

The relationship between stress and syntax in German

Manuela Korth

University of Stuttgart

manuela.korth@ling.uni-stuttgart.de

Abstract: The following paper is intended to show how metrical structure of German verb-final sentences can be derived from syntactic and information-structural cues by taking the syntactic relationship and the information status of adjacent syntactic constituents into consideration. It will be argued that the syntactic structure has to be supplemented by focus features rather than by givenness features and that focus features need to be restricted to foreground domains to derive the correct stress pattern.

Key words: syntax, stress, focus, givenness, German

1. Introduction

It has been uncontroversial for several decades that prosody is in some way related to syntax and information structure;¹ but how this relationship can be solved formally is still in the focus of interest. Taking part in the discussion, I would like to introduce a model which deals with the interaction of syntax, focus, and stress in German.

I use a basic generative approach without intermediate projections as syntactic foundation for the derivation of metrical structure. Although German differentiates three types of sentences by the position of the finite verb, the discussion concentrates on sentences with the finite verb in final position.² I show that metrical structure of verb-final sentences in German depends on the syntactic relationship as well as on the information status of adjacent syntactic constituents.

The basic metrical model for information-structurally neutral sentences is introduced in section 2 and extended to information-structurally marked constructions in section 3. The metrical behaviour of focused constituents and their domain restrictions are shown in section 3.1, whereas section 3.2 deals with given resp. background information. As a last point, section 3.3 argues that only focus but not givenness constitutes a relevant feature in syntax.

2. Basic model for information-structurally neutral sentences

The syntactic model I am adopting is a basic generative model which manages without intermediate projections and phonetically empty functional projections. It is founded on the two basic kinds of structural relationship – integration and separation. Constituents can either combine in a head-complement structure or in an adjunct structure. Syntactic heads are able to take one of their arguments as complement (= integrating structure), whereas further arguments as well as modifiers have to be bound by adjunction (= separating structure). The syntactic relationship is reflected in metrical structure. Head-complement structures lead to an integrating prosodic structure with metrical

¹ Work on the relation of prosody to syntax and information structure goes back to the 1960s. Early approaches have been given by Kiparsky (1966), Chomsky & Halle (1968), and Bresnan (1972), later ones by Selkirk (1984, 1995) and Cinque (1993), and current ones by Wagner (2005) and Kahnemuyipour (2009) among many others.

² For a description of the stress assignment in verb-first and verb-second sentences in German cf. Korth (2010a).

subordination of the head, whereas the immediate sub-constituents of adjunct structures receive equally strong main stresses.

The diagram on the left side of figure 1 shows an adjunct structure with the context-independent metrical structure for each sub-constituent. The metrical structure is represented in an alternative relational model.³ It differs from the traditional relational model (a tree structure with strong and weak nodes, which has been introduced by Liberman (1975) and Liberman & Prince (1977)) in the point that it allows for equally strong stresses on adjacent constituents in the abstract metrical representation.⁴ The metrical marks (shown by squares in figure 1) represent relative metrical strength, not absolute values. Main stresses of the respective morpho-syntactic unit are placed on the upper bounds (= maximal strength). Marks for reduced syllables with schwa or syllabic sonorants, which cannot be accented, are placed on the lower bounds (= minimal strength). According to relative metrical differences derived from morpho-syntactic information, further marks are arranged in the space between.⁵ The diagram on the right side of figure 1 shows the same adjunct structure after the stress assignment process (indicated by the arrows in the syntactic structure) has applied. Both sub-constituents are realized with main stresses of the same strength.

