. The absence of pitch height difference on the accent of the sentence speaks in favor of a relative model of prosody, in which accents are scaled relative to each other, and against models in which pitch accents are scaled in an absolute way. The results also speak for a model in which syntax, but not information structure, influences the prosodic phrasing. Finally, perception experiments show that the prosodic structure of sentences with a marked word order needs to be presented for grammaticality judgments. Presentation of written material only is not enough, and falsifies the results.

Keywords: Prosody, experimental linguistics

1 Prosodic structure and narrow focus

The influence of information structure on the distribution and scaling of pitch accents in German has been shown experimentally a number of times in the literature: narrow focus triggers a new pitch accent or raises the height

* This paper is part of the project A1 of the SFB 632 on Information Structure at the University of Potsdam. For insightful discussions, we are grateful to the members of this project, Shinichiro Ishihara, Ingo Feldhausen and especially Gisbert Fanselow, who also helped in the preparation of the material for the experiments and provided many insights that helped to clarify the issues in this paper. We are also grateful to Frank Kügler, Lisa Selkirk and Shravan Vasishth for their comments on a pre-version of this paper. Many thanks are also due to Kirsten Brock, Matthias Koch, Anja Mietz, Anja Kuschmann and Esther Sommerfeld for technical assistance. The usual disclaimers apply.

of an existing pitch accent, and givenness cancels an accent or lowers it (see for instance Katz & Selkirk 2006 for English and Féry & Kügler 2008 for German). But the issue of the best way to account prosodically for such manipulations of pitch is not settled.

It is sometimes assumed that the influence of narrow focus is felt directly on the focused constituent inside the limits of a certain domain (see Jackendoff 1972, Rooth 1985, 1992 and Féry & Samek-Lodovici 2006 for English). As a consequence of focus, a pitch accent is added on a relevant syllable (the focus exponent), or an existing pitch accent is rendered more prominent by raising its pitch or expanding its range. In some other accounts, this influence is indirect. Prominence is achieved by a change in the prosodic phrasing. In this latter case, a prosodic phrase boundary is inserted to the left or to the right of the focused constituent, see Gussenhoven (1983, 1992) and Truckenbrodt (1995, 2007). Beckman & Pierrehumbert (1986) show that regular downstep or catathesis is interrupted at a focused word. At this place, pitch reset occurs. To account for this property of focus, they propose that in English, as in Japanese, a focused word inserts an intermediate phrase boundary to its left. The higher pitch accompanying a narrow focus is then a consequence of the resetting of pitch at the beginning of a prosodic phrase. In the following example, the beginning of the sentence is an intermediate phrase, but when the focused constituent *eighty* is uttered, a prosodic boundary is inserted to its left, which has the effect of resetting the pitch range to its original level.

(1) [It's eleven and one and nine]_{ip} [and EIGHTY_F]_{ip}

- b. () intonational phrase
 (x)(x) major phrase
 He will probably offer that Modigliáni to MÓMA.

In Selkirk's proposal, givenness has a more radical effect on phrasing, since it not only deletes heads of Major Phrases, but also changes the phrasing. In (3), if the PP *over to Anscombe* is given (because previously mentioned in the discourse), it no longer forms a major phrase, as it would in an all-new context, and has either the structure shown in (3a) or the one in (3b).²

- (3) {A: Anscombe has been féuding with her cólleagues.}
 B: Wittgenstein brought
 ((x)) major phrase
 a. [... [a glass of wine] [over to [Anscombe]_G]]
 b. (x) major phrase
 [... [a glass of wine] [over to [Anscombe]_G]]

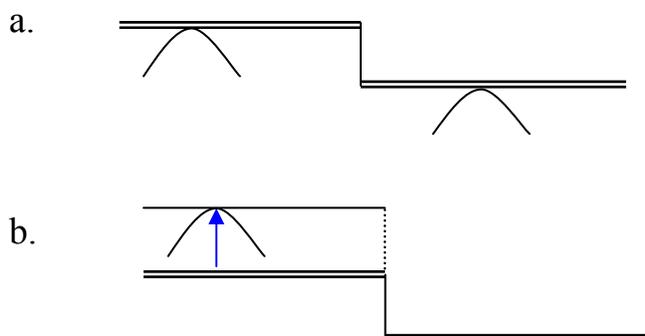
An alternative model of interaction between prosody, syntax and information structure is defended in this paper, and proposes that prosodic phrasing is not affected by focus, but only by syntax. The proposal is an extension of Féry & Ishihara (2005, to appear). The object of investigation is the raised or lowered pitch scaling as a consequence of narrow focus and givenness by unchanged prosodic structure.³

² Selkirk considers both structures to be equally likely.

³ Obviously, marked information structure, like narrow focus, may affect word order. This is when a narrow focus triggers a marked syntactic structure, as for instance in extraposition, cleft-constructions, scrambling, wh-constructions, etc. In such

The model proposed assumes that prosodic structure is a mapping from the syntactic structure, and this at different levels. How the prosodic structure arises from the syntactic one is not the subject of this paper. The interested reader is referred to Kratzer & Selkirk (2007) and the references therein for a proposal in minimalist terms. Here we are only interested in pitch accents and their scaling. The model is shown schematically in Figure 1 (from Féry & Ishihara 2005). The prosodic domains are organized in a downstep relationship: this is best conceived as downstep of the top lines of the smaller prosodic domains inside of a larger prosodic domain (Figure 1a). In the case concerning us here, the p-phrases of an i-phrase are downstepped relative to each other. The highest tones of each p-phrase are adjusted to these top lines, and cannot reach higher levels than the restricting top lines at the time of utterance.

The primary influence of information structure is that it changes the relationship between top lines: the top line of the domain containing a focus is raised (Figure 1b). Those of prenuclear given material are lowered (Figure 1c). Postnuclearly, we find deaccenting and compression of the register. The top lines are near the bottom of the speaker's voice.



constructions, new phrases are created and/or deleted or the order of the prosodic phrases is changed. We are not interested in such reorderings in the present paper.

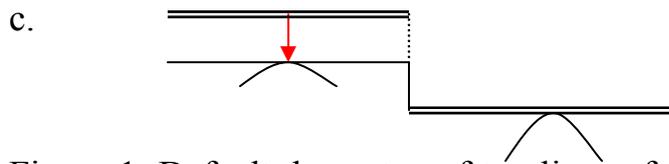


Figure 1. Default downstep of top lines of p-phrases (a). Raising of top line as a consequence of narrow focus (b). Lowering of top line as a consequence of givenness (c).

Since downstep is relative to preceding phrases, this model predicts a difference in pitch scaling only when pitch accents can be compared to each other. Two such situations may arise. First, within the limits of the same utterance, Féry & Kügler (2008) show that a narrow focus raises the pitch of the focus exponent (and givenness lowers it), to the effect that it is higher (or lower) than the same pitch accent in an all-new sentence. The second situation is pitch scaling across utterances. Again, a pitch accent can be higher or lower than a comparable pitch accent in a similar position, depending on its status as part of an all-new sentence, or as narrow focus or a given constituent. However, this raising or lowering happens only if there are other accents in the same utterance to which the affected accent is compared.

This paper investigates experimental results that bear on the question of prosodic phrasing representation. The experiments are described in section 2. Section 3 discusses the results and how they bear on the prosodic analysis. Section 4 concludes the paper.

2 Experiments

2.1 Wide Focus Partial Fronting: Utterances with one prosodic phrase

The model sketched in the preceding section predicts that if an utterance consists of only one prosodic phrase, there will be no difference between a

pitch accent as the focus exponent in an all-new (or wide) focus and the same one in a narrow focus context. In both cases, there is no other accent relative to which it can be scaled. To be more precise, the unique prosodic phrase has only one top line, and no downstep of top lines can take place.⁴

To test this central claim, sentences consisting of only one p-phrase have been studied experimentally. We call them Wide Focus Partial Fronting (WFPPF) and illustrate them in (4). These sentences consist of a single i-phrase, and have a unique, early falling pitch accent on the fronted object. The remainder of the sentence is deaccented and pronounced very low in the speaker's register. Fanselow & Lenertová (2006) propose a purely syntactic account of a larger group of partial focus constructions in terms of A-bar movement attracting the first accent in the clause, and fulfilling in this way the Minimal Link Condition (see Chomsky 1995). This operation, called 'Partial Focus Fronting,' is triggered by a formal property, viz. accent, and is sensitive to island and pied-piping restrictions. But crucially, the sentences they examine may have more than one accent, which renders them a different group from the sentences examined in the present paper. In their account, a constituent, which may be larger than just a word and which carries an accent, is attracted by a special feature located in Spec,CP. In Partial Focus Fronting, the only constraint on movement is the presence of an intervening accented element, in violation of the Minimal Link Condition (see Chomsky 1995). In sum, in Partial Focus Fronting, a formal operation targets the closest accent, which is attracted to Spec,CP by a special feature, and leaves all other accents untouched; see also Krifka (1994), Jacobs (1996)

⁴ Obviously, emphasis has an effect on pitch height, as has been shown several times in the literature (see for instance Liberman & Pierrehumbert 1984 for English). It is always possible to raise the voice's overall register to express more excitement or involvement. This effect has to be kept apart from the grammatical pitch scaling considered here.

and Müller (2002) for different syntactic and/or semantic accounts of these or similar sentences.

