

Revisiting prosodic reconstruction: An interface-based approach to partial focus and topic fronting in German



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Chapter 1

Introduction

1.1 Outline

The central empirical phenomenon investigated in this thesis is partial fronting of information-structural categories in German. The basic observations are illustrated in (1): when a direct object is fronted to the left periphery in German, it is still possible to interpret the whole VP as the focus (observed e.g. by Höhle 1982, Krifka 1998; tested empirically a.o. by Féry & Drenhaus 2008) or a contrastive topic (observed by Büring 1997, Jacobs 1997; tested empirically by Wierzba 2011).

- (1) Was hat Maria am Nachmittag gemacht? ‘What did Maria do in the afternoon?’
- a. Ein Buch hat sie [~~ein Buch~~ gelesen]_{foc}.
a book has she a book read
‘She read a book.’
 - b. Ein Buch hat sie jedenfalls nicht [~~ein Buch~~ gelesen]_{CT}...
a book has she anyway not a book read
‘As for reading a book, that’s not what she did...’

Previous experiments on partial fronting of information-structural categories yielded a puzzling finding: a broad focus interpretation is possible when the object carries sentence stress, but not when the subject does (even if it is a full discourse-new phrase and not just a pronoun as in (1)). This is at odds with the common assumption that sentence stress is usually assigned to the rightmost argument under broad focus. In this thesis, I develop a novel account of this observation. It is based on the idea that interface mapping rules apply under reconstruction. For (1a), this would mean that sentence stress on the

object licenses a focal interpretation of the object or a larger constituent *containing the trace/lower copy* of the object (just like it would be the case if the object was in that position). This proposal comes with the benefit that in contrast to previous approaches, it can be extended to the hitherto less discussed partial fronting of contrastive topics in German: in (1b), a rising accent on the object licenses a contrastive topic interpretation of the fronted object or a larger constituent (just like it would if the object was in its original position).

With the aim to provide a concrete implementation of this idea, I will first review previous work on ‘prosodic reconstruction’. A number of authors (Bresnan 1971, 1972, Selkirk 1995, Legate 2003, Korth 2014, a.o.) have proposed that the basic structure of a sentence has to be considered in order to predict its stress pattern (and therefore, under the view that more complex structures are derived from more basic structures by transformations, a previous step in the derivation has to be re-built or re-accessed in some way). The theoretical focus of the thesis is on assessing to what extent the proposed approaches and the concept of prosodic reconstruction in general can be reconciled with recent theoretical developments. The goal is to arrive at a workable theory that is compatible with current syntactic assumptions like the copy theory of movement (Chomsky 1995) and phase theory (Uriagereka 1999, Chomsky 2000) as well as with current assumptions of prosodic phonology. The proposed model combines a generative syntactic component with Optimality Theoretical (Prince & Smolensky 1993) interface mapping constraints. The core idea—applying interface mapping rules before copies are deleted—is in line with a recent analysis sketched in Truckenbrodt (in press).

My proposal is to extend the idea that syntax-prosody mapping happens under reconstruction also to the mapping between prosody and information structure. This analysis of partial focus/CT fronting that I develop based on previous studies will also be tested against new data stemming from five acceptability judgment experiments on a variety of structures of German. The study was designed to test the empirical adequacy of the basic idea of prosodic reconstruction in comparison to alternative models with surface-oriented mapping, abstracting away from the implementation details of the reconstruction mechanism. For this, relevant parts of previous experiments were replicated with a more rigid control of potentially confounding factors, and the data set was also extended to hitherto untested structures. The results indicate that reconstruction for interface mapping indeed helps to account for partial focus data in German as well as partial contrastive topic fronting (although structural factors influence the latter phenomenon less strongly).

A more general, methodological goal of this study was to address the question how we can evaluate the adequacy of different models in an empirical domain like information-structure related word order variation, in which gradient patterns and optionality are prevalent and a multitude of factors interact in an intricate way. I use a methodology based on linear modeling (adopting Keller’s 2000 proposal that the violation of grammatical principles affects acceptability in a linearly cumulative way) to analyze to what extent various independently proposed interface-related principles are sufficient to explain the acceptability data, and which additional principles help to improve the empirical adequacy of the model.

1.2 Structure of the thesis

The remainder of the thesis is structured as follows.

Chapter 2 provides a review of the relevant literature. First, I review approaches to syntax-prosody mapping for unmarked syntactic structures, spanning from Chomsky & Halle’s (1968) Nuclear Stress Rule to recent Optimality Theoretical models. The focus is on two prosodic asymmetries and how the approaches account for them: the prosodic subordination of the verb to its complement, and the prosodic subordination of the subject to the VP in transitive structures, in both English and German. I conclude that whereas the latter asymmetry (concerning the position of sentence stress) is best captured in terms of a linear preference, the former asymmetry (concerning the distribution of accents within the VP) is best explained by accounts that are based on the distinction between syntactic phrases and non-phrases, as proposed by Truckenbrodt (1995), Selkirk (2011), and Féry (2011). This approach will also be adopted in the model that I propose in chapter 3.

I then try to assemble all observations that have been discussed in the linguistic literature in connection with the interaction of syntax-prosody mapping with syntactic movement. This includes observations on relative clauses, wh-movement, VP-internal subjects, verb movement, and discontinuous constituents. I review the theoretical implementations of the idea of prosodic reconstruction that have been proposed to account for prosodic reconstruction effects. Some of them are based on the idea that the general syntax-prosody principles apply cyclically during the derivation. Others involve a mechanism that allows to take into account traces/lower copies of moved constituents for the purpose of interface mapping.

In Chapter 3, I propose a new implementation of prosodic reconstruction, aiming to bring together the most theoretically and empirically advantageous features of the discussed approaches. The goal is a unified approach which is applicable to all types of examples that have been put forward as evidence for prosodic reconstruction, and which is compatible with recent syntactic and prosodic frameworks. My proposal involves reconstructing variants of the Optimality Theoretical constraint MATCH PHRASE (Selkirk 2009, 2011), which favors a single accent on the object within transitive VPs (capturing the verb-complement asymmetry), and the NUCLEAR SENTENCE STRESS RULE NSS (Sato 2012), which singles out the rightmost phonological phrase as the most prominent one (capturing the subject-verb asymmetry). I propose an architecture of grammar in which copies emerging from syntactic movement are not deleted before the assignment of prosodic structure and can undergo prosodic phrasing. This makes it possible to explain why the same prosodic asymmetries are observed for syntactic structures involving movement as for canonical structures.

Chapter 4 provides more details on a phenomenon that has not been discussed much in connection with prosodic reconstruction so far, namely partial fronting of foci and contrastive topics in German. I present previous work done by myself and others on the information-structural properties of object-initial sentences in German from the experimental literature, complemented by some previously unpublished findings.¹ The findings point towards the following generalizations: (i) In object-initial sentences of the form OVS(PP) the whole VP can be interpreted as focus or contrastive topic. (ii) In PP-initial sentences of the form PPVSO, either only the PP or the constituent containing the verb and the PP can be interpreted as a contrastive topic. (iii) A broad focus interpretation in OVS(PP) structures is only possible with sentence stress on the fronted object, not on the subject. (iv) Object-initial sentences are less acceptable when the subject is a discourse-new phrase.

I argue that generalizations (i)–(iii) can be explained if the model of reconstruction for syntax-prosody mapping developed in chapter 3 is extended to prosody-interpretation mapping. I propose the constraints FOC, favoring prosodic realizations in which the phonological phrase that is right-aligned with (the original position of) the focus is the most prominent one, and CT, favoring left-alignment of a hat contour with (the original position of) a contrastive topic. FOC has the effect that sentence stress preferably falls on the object in transitive broad-focus sentences, and generalization (iv) then follows from the

¹A part of the presented data stems from collaborative work: the experiments reported as Wierzbica & Fanselow (under revision) in section 4.3.1 were designed and conducted together with Gisbert Fanselow.

fact that postnuclear compression excludes any further fully realized pitch accents and is thus incompatible with discourse-new (accent-requiring) subjects.

In Chapter 5, I present a new acceptability rating study on German. The model proposed in chapter 4 was developed based on previous studies. The new study serves to test the main idea that I derived from that data, namely that there is reconstruction for prosody-information structure mapping. In particular, the aim is to test whether this assumption helps to capture the patterns observed in partial focus and contrastive topic fronting, and whether the influence of subject newness/givenness (generalization (iv) from above) can be reduced to the general preference to accent discourse-new constituents. Besides materials involving partial focus/CT fronting, further types of structures were included in the materials that were not part of the previous studies. This allows one to evaluate whether the proposed reconstructing information-structure related mapping rules are empirically sound more generally, beyond the specific partial fronting data set they were designed for. It also helps to precisely identify problematic predictions of the tested models.

The results indicate that reconstruction-based sentence stress mapping indeed leads to a better fit with the partial focus fronting data in comparison to a baseline model with surface-oriented mapping. However, in other constructions like wh-questions, sentence stress seems to be assigned in a more surface-oriented way. As for the acceptability difference between new and given subjects in object-initial sentences, the results are compatible with the view that they are due to a general problem with deaccented new constituents, at least in the postnuclear domain. The results for partial CT fronting are compatible with the reconstruction model, both for replicated as well as newly tested types of structures, but the high inter-subject variability in this domain suggests that there is a higher degree of subjective liberty in contrastive topic marking and fronting.

In Chapter 6, the theoretical as well as empirical contributions of the thesis are summarized. The chapter also provides an outlook on goals of possible future research that could help to further refine the proposed model.

Chapter 2

Syntax-prosody mapping and syntactic movement

2.1 The prosody of structures without movement

The goal of this section is to identify the empirically and conceptually most adequate syntax-prosody mapping model for canonical structures without movement. After reviewing and discussing the main existing approaches, I will adopt Selkirk's (2011) *Match Theory* based account. In sections 2.2 and 2.3, I will review previous work on the question how syntax-prosody mapping interacts with syntactic movement and how prosodic reconstruction can be implemented. In chapter 3, I will then develop a new model of prosodic reconstruction which is compatible with current theoretical assumptions, including Selkirk's (2011) *Match Theory*.

2.1.1 Prosodic asymmetries

Two basic prosodic asymmetries can be observed in English and German: (i) the object is more prominent than the verb, and (ii) the object is more prominent than the subject (references for the claim will be provided throughout this section). The patterns are illustrated in (1) (throughout the thesis, underlining indicates prosodic prominence; double underlining marks maximal prominence):

- | | | | |
|-----|-----------------------------------|-----|--|
| (1) | What did Peter do? | (2) | Was hat Peter gemacht? |
| a. | <u>Peter</u> read <u>a book</u> . | a. | <u>Peter</u> hat <u>ein Buch</u> gelesen. |
| b. | <u>#Peter</u> <u>read</u> a book. | b. | <u>#Peter</u> hat <u>ein Buch</u> <u>gelesen</u> . |
| c. | <u>#Peter</u> read a book. | c. | <u>#Peter</u> hat ein Buch gelesen. |
| | SVO data set (schematically): | | SOV data set (schematically): |
| a. | <u>S</u> V <u>O</u> | a. | <u>S</u> <u>O</u> V |
| b. | <u>#S</u> <u>V</u> O | b. | <u>#S</u> <u>O</u> <u>V</u> |
| c. | <u>#S</u> V O | c. | <u>#S</u> O V |

For this kind of data, different explanations have been proposed: the higher prominence of the object could be explained in terms of linear order (the rightmost element is most prominent; this type of approach will be discussed in section 2.1.2), syntactic hierarchy (the most deeply embedded element is most prominent; see section 2.1.3), a head-complement asymmetry (a head is less prominent than its complement; see section 2.1.4), or an asymmetry between phrases and heads (the former being more prominent than the latter; see section 2.1.5).

In the following subsections, I will first present how the approaches work. In section 2.1.6, I will then discuss their respective advantages and disadvantages. I will argue that they are all able to account for the two asymmetries mentioned above, but additional data and conceptual considerations help to identify advantages and disadvantages. I will argue that an account in terms of linear order is preferable to capture the prominence asymmetry between the VP and the subject, because alternative explanations in terms of embedding face problems with sentences involving complex subjects or adjuncts. As for the asymmetry between object and verb within the VP, I will argue that approaches in terms of argument structure (head-complement / predicate-argument distinction) as well as in terms of phrases vs. non-phrases are empirically adequate with respect to the discussed data, but the latter type of account comes with the conceptual benefit that the involved assumptions are independently motivated and rely solely on structural factors.

2.1.2 Accounts based on linear order

Chomsky & Halle's (1968) Nuclear Stress Rule (NSR) is an example of a syntax-prosody mapping rule based on linear order. In a “sequence of heavy stresses” within a constituent, the NSR rule determines the rightmost one as the heaviest, i.e. as the nuclear stress (p. 90). In the system of Chomsky, Halle, and Lukoff (1966) and later Chomsky

In **more recent work**, the number of lines in the metrical grid is usually assumed to correspond to a limited set of levels of a universal prosodic hierarchy (see e.g. Ito & Mester 2009; this perspective will be adopted in the remainder of the thesis): phonological word (ω), phonological phrase (ϕ), intonation phrase (ι), and utterance. Modern incarnations of the NSR are often stated in form of Optimality Theoretic alignment constraints. For example, the HI constraint states that the right edge of the intonation phrase is aligned with its head (Truckenbrodt 1995). In interaction with other constraints governing how the utterance is parsed into prosodic constituents, HI favors prosodic structures in which the rightmost phonological phrase is the most prominent one within an intonation phrase.

(6) HEAD-I (HI): Align (I, R, Head(I), R)

The definition of the constraint builds on McCarthy & Prince’s (1993) proposal for a generalized form of alignment constraints. Cross-linguistic differences with respect to sentence stress placement can be captured by language-specific rankings of alignment constraints governing the preferred alignment of heads at different levels of the prosodic hierarchy, similar to the parametric settings in Kiparsky’s model.

2.1.3 Accounts based on depth of embedding

Cinque (1993) proposes a different solution to the VO/OV problem. He adjusts the NSR such that it makes reference to syntactic hierarchy rather than linear order. His goal is to get rid of language-specific parametric rules and replace them by a single universally applicable rule, building on Halle and Vergnaud’s (1987) grid-based implementation. Cinque proposes that the degree of prosodic prominence of an element, i.e. the number of grid marks associated with it, corresponds to the depth of syntactic embedding, i.e. the number of syntactic brackets that it is enclosed in. The same result emerges for SVO and SOV structures: typically, the object is the most deeply embedded element and is therefore the most prominent one. In this approach, the crucial difference between verbs and objects causing the prominence asymmetry is the phrase/non-phrase difference: the object is a phrase and therefore enclosed in an additional pair of brackets, in contrast to the verb.

(7) a.
$$\begin{array}{l} (\qquad \qquad \qquad x \qquad \qquad) \\ (\quad x \quad (\quad \quad x \quad)) \\ ((x) (\quad (x))) \quad \textit{prosody} \\ [[S] [V [O]]] \quad \textit{syntax} \end{array}$$

$$\begin{array}{l}
 \text{b. } (\qquad \qquad \qquad \text{x} \qquad \qquad) \\
 (\quad \text{x} \quad (\quad \text{x} \quad)) \\
 ((\text{x}) ((\text{x}))) \quad \textit{prosody} \\
 [[\text{S}] [[\text{O}] \text{V}]] \quad \textit{syntax}
 \end{array}$$

Cinque discusses SVO data from English and Italian and SOV data from German. He shows that his algorithm correctly predicts the observed pattern, namely that the object rather than the verb usually carries sentence stress in these languages, regardless of whether it is the rightmost constituent or not. However, a problem arises concerning the subject/object asymmetry: if the subject is highly complex, it can involve more levels of embedding than the object, which would incorrectly predict higher prominence on the subject in such a case. I will return to this problem in the discussion section (2.1.6).

2.1.4 Accounts based on argument structure

Schmerling (1974) notices that objects are more prominent than verbs both in English, where the object follows the verb, and in German, where it is the other way round. She proposes to capture this by a principle requiring that “predicates receive lower stress than their arguments, irrespective of their linear position in surface structure” (p. 106). The difference between subjects and objects, in turn, (the latter carrying sentence stress in the default case), is explained by an independent, NSR-like principle stating that in a series of equally stressed units, the rightmost one is the most prominent one.

Selkirk (1984) and **Rochemont (1986)** also propose a model in which accentuation is not determined in linear terms, but depends on the sentence’s argument structure. Selkirk proposes a set of “focus projection rules” (p. 207), which determine the distribution of pitch accents within a discourse-new (in Selkirk’s terms, focused) constituent. Rochemont proposed a slightly adjusted version of the rules. He paraphrases their effect as follows: “when an argument of the lexical head of a phrase is focus, the head itself may be focus” (p. 82). This means, for example, that within the VP of a transitive sentence, it is not necessary to accent both the verb and the object, but accenting the object suffices even if both of them are discourse-new. Accenting the subject, on the other hand, will not license the deaccentuation of the object or the verb: focus projection from an argument of X to the whole XP is only possible if the argument is contained in the XP. The subject is not contained in the VP, and therefore accenting the subject is not sufficient to mark any other elements within the VP as discourse-new. Accenting the subject does not license

focus-marking of the TP or CP either, because the subject is not an argument of T or C.

Selkirk argues that it is beneficial to get rid of linear-order-based constraints like the NSR because it makes the theory applicable to more languages, e.g. German.

Gussenhoven (1984) proposes the Sentence Accent Assignment Rule (SAAR). It predicts that a focused predicate that is adjacent to a focused argument (irrespective of linear order) can form a focus domain together with it. This captures the observation that transitive verbs that are adjacent to their object need not be stressed even if they are new.

Gussenhoven assumes that unfocused elements do not block this relation, whereas focused ones do. He argues that this is supported by the following data (p. 28):

- (8) a. Our dog's disappeared.
b. Our dog's mysteriously disappeared.
c. (Context: Talking about mysteries...)
Our dog's mysteriously disappeared.

In (8b), a new adverb intervenes between the predicate and the argument, prohibiting the formation of a shared focus domain. As a result, all three constituents need to receive their own accent. In (8c), a given adverb intervenes. This does not block the formation of a shared focus domain containing both the predicate and the argument. It is therefore sufficient if only the argument carries an accent.²

In addition to the SAAR, Gussenhoven assumes that unfocused material is included in the nearest focus domain. An unfocused object is thus the only case in which sentence stress on the verb could emerge in VO / OV structures in Gussenhoven's model—if both the object and the verb were focused, they would need to share a focus domain and only the argument would receive an accent.