Figure 1. Adjunct structure

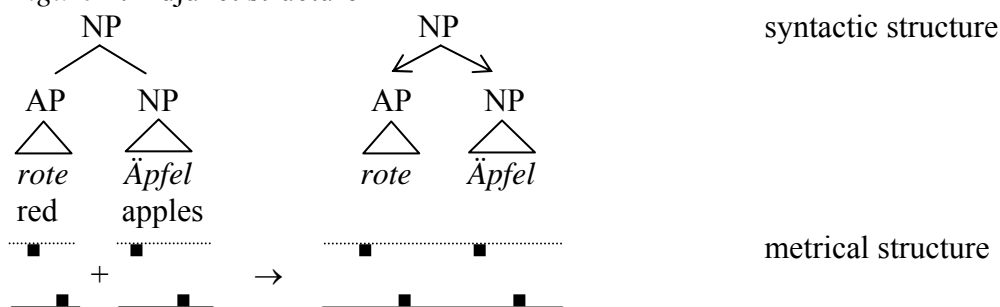


Figure 2 shows the stress assignment for head-complement structures. The complements are metrically stronger than the respective head, independent of whether the structure branches right or left.⁶ The single metrical mark for the determiner in the context-independent metrical structure in the left diagram of figure 2 is underspecified for its position until it is combined with other material because metrical relations only exist between at least two marks.

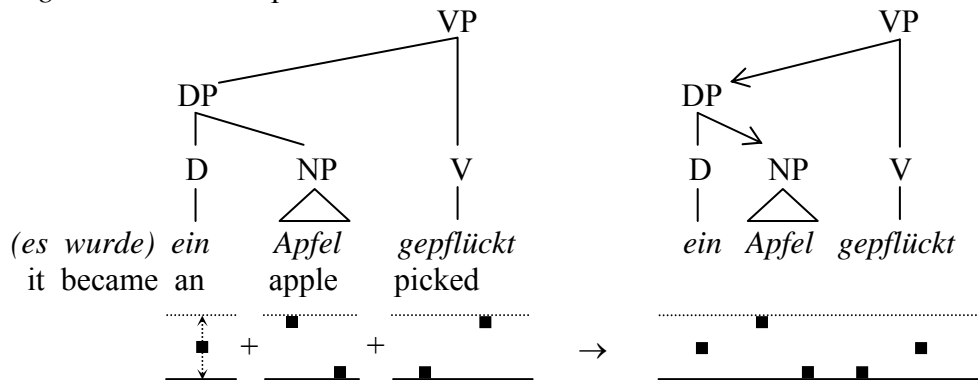
³ I use a simplified version of the metrical model here for ease of presentation. For a more detailed description of the model involving neutral reference marks and sub-syllabic structure cf. Korth (2010b).

⁴ For the necessity of a model which allows for metrically identical constituents cf. the argumentation of Wagner (2005), who uses an alternative metrical grid notation.

⁵ Cf. the stress assignment processes in the following figures.

⁶ In contrast to Wagner (2005), I assume that differences in linear order of heads and their arguments are not reflected in metrical structure. The fact that heads which precede their argument(s) can carry pitch accents in contrast to heads which follow their argument(s) has independent reasons: A pitch accent on a weaker stressed syllable preceding a main stressed syllable can be covered by an upstep in fundamental frequency on the main stressed syllable. A weaker stressed syllable following a main stressed syllable instead cannot be realized by a pitch accent – even if it is a downstepped one – because it would be indistinguishable from an accent on a main stressed syllable, which is subject to downtrend in fundamental frequency.

Figure 2. Head-complement structures



(‘an apple has been picked’)

These basic assumptions make it possible to derive the metrical structure of information-structurally neutral verb-final sequences in German. Based on these first findings, I would like to extend the model to information-structurally marked sentences in the next section.

3. Advanced model for information-structurally marked sentences

Only few of our daily utterances can count as neutral. Most sentences are in some way related to the discourse context and show a clear information-structural subdivision. The syntactic structure of those non-neutral sentences needs to be supplemented by features for the information status of its constituents. The question whether a feature for focus is relevant (as e.g. used by Selkirk 1995) or a feature for givenness (as assumed by Sauerland 2005 and Kučerová 2007) will be the topic of section 3.3. Before we take part in the discussion, it is necessary to have a closer look at both features separately.