The sentences examined below are thus a subgroup of the sentences examined syntactically by Fanselow & Lenertová (2006). Prosodically, our sentences always consist of a single phrase, and the accent of this p-phrase can be fronted. Fronting of the accent triggers a different prosodic pattern which corresponds to pragmatic needs (see section 3.1 for more on pragmatic use of this construction).

We provide a phonological account of these sentences by showing how their prosodic properties bear on the issue of the best prosodic analysis. Since there is no material preceding the accent, there is nothing relative to which the initial accent may be scaled. We thus hypothesize that the pitch accent will be identical in wide and narrow focus.

In all examples in this paper, an i-phrase is indicated with a subscript I, a focus with a subscript F and a topic with a subscript T. Small caps indicate pitch accents and unaccented words are written in lower case. The sentences in curly brackets in (4) preceding the target sentences show thinkable contexts for the occurrence of the sentences in their wide focus readings. The term ‘wide focus’ is used for sentences with at least VP-focus, with a given or inferable subject. The term ‘all-new’ denotes sentences which are entirely new, including the subject.

- (4) a. {What did you do after I left?}
 [_I [Ein BIER haben wir getrunken]_F]
 a-ACC beer have we drunk
 ‘We drank a beer.’

- b. {How was your evening?}
 [I [FERNSEHEN habe ich geguckt]_F]
 television have I looked
 ‘I watched television.’
- c. {Why was she away so long?}
 [I [Das KIND hat sie ins Bett gebracht]_F]
 the-ACC child has she in-the bed brought
 ‘She brought the child to bed.’
- d. {Why was the class cancelled?}
 [I [Den EINGANGSSCHLÜSSEL haben sie verloren]_F]
 the-ACC front door key have they lost
 ‘They lost the front door key.’
- e. {What did he do then?}
 [I [Die KÜCHE hat er gestrichen]_F]
 the-ACC kitchen has he painted
 ‘He painted the kitchen.’ (Krifka 1994)

Even though the object is fronted in these sentences, resulting in a marked word order, they are perfect in a wide focused context, in contrast to other structures with marked word orders.⁵

In the wide focus reading of the sentences in (4), there is a single accent, as illustrated in (5) and in Figure 2. This unique accent is located very early in the sentence, on the fronted object, and the remainder of the sentence is unaccented. The nuclear accent on *die Miete* ‘the rent’ is a bitonal falling tone H*L. A boundary tone L_I is aligned with the last syllable of the sentence. Between the postnuclear L tone and the low boundary tone, the melody of the phrase is low throughout, which can be analyzed as alignment of the low boundary tone to both the end of the i-phrase and the position

⁵ See for instance Lenerz (1977), who shows that marked word orders are paired with marked discourse contexts.

immediately following the pitch accent (see Gussenhoven 2004 for a proposal along these lines). The result is a low contour throughout.

- (5) $H^* L$ L_I
 [I [Die MIETE haben sie wieder mal erhöht]_F]
 the rent have they again once raised
 ‘They have raised the rent again.’

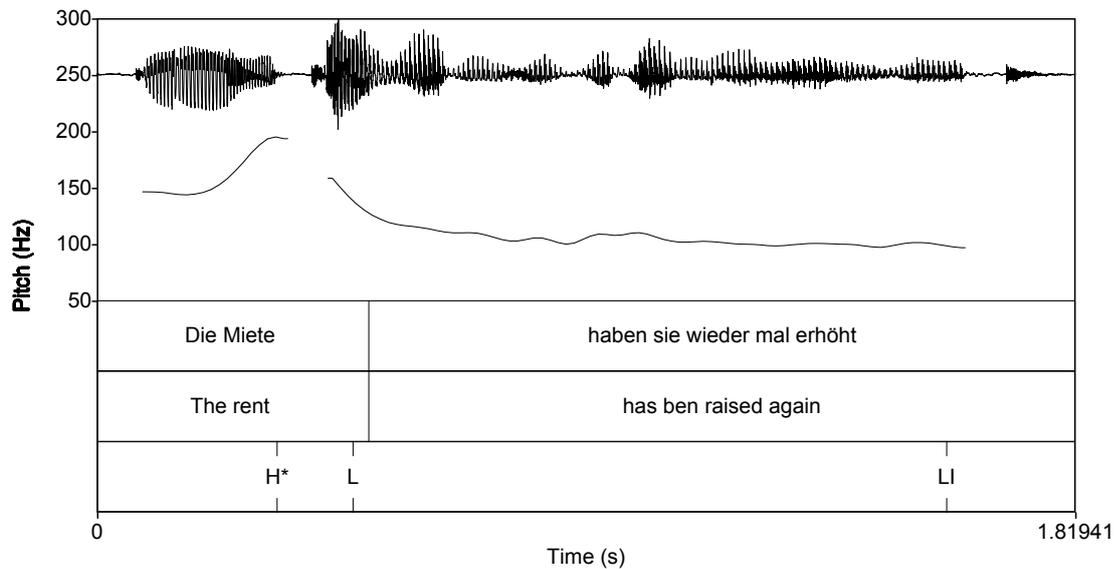


Figure 2. Pitch track of *Die MIETE haben sie wieder mal erhöht*

An important property of sentences with object fronting like those in (4) is that they are not only optimal in a wide focus context (WFPP), but also in a context inducing an initial narrow focus, thus Narrow Focus Partial Fronting (NFPP). The same sentences, with exactly the same prosodic pattern, are also answers to questions asking only for the object, as shown in (6).

- (6) a. {What did you drink?}
 [I [Ein BIER]_F haben wir getrunken]
 b. {What did you do?}
 [I [FERNSEHEN]_F habe ich geguckt]
 c. {Who did she bring to bed?}

[_I [Das KIND]_F hat sie ins Bett gebracht]

d. {What did they lose?}

[_I Den [EINGANGSSCHLÜSSEL]_F haben sie verloren]

e. {What did the police do?}

[_I [Eine ALKOHOLKONTROLLE]_F hat die Polizei gemacht]

In the examples in (6), accent, prosodic phrasing and tonal structure are identical to those shown in (4). There is only one initial accent and the remainder of the sentence is unaccented. In these cases, too, only one i-phrase (and one p-phrase) is formed. The narrow focus on the fronted element is clearly enhanced by its initial position, not only because of the pitch accent on the narrowly accented word, but also because of the deaccenting of the remainder of the sentence.

The fact that these constructions are possible in wide focus as well as in narrow focus make them excellent subjects of investigation for the following questions. What happens when the pitch height of a certain accent cannot be scaled relative to other accents? Does narrow focus affect phrasing in the absolute sense, by changing the phrasing of the sentence, or by being the head of a different prosodic phrase? If the relational view of pitch scaling proposed in section 1 is correct, we should not find any difference in the pitch height of the initial accented object in the sentences in a wide focus and in a narrow focus context.

Both production and grammaticality judgment experiments were performed to find an answer to these questions, the results of which are discussed in turn.

2.2 Production

Three production experiments were designed to investigate the prosodic pattern of WFPF sentences. The sentences used in the experiments differed

in length, in focus domain and in the kind of subject. First, some of the sentences had only a full object, while others had an additional argument. Second, the focus domain was wide or narrow, and third, the subject was pronominal or a full DP. In the production experiments, the number of accents produced by the participants was counted, and the height of the pitch accent on the fronted object was measured and compared in different conditions.

2.2.1 First production experiment

Goal: The first production experiment aimed at answering the following question: Is there a difference in the production of Partial Fronting sentences in a wide focus and in a narrow focus context? More specifically, is the accent higher in the narrow focus context than in the wide focus context?