Zubizarreta (1998) also aims at explaining a cross-linguistic dataset, including data from English, German, and Romance languages. She proposes two variants of the NSR: the C-NSR (constituent-driven NSR) and S-NSR (selection-driven NSR). The C-NSR states that the rightmost constituent receives the main prominence. The S-NSR, on the other hand, is independent of linear precedence and assigns higher prominence to selectional relations (the element that is selected is more prominent than the one that selects). The S-NSR accounts for the fact that sentence stress falls on the object rather than the verb not only in English, but also in the OV language German: by assuming that the S-NSR

²This data has later been challenged by Bolinger (1985) and Rochemont (2013), who claim that sentence stress on *dog's* is as least a possible option in structures like (8b).

takes precedence over the C-NSR in German, the model predicts that the object is more prominent than the verb, because the former is selected by the latter. Based on data on transitive, unergative and unaccusative structures, Zubizarreta argues that the C-NSR is active in Romance languages, the S-NSR is active in German, and in English, the two constraints are unordered.

Wagner (2005) assumes that prosodic structure is built up cyclically along with the syntactic derivation. Each time two pieces of prosodic structure are concatenated, either *Prosodic Matching* (p. 209) or *Prosodic Subordination* (p. 210) applies. Prosodic Matching means that all grid marks in both pieces of structure project equally, resulting in equal prominence. In contrast, when Prosodic Subordination applies, one of the parts projects to a lower level than the other, resulting in a prominence asymmetry. Note that in the case of Prosodic Matching, the two structures are equally prominent in the abstract metrical grid, but can nevertheless be perceived as non-equal due to the Nuclear Stress Generalization (p. 209), which states that in a series of equally high grid marks within a prosodic domain, the last one is perceived as most prominent. In addition, Wagner assumes that the following principle holds (p. 211):

(9) *Complement Prominence:*

If A and B are sisters and A is the functor and B its argument, then B is more prominent than A.

This principle enforces that Prosodic Subordination rather than Prosodic Matching apply whenever a functor is concatenated with a sister argument that *precedes* it. If Prosodic Matching applied, functor and argument would be equal metrically, but according to the Nuclear Stress Generalization, the functor would still be perceived as more prominent (elements that are perceptually strengthened by the Nuclear Stress Generalization are indicated by double underlining below). In contrast, when a functor precedes its sister argument, Prosodic Subordination is not enforced but optional, because the Nuclear Stress Generalization will ensure that the argument is perceived as more prominent either way. The following patterns are predicted:

- (10) a. functor argument / functor argument
 b. argument functor / *argument functor

Wagner argues that these patterns can be observed across languages (e.g., when comparing

German and English), but also within a language (examples adapted from p. 201):

- (11) a. She painted some walls. / She painted some walls.
b. She had some walls painted. / *She had some walls painted.

Wagner's notions functor and complement are related to the concept of selection and are thus close to the notions that Zubizarreta's explanation of the verb-object asymmetry relies on. Translated to Zubizarreta's system, Wagner's views would correspond to the assumption that the S-NSR takes precedence over C-NSR not only in German, but also in English.

Wagner notes that *Complement Prominence* as stated in (9) would wrongly apply for subjects, too, under the view that its sister node is a functor. He therefore suggests to restrict the principle in the following way in order to account for the subject-VP asymmetry (p. 218):

- (12) *Complement Prominence (adjusted)*: If A and B are sisters and A is the functor and B its argument, then B is more prominent than A unless A already contains an argument.

Korth (2014) also aims to capture the mentioned prominence asymmetries in German. Her model is close to Wagner's in that it also makes reference to complements (Korth 2014, p. 139):

- (13) In a syntactic structure $[B_1 (B_2)]_A$, every constituent B inside of A is accented that does not have a complement in A.

Korth (2014, p. 11) defines complements as sister nodes of non-expanded categories. This means that the rule exempts heads that have an argument sister from being accented. In both SVO and SOV sentences, the object but not the verb is predicted to be accented. Thus, in these cases, Korth's predictions differ from Wagner's (2005) with respect to the accentuation of the verb. Wagner's subject-object related problem does not arise here, first because Korth makes reference to heads rather than functors, and second, because Korth's rule only predicts the complement to be accented and not be *more* prominent than its sister. The fact that it is typically the rightmost one in a series of equal accents that is perceived as most prominent follows from general considerations concerning the perception of metric and rhythmic structures (Korth 2014, sec. 3.3). This is similar to the role of the

Nuclear Stress Generalization in Wagner's system.

2.1.5 Accounts based on the distinction between phrases and non-phrases

Truckenbrodt (1995) proposes an OT model which is also able to capture the object prominence in OV structures, without making reference to argument structure. It is based on the constraints STRESS-XP (p. 226) and WRAP-XP (p. 81). The former requires each lexical XP to contain a phrasal accent; the latter (which is motivated independently by phrasing-related phenomena in Bantu languages) requires each XP to be contained inside a phonological phrase.

(14) STRESS-XP: Each lexically headed XP must contain a phrasal stress x_ϕ .

(15) WRAP-XP: Each XP must be contained in a phonological phrase ϕ .

In the case of a VP that contains an object XP and a verb, these constraints will favor a prosodic structure with only one phonological phrase; if object and verb were phrased separately, WRAP-XP would be violated for the VP. STRESS-XP then favors structures in which the object (which is an XP) rather than the verb (which is not) is the head of the phonological phrase. This single phrasal accent satisfies STRESS-XP for the VP and the object XP simultaneously. As (16) and (17) show, the same predictions emerge for VO and OV structures.

| | | | |
|------|---|-----------|---------|
| (16) | | STRESS-XP | WRAP-XP |
| | (x) (x) | | |
| | [[O] _{NP} V] _{VP} | ✓ | * |
| | (x) | | |
| | [[O] _{NP} V] _{VP} | * | ✓ |
| | (x) | | |
| | [[O] _{NP} V] _{VP} | ✓ | ✓ |

| | | | |
|------|---|-----------|---------|
| (17) | | STRESS-XP | WRAP-XP |
| | (x) (x) | | |
| | [V [O] _{NP}] _{VP} | ✓ | * |
| | (x) | | |
| | [V [O] _{NP}] _{VP} | * | ✓ |
| | (x) | | |
| | [V [O] _{NP}] _{VP} | ✓ | ✓ |

As for the higher prominence of the object in comparison to the subject in the default case, this is explained by the additional HEAD-I (HI) constraint, which, as mentioned above in (6), aligns the right edge of the intonation phrase with its head. This constraint has the effect that the rightmost phrasal stress (which, in an English SVO or a German SOV sentence, will fall on the object) will be the head of the intonation phrase.

Selkirk (2011) argues that *Matching Theory* (as proposed already in Selkirk 2009) is able to account for the same German data as Truckenbrodt’s STRESS-XP and WRAP-XP.

According to Match Theory, there is a correspondence between syntactic phrases and prosodic phrases, unless higher-ranked constraints motivate a deviation from that basic principle. In contrast to standard edge-based alignment constraints, *matching* means that both the left and the right edges coincide. For the purposes of accentuation in German, the MATCH PHRASE constraint is particularly relevant (in addition, Selkirk proposes MATCH CLAUSE and MATCH WORD):

- (18) MATCH PHRASE: A phrase in syntactic constituent structure must be matched by a corresponding prosodic constituent, call it ϕ , in phonological representation.

In combination with the assumption that prosodic structure can be recursive and the condition that each ϕ contains exactly one main phrase stress (i.e., nested phonological phrases must share the same phonological word as their head), MATCH PHRASE has a similar effect as STRESS-XP and WRAP-XP together: the direct object is a syntactic phrase, and the verb and the object also form a phrase together. MATCH PHRASE favors a nested ϕ -structure. If both the inner and the outer ϕ must contain exactly one phonological word that is prominent at the level of ϕ , it must be within the inner ϕ , i.e. on the object. This is illustrated for an English SVO structure in (19a) and for a German SOV structure (as it would occur e.g. in a subordinate clause) in (19b).

- (19) a. (Peter)_φ (met (Mary)_φ)_φ.
 b. (Peter)_φ ((Mary)_φ traf)_φ.

The same core idea of nested phonological phrases whose respective heads are realized by the same pitch accent is also found in Féry's (2011) proposal. Féry's model of German accentuation includes the constraint XP=PROSODIC-DOMAIN (XP=PRO), which has a similar effect to Selkirk's (2011) Match-Phrase:

- (20) XP=PRO: A syntactic maximal projection including at least a prosodic word is contained in its own prosodic domain.

A difference between Selkirk's and Féry's models concerns the status of the assumption that nested phonological phrases contain only one pitch accent. In Selkirk's model, this assumption is part of the prosodic phonology of phonological phrases; this seems to mean that it is an inviolable part of the prosodic system. In Féry's model, it is a constraint that is high-ranked, but in principle violable:

- (21) ACCENT ASSIGNMENT (AA): The head of a prosodic domain (i-phrase and p-phrase) is realized by a pitch accent.

Besides this difference, the two models make similar predictions for the prominence relation within the VP: when the verb has a direct object which is a syntactic phrase, the object should receive the only pitch accent within the VP.

2.1.6 Discussion

The two main prosodic asymmetries that a model of syntax-prosody mapping needs to capture are repeated schematically in (22) and (23).

- (22) V/O asymmetry:
 a. S V O #S V O
 b. S O V #S O V
- (23) S/VP asymmetry:
 a. S V O #S V O
 b. S O V #S O V

As for the object-verb asymmetry, the discussed accounts provide different explanations: in terms of linear order (NSR), predicate-argument structure / selection (Schmerling 1976, Zubizarreta 1998, Wagner 2005), XP status (Truckenbrodt 1995, Selkirk 2011, Féry 2011; indirectly, XP status is also relevant in Cinque’s 1993 level-of-embedding account and in Korth’s definition of complement), or a head-complement asymmetry (Korth 2014). The purely linear NSR account fails to capture that the object tends to be more prominent than the verb not only in VO but also in OV structures. This shortcoming can be overcome by an account like Kiparsky’s (1966), in which language-specific rules for each phrase are posited.

In contrast, the subject-VP asymmetry is explained in terms of linear order in almost all of the discussed approaches. For Schmerling (1976), Zubizarreta (1998), Truckenbrodt (1995), Wagner (2005), and Korth (2014), an NSR-like principle leading to higher (perceived) prominence of the rightmost accented category explains why sentence stress falls on the object rather than the subject in transitive sentences. Only Cinque (1993) does not make reference to linear order at all. In his model, the algorithm will predict higher prominence of the object in most cases due to a higher level of embedding. However, in the case of highly complex subjects this would lead to wrong predictions, which needs to be prevented by additional principles.

So far, it can be concluded that all the discussed approaches are able to cover the basic asymmetries in some way. Some of the authors have therefore put forward additional empirical and conceptual arguments that set apart their approaches from the others. This includes a further asymmetry, namely the one between arguments and adjuncts (discussed e.g. by Truckenbrodt 1995, Wagner 2005, and Korth 2014). The asymmetry is illustrated by the example in (24) and the schematic representation in (25).

- (24) What does he do?
- a. Er soll Linguistik unterrichten.
he shall linguistics teach
‘He is supposed to teach linguistics.’
 - b. Er soll in Ghana unterrichten.
he shall in Ghana teach
‘He is supposed to teach in Ghana.’

(25) argument/adjunct asymmetry:

- a. S V arg — S V adj
- b. S arg V — S adj V

The argument/adjunct patterns in (25) are based on the German judgments reported in Truckenbrodt (1995) and Korth (2014) and on the experimental results for English reported by Gussenhoven (1983). Intuitively, the same pattern holds for other kinds of adverbs, for instance temporal, sentential, or manner adverbs:

- (26) a. Er soll freitags unterrichten. ‘He is supposed to teach on Fridays.’
 b. Er soll wahrscheinlich unterrichten. ‘He is probably supposed to teach.’
 c. Er soll gewissenhaft unterrichten. ‘He is supposed to teach diligently.’

In transitive sentences involving an adjunct, the relative ordering of adverb and direct object can vary depending on the adverb type and properties of the object. The prosody of such structures will be addressed in more detail at a later point in section 3.4.2.

All accounts that make explicit reference to the head-argument relation or selection are capable of capturing this additional asymmetry, or at least the clearer contrast in OV order: Selkirk’s (1984) focus projection rules exempt verbs from carrying an accent when an argument is present, not when an adjunct is present. Zubizarreta’s (1998) selection-based S-NSR can only apply when there is a selectional relation between a verb and an argument; when only an adjunct is present, the C-NSR has to apply, predicting rightmost stress (but this account has nothing to say about the more subtle deaccentuation possibilities of the verb in English). Schmerling’s (1974), Wagner’s (2005) and Korth’s (2014) assumption that heads/functors are less prominent than their argument also provides an explanation for the asymmetry: it applies only to arguments and not to adjuncts, correctly predicting two accents in V adj / adj V structures, and only one accent on the argument in V arg / arg V structures. Similarly, the SAAR allows predicates to share one accent assignment domain with an argument but not with an adjunct, leading to the same predictions.

Truckenbrodt’s (1995), Selkirk’s (2011), and Féry’s (2011) proposals are also able to account for the argument/adjunct asymmetry, but in a less direct way via phrasing preferences: In adjunct structures, both the verb and the adjoined PP/AdvP need to receive stress to satisfy STRESS-XP: [VP PP]. In structures of the form [DP V]_{VP}, an accent on the object DP can satisfy STRESS-XP for both the DP and the VP. The crucial factor in this account is the status as a phrase: syntactic XPs require an accent, non-maximal projections do not. Similarly, Selkirk’s MATCH PHRASE and Féry’s XP=PRO favor a single-accent pattern for ((arg)ϕ V)ϕ structures, in which both the verb and the argument are within the VP, and a two-accent pattern for ((adj)ϕ (V)ϕ)ϕ, in which something is adjoined to the VP containing only the verb.

On the other hand, the argument/adjunct asymmetry does not follow directly from Cinque's (1993) embedding-based model. In order to capture the fact that sentence stress falls on the adjunct in V adj structures, Cinque (1993, p. 264) must assume that adverbials are embedded as deeply as arguments and are in fact sisters of the verb position. If the same assumption was made for a verb-final language like German, sentence stress would be wrongly predicted to fall on the adjunct also in adj V structures. Thus, a considerable syntactic difference would need to be assumed between English and German in this respect (with deeply embedded adverbials in English and highly attached ones in German) to account for the asymmetry in this kind of framework, as far as I can see.

A further relevant set of data concerns complex subjects, as illustrated in (27):

- (27) complex subjects:
- a. [...[...[...]]]_{subject} V [Q]
 - b. [...[...[...]]]_{subject} [Q] V

Problems with this data set only emerge for accounts in which depth of embedding plays a crucial role, like Cinque's (1993) model. Cinque's version of the NSR predicts that if the subject is a highly complex phrase containing several levels of embedding, it can end up as more prominent than the object. This contradicts the intuition that the object is systematically more prominent than the subject, irrespective of their respective complexity. Cinque discusses two solutions to that problem. One idea (discussed in Cinque 1993, ch. 6) is that the NSR is restricted to the focused part of the sentence, and the subject is typically not part of the focus. A different solution (Cinque 1993, ch. 7) would be to treat embedding within specifiers and embedding within complements differently and assume that specifiers can only receive secondary and never primary stress.

In sum, these considerations suggest that two different principles cause the verb/object asymmetry and the subject/VP asymmetry. Most authors agree that the latter should be attributed to the very general preference of sentence stress to fall towards the right, or the tendency to perceive the rightmost accent as the most prominent one. This rightward trend seems to be a prevalent default that is found both in adjunct verb / verb adjunct structures (where the element to the right is more prominent) and in sequences of arguments. Accounts in terms of embedding rather than linear order would need to be complemented by additional solutions for the problem of complex subjects and rightward adjuncts. Although I will adopt the view that sentence stress placement is determined in a linear way, I assume that the direction (leftward/rightward) can be subject to cross-linguistic parametrization.

As for the prosodic subordination of verbs under objects, it appears to be beneficial to explain it in terms of a very specific rule in order to prevent it from applying in too many cases, e.g. when adjuncts rather than arguments are involved. This can be achieved either by positing a special rule making direct reference to the relation between heads and selected arguments, or it can be derived from more general principles of syntax-prosody mapping, as in Truckenbrodt's (1995), Selkirk's (2011), and Féry's (2011) models. The latter approaches are especially attractive because the wrapping / matching constraints are motivated independently and also make correct predictions for adjunct structures without further adjustments. Accounts that attribute the prominence of objects to depth of embedding encounter problems with complex subjects and adjunct structures and require further assumptions to capture the whole range of data. Another attractive feature of MATCH PHRASE, XP=PRO, and STRESS-XP is that they are purely structural and do not require access to selectional relations, which can be argued to involve a semantic component.

I conclude that a comprehensive model of syntax-prosody mapping should involve at least a rule restricting the accentuation of verbs and other heads, defined in structural or selectional terms, and a rule determining the position of sentence stress in a series of phrasal accents, defined in terms of linear order (potentially parametrized, in order to capture cross-linguistic differences). Truckenbrodt's account in terms of STRESS-XP and WRAP-XP, Selkirk's Match-Theory-based account, and Féry's similar model seem to unite empirical adequacy and conceptual parsimony best for the verb-object asymmetry. For concreteness, I will adopt Selkirk's Match-based explanation.³ For the subject/VP asymmetry, I will adopt a linear account.

In section 2.3, I will examine extensions of the discussed approaches that have been proposed with the aim to account for the prosody of syntactic structures that involve movement.

2.2 The prosody of structures with movement

All the approaches presented in the previous section are designed to predict prosodic properties of simple sentences. The question arises how principles like the NSR, SAAR or

³But see e.g. Ishihara (2014) for some problems of Match Theory, especially the Match Clause constraint, in relation to other phenomena; on the other hand, Match Theory adheres more strictly than STRESS-XP to the indirect reference hypothesis, according to which phonological rules should refer only to prosodic constituent structure (see Truckenbrodt 1999 and references therein for discussion of the importance of that hypothesis; see also Féry 2011, footnote 8, for disadvantages of STRESS-XP).

STRESS-XP are applied in more complex cases, in which syntactic movement is assumed to occur. Do the interface mapping rules apply to the syntactic surface structure, or is it necessary to take into account earlier positions of constituents by referring to traces or copies (in other words, do constituents reconstruct for prosody/stress assignment)? In this section, I will first give a short overview of the literature on this topic. Second, I will review evidence that has been put forward for/against the idea that interface mapping rules apply under reconstruction for different types of movement. Third, I will present the different technical implementations of prosodic reconstruction that have been proposed by various authors. I will also look into the relation of phase theory with prosodic reconstruction. A unified and modernized approach to the reported phenomena will then be provided in chapter 3.