3.1 Marking focused constituents

There is general agreement about the point that focused constituents in German (and in many other languages as well) attract stress in comparison to non-focused parts of the same utterance. Figure 3 uses the adjunct structure of figure 1 in a context which forces the focussing of the NP *Äpfel* (‘apples’) because ‘apples’ contrasts with ‘berries’, whereas *rote* (‘red’) cannot be contrasted to anything in the context. The focused constituent is marked by the feature ‘foc’ in syntax, whereby it receives stronger stress than its unmarked sister constituent. The upper bounds of the metrical domain of the NP are raised in comparison to the metrical domain of the AP.⁷ The whole metrical domain of the NP is stretched. The metrical relations inside the domain remain untouched.⁸

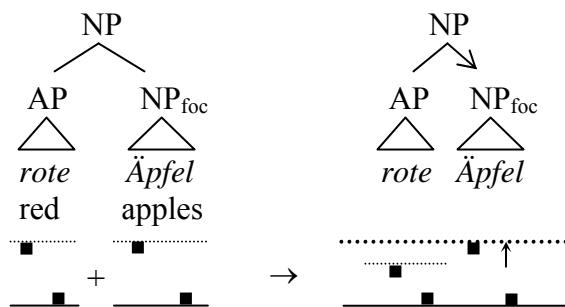
⁷ It is also possible to say that the upper bounds of the metrical domain of the AP are lowered in comparison to the metrical domain of the NP because the model mirrors the metrical *relations* of constituents and represents *relative* rather than *absolute* strength. But if we take the linear order during the utterance into consideration, the term ‘raising’ would be more appropriate in this case.

⁸ The metrical grid theory in contrast has to assume that either only the main stressed syllable is affected by adding a mark to it, which leads to an unmotivated high number of metrical marks on the nuclear stressed syllable in several examples (e.g. by Cinque 1993), or that all syllables of a focused constituent are affected by adding a mark to them, which would also give stress to unstressable reduced syllables.

Figure 3. Focused constituents

A: Does Peter like red apples or red berries?

B: Peter likes...



Focused constituents can be embedded into one another as in example (1). The information focus of B's answer in (1) covers the whole sentence. It encloses a narrow focus introduced by the focus particle *nur* ('only'), which selects one member out of the set of possible book buyers. The book buyers are accessible from the context, which provides a book store frame. The embedded focus attracts the strongest stress inside the higher ordered information focus.

- (1) A: Why was Anne a bit disappointed when she came out of her bookstore yesterday?
 B: [*weil nur [ein JUNge]*_{foc} *ein Buch kaufte*]_{foc}
 because only a.NOM boy a.ACC book bought
 ('...because only a boy bought a book')

But an utterance can also contain constituents which receive stresses as strong as the stress of an embedded focus in the same utterance (cf. example (2)). The information focus of B's answer in (2) covers the whole sentence. The two contrasting APs *großer* ('tall') and *kleiner* ('small') form embedded foci. Nevertheless, the constituent *Buch* ('book'), which is neither an embedded focus nor a part of an embedded focus, receives the same metrical strength as the two contrastive foci. The reason is that every focus is restricted to a specific domain, its foreground⁹. The foreground is the result of filling the variables contained in the background by foci. The relevant background for the two embedded foci is 'an x boy', which is filled as soon as the DP-level is reached. Both embedded foci are therefore restricted to their DP ('a tall boy' resp. 'a small boy') and have no influence on the stress assignment at higher syntactic levels.

- (2) A: Why was Anne happy?
 B: [*Weil ein [GROßer]*_{foc} *Junge einem [KLEInen]*_{foc} *Jungen ein BUCH gab*]_{foc}
 because a.NOM tall boy a.DAT small boy
 a.ACC book gave
 ('...because a tall boy gave a book to a small boy')
 → FG₁ (= foreground): a tall boy → FG₂: a small boy
 BG₁ (= background): an x boy BG₂: an x boy
 F₁ (= focus): tall F₂: small

⁹ The notion 'foreground' goes back to Gestalt Psychology and is used e.g. by von Heusinger (1999). Our conception of foreground has parallels to the approach given by Rooth (1992), who describes focus within Alternative Semantics.