Subjects: After giving informed consent, 30 students from the University of Potsdam participated in this study for course credit or 5 Euros. All participants were native speakers of German, had normal or corrected-to-normal vision and no hearing problems were reported.

Materials: Each participant read 12 experimental sentences aloud, as illustrated in (7), as answers to context questions. Additionally, subjects read 100 unrelated filler sentences. The material was presented in a pseudo-randomized order. Moreover the object was generic or specific, to check for possible effects of specificity. The sentences were recorded with two different syntactic structures: with a fronted object (7a) and with a canonical word order, SVO (7b).⁶

⁶ The complete list of examples used in the experiments is given in the appendix.

- (7) Wide focus: {Did you go out afterwards?}
Narrow focus: {What did you drink?}
- a. Ein Bier haben wir getrunken./ Ein Jever haben wir getrunken.
a beer/a Jever have we drunk ‘We drank a beer/a Jever.’
 - b. Wir haben ein Bier getrunken./ Wir haben ein Jever getrunken.

Method: The recordings took place in a soundproof box at the University of Potsdam with a DAT tape recorder. A set of instructions familiarized the subjects with the process and had them practice with four examples. After the instructional part, the subject went through the experiment in the form of a Powerpoint presentation in a self-paced manner. The speakers read the sentences on a screen as answers to questions which were presented both visually and acoustically over headphones: they heard a question and read it on a computer screen, pressed the return key, and read aloud a target sentence presented on the next slide.

Results: In all sentences of type (7a) with a fronted object (altogether 360 realizations: 12 sentences x 30 subjects), a falling pitch accent was realized on the object and no other accent was present, showing the readiness of native speakers to realize these sentences in the contexts given.

In the sentences with a fronted object, there is no difference in pitch between the narrow and the wide focus realization. All instances of the sentences of type (7a) were realized with a single accent on the object. There were some differences in the average fundamental frequency (F_0) of the objects and the verbs (see Figure 3). In the wide focus condition, the specific objects always had a lower pitch than the generic ones, but the difference is not significant ($t = -0.543$, $df = 54.379$, $p = 0.5893$) and does not relate to the

difference in focus context of interest here.⁷ Thus no comparison regarding wide or narrow focus was significant ($t = -0.1571$, $df = 693.785$, $p = 0.8752$).

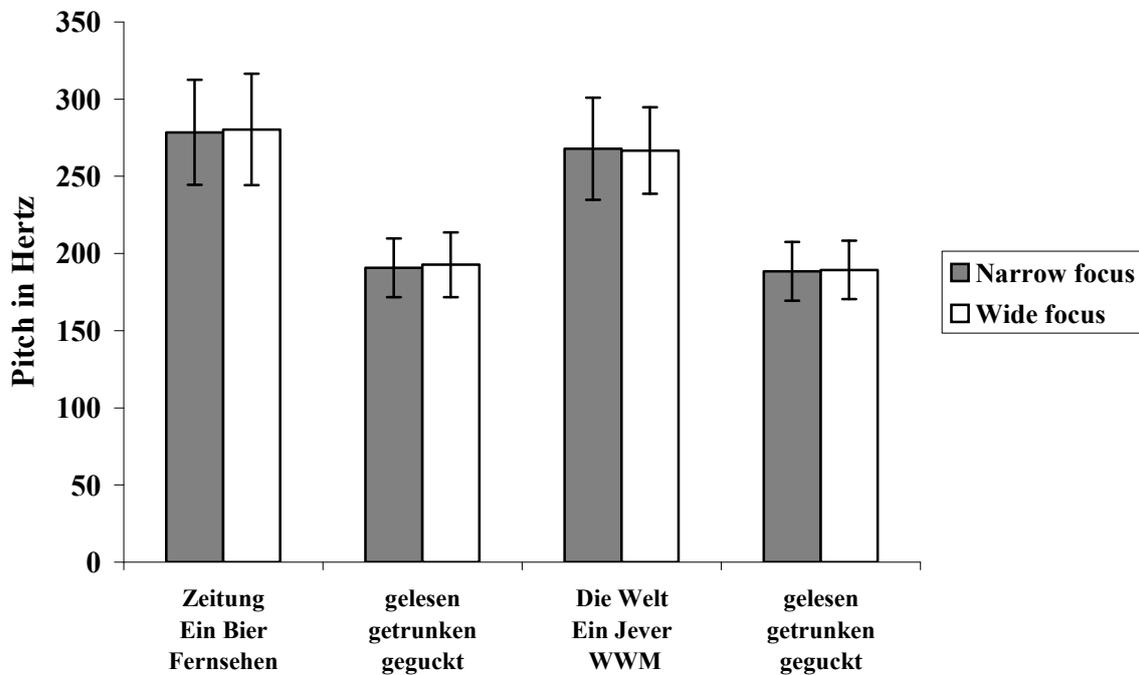


Figure 3. Averaged pitch accents in F_0 on the fronted objects of experiment 1

Discussion: The results of the first experiment led to a similar pattern in the tested wide and narrow contexts for the accented fronted object. At least in this experiment, no prosodic difference between an accent on the fronted object in a wide focus context and an accent on the same fronted object in a narrow focus context could be found. This result is compatible with the following view of prosodic structure: if there is only one p-phrase, the height of the top line of the p-phrase is scaled in an absolute way. There is no

⁷ The remaining comparisons are not significant: Verbs in the wide focus condition ($t = 1.0112$, $df = 170.951$, $p = 0.3134$), objects in the narrow focus condition ($t = 0.4405$, $df = 171.677$, $p = 0.6601$), and verbs in the narrow focus condition ($t = 0.9323$, $df = 171.772$, $p = 0.3525$).

indication that the phrasing is changed in narrow focus as compared to wide focus.

2.2.2 Second production experiment

Goal: The second experiment investigates the readiness of German speakers to realize a WFPF prosodic pattern with longer sentences. More specifically, this experiment investigated the following question: Does an increase in the number of arguments in the (intended) deaccented part of the sentence impede the willingness of speakers to produce a prosodic pattern with only one early falling accent and the remainder of the sentence deaccented?

An answer to this question should help to understand whether WFPF is insensitive to prosody and length of sentences, or whether, alternatively, the occurrence of such sentences decreases when more p-phrases are to be realized. We hypothesize that this pattern is readily realized when there is only one prosodic phrase mapped to syntax, as the first experiment demonstrated, but that it is less frequent when more than one prosodic phrase is present, because in the default case, all prosodic phrases are preferably headed with a pitch accent. An unaccented argument is either the consequence of givenness, or it is due to special syntactic conditions. For instance, a directional or locational PP, as in (6c), is usually integrated into the p-phrase of the preceding object and following verb (Krifka 1984, Kratzer & Selkirk 2007), and is thus realized without a pitch accent. In all other cases, a maximal projection projects a p-phrase. As a result, the addition of a syntactic phrase should impede the formation of WFPF.

Subjects and method: A group of 30 students of the University of Potsdam performed this study for course credit or 5 Euros. Participants of this

experiment did not participate in the first experiment. All subjects were native speakers of German, had normal or corrected-to-normal vision and no hearing problems were reported. The method was identical to the first study.

Material: The second series of sentences were realized in wide and narrow focus contexts. They were longer sentences with two non-subject arguments and a pronominal 1st pers. sg. subject. Examples are shown in (8) to (10) (see the appendix for the remaining sentences). In (8), three versions of the sentence as answers in a context asking for a wide focus sentence are listed: (8a) is the canonical word order, (8b) has a fronted object, and (8c) a fronted second argument — a prepositional phrase. (9) and (10) show the same sentences as possible answers to a question asking for a narrow focus. (9) asks for the object, and (10) for the prepositional phrase. Again the object came in two versions, a non-specific (*Wagen* ‘car’) and a specific noun (*Jaguar*).

- (8) {Why were you away so long?}
- a. Ich habe den Wagen/den Jaguar in die Garage gefahren.
I have the-ACC car/ the-ACC Jaguar into the garage driven
‘I drove the car/the Jaguar into the garage.’
 - b. Den Wagen/Den Jaguar habe ich in die Garage gefahren.
 - c. In die Garage habe ich den Wagen/den Jaguar gefahren.
- (9) {What did you drive into the garage?}
- a. Ich habe den Wagen/den Jaguar in die Garage gefahren.
 - b. Den Wagen/Den Jaguar habe ich in die Garage gefahren.
- (10) {Where did you drive the car to?}
- a. Ich habe den Wagen/den Jaguar in die Garage gefahren.
 - b. In die Garage habe ich den Wagen/den Jaguar gefahren.