2.2.1 A brief history of the debate

The first widely noticed article on the relation between syntactic movement and accentuation was published in *Language* by Bresnan (1971). She presents data showing that sentences that are structurally very similar on the surface nevertheless differ in their accentuation pattern. An example is shown in (28) (adopted from Bresnan 1971, pp. 258–9; based on an example by Newman 1946). (28a) involves the relative clause *that George left*, whereas the similar string in (28b) is interpreted as a complement clause of *proposal*.⁴

- (28) a. Mary liked the proposal that George left.
b. Mary liked the proposal that George leave.

Bresnan provides an account in terms of a cyclically applying NSR, which allows to make structural differences at earlier stages of the derivation (in this case, the absence/presence of an object to the right of the verb) responsible for the observed accentuation contrasts. Bresnan’s proposal triggered a series of responses in the following volume of the journal (Lakoff 1972, Berman & Szamosi 1972, Bresnan 1972).

Both Berman & Szamosi and Lakoff provide examples that are intended to show that Bresnan’s system cannot account for sentence stress placement in all cases, and that therefore some factors must be missing (or, as Berman & Szamosi go on to argue, that stress patterns do not systematically depend on syntactic structure at all). Two examples are shown in (29) (adopted from Lakoff 1972, p. 286) and (30) (from Berman & Szamosi 1972,

⁴For the purpose of a unified notation, I am changing the various different possibilities the authors use to mark sentence stress to double underlining in this and the following subsections.

p. 306).

- (29) a. I looked over the books Sam read.
 b. I looked over the books Sam read.
- (30) a. Let me tell you about something that happened.
 b. Let me tell you about something strange that happened.

It is true that these stress patterns do not follow from Bresnan's simple cyclic NSR system: in (29), there is optionality with respect to stress placement in the absence of a structural ambiguity; in (30), the two sentences differ in their stress pattern, but the explanation cannot have to do with something being absent or present to the right of the verb in earlier stages of the derivation. Thus, the examples indeed show that a (cyclically applying) NSR is not enough to account for the whole range of stress patterns that can be observed. Crucially, however, Bresnan (1971) does not claim to explain all cases of non-final sentence stress. Rather, her core claim is that the accentuation pattern of early derivational stages influences the accentuation pattern observed at surface structure. This is confirmed when Berman and Szamosi's examples are compared to more basic versions:

- (31) a. Something happened.
 b. Something strange happened.

Bresnan stresses this point in her follow-up article: “[w]hile there may be semantic and surface-structure generalizations about primary-stress placement, the ordering hypothesis is essential to project these generalizations onto complex cases” (Bresnan 1972, pp. 332–333).

In contrast to Berman & Szamosi, Lakoff (1972) does not draw the conclusion that stress cannot be predicted systematically at all, but he proposes some amendments of the simple NSR rule. First, Lakoff's revised NSR (see Lakoff 1972, p. 298 for the exact formalization) takes into account anaphoricity/givenness as a factor in that previously mentioned nominal phrases cannot be stressed. Second, it makes specific reference to direct objects. This is intended to capture the fact that adverbial PPs do not show the same reconstruction-like effects with respect to sentence stress as the direct objects in Bresnan's (1971) examples: they carry sentence stress when they occur in sentence-final position, but not when they are a fronted wh-phrase. This point was refuted in Bresnan's reply (1972): she shows that prosodic reconstruction effects are not limited to direct objects, as (32) shows (p. 339,

footnote 14):

- (32) a. I talk to customers.
b. I have customers to talk to.

In addition to the empirical criticism, Lakoff (1972) also presents conceptual arguments in favor of a global instead of a cyclic rule. These will be examined in more detail in section 2.3.

Bresnan's (1971) and Lakoff's (1972) proposals already stake out the two different ways in which accentuation of complex sentences can be related to underlying or more basic structures: either the relevant syntax-accentuation mapping rule needs to apply already at an early point in the derivation, or information about earlier positions of the constituent needs to be retrieved post-derivationally for the purpose of the mapping.

Bresnan's (1971, 1972) arguments were accepted as valid by other researchers of the syntax-prosody field and incorporated into theories of syntax-prosody mapping. For example, Selkirk (1995) argues that traces should be taken into account for the application of the F-marking rules. This and other implementations will be discussed below in section 2.3.

The debate was revived with the emergence of phase theory. Starting with Uriagereka (1999) and Chomsky (2000), a prevalent idea in recent generative-transformational syntax is that some heads—typically at least (certain types of) *v* and *C*—demarcate special domains called phases. When a phase is completed during the derivation, the complement of the phase head is ‘sent off’ to the phonological and semantic interfaces (*multiple Spell-out*). The independently motivated system of phases invites a reconsideration of the idea that mapping processes between syntax and the interfaces happen repeatedly during the derivation, and of the question how this relates to syntactic movement. In some of the proposals (e.g., Legate 2003), a trace-based mapping mechanism is combined with a phase-based framework in order to derive Bresnan's observations and further data. In others (Kahnemuyipour 2009), the syntax-prosody mapping is assumed to take place in a phase-based manner, but it is explicitly argued to apply to the surface structure, disregarding the original position of moved constituents. This clearly shows that phases, even though they are reminiscent of Bresnan's proposal in that they entail cyclicity, do not in themselves explain reconstruction effects with respect to stress. The reason is that constituents that undergo syntactic movement are assumed to escape from the domain that is transferred to the interfaces domain prior to Spell-out—otherwise they would not be

eligible for the syntactic transformation. Therefore, the accentuation of constituents that undergo syntactic movement is not necessarily determined at an early stage, when they are still in their original position. A phase-based approach can or can not be combined with a component that takes into account earlier stages of the derivation, but in principle, the question whether an account assumes multiple Spell-out points is orthogonal to the question whether it predicts prosodic reconstruction.

Legate's (2003) and Kahnemuyipour's (2009) proposals as well as further phase-based approaches will be presented in more detail in section 2.3. But before I turn to the concrete implementations, I will review the arguments in favor of and against prosodic reconstruction first.

2.2.2 Evidence in favor of prosodic reconstruction

In this subsection, I will review different types of evidence that has been put forward in favor of prosodic reconstruction: relative clauses (Bresnan 1971), wh-movement (Bresnan 1971), VP-internal subjects (Selkirk 1995), verb movement (Bierwisch 1968), and discontinuous realizations of verbs and foci (Bierwisch 1968, Krifka 1998). A summary will be provided at the end of the subsection. The discontinuity data will play a central role in the thesis and will be discussed again in depth in chapter 4.

Relative clauses

The following sentence pair was already briefly mentioned above as an example of the kind of data Bresnan bases her theory of cyclic NSR application on (Bresnan 1971, pp. 258–9; Newman 1946):

- (33) a. Mary liked the proposal that George left.
b. Mary liked the proposal that George leave.

(33a) and (33b) have in common that they involve an embedded sentence, but they differ in the stress pattern that would be normally assigned to them by native speakers, as indicated above. Bresnan assumes that the crucial difference between (33a), where *the proposal* is the head of an object relative clause, and (33b), where *the proposal* has a complement clause, is the following: (33a) involved a direct object to the right of the embedded verb at some point in the derivation, whereas (33b) did not, as indicated in (34):

- (34) a. Mary liked the proposal that George left proposal.

- b. Mary liked the proposal that George leave.

Bresnan assumes that the presence of the direct object at an early stage of the derivation in (34a) is responsible for the deaccentuation (prosodic weakening) of the verb, even though it is not phonologically present in that position in the surface structure. Bresnan concludes from these observations that the NSR must be ordered before at least some syntactic operations, like relative clause formation. Since the syntactic operation can apply cyclically, i.e. several times during a derivation (a relative clause can be embedded in another relative clause), Bresnan further concludes that NSR has to be a cyclic rule as well.

When the object in such cases is pronominal, it does not carry stress, as the comparison of (35a) and (35b) shows (from Bresnan 1971, p. 259). The examples in (36) show that the same holds in syntactically simpler cases in which the object stays in situ.

- (35) a. George found someone he'd like you to meet.
b. George found some friends he'd like you to meet.
- (36) a. I would like to meet someone.
b. I would like to meet some friends.

Truckenbrodt (in press) argues that similar facts also hold in German:

- (37) a. Nenn mir bitte einige Papiere, die du magst.
name me please some papers which you like
'Please name some papers that you like.'
- b. Nenn mir bitte einige, die du magst.
name me please some which you like
'Please name some that you like.'

It depends on both the syntactic analysis and the prosodic framework whether these facts fall out from an account involving prosodic reconstruction (this point is also made by Adger 2007). The syntactic analysis of relative clauses has been controversially discussed (see Salzmann 2017 for a recent comprehensive overview of the debate). It is a standard assumption that the relative pronoun (which can be left out in English) is an operator that is related to the *relativization site* (the position within the relative clause that is semantically abstracted over). This relation is often assumed to be established via syntactic movement. What is more controversial is the relation between the relative operator and the *relative head* (the noun modified by the relative clause).

(38) Mary liked the [proposal]_{rel. head} [∅/pronoun] George left [∅]_{rel. site}

According to *head raising analyses*, the head NP originates from the relativization site and moves to the relative head position. The individual accounts differ in whether it is assumed that the relative head is in relative-clause external position (Vergnaud 1974) or at the left edge within the relative clause (Kayne 1994, Bianchi 1999, Bhatt 2002), but they have in common that at an early stage of the derivation, a full NP occupied the relativization site.

(39) Head raising analysis:

Mary liked the [proposal] [which ~~[proposal]~~] George left [~~which~~ ~~[proposal]~~]

According to *matching analyses*, the relative operator and the head noun are not linked via movement, but only via a semantic relation. It is nevertheless commonly assumed that the relativization site has been filled by the relative operator with a full NP complement, which is later deleted (Sauerland 2003, Salzmann 2006).

(40) Matching analysis:

Mary liked the [proposal] [which ~~[proposal]~~] George left [~~which~~ ~~[proposal]~~]

If a full NP is present at some point in the relativization site as in (39) and (40), it can affect the prosodic realization of the verb in the relative clause in the way Bresnan assumes this to happen. As Adger (2007) shows, the distinction between the two options (raising/matching) is not crucial for Bresnan’s system: the presence of the direct object at earlier stages of the derivation causes the prosodic weakening of the verb. For this to work, it is only necessary to assume that a (stressable) object was present at some point. It is not relevant whether it is deleted or moved away later on—the verb remains weakened in both cases, thus it cannot end up with sentence stress; the effect of the object is not lost even if it is removed.

In a system of prosodic reconstruction in which the crucial operation was prosodic strengthening of the object, reconstruction effects could emerge only under a movement analysis of relativization—only then the increased prominence of the object can be preserved in some way. In a deletion account, the effect that the presence of the object had would be only encoded in the increased prominence of the object itself, and it would be lost when the object is deleted. This will be relevant in section 2.3 and chapter 3 when other implementation options of prosodic reconstruction will be discussed.

Wh-movement

A further argument that Bresnan presents concerns wh-movement. The following example illustrates the relevant type of data (from Bresnan 1971, p. 259):

- (41) a. What has Helen written?
b. What books has Helen written?

Again, Bresnan argues that the stress pattern cannot be captured correctly by a simple alignment rule that determines whether sentence stress falls to the left of right at the level of the utterance: in spite of the similar surface structure of the examples, sentence stress is final in (41a) and non-final in (41b). As in the case of relative clauses, Bresnan proposes to capture the pattern by applying the NSR at an early point of the derivation, where the object is to the right of the verb.

- (42) a. What has Helen written ~~what~~?
b. What books has Helen written what books?

According to Bresnan, wh-pronouns (e.g., *what*) are unstressable like their indefinite counterparts (e.g., *something*). The sentence stress falls on the rightmost stressable element in (42a), which is the verb. In (42b), it is the stressable noun *books*. These basic prominence relations are then maintained during the course of the derivation. This correctly predicts that the resulting pattern in the questions is similar to corresponding declarative sentences with indefinite pronouns:

- (43) a. Helen has written something.
b. Helen has written some books.

Bresnan's account also explains ambiguities like the one in (44), where the reading depends on what is assumed to have moved. As predicted, the ambiguity is resolved by accentuation.

- (44) a. The parable shows [what suffering] men can create ~~what suffering~~.
b. The parable shows [what] suffering men can create ~~what~~.

Selkirk (1995) cites the data and agrees with the view that it speaks against surface-based mapping. Truckenbrodt (2012, p. 86) reports that the same pattern is found in German:⁵

⁵As acknowledged e.g. by Selkirk (1984, p. 229), stressing the verb in addition to the object can sometimes be preferred in German sentences like (45a), depending among other factors on the perceived

- (45) Context: Hans knows that she has been very active, though he doesn't know anything about the content of her academic occupation.
- a. Er fragt sich, was für Bücher sie herausgegeben hat.
 he asks himself what for books she edited has
 'He wonders what books she has edited.'
- b. Er fragt sich, was sie herausgegeben hat.
 he asks himself what she edited has
 'He wonders what she has edited.'

Kahnemuyipour (2009) raises doubts about Bresnan's analysis. His counterargument will be discussed below in section 2.2.3.

VP-internal subjects

Selkirk (1995) discusses the accentuation of intransitive verbs. Unaccusatives like *die* in (46) can have a broad focus reading if the argument *Johnson* carries sentence stress and the verb remains unaccented. This contrasts with unergative verbs, which tend to require accents on both the argument and the verb in order to obtain such an interpretation, as shown in (46b).

- (46) a. Johnson [~~Johnson~~ died]_{VP}.
 b. John [whistled]_{VP}.

Selkirk argues that this can be explained by a syntax-prosody mapping system that takes into account the position of the argument of intransitive verb at earlier stages of the derivation. It is a standard assumption that the argument of an unaccusative verb is generated within the verb phrase and then moves up to a higher syntactic position (see e.g. Diesing 1992), whereas the subject of unergatives is generated in a higher position. This assumption makes it possible to explain the difference in accentuation in terms of a mapping system that is sensitive to syntactic differences at earlier stages of the derivation, in contrast to a surface-based mapping mechanism. Selkirk's concrete implementation of this idea will be shown later in section 2.3.

Selkirk extends the argument to the sentences in (47) from Gussenhoven (1992). In (47a), Selkirk assumes a syntactic structure in which *a clock* originates from a VP-internal

"semantic richness" of the verb (for example, it is more likely to find an accent on *herausgegeben* 'edited' than *gelesen* 'read' in a sentence like (45a)). However, as argued by Bresnan (1972), the same factors are at play in the corresponding sentences with canonical word order. The crucial point is that whatever the accentuation preference is, it carries over from unmarked to marked syntactic structures.

position. In this case, it receives sentence stress. In a control structure like (47b), on the other hand, *a clock* does not originate from a VP-internal position, and sentence stress falls on the verb. Again, only a mapping system that is sensitive to differences in the underlying syntactic structure is able to account for the accentuation facts.

- (47) a. I heard [a clock] [~~a clock~~ tick]_{VP}.
 b. I forced a clock to [*PRO* tick]_{VP}.

Furthermore, the contrasts in (48) and (49) concerning non-generic vs. generic and stage-level vs. individual-level statements fall into the same category of argument. Selkirk follows Diesing's (1992) analysis that in a non-generic statement, the subject has moved from a VP-internal position to its higher surface position. In that case, no additional accent on the verb is required. In generic statements, on the other hand, the subject controls a VP-internal PRO, and the verb needs to be stressed in a broad-focus context. An analogous argument is made for the difference between stage-level predicates as exemplified in (49a), which Diesing and Selkirk assume to involve a subject trace within the VP, and individual-level predicates as in (49b), which they assume to involve a control structure. As in the previous examples, a surface-based syntax-prosody mapping mechanism could not account for these differences.

- (48) a. Trespassers will be [~~trespassers~~ prosecuted]_{VP}. *non-generic*
 b. Trespassers will be [*PRO* prosecuted]_{VP}. *generic*
- (49) a. Firemen are [~~firemen~~ available]_{VP}. *stage-level*
 b. Firemen are [*PRO* altruistic]_{VP}. *individual-level*

Rochemont (2013) provides data (partly going back to Bolinger 1972, 1985, Schmerling 1974 and others) that shows that there is no 1:1 relation between syntactic properties (e.g. unaccusativity/unergativity) and accentuation. In certain contexts, unergative verbs do not carry sentence stress, and sometimes unaccusative verbs do, as exemplified in (50) (from Rochemont 2013, p. 54).

- (50) a. A man whistled, but: A train whistled.
 b. Johnson died, but: Truman died.

Rochemont proposes an account in which (potentially accommodated) givenness rather than the base-generated structural position is the crucial factor. However, he acknowledges

that the account does not explain why a single-accent realization is more common for unaccusative than for unergative predicates (Rochemont 2013, footnote 42 on p. 48).

As for experimental studies, Hoskins (1996) conducted a production experiment in which information-structure (i.e. the context question) and the syntactic structure were manipulated. When the subject was narrowly focused, sentence stress was always produced on the subject; when the verb was narrowly focused, sentence stress always fell on the verb. In broad focus, the accentuation depended strongly on syntactic structure: in unaccusative and passive structures, the verb was usually deaccented (in 71.1% / 58.5% of the cases), whereas in unergative structures, a reversed tendency was found (the verb was deaccented only in 8.2% of the cases).

In the same vein, Irwin (2011) reports a significant effect of the unergative/unaccusative factor (with four phonologically matched verbs in each group) on pitch mean and duration in her production study.

Hirsch & Wagner (2011), however, provide important criticism of Hoskins's (1996) and Irwin's (2011) studies: some further potentially relevant factors were not carefully controlled in the items. In particular, they argue that it is crucial how likely it is that the subject is construed as a topic, and this in turn depends on factors like subject animacy and properties of the verb. For example, a subject is more likely to be interpreted as a topic with a verb of disappearance like *vanish* (which presupposes that something existed before) than a with a verb of appearance. Hirsch & Wagner present a series of experiments in which no significant effect of the unaccusative/unergative distinction on accentuation was found when all other factors were held constant, whereas manipulating animacy and the disappearance/appearance distinction had significant effects.

Verhoeven & Kügler's (2015) present an experiment on German in which they manipulated the syntactic status of the verb (passives vs. unergatives) as well as the pragmatic factor predictability, e.g. *Das Baby weint* 'The baby is crying' (where the occurrence of the verb is highly probable in view of the subject) vs. *Die Angestellte weint* 'The employee is crying' (where it is not). The authors report that predictability can make the (atypical) deaccentuation of an unergative verbs acceptable, but in the case of passives, the clear preference for sentence stress on the argument is almost unaffected by predictability. Verhoeven & Kügler suggest that the results for the passive construction are generalizable to unaccusatives, as they also involve a theme argument that can be analyzed as originating from the object position.

As far as I can see, Hirsch & Wagner's methodological criticism does not apply to Ver-

hoeven & Kügler’s experiment: all tested subjects were animate, and only the subjects but not the contexts or predicates were replaced to manipulate predictability, making it unlikely that any further information-structural differences (especially concerning topicality) emerged as a confound. But the results of Hirsch & Wagner and Verhoeven & Kügler seem to point to contradictory conclusions.