The first conjunct of example (3) is – at first glance – identical to the sequence in (2). But it differs from (2) in the point that *Buch* (‘book’) is metrically weaker than the two embedded foci, by means of which it lacks an accent, because the presence of the second conjunct leads to an additional contrast at the DP-level: The subject of the first conjunct contrasts with the subject of the second conjunct; and the object of the first conjunct contrasts with the object of the second conjunct.

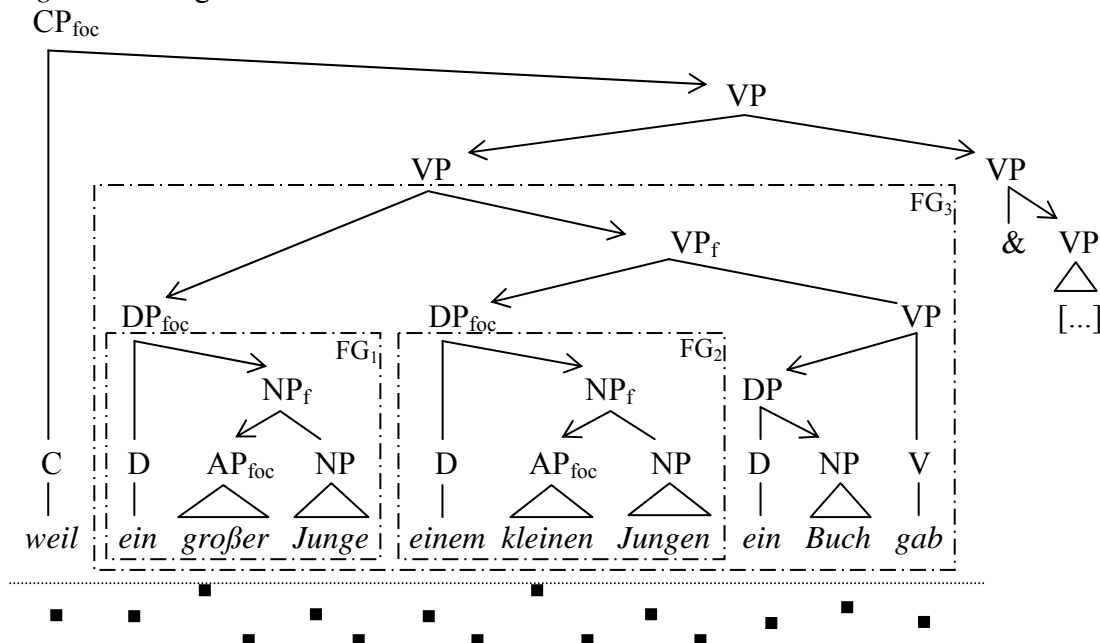
- (3) A: Why was Anne happy?
 B: [*Weil* [*ein* [*GROßer*]_{foc} *Junge*]_{foc} [*einem* [*KLEInen*]_{foc}
 because a.NOM tall boy a.DAT small
Jungen]_{foc} *ein* *Buch gab* *und* [*ein* [*KLEIner*]_{foc} *Junge*]_{foc}
 boy a.ACC book gave and a.NOM small boy
 [*einem* [*GROßen*]_{foc} *Jungen*]_{foc} *ein* *Buch gab*]_{foc}
 a.DAT tall boy a.ACC book gave
 (‘...because a tall boy gave a book to a small boy and a small boy gave a
 book to a tall boy’)

That the DPs rather than the APs are responsible for the contrast between the first and second conjunct can be illustrated by replacing the contrasting DPs by individual names. Due to the contrast, *Buch* (‘book’) lacks an accent in the sequence in (4) as well as in the sequence in (3).