Results: In this experiment, only the accent pattern, that is the number of realized accents, was examined. The answer (8a) to the question asking for a wide focus was usually realized with a neutral prosodic structure, thus a main accent on the preverbal argument and a secondary accent on the preceding argument, though there was a very small amount of variation in the accent pattern (some speakers added an accent on the verb): in the majority of the cases, both the object and the PP were accented. This is not discussed further and not illustrated in the figures below.

Figure 4 compares the accent patterns of sentences with a fronted object in a wide focus context (8b) with those in a narrow focus context (9b) in the form of percentages.⁸ A fronted object as a narrow focus carries the unique accent in 93% of the cases, whereas the same accent pattern arises in only 44% of the cases in a wide focus context. The other realizations comprise those with additional accents on the PP, on the verb, or on both.

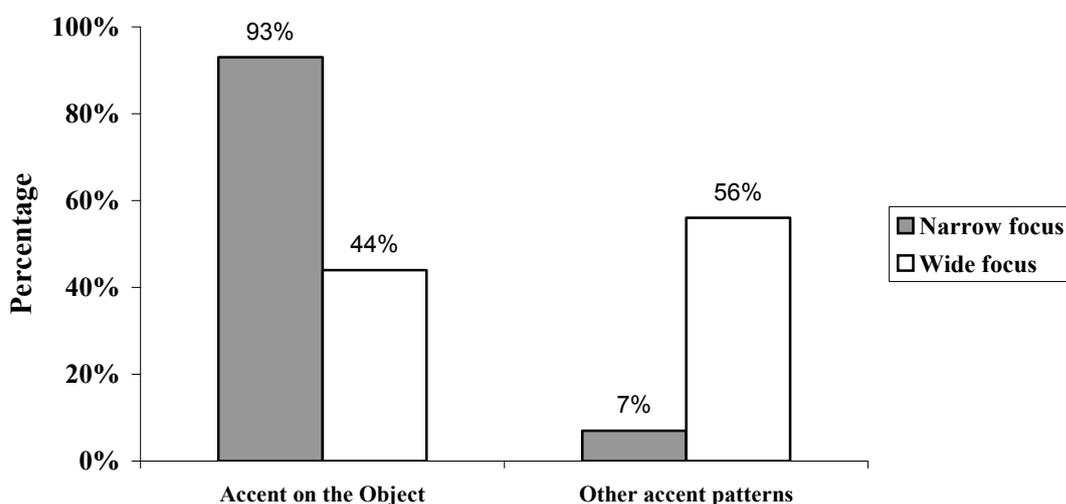


Figure 4. Percentages of accents on the fronted object in sentences with wide (8b) and narrow focus (9b)

⁸ (9a), a sentence in the canonical word order with a narrow focus on the object, was always realized with an accent on the object.

As for the fronted prepositional phrase, illustrated in Figure 5, the accent pattern is similar to that in Figure 4 for the narrow focus, with 94% of the realizations having a single accent on the narrowly focused PP. However this decreases to 6% in the wide focus condition.⁹ This means that in 94% of the wide focus realizations, not only the fronted PP was accented, but also the object or the object and the verb.

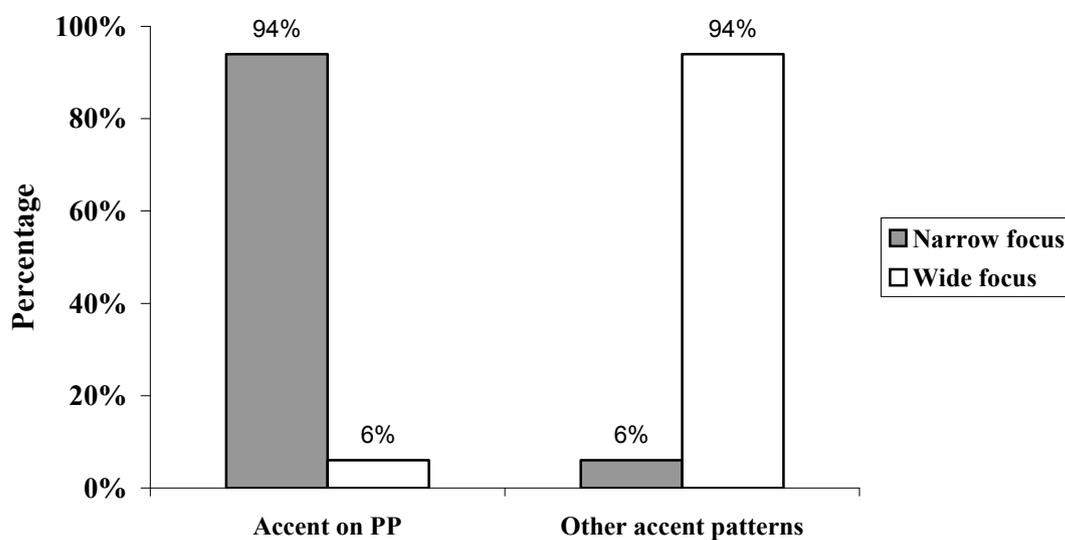


Figure 5. Percentages of accents on the fronted PP in sentences with wide (8c) and narrow focus (10b)

Discussion: The addition of postverbal accentable constituents renders the sentences less apt to be realized with only one accent on the fronted argument. In the first condition, namely when the direct object was fronted, 56% of the realizations in wide focus had at least one additional accent. When the PP was fronted, more than one accent was the rule: 94% of the realizations had more than one accent.

⁹ Again the SVO sentence (10a), with narrow focus on the PP, was realized as expected, with a single accent on the head of the PP (*Garage* in the example).

The difference between the 44% of the intended realizations in the case of fronted object as compared to the 6% in the case of fronted PP is very revealing. It is more natural for speakers to realize a unique accent if the fronted constituent is the direct object than if it is the prepositional object, a clear confirmation of Fanselow & Lenertová's (2006) claim that it is always the first accent of the canonical word order which is allowed to be fronted in order to be an adequate sentence in a wide focus context. In this case, the object comes before the prepositional phrase, and fronting the object results in a good WFPF pattern, whereas fronting the PP does not.

If, as hypothesized in the proposed model of prosody, every non-pronominal argument projects its own p-phrase, it is natural that speakers have a tendency to realize more accents in these longer sentences. The information structure sometimes prevails (see section 3.1), but the syntax and the default prosodic phrase are very influential, as well, and encourage the emergence of accents. If prosodic phrasing is changed at will by information structure, our results cannot be explained.

2.2.3 Third production experiment

Goal: The same question as in the second experiment is investigated here, namely how the addition of a p-phrase changes the number of accents. It is again speculated that the addition of prosodic phrases decreases the speakers' willingness to realize a WFPF pattern. In this experiment, the heights of pitch accents are again compared, in addition to the question of the number of accents. But this time, the postverbal subject is either a pronoun (as before) or a full DP. A pronominal subject is integrated into an adjacent p-phrase, but a full DP forms its own p-phrase. In order for the WFPF prosodic contour to arise, the full DP subject must be deaccented,

which is only acceptable if it is completely predictable and behaves as if it were given. For this reason, the sentences were constructed in such a way that the subject would be maximally predictable. A second difference from the preceding experiments lies in the size of the focused element. While the wide focus context was a VP focus in the preceding experiments, it is now an IP focus. The subject is new, as well. In sum, two different factors might act on the pitch height: the subject as a full DP and the size of the focus domain.

The methods were the same as those described for the preceding experiments. A new set of thirty students from the University of Potsdam read the sentences in two contexts, one inducing an all-new focus and one inducing a narrow focus. As before, the participants produced both variants in one session.

Materials: Sentences like those in (11) were tested. Five such sentences were constructed. Altogether 300 (2 x 5 x 30) utterances were used and analyzed for the results. The subject was either a pronoun (11a) or a full DP (11b), and either the focus encompassed the entire sentence, including the subject, or it was restricted to the object. Focus on the whole sentence is called ‘all-new,’ but the term wide focus is occasionally used, since, as we will see below, VP focus and all-new focus delivered equivalent results.

- (11) {All-new: Why was the talk cancelled?}
{Narrow focus: What did he/they/the doorman lose?}
- a. Den Eingangsschlüssel haben sie/hat er verloren.
‘They/he lost the front door key.’
 - b. Den Eingangsschlüssel hat der Pförtner verloren.
‘The doorman lost the front door key.’