This could be due to the fact that different types of VP-internal subjects were investigated, or to a cross-linguistic difference between the investigated languages. In English, the nominative argument always needs to be positioned in SpecTP; in German, VP-internal arguments do not necessarily have to raise to a higher position (see e.g. Wurmbrand 2006). Thus, a surface-oriented approach to syntax-prosody mapping could potentially explain why unergatives behave differently from unaccusatives/passives in German (where the subject of an unergative verb is VP-external, but the argument of unaccusative/passive verbs can remain in VP-internal position), but not in English (where the argument is invariably located in SpecTP). However, Verhoeven & Kügler tested German V2 structures, in which the argument is located in SpecCP. Thus, the original position of the argument needs to be taken into account in some way in order to explain the difference they found. If it is indeed a cross-linguistic grammatical difference that is responsible for the contrast in the results, the explanation would need to be along the lines that movement to SpecTP in English does not reconstruct for prosody, whereas movement to SpecCP in German does.

The different experimental findings for German vs. English could also be caused by the different methodologies and designs. Whereas Hirsch & Wagner manipulate one factor per experiment while holding all others constant, Verhoeven & Kügler examine the interaction of a pragmatic and a syntactic factor and show that the prosody of only one of the syntactic structures interacts with pragmatic factors—this kind of interaction data is not available in the results presented by Hirsch & Wagner (2011). Also, Hirsch & Wagner (2011)’s experiment is a production study, whereas Verhoeven & Kügler’s participants judged the acceptability of pre-recorded dialogues, which makes a direct comparison more difficult. A further point that complicates the interpretation of the results is that Hirsch & Wagner (2011)’s conclusion that there is no direct effect of unaccusativity/unergativity is based on the lack of a significant effect, which does not yet provide strong evidence against the influence of syntax (in addition to semantic/pragmatic factors).

I will continue to treat the accentuation of VP-internal subjects as potentially relevant data for prosodic reconstruction, because it has featured prominently in the theoretical discussion (and even defenders of information-structure based accounts like Rochemont

2013 note that the syntactic difference also seems to have some additional effect) and because there is at least some evidence for a systematic influence (Verhoeven & Kügler 2015) of the distinction between external and internal subjects. Further research will be needed to show whether this evidence can hold up against data from further studies, controlling for more potential semantic/pragmatic confounds. Also, other kinds of subjects that can be analyzed as VP-internal remain to be tested empirically.

Verb movement

Bierwisch (1968) argues that surface-based syntax-prosody mapping rules fail to account for the fact that in German, similar stress regularities are observed in clauses in which the main verb is in final position as in clauses in which it is in second position.

More specifically, Bierwisch criticizes the surface-based mapping system proposed by Kiparsky (1966). In order to account for the fact that new objects receive stress within the VP, whereas in the case of a given object, the verb receives stress instead, Kiparsky proposes that given objects move out of the syntactic domain within which stress assignment is leftward. This is illustrated in (51).

- (51) *Main verb in final position:*
- a. New object: [Peter hat [das Buch betrachtet]_←]_→
 - b. Given object: [Peter hat das Buch [betrachtet]_←]_→

Bierwisch argues that this analysis fails to account for the fact that the same stress patterns is observed in V2 clauses, where the verb is in second position:

- (52) *Main verb in second position:*
- a. New object: Peter betrachtet das Buch.
 - b. Given object: Peter betrachtet das Buch.

The assumed syntactic difference between given and new objects does not help to explain why in both cases it is the verb that receives stress if the object is given. Bierwisch argues that even if it was possible to come up with different surface structures that would correct the predictions, this would “obscure the fact that the difference in the placement of the main stress [...] is due to exactly the same cause”, which “has its roots in rather deep syntactic (or even semantic) conditions” (p. 177). In other words, a simple generalization is missed if the original syntactic configuration is not taken into account: if the complement

of the verb is new, it carries sentence stress; if its complement is given, the verb itself carries sentence stress. This is exactly the generalization that was later broadly agreed on and formalized in many different ways (Stress-XP, SAAR, focus projection; cf. section 2.1).

Although Bierwisch specifically criticizes Kiparsky's (1966) proposal, the argument applies more generally to all approaches which are based on the idea that some objects are unstressed because they move out of a sentence stress assignment domain. Kahnemuyipour's (2009) analysis of specific and unspecific objects, which will be discussed below, is very similar in this respect and therefore the same problem applies to it. Bierwisch does not provide an explicit alternative explanation (he refers to Heidolph 1966, who proposes that givenness-related features play a role in determining the accentuation in German), but the comment that "deep syntactic (or even semantic) conditions" (p. 177) determine the accentuation points into the direction that reconstruction for the purpose of interface mapping could solve the problem. In a model including such a reconstruction mechanism, the relevant generalizations determining the relative prominence of the verb and the object (the object being more prominent, unless it is given) could be stated in a simple way for the cases with basic OV order and be carried over to derived cases with verb movement.

Truckenbrodt & Darcy (2010) independently make a similar argument with respect to verb movement, but in connection with unaccusative vs. unergative subjects, which they assume to be VP-internal and VP-external, respectively (like Selkirk 1995 does). They present data showing that the accentuation pattern of German V2 clauses in this respect is identical to what is found in the corresponding embedded clause. For example, in (53a), sentence stress falls on the subject, whereas in (54a), it falls on the verb. This asymmetry is preserved in the corresponding derived V2 structure in (53b) and (54b).

- (53) a. ...dass [Otto kommt]_{VP}.
that Otto comes
'...that Otto comes.'
b. Otto kommt [~~Otto kommt~~]_{VP}..
- (54) a. ...dass Otto [geigt]_{VP}.
that Otto fiddles
'...that Otto fiddles.'
b. Otto geigt ~~Otto~~ [geigt]_{VP}.

This argument presupposes a syntactic analysis of the accentuation difference, along the lines of Selkirk (1995), which was discussed above.

Discontinuous constituents

Although this is not a point that is explicitly made by Bierwisch (1968), in my view a part of the data that he presents shows that discontinuous constituents pose a special problem for surface-based accent assignment algorithms. Consider (55) (from Bierwisch 1968, p. 176):

- (55) a. Peter hat das Buch angeschaut.
Peter has the book at.looked
'Peter has looked at the book.'
- b. Peter schaut das Buch an.
Peter looks the book at
'Peter looks at the book.'

Here, the verb contains a separable prefix, which is left behind in final position when the verb moves to the second position. Besides givenness, sentence stress on the (prefix of the) verb can also be due to a narrow focus:

- (56) Ich habe Peter einen Bildband gegeben. Ich glaube, er scannt das Buch gerade ein. *'I gave Peter a photo book. I think he is scanning the book right now.'*
Nein, Peter schaut das Buch an.
'No, Peter is looking at the book.'

In (56), the context induces verb focus. The verb, however, does not form a continuous string in (56)—the stem is in second position, and the separable prefix is in final position. Two ways are conceivable to determine which of the discontinuous parts receives stress. First, the accentuation rule could make specific reference to the prefix part and apply globally to the whole sentence including a discontinuous verb, e.g.: “If a stressed verb contains a separable prefix, it is the prefix that is most prominent.” A second option would be to adopt a local rule that governs the stress pattern within a verb either in terms of depth of embedding (Kahnemuyipour 2009, Cinque 1993) or linear order. Such a solution is desirable in the respect that accentuation properties are derived from more general properties rather than postulated specifically, but it would not be applicable to the surface structure of discontinuous constituents—in this case, reconstruction would be necessary, since the particle is neither to the left of the verb stem nor embedded deeper than the stem at the surface of the discontinuous structure.

Bierwisch's (1968) particle verb examples are also discussed by Krifka (1998), who

proposes a cyclic syntax-focus mapping account in order to account for them. He makes the further point that the problem of discontinuity arises also in examples involving partial focus fronting when the focus is the whole VP:

- (57) What did Maria do next?
Einen Roman hat sie gelesen.
a novel has she read
'She read a novel'.

If a discontinuous VP, resulting from object movement to the prefield, is focused in German, it is still the object that receives main stress. Again, this could either be formalized by making specific reference to the direct object category in the rule, or by applying a more general mapping algorithm—making reference to rightmost or most deeply embedded constituents/arguments—to the underlying structure. I will discuss this kind of example in depth in chapter 4, and I will argue in favor of a reconstruction-based account.

Summary

To sum up, the following arguments have been put forward in favor of the view that syntactic configurations at early stages influence accentuation:

- *Relative clauses*: prosodic reconstruction can account for sentence stress on the head noun in English.
- *Wh-movement*: combined with the assumption that wh-words are like indefinite pronouns in that they usually reject sentence stress, reconstruction can account for the fact that fronted wh-words do not carry sentence stress, but wh-phrases containing accentable material do; supported by data from English and German.
- *VP-internal subjects*: There is evidence for an accentuation difference between unaccusatives and unergatives. Under the assumption that subjects of unaccusatives are generated in object position, reconstruction can account for the fact that they carry sentence stress; the analysis can be extended to other VP-internal subjects. Whether the reported accentuation contrast is a direct consequence of differences in the syntactic structures, or whether it is rather caused indirectly by properties that often correlate with the syntactic distinction (like animacy and topicality of the argument) is debated.

- *Verb movement in German*: The same generalizations about the relative prominence of verb and object hold irrespective of whether the verb is in final or second position; under a reconstruction account, this can be captured by a straightforward local rule.
- *Discontinuity*: Reconstruction helps to state generalizations about the accentuation of discontinuous constituents in a more straightforward way. This includes:
 - discontinuous particle verbs (when the verb is fronted leaving the particle behind, the particle receives sentence stress if it had received it without the movement)
 - discontinuous VPs (when the object is fronted leaving the verb behind it receives sentence stress if it had received it without the movement)

Especially the data concerning relative clauses and wh-movement provides convincing evidence in favor of prosodic reconstruction. The data concerning VP-internal arguments and Bierwisch's (1968) and Krifka's (1998) data on discontinuous constituents point in the same direction. In chapter 4, I will add further data from German that supports and extends the latter argument.

2.2.3 Evidence against prosodic reconstruction

In this subsection, I will discuss evidence that has been put forward to argue that syntax-mapping applies in a surface-oriented, non-reconstructing way, at least for some type of syntactic movement: *tough*-movement, passive (Bresnan 1971), verb-particle constructions (Legate 2003), scrambling of specific objects, topicalization, wh-movement (Kahnemuyipour 2009), and extraposition (Rochemont 1998). A summary will be provided at the end of the subsection. I will argue that some of the evidence is based on obsolete theoretical assumptions, but for some constructions, including scrambling and extraposition, there are valid indications of surface-oriented mapping.

Tough-movement / passive

Bresnan (1971) observes that there are syntactic operations for which, in contrast to wh-movement and relative clause formation, former stages of the derivation seem to be neglected for the purpose of sentence stress assignment, e.g. *tough*-movement and passivation. Bresnan's view on these constructions is shown in (58) and (59). In both examples, sentence stress falls on the rightmost word in the default case (i.e., without a context that

would make parts of the sentence contrastive or given), even though, according to the syntactic model that Bresnan assumes, it only became the rightmost element after a syntactic transformation was applied.

(58) The theorem was tough to prove ~~the theorem~~.

(59) John was seen by Mary ~~see John~~.

Within her cyclic approach, Bresnan proposes that the relevant transformations in these cases occur before the prosodic rules apply for the first time. An explanation along these lines would not be available in a non-cyclic, postderivational approach. However, it has to be noted that the argument relies on specific syntactic assumptions. Bresnan assumes that *the theorem* in (58) originates from a complement position of *prove*. Chomsky (1977) proposed a different analysis, according to which *the theorem* is base-generated in the matrix clause and the infinitival construction involves a null operator; see Hicks (2003) for a comprehensive overview of arguments in favor of a null operator analysis, and an updated version of it. Under this view, it is irrelevant for determining the position of sentence stress whether there is reconstruction or not. As for (59), Bresnan assumes that passive sentences are derived directly from active ones, i.e., the experiencer *Mary* was above / to the left of the theme *John* at an early point of the derivation. Under this view, sentence stress would be falsely predicted to fall on *John* if the base-generated position mattered for syntax-prosody mapping. In current analyses, the agent in the passive construction, if it is expressed at all, is usually not merged in subject position, but directly as an adjunct (see e.g. Bruening 2013 and references therein). As such, it would be predicted to behave like other sentence-final adjuncts in English, e.g. locative or temporal PPs, which typically carry sentence stress. Thus, under this view of the passive construction, *by*-phrases do not deviate from the usual syntax-prosody mapping.

Verb-particle constructions

Legate (2003) presents data like the following as counterevidence to Bresnan's claim that the original position counts for stress assignment (from Legate 2003, p. 512, judgments as provided there):

- (60) a. Please put away the dishes.
b. Please put them/?the dishes away.

If (60b) is derived from (60a) via short object movement, its original position seems to be neglected for sentence stress assignment.

Schmerling (1974, p. 107) discusses similar data, but reports that the particle would only receive primary stress in structures like (60b) if the object is a pronoun. Dehé (2002) also reports that with full DP objects, the structure in (60b) is marked and limited to contexts in which the object is discourse-given and/or the verb is focused.

Legate’s argument will be discussed in more detail below in section 2.3 in connection with her model of prosodic reconstruction. There, it will be shown that in addition to the problem that (60b) is probably only possible in information-structurally marked contexts, the syntactic analysis underlying Legate’s analysis is not shared by other authors.

Specific vs. unspecific objects

Kahnemuyipour (2009, p. 75) shows that in Persian, unspecific objects as in (61a) are morphologically unmarked and carry sentence stress in a transitive sentence (in the absence of manner/measure adverbs). Specific objects as in (61b) are marked for accusative case and do not carry sentence stress—here, the verb is stressed instead. Following the syntactic assumption that specific objects occupy a higher position than unspecific ones (Kahnemuyipour cites e.g. Browning & Karimi 1994 for Persian), Kahnemuyipour argues that a difference in the surface position of the objects must be responsible for the different stress patterns in (61a) and (61b). Crucially, the base-generated position is assumed to be the same in both cases, so a syntax-prosody algorithm that neglects movement and only considers underlying structure would not be able to account for the contrast.

- (61) a. Ali qazaa xord.
 Ali food ate
 ‘Ali ate food.’
 b. Ali qazaa-ro xord.
 Ali food-ACC ate
 ‘Ali ate the food.’

Kahnemuyipour (2009, pp. 75–76) provides similar data for Dutch and German. The latter is presented in (62).

- (62) a. Der Arzt wird einen Patienten untersuchen.
 the doctor will a patient examine
 ‘The doctor will examine a patient.’

- b. Der Arzt wird den Patienten untersuchen.
the doctor will the patient examine
'The doctor will examine the patient.'

The same examples are discussed by Kiparsky (1966, p. 91). Kahnemuyipour and Kiparsky provide similar analyses in terms of syntactic movement out of a stress assignment domain (apparently independently of each other; Kahnemuyipour cites Cinque 1995 as his source of the data). Both surface-oriented analyses suffer from the problem that was pointed out by Bierwisch: when the main verb is in second position, the different surface position of the object does not help to explain the observed difference in accentuation.

A second potential problem with this argument is that at least in the case of German, the prosodic difference can be arguably reduced to the factor givenness (see e.g. Bierwisch 1966, Heidolph 1966)—the object is deaccented if it was mentioned in the preceding context. This often correlates with definiteness/specificity, but in principle, givenness and definiteness/specificity can be separated from each other. When the object is discourse-new, sentence stress on the object is preferred both for definite and indefinite objects (also unspecific ones) according to my intuition, as shown in (63). We can imagine that the definite article is licensed by virtue of a visual scene that is presented along with the target sentence.

- (63) a. (Visual context: a doctor and several patients are in a hospital room.) The doctor is washing his hands now. What will he do next?
Der Arzt wird einen Patienten untersuchen.
'The doctor will examine a patient.'
- b. (Visual context: a doctor and a patient are in a hospital room.) The doctor is washing his hands now. What will he do next?
Der Arzt wird den Patienten untersuchen.
'The doctor will examine the patient.'

When the object is given (i.e. verbally mentioned in the preceding context), it is preferable for me to deaccent it by putting the sentence stress on the verb, as shown in (64b).

- (64) a. Verbal Context: There are five patients in the waiting room. What will the doctor do next?
Der Arzt wird einen Patienten untersuchen.
'The doctor will examine a patient.'

- b. Verbal Context: There is one patient in the waiting room. What will the doctor do next?

Der Arzt wird den Patienten untersuchen.

‘The doctor will examine the patient.’

That given elements are deaccented in German is a more general rule, which does not only govern the prominence relation between objects and verbs. For example, it applies also when the prominence relation between an adjective and a noun is concerned:

- (65) a. Context: ‘The doctor just released a patient. What will he do next?’

Der Arzt wird den nächsten Patienten untersuchen.

the doctor will the next patient examine

‘The doctor will examine the next patient.’

- b. Context: ‘The doctor just washed his hands. What will he do next?’

Der Arzt wird den nächsten Patienten untersuchen.

In this case, an analysis in terms of syntactic movement seems unlikely, and an IS-prosody mapping rule relating givenness to deaccentuation seems to be needed anyway. Such a rule would also capture the cases of object deaccentuation that Kahnemuyipour discusses. Thus, at least for German, a syntactic movement account of that data is not necessary.

However, it remains to be shown whether this alternative analysis would also capture the Persian data correctly. Also, if the argumentation above is correct, this means that there is no 1:1-relation between specificity and syntactic position nor between specificity and deaccentuation in German. However, a part of Kahnemuyipour’s proposal might still be correct: the data above do not speak against the generalization that *if* an object leaves the VP, it does not carry sentence stress. I will come back to this later in section 3.4.

Topicalization

Kahnemuyipour (2009) points out that objects usually receive sentence stress in English, but not when they are topicalized. The problem is illustrated in (66) (based on examples from Kahnemuyipour 2009, p. 165):

- (66) a. I like beans.

- b. *Beans, I like. (under the topicalized reading)

I think that a direct comparison of these examples is not warranted due to information-

structural differences. (66b), following Büring (2003), could be analyzed as a combination of a contrastive topic (*beans*), and a focus (*like*). According to Büring, if a sentence with the word order in (66a) has this kind of information structure, the focus would carry a falling accent, whereas the contrastive topic would carry a rising accent. Thus, the same accentuation pattern is found in both the simple and the derived structure if the information structure is held constant across the examples.

Schmerling (1974, p. 107) makes the same point: “[T]he applicability of a rule like Topicalization [...] seems to be correlated with certain assumptions on the part of the speaker, and thus we would expect that the stress contour of a sentence in which such a rule applies might not necessarily correspond in a direct way to the stress contour of a “corresponding” sentence in which this rule does not apply”.