- (4) *weil* *OTto* *THILO* *ein* *Buch gab* *und* *PEter* *ANton* *ein*
 because O.NOM T.DAT a.ACC book gave and P.NOM A.DAT a.ACC
Buch gab
 book gave
 (‘...because Otto gave a book to Thilo and Peter gave a book to Anton’)

Figure 4 shows the syntactic structure belonging to the first conjunct of (3) with the relevant information-structural features. The subscript ‘foc’ marks the focused constituent, which projects a stress relevant focus feature (marked by the subscript ‘f’) until its foreground is reached. Due to the focus projection, the focused constituent attracts stress inside the foreground. Once the background is filled, the f-feature does not project any higher and the respective constituents behave similar to other unmarked constituents. The foreground domains FG₁ and FG₂ are identical to the corresponding domains of example (2). A third foreground domain, which covers the first conjunct, is added. The second conjunct is structured in parallel to the first one, so that the whole sentence in (3) contains eight embedded foci which are restricted to six different foreground domains. The post-focal material in the identical backgrounds can be deleted, except of the material in the final one (cf. example (5)).

Figure 4. Foreground-restricted foci



→ FG₃: a tall boy gave a book to a small boy

BG₃: x gave a book to y

F_{3x}: a tall boy

F_{3y}: a small boy

- (5) *weil ein GROßer __ einem KLEInen __ und ein*
 because a.NOM tall a.DAT small and a.NOM
KLEIner __ einem GROßen Jungen ein Buch gab
 small a.DAT tall boy a.ACC book gave

Marking syntactic constituents with foreground-restricted focus features leads to the correct stress pattern in the examples discussed so far, in which the embedded foci either directly contrast with other constituents in the utterance or in which they are in the scope of a focus particle as in (1). The following section takes a closer look at constituents which are destressed because of their relation to the discourse context.

3.2 Marking given / background constituents

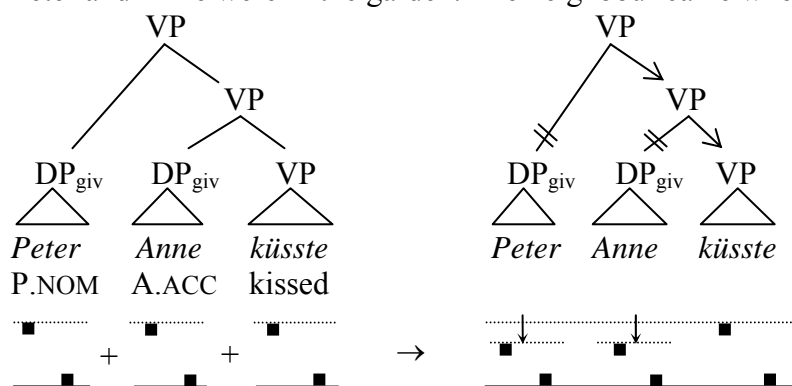
Constituents given in the context of an utterance are usually destressed. Therefore, Schwarzschild (1999) and Sauerland (2005) among others argue for the relevance of givenness with respect to the derivation of stress. While Schwarzschild is explaining his point of view by still using focus features in syntax, Sauerland replaces them by corresponding features for given constituents.

Figure 5 shows the stress assignment for sequences with given constituents. Each of the two DPs carries a feature for givenness because *Peter* and *Anne* are mentioned in the preceding context. The givenness feature blocks the stress assignment and *küsste* ('kissed') as unmarked constituent receives the strongest stress of the sequence. The upper bounds of the metrical domain of each of the two DPs are lowered in comparison to the upper bounds of the metrical domain of the respective syntactic sister

constituent.¹⁰ The whole metrical domain of each of the two DPs is compressed. The metrical relations inside the lowered domains remain untouched.

Figure 5. Given constituents

Peter and Anne were in the garden. The neighbour came when...