Results: Figure 6 shows the distribution of accents in the individual items in the all-new condition: when the subject is pronominal (11a) and when the subject is a full DP (11b). The sentences with a narrow focus on the fronted object are not shown here, because they do not bring any new insight. They were consistently realized with a unique accent on the fronted object.

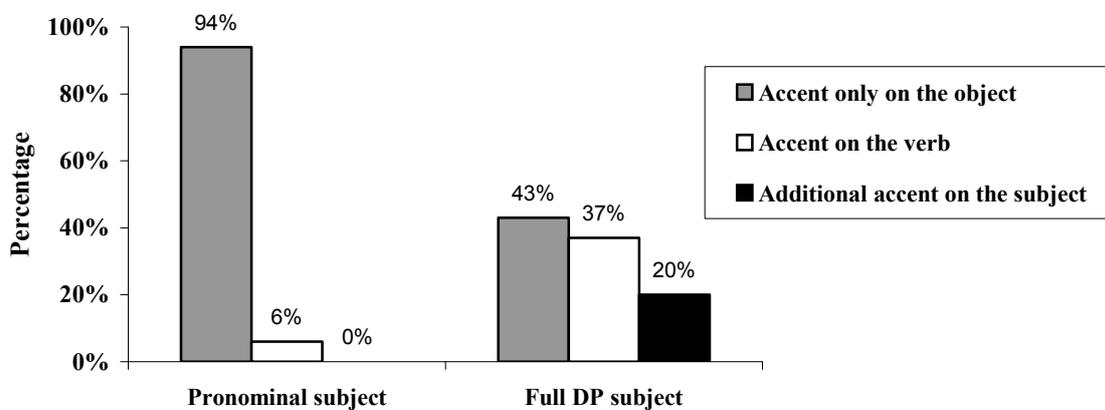


Figure 6. Percentages of accent patterns in all-new sentences

In the case of a pronominal subject, only 10 of 150 realizations had an additional accent, which was located on the verb (6%). All other instances (94%) had a single accent on the object. In the case of a full DP subject, 65 realizations (43%) had a single accent on the object, and the remainder of the sentence, even the new subject, was deaccented. 20% had an additional accent on the subject. In 37% of the realizations, the verb was accented as well, either with or without an accent on the subject.

As for the F_0 of the preposed object, no significant difference could be found between the sentences with pronominal subject and those with full DP. The data were analyzed in a repeated-measures analysis of variance

(ANOVA) with a factor CONDITION, with two levels (Full-DP-subject and Pronominal-subject) and a factor ELEMENT, with five levels (the objects *Eingangsschlüssel*, *Alkoholkontrolle*, *Miete*, *Damm* and *Löhne*). In Figure 7, the averaged F_0 values of the accented syllable for all speakers are shown. The statistical analysis revealed no effect for CONDITION ($F < 1$) but a main effect for ELEMENT ($F(4,100) = 10.5, p = .001$). The effect was due to the lower F_0 values in sentences with the element *Eingangsschlüssel*. There was no interaction between both factors ($F < 1$). Single comparisons of each preposed object regarding sentences with pronominal subject compared to sentences with full DP subject were not significant ($F < 1$).

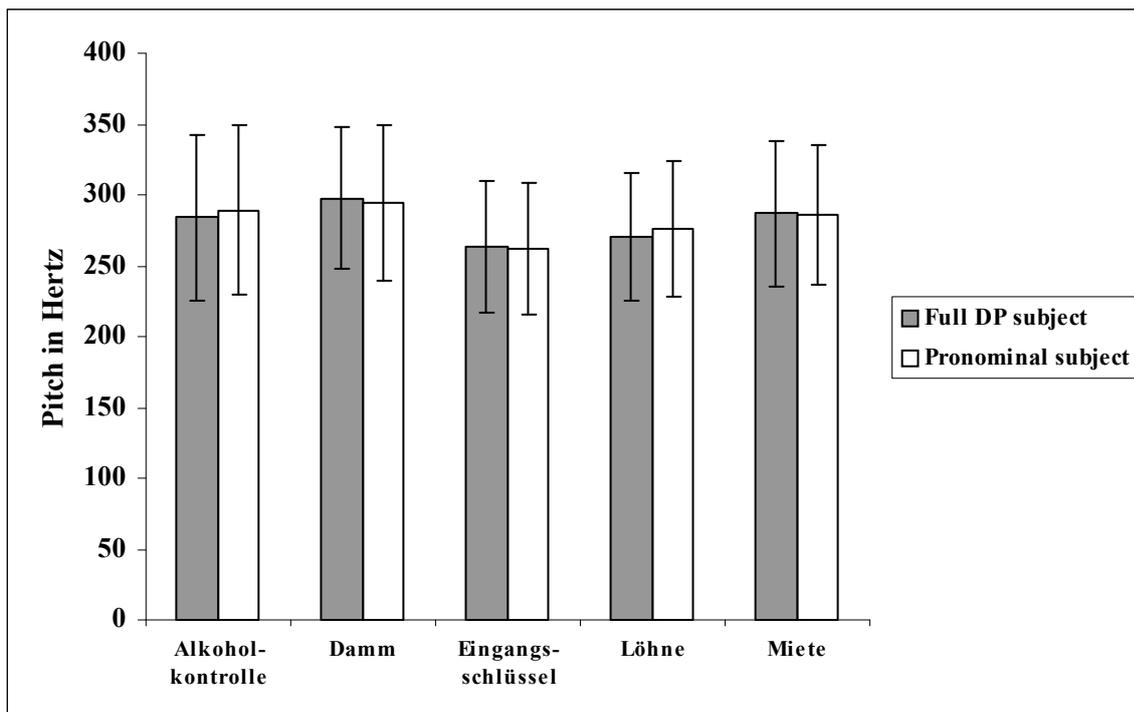


Figure 7. Averaged F_0 value of the preposed object in sentences with a pronominal subject and with a full subject

Discussion: The addition of a full subject had a clear influence on the accent pattern of these sentences. As expected, it considerably decreased the number of WFPF patterns. Interestingly the number of cases with this

pattern is nearly identical to that of experiment 2 with a fronted object (43% vs. 44%). Thus a unique accent on the fronted object nearly always arises when the remaining constituents consist exclusively of a pronoun, a verb and an auxiliary, at least in a context asking for an all-new reading. But as soon as the postverbal subject is a full DP, only less than half of the realizations have a unique accent on the fronted object.

The second result of this experiment is that the height of the fronted object was not influenced by the kind of postverbal subject. It has nearly the same F_0 value in wide and in narrow focus (despite the presence of additional accents in the all-new condition).

An additional result is that the size of the focused part, which is the VP in the second experiment and the whole sentence in the third one, does not matter in these experiments. VP and all-new focus do not lead to different WFPF accent structures.

2.3 Perception

Acceptability judgment tasks were performed with WFPF sentences to test whether they are accepted as easily in an all-new as in a narrow focus context. Moreover, the material was presented both acoustically and in a written form to investigate the effect of the prosody on acceptability.

2.3.1 First perception experiment: Spoken material

Goal: Acceptability judgment tasks were conducted with spoken sentences with a fronted object in an all-new environment as compared to a narrow focus context. Two additional factors were investigated: first the kind of subject (pronoun vs. full DP), and second the accent pattern (a unique accent on the object or an additional accent on the full DP subject). The aim of the

perception experiments was to test the well-formedness of these sentences, and whether the accent pattern has an influence on the acceptability of these sentences. We hypothesize that the intended prosodic pattern, namely a unique accent on the fronted object, will increase the acceptability of the sentences as wide focus. Furthermore, a pronominal subject should also increase the acceptability, as compared to a full DP subject, since fewer prosodic phrases need to be deaccented in the former case.

Method: Dialogues were pre-recorded. Two native speakers of German read the sentences in a natural way: one of them read the questions, and the other one, a trained phonetician, read the answers. The sentences were integrated into a larger PowerPoint presentation containing several filler sentences between each target sentence.

Subjects: The experiment material was presented individually to each informant. 30 male and female students, a different group from those who participated in the production experiments, delivered the auditory grammaticality judgments.

Material: There were 6 conditions (2 x 3): first the contexts, all-new or a narrow focus (see (12Q) and (13Q)); second, the subject, which could be pronominal ((12a) and (13a)) or a full DP (all others). The last condition was an accented or an unaccented subject, but only in the sentences with a full DP ((12b–c) and (13b–c)). The pronoun was always deaccented.