Wh-movement

Another point that Kahnemuyipour (2009) makes against prosodic reconstruction is that English *wh*-elements are stressed in situ (e.g. in multiple questions), but unstressed when fronted to the left periphery.

- (67) a. Who kissed who?
b. *Who did John kiss?

In Bresnan’s analysis (1971) the fact that *who* cannot be stressed in (67b) follows from the assumption that *wh*-elements are like indefinite pronouns in that they are typically unaccented. Kahnemuyipour argues that the data in (67a) shows that *wh*-elements cannot be inherently unstressed, and a different explanation is needed. He provides an analysis in terms of surface-based mapping, according to which the *wh*-element moves out of the position where it would normally receive sentence stress. If there was prosodic reconstruction, it would not be possible to escape from a stressed position.

However, the behavior of *wh*-elements is not as different from indefinite pronouns as Kahnemuyipour claims. The in situ *wh*-element in a multiple question carries sentence stress; in the answer to a multiple question, a focused in situ indefinite pronoun would also carry sentence stress, as (68) shows.

- (68) Who kissed who?
John kissed someone.

In my view, it is fronted wh-elements rather than in situ ones that show a deviating behavior requiring an additional explanation. A left-peripheral wh-word does not carry sentence stress, but a focused indefinite pronoun in the corresponding answer does. In other words, the question is not why the in situ wh-element in (67) carries sentence stress (it is because of focus), but why *who* in (69) does not carry sentence stress.

- (69) A: Who kissed John?
B: Someone kissed John.

One possibility would be to assume that the difference is due to givenness: In (69), *kissed John* is not given in the question, but it is given in the answer. However, as Truckenbrodt (2012) points out, such an explanation is problematic: under the assumption that indefinite pronouns and wh-words are typically unstressed (which is needed to account for basic cases like *John kissed someone* under broad focus), this should hold in (69), too. This would result in an utterance in which all elements are unstressable (in the case of *kissed* and *John* due to givenness, and in the case of *someone* due to inherent properties). This constellation usually results in a default stress pattern, e.g. in all-given-sentences, which is however not what happens in (69).

Truckenbrodt (2012) draws the conclusion that the accentuation of *someone* in (69) must be due to focus. If questions and their corresponding answers are information-structurally parallel, this would mean that *who* is also focused, and an additional explanation is needed for the fact that it does not carry sentence stress. Since this problem arises also for subject and not only for object questions (and only the latter can be assumed to emerge from a right-peripheral default stress position), the issue is not directly related to reconstruction. Rather, the question is why left-peripheral wh-elements are exempted from the usual prosody-IS mapping rules. Truckenbrodt (2012) proposes that syntactic movement is an alternative means to express focus on a wh-element, and thus fronted wh-expressions are not marked prosodically.

Extraposition

Rochemont (1998) examines Heavy Noun Phrase Shift (HNPS) in English. He reports that in contrast to VP-internal subjects, which seem to behave as if they were in a lower position for the purposes of accent assignment (as Selkirk 1995 argues), a similar effect is not observable for objects affected by HNPS (p. 346). In (70a) with canonical order, sentence stress falls on the direct object; in (70b), where the object is extraposed, there

are two intonational phrases, with sentence stress on the PP in the first one, and on the extraposed object in the second one.

- (70) a. The Moral Majority elected a man named Ronald Reagan to the presidency.
 b. The Moral Majority elected to the presidency, a man named Ronald Reagan.

Rochemont argues that the regular NSR applies in the first intonational phrase and assigns sentence stress to the rightmost constituent. In the second one, a focus-sensitive version of the NSR called NSR' applies, which assigns sentence stress to focused constituents. Rochemont assumes that only new/focused constituents can be extraposed, and that they will therefore always receive sentence stress by the NSR'.

Truckenbrodt & Darcy (2010) present experimental results that point into the direction that extraposed complement clauses do not—at least not necessarily—involve prosodic reconstruction in German, in line with what Rochemont (1998) reports for extraposition in English.

Truckenbrodt & Darcy recorded six native speakers of German, who produced sentences corresponding to the example in (71) and the schematic structures in (72). In the (a) and (b) conditions, the matrix clause was followed by an adjunct clause (e.g. *auch wenn er sich damit viele Feinde macht* 'even though he will make a lot of enemies this way'), which is left out in (71). In addition to the three conditions shown here, there was a fourth one, in which the object clause was an embedded V2 structure (this additional manipulation is not immediately relevant for the discussion here).

- (71) a. Der Manager will eine neue Strategie darlegen....
 the manager wants a new strategy suggest
 'The manager wants to suggest a new strategy...'
 b. Der Manager soll das auf der Versammlung darlegen...
 the manager shall this at the meeting suggest
 'The manager is supposed to suggest this at the meeting...'
 c. Der Manager will auf der Versammlung darlegen, dass der Millionär die
 the manager wants at the meeting suggest that the millionaire the
 Firma verwalten soll.
 company manage shall
 'The manager wants to suggest at the meeting that the millionaire is supposed
 to manage the company.'

- (72) a. [... O V]_{matrix clause} [although S ... V]_{adjunct clause}
 b. [... PP-adjunct V]_{matrix clause} [although S ... V]_{adjunct clause}

- c. [... PP-adjunct *t_{object clause}* **V**]_{matrix clause} [that S ... V]_{object clause}

Conditions (a) and (b) served as control base lines. As expected, the matrix verb (marked by boldface) rarely received a phrasal accent in condition (a), where it is adjacent to its object, but it was stressed in the majority of cases in (b) (different explanations for this were discussed in section 2.1). In (c), the verb appears in an adjacent position to a PP-adjunct, similar to the situation in (72b). However, Truckenbrodt & Darcy assume that the object clause in (c) originates from a complement position to the verb and has been extraposed to the right (see Haider 2010 for the alternative view that extraposed complement clauses are base-generated in a postverbal position and for an overview and discussion of the competing analysis). If the extraposed clause is reconstructed for syntax-prosody mapping, condition (c) should pattern with condition (a): it should not be necessary to stress the verb, as the object (clause) should exempt the verb from being stressed. If there is no such reconstruction, condition (c) should pattern with condition (b): it should be necessary to stress the verb.

The results are that condition (c) (and also the fourth condition with a V2 object clause) patterned with condition (b): the verb received a phrasal accent in the majority of cases. This favors the view that the object clause is not reconstructed to its original position for syntax-prosody mapping. The authors point out a methodological caveat: even if the speakers had a prosodic reconstruction principle in their grammar, reconstruction of the object clause would need to be anticipated, i.e. the speaker would need to have read and parsed the entire sentence before producing the matrix verb. If the speaker first reads and produces the matrix clause and only then proceeds to read and produce the object clause, the cue licensing destressing of the matrix verb comes too late. The authors also conjecture that prosodic reconstruction might require a prosodically integrated realization of the extraposed clause (which might correspond to a lower syntactic attachment site). The recorded speakers tended to realize the object clause in a non-integrated way, as a separate intonation phrase, which might have blocked this possibility.

Summary

In sum, the following evidence has been put forward in favor of the view that at least for some types of syntactic movement, the surface position of the moved constituent has to be taken into account, disregarding the original position:

- *Tough*-movement / passive: Bresnan (1971) presents data showing that these trans-

formations are not reconstructed for the application of NSR; but the argument can be seen as obsolete in view of more recent syntactic analyses.

- Verb-particle construction: Legate (2003) shows that short object movement across a particle is not reconstructed for sentence stress assignment. However, the prosodic pattern might be influenced (and independently explained) by information-structural confounds here—the discontinuous pattern with stress on the particle is reported to be marked by other authors.
- Specific vs. unspecific objects in Persian and Germanic: At least in German, the crucial factor is givenness, which requires deaccentuation independently of structural configurations; this speaks against Kahnemuyipour’s (2009) generalization that specific objects are deaccented due to their syntactic position. However, this does not exclude that the argument holds for Persian. Also, the point that scrambled objects differ prosodically from in situ ones might still hold in German—this point will be taken up again in 3.4.
- Topicalization: If information structure is held constant, the prosodic contrast between simple and derived sentences reported by Kahnemuyipour (2009) disappears.
- Wh-movement: Kahnemuyipour (2009) correctly points out that it is unexpected that fronted wh-elements do not carry sentence stress, in contrast to in situ wh-phrases or focused non-wh-pronouns. However, surface-based mapping does not solve this issue; it still remains to be explained why fronted wh-elements seem to be exempted from the usual focus-prosody mapping rule. An additional explanation seems necessary irrespective of whether the mapping rules involve reconstruction or not.
- Extraposition: Rochemont (1998) claims that extraposition in English does not involve prosodic reconstruction, and Truckenbrodt & Darcy’s (2010) data from German lend some support to this view.

Some of the counterarguments that were raised against prosodic reconstruction are obsolete in view of more recent syntactic analyses (*tough*-movement, *by*-phrases) or under closer inspection of the phenomenon (verbal particles, wh-movement, topicalization). However, for some types of movement, there is some evidence for non-reconstructing syntax-prosody mapping. This includes extraposition and potentially scrambling.

2.3 Previous approaches to prosodic reconstruction

The proponents of some sort of reconstruction in the domain of syntax-prosody mapping have offered different implementations. These will be reviewed in sections 2.3.1–2.3.6 and summarized in section 2.3.7. In chapter 3, I will discuss shortcomings of the approaches and propose new implementation options.

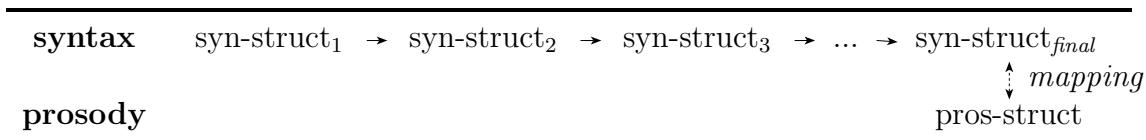
2.3.1 Logical possibilities

Within a transformational approach to syntax, interface mapping can take place either at multiple points during the derivation, or only once at the end of the derivation. It can either apply to the current syntactic structure at the point of mapping, or it can take into account earlier stages of the derivation via reference to traces or lower copies. This results in the four logical mapping possibilities displayed in Figure 2.1 (see Korth 2014, pp. 213–214 for a similar two-factorial taxonomy of mapping approaches).

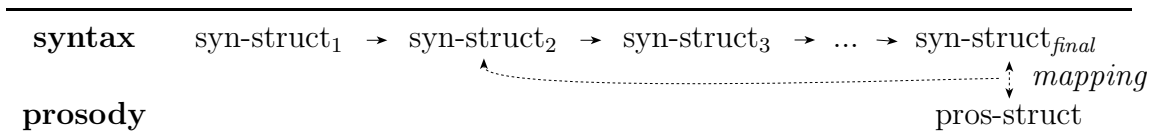
Under surface-based post-derivational mapping (1.), no prosodic reconstruction effects are predicted to occur. If traces/lower copies are taken into account for the mapping (2.), prosodic reconstruction effects are predicted. Lakoff (1972), Selkirk (1995), and Korth (2014) will be discussed as representatives of this type of approach in section 2.3.2. In cyclic approaches (3./4.), it depends on the details of the model whether prosodic reconstruction effects are predicted or not. I will discuss Bresnan (1971, 1972) as the main example of a cyclic approach intended to capture prosodic reconstruction, and Kahnemuyipour (2009) as an example of a cyclic approach that is explicitly surface-oriented in section 2.3.3. Legate’s (2003) cyclic model is a special case within the cyclic implementations in that it predicts reconstruction effects for some movement operations, and surface-oriented mapping for others. In a note on phase-based approaches in section 2.3.6, I will review a number of approaches that do assume cyclic syntax-prosody mapping for independent reasons, but are agnostic with respect to prosodic reconstruction.

I will refrain from a detailed discussion of the model of prosodic reconstruction that is sketched in Truckenbrodt (in press) and being developed further in Truckenbrodt & Büring (in preparation; cited in the former manuscript), as the completion of this thesis predates the appearance of their final versions. As far as I can tell at the current point, Truckenbrodt’s (in press) approach is largely compatible with the implementation that will be developed in the next chapter, and I will refer to certain aspects of it there.

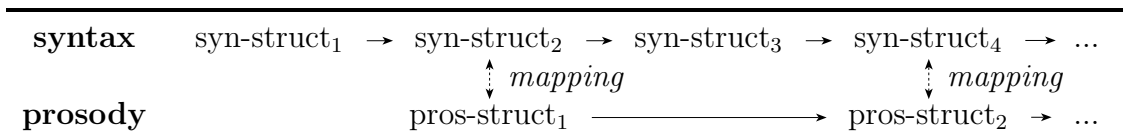
1. Surface-based post-derivational mapping:



2. Trace-based post-derivational mapping:



3. Surface-based cyclic mapping:



4. Trace-based cyclic mapping:

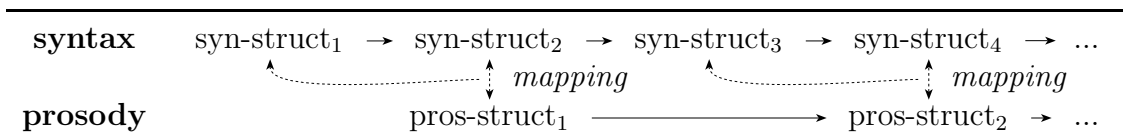


Figure 2.1: Logical possibilities for timing and manner of interface mapping

2.3.2 Trace-based post-derivational implementations

Lakoff (1972) provides conceptual arguments against Bresnan’s cyclic NSR proposal, which will be discussed in more detail below. He shows that Bresnan’s system can be reformulated in terms of a ‘global rule’, i.e. a rule that makes reference to corresponding nodes in non-adjacent phrase-markers of the derivation (cf. Lakoff 1970 for this terminology). Lakoff’s global rule roughly states that sentence stress falls on the direct object (if it is stressable and it is not followed by any clause-mates), or otherwise on the rightmost stressable constituent (for the exact formulation, see Lakoff 1972, p. 298). Lakoff argues that ‘[i]t is preferable for a rule to apply postcyclically rather than cyclically (all other things being equal)’ (p. 301). The reason he provides is that a postcyclical rule is a stronger statement: it entails that no syntactic processes can be influenced by its output, which Lakoff takes to be correct for stress assignment. It can further be noted that Lakoff’s rule

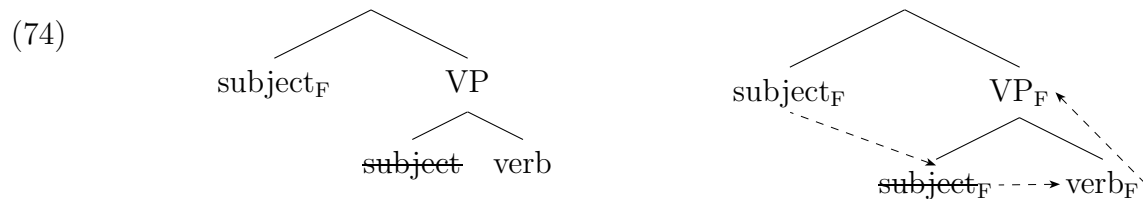
explicitly refers to the grammatical function of “direct object”, which is not necessary in Bresnan’s system.

Strictly speaking, Lakoff’s account is not trace-based but makes direct reference to earlier phrase-markers; I will nevertheless subsume it under this label, because it is similar to approaches involving the notion of trace or copy in that earlier positions of constituents are accessed again at a later point.

Selkirk (1995) extends Selkirk (1984) and Rochemont’s (1986) system of focus marking (F-marking) to cases involving syntactic movement. Selkirk argues that they can be accounted for if traces are taken into account for the application of the F-marking rules.

This is exemplified for the problem of unaccusatives in (73) and (74). The trace of *Johnson* can F-mark the verb, and subsequently the VP and the whole sentence.

(73) Johnson_i [*t*_i died]_{VP}.



Similarly, in (75a), the VP-internal trace of *a clock* can F-mark the VP. In a control structure like (75b), on the other hand, there is no VP-internal trace of *a clock* which could F-mark the VP. Thus, a different VP-internal accent is required if the sentence is to have a broad-focus interpretation: the verb needs to receive the sentence accent.

- (75) a. I heard [a clock]_i [*t*_i tick]_{VP}.
 b. I forced a clock to [*PRO* tick]_{VP}.

In non-generic statements, the subject’s trace can F-mark the VP, whereas this is not possible in generic statements involving PRO, as shown in (76). Analogously, as shown in (77), the trace of the subject of a stage-level predicate can F-mark a VP, whereas this is not possible with subjects of individual-level predicates.

- (76) a. Trespassers_i will be [*t*_i prosecuted]_{VP}. *non-generic*
 b. Trespassers will be [*PRO* prosecuted]_{VP}. *generic*
- (77) a. Firemen_i are [*t*_i available]_{VP}. *stage-level*

- b. Firemen are [PRO altruistic]_{VP}. *individual-level*

Finally, Bresnan's (1971) examples with wh-movement also follow in the F-marking system if the trace of *what books* in (78) can F-mark the VP.

- (78) [What books]_i has Helen [reviewed t_i]_{VP}?

Selkirk mentions that “an alternative to this appeal to trace would be to assume that Focus Projection held at the level of Logical Form”, where the lower positions of the relevant constituents would be restored “through reconstruction” (p. 559).

Korth (2014, section 5.2) argues for a reconstruction-based approach to prosody-syntax mapping for German. She argues against cyclic approaches, as they would require to move constituents along with the metrical structure built up so far, which Korth assesses as counterintuitive and problematic from a phonological point of view (p. 219). Instead, Korth proposes that the metrical structure is built after the syntactic derivation is completed, and constituents that have undergone syntactic movement are reconstructed to their original position for the purpose of certain grammatical rules, which is necessary to account for the verb movement facts that were discussed above.

In particular, Korth (p. 220) proposes a rule for constituent reconstruction (“Regel zur Konstituentenrekonstruktion”), which is used to handle both semantic reconstruction (e.g., for the purpose of binding or quantifier scope, cf. Korth 2014, p. 230) and prosodic reconstruction (for the purpose of syntax-prosody mapping). Korth discusses the problem mainly with respect to V2 structures. For this type of data, she assumes that the prefield constituent and the verb are reconstructed into their original positions in such a case, and the metrical structure is assigned in accordance with the syntax-prosody mapping rules (favoring stress on complements) based on this reconstructed configuration. This ensures that the verb-object asymmetry as well as the argument-adjunct asymmetry carry over from the basic verb-final structures to V2 configurations.

2.3.3 Cyclic implementations predicting prosodic reconstruction

Bresnan (1971, 1972) proposes to model sentence stress assignment by a cyclic application of the nuclear stress rule (NSR), which she adopts from Chomsky & Halle (1968). The NSR lowers all accents at the sentence level except for the most prominent one; in case of a tie, except for the most prominent *rightmost* one. Accent lowering is represented

by increasing the numbers associated with each prosodic word. Bresnan assumes that the NSR applies at multiple points during the derivation: (at least) at every NP level and sentence level.