(‘...Peter kissed Anne’)

If we take a look at the following example, the question arises whether it is really givenness which the constituents should be marked for because destressed constituents are rarely given in a canonical sense. The referent of a destressed constituent has not to be explicitly mentioned before. Destressed constituents can also be accessible via the situational context or the relation to a constituent in the discourse.¹¹ The only constituent in (6) which can count as given is the PP *von den Hunden* (‘of the dogs’). The other destressed constituents are not given in a canonical sense. The DP *einen von den Hunden* (‘one of the dogs’) is accessible by its relation to a discourse constituent. It describes a part of the previously mentioned set of Peter’s dogs. The deictic pronoun *ich* (‘I’) and the temporal adverb *gestern* (‘yesterday’) are related to the situational context. The pronoun refers to the speaker of the utterance, and the adverb refers to a time depending on the utterance time (= one day before). The constituents should therefore rather be marked with a background feature than with a givenness feature (cf. example (6)).

- (6) A: Do you know that Peter owns dogs?
 B: *ja* [*ich*]_{BG} *habe* [*gestern*]_{BG} [*einen* [*von den Hunden*]_{BG}]_{BG}
 yes I.NOM have yesterday one.ACC of the.DAT dogs
geSTREIchelt
 patted
 (Yes. I patted one of the dogs yesterday.)

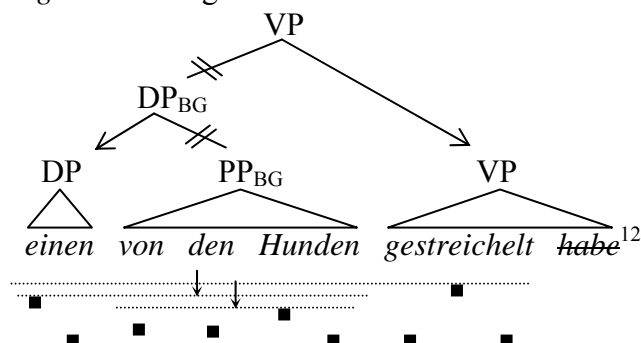
A constituent which is marked as background information can be embedded into another constituent with the same feature. The syntactic structure of the relevant sequence of example (6) is given in figure 6. The upper bounds of the metrical domain of the background-marked PP *von den Hunden* (‘of the dogs’) are lowered in comparison to the metrical domain of the unmarked adjacent DP, and the upper bounds

¹⁰ It is also possible to say that the upper bounds of the metrical domain of the VP are raised because of the relational character of the metrical model.

¹¹ That it is necessary to have degrees of cognitive accessibility or familiarity has often been mentioned. Cf. e.g. the work by Prince (1981) and Gundel & Hedberg & Zacharski (1993). An overview of different approaches is given by Baumann (2006: §2.2).

of the whole metrical domain of the superordinate background-marked DP *einen von den Hunden* ('one of the dogs') are lowered in comparison to the unmarked adjacent VP.

Figure 6. Background constituents



Background features, which block the stress assignment, lead to the correct stress pattern in the discussed examples. But whether we really need background features next to or instead of focus features will be the topic of the next section.

3.3 Focus versus background

The relationship of foreground, background, and focus can be subsumed in the simple formula *foreground – focus = background*¹³, which allows the following conclusions: First, if we know which constituents are background information in a specific foreground domain, we can infer that all other material is focused. Second, if we know which constituents are focused in a specific foreground domain, we can infer that all other material is background information.

But how can we decide which features are the necessary ones? An argument for marking background rather than focus would be that background information can be inferred from contextual information, whereas focusing depends on the respective background. The contrast of the embedded foci in the examples (2) and (3) of section 3.1 can only be recognized by knowing the background. If we do not have any information about the identical backgrounds, we cannot identify the non-identical constituents as foci. A similar conclusion can be made for the examples discussed in section 3.2 as well as for example (1). The foci of these sentences can only be identified by knowing which parts of the respective sentence are related to the textual or situational context, which is the same as knowing the background. Therefore, background is necessary for identifying focus. But using a feature for background in syntax would nevertheless be problematic because background information only rarely corresponds to syntactic constituents (cf. example (7) as well as the examples in section 3.1), whereas focus matches with constituents in the underlying syntactic structure. Discontinuous focused constituents as in (8) are only possible at the surface. They are the result of moving a part of the focus out of its base position. In underlying structure, they form a single syntactic constituent.