- (12) {Q: Why are your neighbors complaining?}
- a. Die MIETE haben sie wieder mal erhöht.
 - b. Die MIETE hat der Hauswirt wieder mal erhöht.

c. Die MIETE hat der HAUSWIRT wieder mal erhöht.
 the rent has the landlord again once raised
 ‘The landlord/they raised the rent again.’

(13) {Q: What did the landlord raise again?}

a. Die MIETE hat er wieder mal erhöht.

b. Die MIETE hat der Hauswirt wieder mal erhöht.

c. Die MIETE hat der HAUSWIRT wieder mal erhöht.

‘The landlord/he raised the rent again.’

Results: The averages of the grammaticality judgments appear in Figure 8. The scale is the inverse of the German school grading system: 1 is the worst and 6 the best.

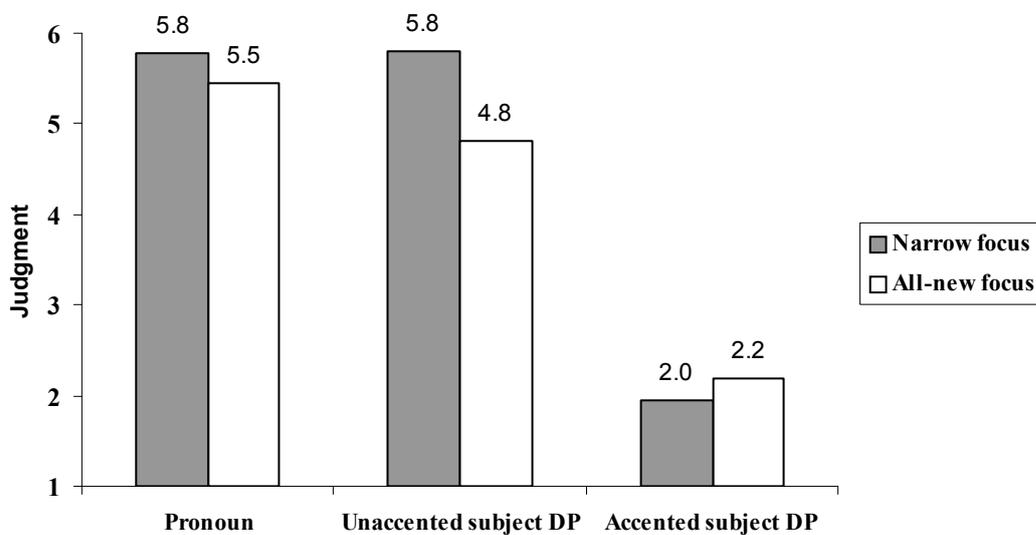


Figure 8. Averaged judgments of the question/answer pairs in spoken form¹⁰

¹⁰ An analysis of variance (ANOVA) was performed with a factor FOCUS, with two levels (Narrow focus and All-new focus), and a factor STRESS, with three levels (Pronoun, Unaccented subject DP and Accented subject DP). There was a main effect for FOCUS ($F(1,29) = 10.5, p = .01$) and a main effect for STRESS ($F(2,58) = 263.3, p = .001$).

When the subject was a pronoun, the sentence always got high scores, both in an all-new (5.5) and in a narrow focus context (5.8), though the sentences were judged slightly better in a narrow focus context. Sentences with a full but deaccented subject got higher scores in a narrow focus context (asking for the object) than in an all-new one (5.8 vs. 4.8). Both scores are well above the mid level. The accented subject DP got a low score (2.0) when the context asked for a narrow focus on the object. This question/answer pair contained an accent in the wrong place, and it has been shown several times in the literature that listeners are sensitive to this kind of mismatch. This also accounts for the variance within the subject group (see for instance Gussenhoven 1983, Birch & Clifton 1995, Hruska et al. 2001 and Féry & Stoel 2005).

An interesting result is the nearly equally low score obtained in a sentence with an accented subject when the question asks for an all-new focus (2.2). At first glance, nothing in the prosody prevents the accenting of the subject in such a sentence. In fact, theories of phrasing formation predict a phrase on the subject because it should form its own phrase by virtue of not being integrated in the domain of the verb (see among others Gussenhoven 1992 and Truckenbrodt 2007 for such models).

In models of word order that take the prosody into account, the reason for the low scores is clear. Accented object fronting always meets a need. As shown in section 1, it takes place either in a narrow focus context, or because the object is topicalized, or by virtue of its being the unique head of a WFPF sentence. But the question asked for a wide focus with a new subject, and a

Additionally, the ANOVA revealed an interaction between both factors ($F(2,58) = 18.6, p = .001$).

pattern with a fronted object and deaccented subject is not optimal in this context.

Discussion: To sum up the results of the first perception experiment: Both wide focus and narrow focus are nearly equally good when a pronominal subject is involved, but when an unaccented full DP is present, the acceptability of such a sentence in a wide focus decreases. In both contexts the sentences are bad when the full DP subject is accented.

2.3.2 Second perception experiment

Goal: The second perception experiment was a grammaticality judgment task using written material inserted in standard questionnaires. The aim of this experiment was to find out whether the difference in the presentation of the material in a written and in an oral form has an effect on the acceptability. In other words, does it matter for the acceptability judgments whether the accent pattern is presented together with the sentences? We hypothesize that it does.

Subjects and Material: A new group of 120 informants, students at the University of Potsdam, performed grammaticality judgments. The same five sentences as in the first perception experiment were used. Students received course credit or 5 Euros for their participation.

Method: The sentences to be judged were presented in the form of written dialogues. There were 4 versions of each sentence, as illustrated in (14) and (15). The four conditions (2 x 2) were the questions, which elicited an all-new or a narrow focus ((14) vs. (15)), and the two versions of the subject, a

pronoun or a full DP (a versions vs. b versions). Only 4 such dialogues were included in each questionnaire so that participants had to evaluate only one version of each sentence. Altogether six different questionnaires were constructed. The target sentences were separated from each other by numerous distractors.

The most obvious difference between the spoken and the written material is the accent pattern, which was not present in the second experiment. The expectations was that both conditions (focus and subject) would influence the judgments.

- (14) {Q: Why are your neighbors complaining?}
- a. Die Miete haben sie wieder mal erhöht.
 - b. Die Miete hat der Hauswirt wieder mal erhöht.
'The landlord/they raised the rent again.'
- (15) {Q: What did the landlord raise again?}
- a. Die Miete hat er wieder mal erhöht.
 - b. Die Miete hat der Hauswirt wieder mal erhöht.

Results: Figure 9 presents a summary of the results, using the same scale as in Figure 8.

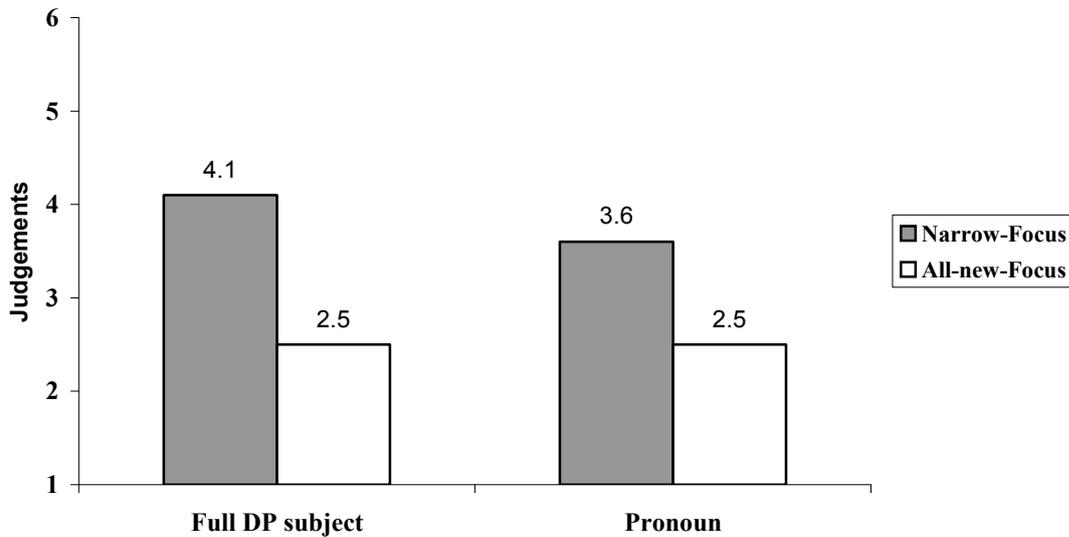


Figure 9. Average of the judgments in written question/answer pairs

Altogether judgments are lower than in the oral presentation. The results show a clear effect of focus ($t = 7.475$, $df = 232.133$, $p = .001$), since the sentences got higher scores when presented in a narrow focus, but they show no effect of pronoun vs. full DP subject ($t = 1.1294$, $df = 232.121$, $p < 0.2599$). It did not matter whether the sentences included an additional accentable argument or not. The WFPF was never a real option, even when a single prosodic phrase could be created. A comparison of these results with those obtained in the spoken presentation is especially revealing. In this latter modus, the accent had a crucial effect on acceptability, since a deaccented subject had a considerable positive effect on scores ($t = 20.434$, $df = 358.203$, $p = .001$). It can be hypothesized that, in the written modus, fronting was interpreted as focus, but not as WFPF.