Recall from the previous sections that Bresnan uses the cyclic algorithm to account, among others, for stress patterns in *wh*-questions. The relevant examples are repeated below.

- (79) a. What has Helen written ~~what~~?
 b. What books has Helen written what books?

The derivational steps that are assumed to take place are illustrated below.⁶ Both (79a) and (b) involved a direct object next to the verb prior to *wh*-movement. The crucial difference here is that *what* is unaccentable according to Bresnan's assumptions (like an indefinite pronoun; as can be noted in the examples, functional elements like determiners and complementizers are also assumed to be accentless), so it does not receive primary stress to begin with, whereas *what books* does, causing deaccentuation of the verb in the first cycle. The derivation is illustrated below.

- (80)
- | | | | | | |
|---------------------|----------------------|-------|---------|-------------------|--------------------|
| | [_S Helen | has | written | what] | |
| | 1 | 1 | 1 | | word stress |
| | 2 | 2 | 1 | | NSR |
| [_S what | [_S has | Helen | written | what] | question formation |
| | 2 | 2 | 1 | | word stress |

- (81)
- | | | | | | | | |
|---------------------|----------------------|--------------------|---------|---------|-----------------|--------------------|--------------------|
| | [_S Helen | has | written | what | books] | | |
| | 1 | 1 | 1 | | 1 | word stress | |
| | 2 | 2 | 2 | | 1 | NSR | |
| [_S what | books | [_S has | Helen | written | what | books] | question formation |
| | 1 | 2 | 2 | 2 | | word stress | |

In order to account for the observation that some types of movement (*tough*-movement, passivization) do not seem to show reconstruction effects, Bresnan proposes that these

⁶I deviate from Bresnan's notation in that the word stress of new syntactic material is introduced at each cycle rather than at the very beginning of the derivation, and I indicate the syntactic transformations in the notation style of the copy theory of movement; the latter changes do not have any impact on the predicted stress pattern.

transformations occur before the NSR applies at the sentence level.

Krifka (1998, ch. 6) argues, based on data concerning discontinuous foci as discussed in section 2.2.2, that focus must be assigned before syntactic movement happens. This assumption allows to retain the view that focus is assigned to constituents, even if the focused part of the sentence does not form a constituent at surface structure. For example, in (82), the verbal particle *an* carries sentence stress if the verb *anschaut* ‘looks at’ is focused. If only surface structure is taken into consideration, and assuming that the non-default stress on the particle rather than on the object is caused by focus, then it would be necessary to either assume that the particle itself is focused, or that the trace of *anschaut* is focused. Krifka argues that the former option is ruled out because the particle does not have an individual meaning, and that the latter option is implausible because focus cannot be assigned to phonologically empty categories. Therefore, Krifka assumes a derivation as in (83), where focus assignment precedes verb movement.

- (82) Peter schaut ~~Peter~~ das Buch anschaut.
Peter looks the book PART
‘Peter looks at the book.’
- (83) a. Peter das Buch [anschaut]_F
 b. schaut Peter das Buch [~~anschaut~~]_F
 c. Peter schaut ~~Peter~~ das Buch [~~anschaut~~]_F

Krifka’s idea of reconstruction for information-structure related mapping rules will be taken up and fleshed out in detail in chapter 4.

2.3.4 Cyclic implementations predicting surface-oriented prosody

Kahnemuyipour (2009) (based on Kahnemuyipour 2004) aims to develop a model in which sentence stress is linked to a specific structural position. Cross-linguistic differences with respect to the position of sentence stress can then be accounted for in terms of independently motivated structural differences.

The proposal is framed within an antisymmetric (Kayne 1994), Minimalist (Chomsky 1995) architecture, with phases and multiple Spell-out. When a phase—a transitive vP or a CP—is completed in the course of the derivation, the syntactic complement of the phase head is transferred to the phonological interface. At each Spell-out point, sentence stress is assigned to the highest element within the Spell-out domain (p. 68)

Kahnemuyipour’s system is illustrated in Figure 2.2. He assumes that objects obligatorily move to the specifier of AspP, which is projected between the VP and the vP. Therefore, it will typically be the object that is the highest element in the complement domain of a transitive v head (following Kahnemuyipour’s terminology, this domain is labeled as *SPELLEE 1* in the figure). It thus receives sentence stress when the v head is reached. When the C head is reached, the highest element in its complement domain (labeled as *SPELLEE 2*) usually is the subject in languages where the subject is assumed to occupy SpecTP. Thus, sentence stress will be assigned to the subject at second Spell-out.

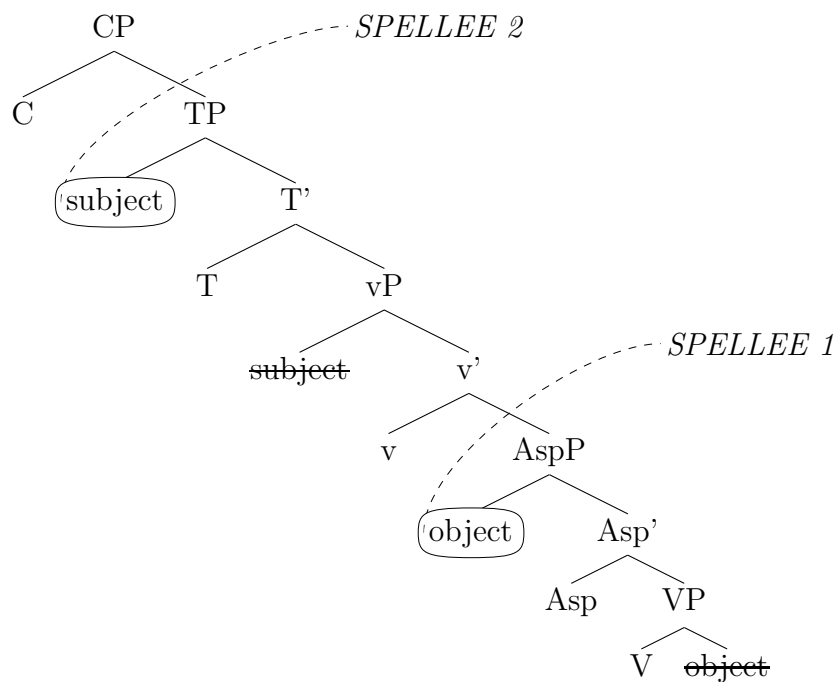


Figure 2.2: Illustration of Kahnemuyipour’s (2009) model

In Kahnemuyipour’s model, the object/verb asymmetry follows from the assumption that objects are located in a high position within the vP. The subject/VP asymmetry does not follow from the principles above. One of the solutions that Kahnemuyipour proposes is introducing a universal phonological/phonetic rule with “the effect of a (perceived) higher prominence on the last or rightmost element” (p. 119).

The most striking feature of Kahnemuyipour’s analysis is that it deviates from most other approaches with respect to the alignment of sentence stress: in contrast to all other proposals discussed so far, sentence stress is assigned to the highest/leftmost element (within the first SPELLEE) rather than to the most deeply embedded/rightmost one. The main motivation for this proposal comes from new data from Persian.

In Persian, manner and measure adverbs receive sentence stress, as (84) shows (from Kahnemuyipour 2009, p. 39), and if there is more than one internal argument, the leftmost one is accented, as shown in (85) (provided that it is unspecific, as it was discussed above in section 2.2.3). This follows from the proposed model, as the leftmost internal argument is assumed to occupy the highest position in the first SPELLEE.

- (84) a. Ali qazaa mi-xord.
 Ali food DUR-ate
 ‘Ali would (used to) eat food.’
 b. Ali xub qazaa mi-xord.
 Ali well food DUR-ate
 ‘Ali would (used to) eat well.’

- (85) Ali ketaab tu qafase mi-zaar-e.
 Ali book in shelf DUR-put-3SG
 ‘Ali puts books on shelves.’

Similar German examples are provided to confirm the pattern cross-linguistically (cited from Kahnemuyipour 2009, p. 94, attributed to Krifka 1984 there):

- (86) Maria hat das Auto in die Garage gefahren.
 Mary has the car into the garage driven
 ‘Mary has driven the car into the garage.’

However, I think that this example cannot be generalized to all cases with more than one internal argument. While it is true that directional PPs can be unaccented if they are definite and given or predictable, they carry sentence stress if they are indefinite and new, as in (88):⁷

- (87) Maria hat das Auto in irgendeine Garage gefahren.
 Maria has the car in some garage driven
 ‘Mary has driven the car into some garage.’

Also, dative objects do not receive sentence stress in all-new contexts, even though they typically appear to the left of accusative objects (cf. Truckenbrodt 2012):

- (88) Maria hat einem Kind ein Buch gezeigt.
 Maria has a child a book shown

⁷Kratzer & Selkirk (2007) and Truckenbrodt (2012) report that sentence stress on the PP is at least possible in such cases

‘Mary has shown a child a book.’

This suggests that in German, like in English, the rightmost argument is the most prominent one by default.

The Persian data however does provide evidence against a universal approach in terms of depth of embedding, as proposed by Cinque (1993). The opposite idea—that it is the highest, not the lowest element that receives sentence stress—fits the presented Persian data well. But making it compatible with well-established data from Germanic and Romance requires a range of specific syntactic assumptions (this concern is also raised by Tokizaki 2011), especially for English, which shows very consistent rightmost stress across almost all kinds of constructions. For example, in order to predict sentence stress on a final adverbial PP correctly, Kahnemuyipour (2009, pp. 81–83) needs to assume that the PP is generated above (and therefore to the left of, obeying antisymmetry) the vP, and the VP moves around it. When the vP is completed, the SPELLEE is thus empty. Kahnemuyipour proposes that an exceptional rule is applied in this case: the closest “phonologically non-null element” (p. 82) receives sentence stress.

Kahnemuyipour’s model includes components that are reminiscent of Cinque’s embedding-based model (in that hierarchy plays a role—although in a reversed way, as it is the highest rather than the lowest element in a certain domain that has a special status), Kiparsky’s parametrized proposal (in that rules which assign stress in leftward/upward direction and are restricted to a certain domain can result in sentence-medial sentence stress), and a globally applying NSR (which is responsible for the prosodic strengthening of the rightmost accent).

2.3.5 Cyclic implementations making mixed predictions

Legate (2003) aims at explaining the difference between Bresnan’s relative clause examples as repeated in (89) and examples like (90), in which the short object movement does not seem to be reconstructed for stress assignment purposes.

(89) Mary liked the proposal that George left ~~the proposal~~.

(90) Please put the dishes away ~~the dishes~~.

Legate’s solution is based on a specific interplay between copy deletion (defined as deletion of non-initial copies) and the application of the NSR. She assumes that both these PF

operations apply in a cyclic, phase-based manner at Spell-out. The difference between the examples is whether the movement takes place across Spell-out domains, as in (89), or within a single Spell-out domain, as in (90). In the former case, there is only one instance of *the proposal* in the Spell-out domain (abbreviated as SOD in the following examples), i.e. the complement of the phase head, when the first phase (vP) is completed — *the proposal* has been moved to the edge of the vP and is thus not subject to Spell-out. Thus, the copy deletion operation applies vacuously, because there are no non-initial copies. Then, NSR applies and assigns sentence stress to the rightmost constituent, namely *the proposal*. According to Legate (2003, p. 512), “at a later phase, this occurrence of *the proposal* will be deleted in favor of a higher occurrence, with the primary phrasal stress realized on the higher occurrence”.

- (91) a. the proposal v [left the proposal]_{SOD}
 b. the proposal v [left the proposal]_{SOD} delete non-initial copies in SOD
 (applies vacuously, nothing is deleted)
 c. the proposal v [left the proposal]_{SOD} NSR

In contrast, in Legate’s particle verb example, the object moves within the Spell-out domain. Thus, there are two copies when the PF rules apply, and the non-initial one is deleted. After that, the NSR applies and strengthens stress of the rightmost element, i.e. the particle.

- (92) a. [put]_v [the dishes put away the dishes]_{SOD}
 b. [put]_v [the dishes put away ~~the dishes~~]_{SOD} delete non-initial copies
 c. [put]_v [the dishes put away ~~the dishes~~]_{SOD} NSR

Generally, Legate’s account predicts that “an element moving from a VP-final position out of the phase should bear primary phrasal stress, while an element moving from a VP-final position to a position within the same phase should not.” (p. 513).

In this respect, Legate’s model can be seen as a cyclic, surface-based approach: syntax-prosody mapping rules apply several times during the derivation, and it is always the currently highest/leftmost copy of moved constituents that is taken into account for that purpose. Whether a movement operation reconstructs for stress or not depends on whether the original and landing position lie within a Spell-out domain. The prosodic reconstruction property of movement types is reduced to the general mechanics of phases and multiple Spell-out.

An aspect of Legate’s proposal remains unspecified, though: if the NSR increases the prominence of a constituent that is deleted at a later point during the derivation, how exactly is it ensured that the prominent accent carries over to a higher occurrence of that constituent? Note that, as shown in (91), the constituent must already have been moved/copied when Spell-out applies. It is therefore not possible to assume that the accent assigned by the NSR is moved/copied along with the targeted constituent when the movement/copying operation happens. It seems that it would be necessary to add a mechanism that ensures that the prosodic information assigned by NSR application is assigned not only to the currently rightmost constituent, but also to any other of its occurrences, including those outside the current Spell-out domain. A possible implementation of such a mechanism, which is left open by Legate, will be fleshed out in chapter 3.

It also has to be noted that the syntactic structure assumed by Legate is not uncontroversial: according to Olsen (1997), the verb moves to *v* in both the continuous and the discontinuous realization. In the former, the whole verb-particle complex moves to *v* (see also Dehé 2000 for an overview of syntactic analyses). The discontinuous order results from moving only the verb and leaving the particle in *V*. Under these syntactic assumptions, Legate’s model would not predict a prosodic difference between the two options:

- (93) a. [put]_v [the dishes put away ~~the dishes~~]_{SOD}
b. [put away]_v [the dishes put away ~~the dishes~~]_{SOD}

2.3.6 A note on phase-based approaches

Cyclic, phase-based application of syntax-prosody mapping rules has been proposed by several authors independently of the discussion about prosodic reconstruction. The benefit of phase theory in this connection is that phases constitute domains that can be used to delimit prosodic operations without further stipulation.

For example, **Adger (2007)** builds on Cinque’s (1993) embedding-based model. However, he does not assume that a grid mark is projected at each syntactic bracketing, but only once per phase (DP, *v*P, CP). Adger argues (based on data from the VSO language Scottish Gaelic) that this allows to avoid predicting too many prominence levels and consequently too large relative prominence differences between adjacent elements. Despite the cyclic mapping, the approach is essentially surface-based. As far as I can see, it also inherits the problems of Cinque’s model, for example the issue with complex subjects.

Dobashi (2003), **Ishihara (2007)**, and **Sato (2009, 2012)** argue that prosodic

constituency corresponds to or is at least influenced by the domains delimited by phases. According to Sato (2012), the resulting prosodic constituents then also are the domain of sentence stress assignment. I will take up Sato's proposal in more detail in chapter 3.

As discussed in more detail above, a similar idea is found in **Kahnemuyipour's (2009)** model. Sato's (2012) and Kahnemuyipour's (2009) theories can be seen as a phase-based implementation of the idea that (phrasal / sentence) stress is assigned either to the leftmost or rightmost element within a certain domain. In older theories like Kiparsky's (1966) or Kahnemuyipour's own earlier theory (Kahnemuyipour 2003), it was assumed that stress assignment can e.g. be leftward within the VP/vP but rightward on the level of the whole sentence, and that the directional preference is language-specific. Kahnemuyipour (2009) and Sato (2012) instead use the independently motivated phase domains to delimit the domain of stress assignment. A difference between the two models is that Kahnemuyipour tries to get rid of the parametrization in favor of a universal approach (he assumes that it is always the highest element within a Spell-out domain that receives sentence stress), whereas Sato allows the direction of sentence stress assignment to vary between languages (e.g., leftward in Persian and rightward in Japanese).

Kratzer & Selkirk (2007) adopt a similar view like Kahnemuyipour, with the small change that they additionally introduce a distinction between phrases and non-phrases: they propose that it is the syntactically highest *phrase* within a phase that becomes the most prominent one. Like Kahnemuyipour's (2009), their approach predicts surface-oriented mapping: Kratzer & Selkirk explicitly assume that copies left by movement are marked as "silent" (p. 119) within the syntax, meaning that they do not need to be spelled out. Potential Spell-out domains that only consist of such silent material can be skipped and do not need to be transferred to the phonological component at all. Thus, traces do not have a phonological effect, and no reconstruction effects are predicted.

Sato (2012) argues that the universal way of stress assignment proposed by Kahnemuyipour (2009) and Kratzer & Selkirk (2007) on the basis of mainly German and Persian data does not carry over to Japanese data. I argued above that even for German, some problematic predictions emerge from the assumption that it is the leftmost/highest phrase within the vP that receives sentence stress. I conclude from this that phases are useful independently motivated delimiters of prosodic domains, but language-specific parameters are necessary to account for different sentence stress preferences.

These examples show that perhaps somewhat counter-intuitively, multiple Spell-out does not necessarily predict reconstruction effects as for example Bresnan's (1971) cyclic

approach. The reason lies in the assumption that spelled-out constituents are not available for further syntactic operations like movement (the Phase Impenetrability Condition, Chomsky 2000). Therefore, if a constituent appears outside of a phase, by assumption it has to have moved to the edge of that phase first, in order to escape Spell-out when the phase is completed, and have then moved further. Whether phase-based approaches lead to surface-oriented mapping or reconstruction effects will depend on the details that are assumed about the Spell-Out mechanism and movement, in particular the question whether the trace/lower copy of the moved constituent is assumed to matter for prosodic purposes or not.

2.3.7 Summary

The cyclic implementations and the trace-based implementations discussed in section 2.3 have in common that they acknowledge the following generalization and aim to find a systematic explanation for it: if a structure B can be analyzed as derived from a structure A, the prosody of B seems to depend to some extent on properties of A; and this dependency cannot be captured in a straight-forward way if only the surface word order of the derived structure B is taken into account.

| account | discussed data | mapping system |
|----------------------|--|--|
| Lakoff (1972) | relative clauses, wh-movement | trace-based, postderivational |
| Selkirk (1995) | VP-internal subjects, wh-movement | trace-based, postderivational |
| Korth (2014) | verb movement | trace-based, postderivational |
| Bresnan (1971, 1972) | relative clauses, wh-movement | surface-based, cyclic |
| Krifka (1998) | discontinuous foci | surface-based, cyclic |
| Legate (2003) | relative clauses, particle verbs | mixed, cyclic |
| Kahnemuyipour (2009) | VP-internal subjects, specific vs. unspecific objects, topicalization, wh-movement | surface-based, cyclic (no reconstruction predicted) |

Table 2.1: Summary of the approaches to the relation between syntax-prosody-IS mapping and syntactic movement discussed in section 2.2

Table 2.1 summarizes and categorizes the implementations discussed above. It shows that there is variety among the accounts, both with respect to the theoretical assumptions and with respect to what kind of data is considered. In the remainder of this section, I will consider conceptual arguments for and against cyclic/trace-based approaches. In the next

chapter, I will then aim to provide a unified approach that can account for all the relevant data that has been presented throughout the literature.