¹² The finite verb in German is base generated at the end of the sentence. It moves to the C-head in verb-first and verb-second sentences. The metrical structure of the auxiliary can be ignored here for ease of presentation.

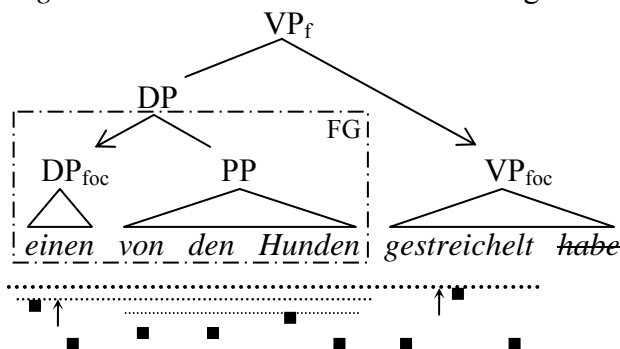
¹³ Cf. von Heusinger (1999: 188): “The background contains the foreground minus the focused expression which is substituted by designated variables.”

- (7) A: Anne became happy when someone came.
 B: Yes, ...
 [als [[Peter]_{DP} kam]_{VP}]_{CP}
 when P.NOM came
 → BG: when x came // x came = ?
 F: Peter = DP
- (8) A: What did Anne do yesterday?
 B: [Ein BUCH]_i hat sie [t_i gelesen]_{foc}
 a.ACC book has she.NOM read
 ('She read a book.')

This leads us to a further argument for the relevance of focus features. There are different kinds of movement to the first position in German verb-second sentences.¹⁴ One kind of movement is default movement, which affects the first moveable maximal constituent of the core sentence (= highest VP-projection). Next to the default movement, German offers the possibility to move the whole focused constituent or at least its first maximal focus exponent, which is a sub-constituent of the focus marked by the same feature.¹⁵ Moving a focus or a focus exponent is a marked option to fill the first position in verb-second sentences. The movement must therefore be triggered by a feature for the focus status of the respective constituent and cannot be subject to a default rule.

According to our findings, the givenness-features of the two DPs in figure 5 has to be replaced by a corresponding focus marking of the VP. The VP *küsste* ('kissed') contrasts with other possible but contextually unmentioned activities *Peter* and *Anne* could be involved in. Because of the relational character of the metrical model, the stress assignment process results in the same metrical structure. The same holds for the example in figure 6. Using foreground-restricted focus features instead of background features leads to the same metrical structure (cf. figure 7).

Figure 7. Focus features instead of background features



To sum up, only features for focus (restricted to foreground domains) are necessary in syntax, but background information gives us the relevant cues to mark constituents as focused.

¹⁴ Different strategies of filling the first position in verb-second sentences are discussed by Fanselow (2003) and Frey (2006).

¹⁵ The theory of focus exponents goes back to Fuchs (1976). For a modified description of focus exponents and their relevance for stress and movement cf. Korth (2010a).

4. Conclusion

The presented model has given some insights in the derivation of the metrical structure of verb-final sentences in German. It has been shown that metrical structure is related to syntactic information in neutral as well as in information-structurally marked sentences. The stress assignment process refers to the syntactic relationship of adjacent constituents. Syntactic heads are metrically subordinate to their complement, whereas adjuncts receive equally strong stresses. The stress assignment is influenced by features for the information status of constituents. The discussion has shown that background information is necessary to identify foci but that it is more useful to supplement the syntactic structure with foreground-restricted focus features, which attract stress, rather than by features for given or background information, which block stress.

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