Discussion: It can be assumed that in the written version, informants did not always project the intended prosodic pattern onto the sentences they read.

Instead they probably very often projected an ‘unmarked’ prosodic pattern, like the one in (16), which is not optimal in a wide focus context.

(16) [[_I [_P Die MIETE]_T [_P hat der HAUSWIRT wieder mal erhöht]]_F]

But this is not the only explanation, since when a pronoun was present, the judgments were also low. We suggest that the marked word order reduced the acceptability of the sentence, but only in the absence of prosodic structure. In an experiment using the same kind of material in written form, Fanselow, Lenertová & Weskott (to appear) also find a difference in acceptability between WFPF sentences in narrow and in wide focus. When the sentences are in a wide focus context, they also find a larger difference between pronominal subject and lexical subject than we did. They speak of “‘intrinsic imperfections’ of the structure caused by violations of syntactic principles (reducing grammaticality) or caused by processing problems of sentences with a marked word order (reducing overall acceptability).” The WFPF constructions without prosodic structure are of the second kind.

The results of this experiment show that the prosodic pattern helps listeners to evaluate sentences in their contexts. The results obtained with spoken material provide more insight into the processing (at least of the tested structures) than those obtained with written material.

3 Discussion and analysis

The experimental results of section 2 show that WFPF sentences are readily pronounced (first production experiment), as well as accepted by German speakers, at least when heard with the correct prosodic pattern (first perception experiment). A unique accent on the fronted object is easier to

realize and more readily accepted when the subject is pronominalized than when it is a full DP (third production and first perception experiments). An intervening accented constituent, be it a subject or another verbal argument or any accentable constituent, blocks the reading of the sentences as WFPF altogether, speaking for a negative influence of additional p-phrases. This was clearly shown in the perception experiment, and in the second production experiment with longer sentences. The perception experiments also showed that adding the intended prosodic structure increases acceptability, an observation which has been made by several authors for other prosodic patterns (see Fodor 2002, Kitagawa & Fodor 2006 and Féry & Stoel 2005 among others). In the present case, when sentences with two arguments, and thus potentially two accents, were presented in a written form in a wide focus context, informants may have had difficulties in mentally creating the right prosodic pattern. Presenting prosody simultaneously with the lexical and syntactic material was thus crucial.

It could be shown that WFPF sentences have a very similar accent pattern in a VP-focus pattern and an all-new IP-focus pattern (production experiments). And finally, the height of the pitch accent on a fronted object was shown to be indistinguishable in a VP focus and in a narrow object focus (first production experiment). The same was true in a comparison between the F_0 of the accents in all-new sentences in which the subject is a pronoun or a full DP (third production experiment). The experimental results do not bear on the question of the role and interpretation of WFPF sentences. This point is instead shortly addressed in section 3.1, where a comparison is made with the so-calledthetic sentences, which show a strong similarity with the WFPF sentences in their prosodic structure and in one of their interpretation patterns. In the last subsection, the impact of our results for the prosodic theory is taken up again.

3.1 WFPF and theticity

A type of sentence called ‘all-eventive’ or ‘thetic’ has been extensively discussed in the literature from the point of view of both its pragmatic interpretation and its formal syntactic and phonological properties (see Marty 1918, Kuroda 1984, Schmerling 1976 and Sasse 1987 among others). These sentences are contrasted with ‘categorical’ sentences, prototypically divided into a topic and a comment. Thetic utterances consist only of a predication and describe a single event without separating it into a theme and a comment about the theme (a rheme), as categorical sentences do. Some examples from the literature are listed in (17), and the reader is referred to the cited articles (especially Sasse 1987) for a survey of theticity.

- (17) a. My HOUSE is on fire.
b. Your EYES are red.
c. My WALLET has disappeared.
d. JOHNSON died. (Schmerling 1976)

Thetic sentences have a unique accent on the subject, both in English and in another action that my wallet could perform, or about other objects that can disappear, but rather it is communicated that a very unpleasant event just happened, and that I have a good reason to be upset.

As has been demonstrated in section 2, WFPF sentences have a similar interpretation, and a similar prosodic structure, but they differ on the crucial accented constituent, since an object or another kind of argument and not a

subject carries the accent.¹¹ We have seen examples with direct objects above. The fact thatthetic sentences accent their subject is readily explained when one becomes aware thatthetic sentences like those in (17) do not have any object and are instead accented on the only available argument, namely the subject. In these types of sentences, the action denoted by the verb is prototypical for the subject. Replacing the verbs in (4) with those in (18) destroys the WFPF preference in the following expressions and forces the emergence of an additional accent on the verb or on another constituent.¹²

- (18) a. {‘What did you do after I left?’}
 [P [Ein BIER haben wir neu ZUSAMMENGEBRAUT]F]
 ‘We brewed a new beer.’
- b. {‘Why was she away so long?’}
 [P [Das KIND hat sie zur NOTAUFNAHME fahren müssen]F]
 ‘She had to drive the child to the emergency room.’

Sentences with partial fronting also arise in readings other than all-new or wide focus ones. As shown by Fanselow & Lenertová (2006), indirect objects may be fronted and accented when the direct object is given, as shown in (19). In their example, a narrower focus is induced by the question, which mentions more than just the subject.

- (19) {What did you do with the book?}
 Meiner FREUNDIN hab ich’s/das Buch geschenkt
 my-DAT friend have I it/the book given
 ‘I gave it to my friend as a present.’

¹¹ An example of a preposed argumental adverb appears in (i).

(i) {How was the trip?} *Schnell sind wir gefahren.* ‘We drove fast.’

¹² In Katalin É. Kiss’s terms (p.c.), in order for WFPF to arise, it should be possible to accommodate the meaning of the verb as soon as the object has been pronounced.

In this case, the thetic flavor is lacking entirely, and the sentence is categorical: it consists of a topic or a theme and a comment on this topic. (19) is a statement about the book asked for by the context. In this example, the ‘topic’ is the element which the sentence comments about. In syntactic terms, the question asks for a VP, but some part of the VP, the direct object in (19), has previously been mentioned. Still the accented part of the sentence may be fronted and the verb remains in situ.

3.2 Prosodic analysis of WFPF

In section 1, we raised the question of how to integrate into the prosodic model the raising of pitch usually observed in relation with an accent on a narrow focus as compared to wide focus. Most approaches advocate an indirect relationship achieved by changes in phrasing. Beckman & Pierrehumbert (1986) propose inserting a prosodic phrase to the left of a focus domain so that regular downstep taking place inside of an Intermediate Phrase is interrupted. Gussenhoven (1983, 1992) and Truckenbrodt (2007) also propose that a narrow focus or a given constituent changes the prosodic phrasing of sentences, so that biuniqueness of prosodic phrases and pitch accents is guaranteed. Selkirk (2006) allows different kinds of pitch accents to be heads of different levels of prosodic phrasing. In particular, a pitch accent which stands for an information focus is the head of a lower level Major Phrase. In contrast, a pitch accent standing for a contrastive focus is the head of the highest level of phrasing, the Intonational Phrase.

Following the proposal for German laid down in Féry & Ishihara (to appear), an alternative view restricts the grammatical component with the power of changing phrasing to syntax, and considers raising and lowering of pitch as affected solely by information structure, which, with unchanged syntax, is unable to insert or delete boundaries of prosodic phrases. Syntax

defines a basic or unmarked prosodic structure, characterized by downstepped top lines of prosodic phrases until the end of the intonation phrase. Information structure can change the scaling of top lines, and indirectly also the scaling of pitch accents adjusted to the top lines.¹³ Information structure, thus, relates pitch accents to each other. A narrow focus raises the pitch of the affected constituent. Simultaneously it lowers the pitch accents of given constituents. Such a conception of the role of pitch accents is purely relational. A hearer knows which accent is the most prominent by comparing it to the other ones of the same domain. If there is no accent to which a prominent syllable can be compared, there is no point in raising or lowering it. In particular, if a specific accent is unique in the intonation phrase, the relational model predicts that it will not change its height as a reflex of informational or narrow focus.