The main benefit that I can see about a **cyclic** approach to prosodic reconstruction effects is that it allows to keep the syntax-prosody mapping rules simple. The mapping rules just apply to the string that has been built up to a certain point and there is no need to refer to earlier stages of the derivation or earlier positions of constituents in their formulation. Another advantage of cyclic approaches is their immediate compatibility with phase theory.

On the other hand, one could argue that the cyclic component in itself adds to the complexity of the architecture. If there was no independent motivation for the mapping to apply at multiple points during the derivation, an account involving only a single point at which syntactic structure is mapped to prosody could be seen as more parsimonious. Such independent motivation has however been argued to exist, and has led to the development of phase theory (see e.g. Gallego 2010, pp. 54–59 for an overview of the general arguments in favor of phases). However, as discussed above, the prosody-related reconstruction effects do not simply fall out from a phase/multiple Spell-out framework.

Some conceptual arguments against cyclic mapping have been put forward a.o. by Samek-Lodovici (2005, pp. 747–748). He argues that a **post-derivational** implementation is more compatible with OT analyses of prosody and information-structure, which rely on a competition between different possible prosodic structures at the level of the whole utterance. This allows to model cross-linguistic difference in terms of conflicting universal constraints with language-specific rankings. Samek-Lodovici argues that in order to model the differences within a cyclic approach, language-specific parameters would need to be assumed, which Samek-Lodovici considers more stipulative.

Lakoff (1972) argued that global rules should be preferred for conceptual reasons over local, cyclic ones when the options are not distinguishable empirically—a global rule amounts to a stronger claim, because it explicitly excludes the possibility that the output of a prosodic rule influences a syntactic rule. To the extent that this is not the case, a post-derivational approach should thus be preferred.

These arguments suggest that the decision whether a post-derivational or a cyclic approach is employed strongly depends on the general grammatical framework that is adopted. I will not take up a stance here with respect to the question whether a cyclic approach or a trace-based approach is preferable. In the following chapter, I will propose an implementation that is flexible enough to be compatible with both types of approaches.

Chapter 3

Prosodic reconstruction and the architecture of grammar

3.1 Goals and challenges

All approaches to prosodic reconstruction that were discussed in the previous section face certain limitations or problems when trying to reconcile them with current generative syntactic and prosodic assumptions.

Some authors (most explicitly Lakoff 1972) state directly that the direct object is typically the most prominent one, irrespective of its surface position. While this allows to describe the observed prosodic reconstruction effects correctly, it lacks the explanatory value of later approaches in which the verb-object asymmetry is derived from syntactic differences between heads/predicates and phrases/arguments.

Other approaches, like Bresnan's model (1971, 1972), were based on prosodic assumptions that were later revised. Bresnan's system of representing degrees of prosodic prominence numerically for each individual word, based on Chomsky & Halle (1968), was replaced by the view that prosodic structure is best represented by metrical trees or grids in later developments of prosodic theory (starting with Liberman 1975). As Selkirk (1984, p. 241) points out, Bresnan's particular implementation of prosodic reconstruction cannot be directly translated to more recent prosodic frameworks: "Neither a metrical tree nor a metrical grid theory of stress would have an analogue to this particular numerology, and an analysis of the sort Bresnan proposes would simply not be possible. [...] Given a different understanding of the representation of stress, an analysis such as Bresnan's is in principle impossible".

Selkirk's (1995) own trace-based focus projection system is compatible with the metrical theory. However, certain conceptual problems with F-features and focus projection have been pointed out in the literature, for example by Rochemont (2013), who argues that newness and focus should not be conflated in the way it is done in this approach, or by Schwarzschild (1999), who adopts F-features as a technical tool for mediation between prosody and information-structure but argues that a model without them and with more direct mapping would be preferable; a similar point is made by Féry & Samek-Lodovici (2006) and Buring (2015). As Horvath (2010) and Fanselow & Lenertová (2011) point out, F-features also violate the Inclusiveness Condition, according to which no features should be added on top of the features of the lexical items in the numeration during the course of the derivation.

Korth's (2014) model is the only one among the reviewed theories which involves actual reconstruction in the narrow sense that a syntactic constituent is treated as if it was in its original position again for the purpose of interface mapping. The reconstruction operation has been put into question e.g. by Chomsky (1995, p. 202), who argues that it is a process that "should be eliminated" if possible, because it involves the "curious" step of undoing a movement operation for which there was an initial motivation; see also Nunes (1995, pp. 203–205) for elaboration on this argument and empirical arguments against reconstruction in this narrower sense. Both Chomsky and Nunes support an alternative analysis in terms of the copy theory of movement instead, which has since been widely adopted within the generative syntactic literature, and which also will be pursued in the alternative proposal below.

In all other approaches that were listed above, the exact reconstruction mechanism remains largely unspecified (Bierwisch 1968, Krifka 1998, Legate 2003), or the model is surface-oriented (Kahnemuyipour 2009). Below, I will explore how the core ideas of the proposals can be made compatible with other current approaches to prosody and generative transformational syntax.

A common challenge for all approaches to prosodic reconstruction is also the question whether and how they can be reconciled with phase theory. If the derivation is divided into self-contained parts, which are transferred to the phonological component individually, is there still a way to allow an element to influence the prosodic realization of another across a phase-boundary?

To sum up, the challenge is to find an account of prosodic reconstruction that is compatible with the following theoretical assumptions:

- Metrical prosodic theory
- Copy theory of movement
- Phase theory

Accordingly, the proposal will also need to specify how the following operations are ordered: building of syntactic structure, building of prosodic structure, syntax-prosody mapping, linearization, and copy deletion.

Below, I will develop two versions of an approach of prosodic reconstruction that is based on Selkirk’s Match Theory—a post-derivational and a cyclic one. I will not try to decide between the two; the goal is to provide a workable implementation for generative syntactic systems that assume multiple Spell-out as well as for those that assume a single Spell-out point. Some arguments that have been forward in favor of each of the views will be mentioned in the next sections.

3.2 Implementation options

3.2.1 Basic idea

I will discuss two implementation options that are both based on metrical grid theory, and in particular on Selkirk’s Match Theoretical approach to the verb-object asymmetry (for concreteness; the proposed analysis would also work with Truckenbrodt’s approach to the asymmetry in terms of STRESS-XP and WRAP-XP). They also both build on the copy theory of movement. The crucial MATCH PHRASE constraint is repeated in (1).

- (1) MATCH PHRASE: A phrase in syntactic constituent structure must be matched by a corresponding prosodic constituent, call it ϕ , in phonological representation.

It has been argued that the set of Match constraints needs to be refined and extended to capture further cross-linguistic facts (see e.g. Ishihara 2014 for discussion concerning Japanese data). For the purposes of this thesis, I will stick with the simpler system as found in Selkirk (2011), following her argumentation that it is sufficient to account for the verb-object asymmetry in German. I will adopt Selkirk’s assumption that in nested ϕ structures, only one phonological word can have main prominence at the level of each ϕ . Under the assumption that main prominence at this level is realized as a pitch accent in German, it follows that there can be only one pitch accent per phonological phrase. I

will therefore assume that it is unavoidable to violate MATCH PHRASE if it would lead to nested structures with more than one pitch accent per ϕ .¹

In order to explain prosodic reconstruction effects concerning the verb-object asymmetry in terms of Match Theory, it is crucial to make the following assumptions whenever deaccentuation of the verb is licensed by virtue of the presence of an object (even if it does not appear adjacent to the verb): (i) at some point during the derivation, there was a syntactic constellation of the form [[object]_{NP} verb]_{VP}, (ii), this constellation was mapped to prosodic structure as ((object) $_{\phi}$ verb) $_{\phi}$, and (iii), this structure was evaluated with respect to the syntax-prosody mapping constraints.

This has a number of consequences for the architecture of grammar. It means that even if the object is not realized within the VP but in a different position, it must have nevertheless been present in this position in the prosodic representation at some point. It must have formed a phonological phrase together with the verb, thus exempting it from carrying a phrasal accent. In this context, it is necessary to consider how syntactic movement is currently thought of within the Minimalist framework, and how it interacts with the phonological component.

Under the *copy theory of movement* (Chomsky 1995, section 3.5), a lexical item can occupy more than one position, even if it was contained in the numeration only once, as a result of the operation Move, which can also be conceptualized as a structure-internal version of Merge (Chomsky 2001). The resulting multiple *copies* of the same element form a *chain*. In contrast to earlier theories of syntactic movement, this allows to assume that the head of a chain and the “trace” are not distinct elements, but actually identical; one and the same element can be associated with several positions in the syntactic tree. The advantages of the copy theory of movement (as discussed e.g. by Bošković & Nunes 2007) include the reduction of theoretical primitives and avoiding to create new elements within syntax. It also makes it possible to account for reconstruction effects in the semantic domain without a specific reconstruction operation that would undo movement steps; instead, lower copies can be accessed directly for interpretation.

A similar approach could be taken to prosodic reconstruction. This would mean that a single item of the numeration could not only occupy more than one position in the syntactic structure, but also in the prosodic structure. This presupposes a certain ordering of operations within the phonological component: prosodic structure crucially needs to be

¹But see Féry 2010, Ishihara 2014, Ito & Mester 2015 for different systems where multiple phrasal accents within a phonological phrase are possible. Further principles besides MATCH PHRASE are then necessary to account for the verb-object asymmetry.

assigned before the relevant copies are deleted.

This is in line with Bošković & Nunes’s (2007, p. 69) claim that “the phonetic realization of copies is similar to the LF interpretive procedure in the sense that it allows activation of lower copies”, or, in other words, that “copies survive for quite some time into the PF derivation”.

To support this assumption, Bošković & Nunes review a number of phenomena for which an explanation has been proposed in terms of the Pronounce Lower Copy (PLC) mechanism, i.e. in terms of the idea that under certain circumstances, lower links in a chain can be pronounced instead of or in addition to the highest one. This includes e.g. the observation that even though usually all *wh*-elements are fronted in Romanian, under certain conditions they can be realized *in situ* instead, or the observation that in some dialects of German, copies of the *wh*-element occur in intermediate positions (see also Fanselow & Mahajan 2000).

Prosodic reconstruction can be thought of as an additional phenomenon supporting Bošković & Nunes’s view: if lower copies can affect the prosodic realization of a sentence, they must be active in some form within the phonological component.

First, I will discuss a post-derivational implementation of this basic idea, in which lower copies are taken into account for syntax-prosody mapping once the whole syntactic structure has been built. The second discussed implementation option will be a cyclic account in line with phase theory. An approach similar to the latter option has also been recently sketched by Truckenbrodt (in press).

3.2.2 A post-derivational implementation of the V-O asymmetry

Accounting for the V-O asymmetry The idea of the post-derivational implementation is that the principles governing the verb-object asymmetry apply after the complete syntactic structure has been built, and lower syntactic copies count for the evaluation of the principles. This means that all copies need to be accessible post-syntactically, i.e. deletion applies late.

An ordering of operations that would predict the reported reconstruction-like effects concerning the verb-object asymmetry is shown in (2). First, the syntactic structure is built. (2) shows the schematic representation of a structure with a fronted object (concrete examples will be discussed in section 3.3)². Only lexical phrases (NP, VP) are indicated

²In the schematic representations, I leave out other movement operations besides the object fronting that would take place as well, e.g. subject-auxiliary inversion in English questions. They will be addressed

here³, assuming that functional heads and projections are not relevant for MATCH PHRASE (see Selkirk 2011, section 2.2.2 for discussion). In (2a), both copies of the object⁴ are still present. Then, the syntactic structure is mapped to a prosodic structure, observing the mapping principles of Match Theory, in particular the MATCH PHRASE constraint (repeated below in (3)). In an OT-implementation of this step, this would involve building a candidate set of possible prosodic structures, and evaluating pairs of syntactic and prosodic structures with respect to the set of constraints. Only after the mapping, copies are deleted. Typically, only the highest copy will be pronounced, whereas the lower ones are deleted from the phonological representation. This process can introduce problems for the prosodic structure: e.g., in (2c), there is now a phonological phrase without a head. I will assume that a repair mechanism can restructure the representation, integrating the headless phrase with an adjacent one.

(2) a. Building the syntactic structure:

[O]_{NP} [S]_{NP} [V [O]_{NP}]_{VP} *syntax*

b. Syntax-prosody mapping:

(x)_ϕ (x)_ϕ ((x)_ϕ)_ϕ *prosody*
 [O]_{NP} [S]_{NP} [V [O]_{NP}]_{VP} *syntax*

c. Copy deletion:

(x)_ϕ (x)_ϕ ()_ϕ *prosody*
 [O]_{NP} [S]_{NP} [V ~~[O]_{NP}~~]_{VP} *syntax*

d. Repair:

(x)_ϕ (x)_ϕ ()_ϕ *prosody*
 [O]_{NP} [S]_{NP} [V ~~[O]_{NP}~~]_{VP} *syntax*

(3) MATCH PHRASE: A phrase in syntactic constituent structure must be matched by a corresponding prosodic constituent, call it ϕ , in phonological representation.

One benefit of the assumption that copy deletion applies so late is that it is compatible with the idea mentioned above that it is not always the highest member of a syntactic

in the discussion of the concrete examples.

³The only exception is the CP, which I will mark for clarity, and because it will be relevant in section 3.2.4, when MATCH CLAUSE and prominence at the level of the intonation phrase become relevant.

⁴I am ignoring intermediate copies here which would result from successive-cyclic movement; they would not change the basic mechanism assumed here. Cyclic movement will be addressed in the next section in more detail.

chain that is pronounced. For some phenomena, it has been proposed that phonological constraints can exceptionally cause a lower copy to be pronounced. This includes e.g. multiple wh-fronting in Romanian, which was briefly mentioned above. Bošković (2002) shows that usually all wh-phrases are fronted, but if this would lead to two homophonous phrases being adjacent to each other, one of them stays in situ. Bošković proposes (following an idea from Franks 1998) that in these cases, it is licensed to violate the general preference for pronunciation of the highest copy—because this would lead to the violation of a PF restriction—and pronounce the lower one instead. This analysis also requires the assumption that copy deletion applies late (post-syntactically), and that both copies can have a phonological representation at some point during the derivation; otherwise, it would not be possible to compare the phonological wellformedness of high vs. low realization.

A problem of this post-syntactic implementation, on the other hand, is that it contradicts the idea of phase theory that the syntactic structure is not transferred to PF as a whole, but that the interfaces are accessed at multiple points during the derivation.

Below, I will show an alternative cyclic implementation.

3.2.3 A cyclic (phase-based) implementation of the V-O asymmetry

The basic idea of the cyclic implementation is the same as above: syntax-prosody mapping precedes copy deletion. However, both operations (in this order) happen multiple times during the derivation.

I will follow Fox & Pesetsky's (2005) model of phases and cyclic movement here. They assume that once a phase (vP, CP) is completed, the complement of the phase head (the Spell-Out domain, i.e. VP, TP) needs to be linearized. Linearization is modeled by a set of linearization statements of the form " $\alpha \prec \beta$ ", which are added at the Spell-out point and cannot be altered during the derivation. This assumption provides the motivation for cyclic movement: if, for example, the verb and the object were linearized within the English VP at the first Spell-out, the linearization statement " $V \prec O$ " would be added. The relative verb-object order could not be changed anymore, making object movement (e.g., in a wh-question) impossible, as illustrated in (4), where '!' marks the problematic contradictory statement. Therefore, the object needs to move to the left edge of the Spell-out domain in such a case. If it does, the linearization statements " $O \prec V$ " will be added. If the object moves even further to the left in the further course of the derivation, this will not contradict the " $O \prec V$ " statement. This is illustrated in (5).

- (4) a. vP phase (spelling out the VP): [V O]_{VP}
Linearization: V < O
...
b. Root phase: [O ... [V Θ]_{VP}]_{CP}
Linearization: V < O, ..., !O < V
- (5) a. vP phase (spelling out the VP): O [V Θ]_{VP}
Linearization: O < V
...
b. Root phase: [O ... Θ [V Θ]_{VP}]_{CP}
Linearization: O < V, ...

If not only linearization, but also syntax-prosody mapping takes place in a phase-based manner, this means that there are two copies of the object when the first instance of mapping happens. The lower copy can only affect prosody if the mapping precedes copy deletion. I assume the same sequence of operations as in the post-derivational account: first, the syntactic structure is built until the vP phase is completed. Then, the complement of the phase head—the VP—undergoes Spell-out. At the PF interface, the syntactic structure is mapped to a prosodic structure, including both copies. At this point, the question arises whether syntax-prosody mapping presupposes linearization. If it does, a conflict with Fox & Pesetsky’s (2005) assumptions could arise: linearizing both copies would introduce contradicting statements (“O < V”, “V < O”). In principle, it is conceivable to create a non-linearized prosodic structure, which contains only information about prosodic constituency, but not about linear order. However, any principles of prosodic wellformedness that are based on linear order, e.g. the rhythmic preference to avoid stress clashes, would then need to apply separately at a later point, after linearization. This would limit the ways in which different kinds of prosody-related constraints (those that show reconstruction effects and those that presuppose linearization) could interact with each other. It would also mean that principles based on linear order could never show reconstruction effects—this would not affect STRESS-XP and WRAP-XP, but it would have consequences for principles determining the position of sentence stress like NSR/HI. I will pursue a different solution here. I will assume that linearization does precede prosodic structure building. I think this view is still compatible with Fox & Pesetsky’s model under the assumption that no contradictory linear statements must be present *by the end* of a Spell-out operation. Under this view, the statements “O < V” and “V < O” are both

added at first. The prosodic structure is accordingly built in such a way that it involves both copies (i.e., corresponding to a string of the form $O V O$). Then, the lower copy is deleted, which also leads to the deletion of the latter linearization statement. Thus, the linearization problem is avoided by the means of deletion.⁵

In (6)–(7), a phase-wise derivation for object fronting in English (e.g., in a wh-question) is shown. I assume, following Fox & Pesetsky, that a fronted object needs to move cyclically through a position at the left edge of each Spell-out domain (VP and TP) when it targets SpecCP. I treat the movement within the Spell-out domain parallel to adjunction for the purpose of syntax-prosody mapping (i.e., like an adjunct, the moved phrase forms its own phonological phrase, in contrast to VP-internal arguments that form a phonological phrase together). I leave out the last Spell-out operation at the very end of the derivation (‘Root phase’). Between the Spell-Out of the TP and the last Spell-out point, the object moves from the left edge of the TP to SpecCP. This string-vacuous movement would not affect the prosodic structure.