The results of the first production experiment confirmed the relational model of prosody. The initial pitch accent had the same height in narrow and wide focus contexts. The second and third production experiments confirmed the view that prosodic phrases are mapped onto syntax independently of the information structure. The influence of additional prosodic phrases was tested in the form of an additional verbal argument or of a full DP subject. Since the phrasing is mapped onto syntax, elements following the intended unique pitch accent still project a prosodic phrase, and they are readily assigned a pitch accent. In the third experiment, the height of the preverbal object was measured when it was followed by a

¹³ In this sense, phrasing does affect the height of pitch accents, though not by changing the overall prosodic phrasing. An alternative view consists in viewing the scaling of accents as a local phenomenon, not biased by top lines. We think that top lines provide a more correct view of scaling, because they are needed independently for reset of accents at the beginning of new domains, as well as for embedded scaling. Using top lines for scaling of accents allows a more constrained theory of pitch accent scaling.

deaccented prosodic phrase, as compared to when there was only one prosodic phrase comprising the whole sentence. Again no difference in the height of pitch was found. This is in agreement with the theory that an increase in pitch height for narrow focus only makes sense when there is another accent in the sentence to which it can be compared. If there is none, no raising (or lowering) needs to take place.

A conception of prosodic structure which adds new phrases, or which considers narrow focus as the head of a different level of phrasing from informational focus, cannot account for this lack of difference in pitch height.

The second production experiment did not bear immediately on the issue of accent scaling, but only on the readiness to realize a unique accent if additional prosodic phrases are present. The results of this experiment showed that adding prosodic phrases renders a WFPF intonation less probable. This is predicted by a theory which says that only the syntax influences the creation of prosodic phrases. The addition of postverbal material goes hand in hand with additional p-phrases and thus additional pitch accents. The result of this production experiment showed that speakers were tempted to add accents in these longer sentences. In other words, our results were compatible with a prosodic model in which information structure influences the scaling of accents, and has a deaccenting effect in the postnuclear region, but cannot create or delete prosodic phrases.

4 Conclusion

German Wide Focus Partial Fronting sentences (WFPF), like *Ein BIER haben wir getrunken*, ‘We drank a beer’, have a rigid prosodic structure characterized by a unique initial falling pitch accent H*L on the fronted

object, followed by a flat and low melody until the end of the sentence. The information structure of WFPF sentences is identical to that of a wide focus, though they are pragmatically similar tothetic sentences: the accented argument and the verb must be tightly correlated semantically. The falling accent is to be interpreted as the focus exponent, thus the bearer of the focus accent, and the remaining part of the sentence is integrated into the p-phrase of this accent. The complete deaccenting of the final section of the sentence emphasizes the integrational pattern.

It was possible to show in production experiments that speakers readily pronounce WFPF sentences as long as the postnuclear material can be integrated into one p-phrase. If additional material appears, like a full DP subject or an additional verbal argument, speakers have the tendency to realize additional accents, even in a wide focus context. In perception experiments, a difference in acceptability was found between sentences presented acoustically, and thus displaying the intended accent pattern, and the same sentences presented in a written form, and thus without accents. Sentences presented with the right prosodic pattern got higher scores than sentences presented in the written form. This difference may point to the importance of integrating prosodic patterns into acceptability judgment tasks in general.

The results presented in this paper bear on the best theory of the syntax-information structure-prosody relationship. It was shown that a relational theory of pitch accent scaling can explain the data, whereas absolute models cannot. Moreover, our data are consistent with a view of prosodic structure which considers syntax as the only source of prosodic phrasing. In an unchanged syntactic pattern, information structure cannot introduce new prosodic phrases, but can only raise or lower pitch accent heights, mediated by top lines of prosodic domains.

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Appendix

Experiment 1 (production)

- 1.1 a. Was hast du denn am Sonntag gemacht?
'What did you do on Sunday?'
b. Was hast du denn am Sonntag gelesen?
'What did you read on Sunday?'

Zeitung/Die Welt habe ich gelesen. 'I read the newspaper/Die Welt.'

- 1.2 a. Seid ihr noch ausgegangen? 'Did you go out afterwards?'
b. Was habt ihr getrunken? 'What did you drink?'

Ein Bier/Ein Jever haben wir getrunken. 'We drank a beer/a Jever.'

- 1.3 a. Warum bist du so spät ins Bett gegangen?
'Why did you go to bed so late?'
b. Was hast du geguckt? 'What did you watch?'

Fernsehen/"Wer wird Millionär" habe ich geguckt. 'I watched television/"Who Wants to Be a Millionaire?"'

Experiment 2 (production)

- 2.1 a. Warum warst du so lange weg? 'Why were you away so long?'
b. Wohin hast du den Wagen gefahren?
'Where did you drive the car to?'
c. Was hast du in die Garage gefahren?
'What did you drive into the garage?'

Den Wagen/den Jaguar habe ich in die Garage gefahren.

In die Garage habe ich den Wagen/den Jaguar gefahren.

Ich habe den Wagen/den Jaguar in die Garage gefahren.

‘I drove the car/the Jaguar into the garage.’

- 2.2 a. Was hast du gestern den ganzen Tag gemacht?
 ‘What did you do the whole day yesterday?’
 b. Wohin hast du die Bänder/den Roman gestellt?
 ‘Where did you put the books/the novel?’
 c. Was hast du ins Regal gestellt?
 ‘What did you put in the bookcase?’

Die Bänder/den Roman habe ich ins Regal gestellt.

Ins Regal habe ich die Bänder/den Roman gestellt.

Ich habe die Bänder/den Roman ins Regal gestellt.

‘I put the books/the novel in the bookcase.’

- 2.3 a. Warum warst du gestern in der Stadt?
 ‘Why were you in the city yesterday?’
 b. Was hast du deiner Oma geschenkt?
 ‘What did you give as a present to your granny?’
 c. Wem hast du Blumen/Rosen geschenkt?
 ‘To whom did you give flowers/roses?’

Blumen/Rosen habe ich meiner Oma geschenkt.

Meiner Oma habe ich Blumen/Rosen geschenkt.

Ich habe meiner Oma Blumen/Rosen geschenkt.

‘I gave flowers/roses to my granny.’

Experiments 3–5 (production and perception)

- 3.1 a. Warum hat der Vortrag nicht stattgefunden?
 ‘Why didn’t the talk take place?’
 b. Was hat der Pförtner verloren? ‘What did the doorman lose?’
 c. Was haben sie/was hat er verloren?
 ‘What did they/he lose?’

Den Eingangsschlüssel haben sie verloren.

‘They lost the front door key.’

Den Eingangsschlüssel hat der Pförtner verloren.

‘The doorman lost the front door key.’

- 3.2 a. Wieso kommst du so spät? ‘Why are you so late?’
b. Was haben sie gemacht? ‘What did they do?’
c. Was hat die Polizei gemacht? ‘What did the police do?’

Eine Alkoholkontrolle haben sie gemacht.

Eine Alkoholkontrolle hat die Polizei gemacht.

‘The police were stopping drivers to test for alcohol consumption.’

- 3.3 a. Weswegen beklagen sich deine Nachbarn?
‘Why are your neighbors complaining?’
b. Was haben sie wieder mal erhöht?
‘What did they raise again?’
c. Was hat der Hauswirt wieder mal erhöht?
‘What did the landlord raise again?’

Die Miete haben sie wieder mal erhöht.

Die Miete hat der Hauswirt wieder mal erhöht.

‘The landlord/they raised the rent again.’

- 3.4 a. Wird in China die Natur besonders geschützt?
‘Is the environment in China especially protected?’
b. Was haben sie da gebaut?
‘What did they build?’
c. Was hat die Industrie-Lobby da gebaut?
‘What did the industry lobby build?’

Den größten Damm der Welt haben sie da gebaut.

Den größten Damm der Welt hat die Industrie-Lobby da gebaut.

‘They/the industry lobby built the largest dam in the world.’

- 3.5 a. Warum haben die meisten Lehrer die Linkspartei gewählt?
'Why did most teachers vote for the leftist party?'
b. Was haben sie gekürzt?
'What did they cut?'
c. Was hat das Ministerium gekürzt?
'What die the ministry cut?'

Die Löhne haben sie gekürzt.

Die Löhne hat das Ministerium gekürzt.

'They/the ministry cut the wages.'

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