(6) vP phase (spelling out the VP):

a. Building the syntactic structure:

$[O]_{NP} [V [O]_{NP}]_{VP}$ *syntax*

b. Syntax-prosody mapping:

$(x)_\phi$ $((x)_\phi)_\phi$ *prosody* *Linearization:*
 $[O]_{NP} [V [O]_{NP}]_{VP}$ *syntax* $O \prec V, V \prec O$

c. Copy deletion:

$(x)_\phi$ $(\quad)_\phi$ *prosody* *Linearization:*
 $[O]_{NP} [V \overline{[O]_{NP}}]_{VP}$ *syntax* $O \prec V, \overline{V} \prec \overline{O}$

d. Repair:

$(x$ $\quad)_\phi$ *prosody* *Linearization:*
 $[O]_{NP} [V \overline{[O]_{NP}}]_{VP}$ *syntax* $O \prec V$

(7) CP phase (spelling out the TP):

a. Building the syntactic structure:

$[O]_{NP} [S]_{NP} [O]_{NP} [V \overline{[O]_{NP}}]_{VP}$ *syntax*

⁵Fox & Pesetsky assume that ellipsis can resolve linearization contradictions. They do not discuss this in connection with copy deletion, because they assume a movement system without copies; however, I think the assumptions I make here are compatible with their model. It is also compatible with Nunes’ (1995) argumentation that avoiding contradictory linearization statements is what motivates copy deletion.

b. Syntax-prosody mapping:

| | | | | | |
|------------|------------|------------|-------------------------|----------------|---|
| $(x)_\phi$ | $(x)_\phi$ | $(x$ | $)_\phi$ | <i>prosody</i> | <i>Linearization:</i> |
| $[O]_{NP}$ | $[S]_{NP}$ | $[O]_{NP}$ | $[V \ \cancel{O}]_{VP}$ | <i>syntax</i> | $O \prec V, S \prec O,$ $O \prec S, S \prec V$ |

c. Copy deletion:

| | | | | | |
|------------|------------|---------------------|-------------------------|----------------|--|
| $(x)_\phi$ | $(x)_\phi$ | $($ | $)_\phi$ | <i>prosody</i> | <i>Linearization:</i> |
| $[O]_{NP}$ | $[S]_{NP}$ | $\cancel{[O]}_{NP}$ | $[V \ \cancel{O}]_{VP}$ | <i>syntax</i> | $O \prec V, S \prec \cancel{O},$ $O \prec S, S \prec V$ |

d. Repair:

| | | | | | |
|------------|------------|---------------------|-------------------------|-----------------------|--|
| $(x)_\phi$ | $(x$ | $)_\phi$ | <i>prosody</i> | <i>Linearization:</i> | |
| $[O]_{NP}$ | $[S]_{NP}$ | $\cancel{[O]}_{NP}$ | $[V \ \cancel{O}]_{VP}$ | <i>syntax</i> | $O \prec V, O \prec S,$ $S \prec V$ |

3.2.4 Implementing reconstruction effects of sentence stress: unalterable prominence statements

Above, it has been shown how reconstruction effects with respect to the verb-object asymmetry can be implemented in line with prosodic phonology and the copy theory of movement. I will now propose an amendment that allows to reconstruct for sentence stress as well, if this turns out to be empirically more adequate than a surface-oriented application. The data discussed so far is not clear-cut in this respect; for example, whereas Bresnan (1971) and Selkirk (1995) both argue that prosodic reconstruction takes place in object questions, Bresnan's system predicts sentence stress to fall on the object, whereas Selkirk's (1995) system only predicts reconstruction for the verb-object asymmetry, but not for sentence stress assignment. In the next chapter, further data will be presented, concerning the phenomenon of partial focus and contrastive topic fronting in German. I will argue that reconstruction for sentence stress is a novel way to capture the observed patterns.

The challenge with respect to reconstruction for sentence stress is that it requires to determine which constituent will be the most prominent one based on a lower copy, and at the same time to make sure that this prominence is realized on a higher copy of that constituent in case the lower copy gets deleted.

In contrast to the distribution of phrasal accents, it will not suffice to assume that syntax-prosody mapping is applied before copy deletion. Within the post-syntactic approach, a first idea could be to simply add a grid mark at the level of the intonation phrase above a lower copy of a moved constituent. However, the copy is later deleted;

and without a representation in the prosodic structure, it cannot figure as the head of a phonological constituent. A mechanism of “remote prominence realization” would be needed, which would somehow ensure that the prominence associated with the grid mark is realized on the pronounced copy of the element instead. In a cyclic implementation, this solution would not work: first, the intonation phrase is not formed until the whole clause is completed, so it is not possible to add a grid mark at that level in earlier phases. Second, if the position of sentence stress was determined in absolute terms already within the vP phase (in an unalterable way), it would be impossible for an element that is merged later to carry sentence stress. This would for example be problematic for rightward adjuncts above the vP level, which normally carry sentence stress in English (*Peter left the office at five*).

I will therefore use a different way to preserve information concerning sentence stress throughout the derivation: relative prominence statements. This concept is similar to the relative, unalterable linearization statements in Fox & Pesetsky’s (2005) model. I assume that when syntax-prosody mapping applies, prominence statements of the form “ $\alpha > \beta$ ” are added in accordance with the principles governing the position of sentence stress. The position of sentence stress depends on information-structural properties. This interaction will be discussed and incorporated into the model in the following chapter 4; for now, I will limit the discussion to information-structurally neutral cases without narrow foci or discourse-given elements. For German and English, I assume that there is a general rightward preference for sentence stress. The currently rightmost phrasal stress is determined as the most prominent one. In other languages with different sentence stress preferences, this would differ. At later stages of the derivation, more statements can be added. They cannot contradict the already established ones: e.g., if “ $O > V$ ” is already established, it is impossible to add “ $V > O$ ”. It is however possible to add e.g. “ $Adv > O$ ”, stating that an adverb will need to be even more prominent than the object. Once the intonation phrase is completed, its head will be determined based on the linearization statements—the element that is the highest in the ordering indicated by the statements will receive sentence stress.

The relative nature of the statements allows to capture the case of rightward adjuncts mentioned above in a cyclic implementation. It is also beneficial for other cases, e.g. vPs that are embedded in a non-sentence-final position (*To read books is fun*), where the object is the most prominent element within that vP but not necessarily the most prominent element in the whole sentence.

Adjusting the post-syntactic implementation The relative prominence statements can also be used in the post-syntactic implementation—here, they provide a way to make sure that high prominence of a syntactic element that is determined based on a lower copy can be realized on another instance of that element. If the prominence statements are determined before copy deletion, reconstruction effects are predicted. In order to derive a surface-oriented placement of sentence stress, they would need to be determined after copy deletion.

I will adopt the formalization of the rightward sentence stress preference from Sato (2012, p. 285). In comparison to the HI constraint (Truckenbrodt 1995), Sato’s NSS does not make reference to the intonation phrase (recall that HI requires the intonation phrase to be right-aligned with its head). The NSS only states that the rightmost phonological phrase⁶ is determined as the most prominent one. This fits the approach outlined here and in the next section especially well, because it does not presuppose that an intonation phrase is already built when the rule determining sentence stress applies.

- (8) NUCLEAR SENTENCE STRESS RULE (NSS): The head of the rightmost phonological phrase in phonological representation receives maximal prominence.

In my model, the formulation “receives maximal prominence” means that prominence statements of the form “ $\alpha > \beta$ ” are added where α is the head of the rightmost phonological phrase and β is any other phonological word.

The sentence stress reconstructing effect of early application of the NSS is illustrated in (9).

- (9) a. Building the syntactic structure:

$$[[[O]_{NP} [S]_{NP} [V [O]_{NP}]_{VP}]_{CP} \textit{syntax}$$
- b. Syntax-prosody mapping:

$$\begin{array}{llll} (x)_\phi & (x)_\phi & ((x)_\phi)_\phi & \textit{prosody} & \textit{Prominence:} \\ [[[O]_{NP} [S]_{NP} [V [O]_{NP}]_{VP}]_{CP} & \textit{syntax} & & & O > V, O > S \end{array}$$
- c. Copy deletion:

$$\begin{array}{llll} (x)_\phi & (x)_\phi & ()_\phi & \textit{prosody} & \textit{Prominence:} \\ [[[O]_{NP} [S]_{NP} [V \cancel{[O]_{NP}}]_{VP}]_{CP} & \textit{syntax} & & & O > V, O > S \end{array}$$

⁶More precisely, in Sato’s formulation it is the rightmost major phrase. The distinction between minor and major phrases is not relevant here, so I abstract from it and use the term ‘phonological phrase’ instead.

d. Repair:

| | | | | | |
|--------------|--------------|----------|-----------------------|--------------------|----------------|
| $(x)_\phi$ | $(x$ | $)_\phi$ | <i>prosody</i> | <i>Prominence:</i> | |
| $[[O]_{NP}$ | $[S]_{NP}$ | $[V$ | $[\cancel{O}]_{NP}$ | $]_{VP}]_{CP}$ | $O > V, O > S$ |
| | | | <i>syntax</i> | | |

e. Determining sentence stress based on prominence statements:

| | | | | | |
|--------------|--------------|----------|-----------------------|--------------------|--|
| $(x$ | $)_\phi$ | | | <i>Prominence:</i> | |
| $(x)_\phi$ | $(x$ | $)_\phi$ | <i>prosody</i> | $O > V, O > S$ | |
| $[O]_{NP}$ | $[S]_{NP}$ | $[V$ | $[\cancel{O}]_{NP}$ | $]_{VP}]_{CP}$ | |
| | | | <i>syntax</i> | | |

Adjusting the cyclic implementation (10)–(12) illustrates how the cyclic implementation could be adjusted to incorporate the idea of reconstruction for sentence stress. To achieve this, I will assume that the prominence statements are added before copy deletion within each phase. In the example below, the object is singled out as the most prominent one in the vP phase, as the lowest copy is the rightmost accented element at that point. The statement “ $O > V$ ” is added. Within the CP phase, again, the object is determined as the most prominent one, now relative to both the verb and the subject. The statement “ $O > S$ ” is added. During the last Spell-out operation, the subject is the rightmost accented element. However, the statement “ $S > O$ ” cannot be added, as it is directly contradictory to the already established “ $O > S$ ”. Only “ $S > V$ ” can be added. In the end, the object is the most prominent one according to the statements established during the derivation, and it is assigned sentence stress.

(10) vP phase:

a. Building the syntactic structure:

$[O]_{NP} [V [O]_{NP}]_{VP}$ *syntax*

b. Syntax-prosody mapping:

| | | | | | |
|--------------|-------|--------------|----------|----------------|--------------------|
| $(x)_\phi$ | $($ | $(x)_\phi$ | $)_\phi$ | <i>prosody</i> | <i>Prominence:</i> |
| $[O]_{NP}$ | $[V$ | $[O]_{NP}$ | $]_{VP}$ | <i>syntax</i> | $O > V$ |

c. Copy deletion:

| | | | | | |
|--------------|-------|-----------------------|----------------|--------------------|---------|
| $(x)_\phi$ | $($ | $)_\phi$ | <i>prosody</i> | <i>Prominence:</i> | |
| $[O]_{NP}$ | $[V$ | $[\cancel{O}]_{NP}$ | $]_{VP}$ | <i>syntax</i> | $O > V$ |

d. Repair:

| | | | | | |
|--------------|----------|-----------------------|--------------------|---------------|---------|
| $(x$ | $)_\phi$ | <i>prosody</i> | <i>Prominence:</i> | | |
| $[O]_{NP}$ | $[V$ | $[\cancel{O}]_{NP}$ | $]_{VP}$ | <i>syntax</i> | $O > V$ |

(11) CP phase (spelling out the TP):

a. Building the syntactic structure:

$[O]_{NP} [S]_{NP} [O]_{NP} [V \text{ } \cancel{[O]}_{NP}]_{VP} \textit{syntax}$ *Prominence:*
O > V

b. Syntax-prosody mapping:

$(x)_\phi (x)_\phi (x \text{ })_\phi \textit{prosody}$ *Prominence:*
O > V, O > S
 $[O]_{NP} [S]_{NP} [O]_{NP} [V \text{ } \cancel{[O]}_{NP}]_{VP} \textit{syntax}$

c. Copy deletion:

$(x)_\phi (x)_\phi (\text{ })_\phi \textit{prosody}$ *Prominence:*
O > V, O > S
 $[O]_{NP} [S]_{NP} \cancel{[O]}_{NP} [V \text{ } \cancel{[O]}_{NP}]_{VP} \textit{syntax}$

d. Repair:

$(x)_\phi (x \text{ })_\phi \textit{prosody}$ *Prominence:*
O > V, O > S
 $[O]_{NP} [S]_{NP} \cancel{[O]}_{NP} [V \text{ } \cancel{[O]}_{NP}]_{VP} \textit{syntax}$

(12) Root phase (spelling out the remainder of the structure):

a. Building the syntactic structure:

$[[O]_{NP} [O]_{NP} [S]_{NP} \cancel{[O]}_{NP} [V \text{ } \cancel{[O]}_{NP}]_{VP}]_{CP} \textit{syntax}$
Prominence: O > V, O > S

b. Syntax-prosody mapping:

$(x)_\phi (x)_\phi (x \text{ })_\phi \textit{prosody}$
 $[[O]_{NP} [O]_{NP} [S]_{NP} \cancel{[O]}_{NP} [V \text{ } \cancel{[O]}_{NP}]_{VP}]_{CP} \textit{syntax}$
Prominence: O > V, O > S, S > V
(S > O cannot be added—contradictory)

c. Copy deletion:

$(x)_\phi (x \text{ })_\phi \textit{prosody}$
 $[[O]_{NP} \cancel{[O]}_{NP} [S]_{NP} \cancel{[O]}_{NP} [V \text{ } \cancel{[O]}_{NP}]_{VP}]_{CP} \textit{syntax}$
Prominence: O > V, O > S, S > V

d. Determining sentence stress based on prominence statements:

$(x \text{ })_\iota$
 $(x)_\phi (x \text{ })_\phi \textit{prosody}$
 $[[O]_{NP} \cancel{[O]}_{NP} [S]_{NP} \cancel{[O]}_{NP} [V \text{ } \cancel{[O]}_{NP}]_{VP}]_{CP} \textit{syntax}$
Prominence: O > V, O > S, S > V

Note that in a cyclic implementation, the sentence stress governing rules apply before an intonation phrase is completed. This would pose a problem if the rules made reference to the notion of intonation phrase, as e.g. the HI constraint does (which states that the head of the intonation phrase is right-aligned with the intonation phrase). The problem does not arise for the formulation of the sentence stress determining rules that was proposed above (prominence statements of the form “ $\alpha > \beta$ ” are added, where α is the currently rightmost head of a phonological phrase). To make it possible to use a formulation closer to HI, with direct reference to intonation phrases, it would be necessary to assume that intonation phrases are built already at an early point (at the first Spell-out) and extended if necessary, to potentially incorporate further material from later phases.

3.3 Deriving the classic examples

I will now demonstrate how the proposed model accounts for the cases of prosodic reconstruction that have been most prominently discussed: wh-movement, VP-internal subjects, and relative clauses. I will only demonstrate the post-syntactic analysis in detail; the cyclic variant would lead to the same results.

3.3.1 Wh-movement

(13) illustrates the predictions of the proposed model under the assumption that the principles determining the position of sentence stress apply before copy deletion, and consequently, the prominence statements are added before copy deletion. For the sake of space and readability, a shorter notation is used in these examples. Only the prosodic structure is given for each step, with single underlining marking the heads of phonological phrases and double underlining marking the head of the intonation phrase. I will assume that functional elements like determiners, pronouns, auxiliaries etc. are phrased in a phonological phrase together with adjacent elements (see Féry 2011, p. 1909, who also assumes that “functional material is attached to a p-phrase projected by a maximal projection”), without discussing the phonological motivation for the exact choice of phrasing. As far as I can see, the predicted distribution of accents on the lexical elements does not hinge on the decisions concerning the phrasing of functional elements. Similarly, the distribution of accents is not affected by subject-auxiliary inversion, either, because it only changes the relative position of a functional element. I will therefore ignore the original position of *has* in the following example.

- (13) a. Syntax-prosody mapping:
(What books)_ϕ (has Helen)_ϕ (written what (books)_ϕ)_ϕ
Prominence: books > Helen, books > what, books > written, books > has
- b. Copy deletion:
(What books)_ϕ (has Helen)_ϕ (written ()_ϕ)_ϕ
- c. Repair:
(What books)_ϕ (has Helen written)_ϕ
- d. Determining sentence stress based on prominence statements:
((What books)_ϕ (has Helen written)_ϕ)_ι

For comparison, (14) illustrates that the predictions would indeed differ under the assumption that the prominence statements are added *after* copy deletion. This would predict surface-oriented sentence stress assignment on the subject. The predictions of the reconstruction-based account in (12) are in line with the data discussed by Bresnan (1971). However, Bresnan's examples leave further information-structural properties unspecified (e.g. the question whether Helen has to be discourse-given under this prosodic realization). A preliminary experimental test of the reconstruction-based predictions in (12) vs. the surface-oriented predictions in (13) will be presented in chapter 5.

- (14) a. Syntax-prosody mapping:
(What books)_ϕ (has Helen)_ϕ (written what (books)_ϕ)_ϕ
- b. Copy deletion:
(What books)_ϕ (has Helen)_ϕ (written ()_ϕ)_ϕ
Prominence: Helen > books, Helen > what, Helen > written, Helen > has
- c. Repair:
(What books)_ϕ (has Helen written)_ϕ
- d. Determining sentence stress based on prominence statements:
((What books)_ϕ (has Helen written)_ϕ)_ι

(15) illustrates the predictions for a wh-question with an unaccented wh-pronoun rather than an accented wh-phrase. In line with what both Bresnan (1971) and Selkirk (1995) report, sentence stress is predicted to fall on the verb here, as it is the only accentable element within the phonological phrase that is matched to the VP. The same pattern would be predicted if the prominence statements were applied after copy deletion.

- (15) a. Syntax-prosody mapping:
 (What has Helen)_φ (written what)_φ)_φ
 Prom.: written > Helen, written > what, written > books, written > has
- b. Copy deletion:
 (What has Helen)_φ (written)_φ
- c. Determining sentence stress based on prominence statements:
 ((What has Helen)_φ (written)_φ)_ι

3.3.2 VP-internal subjects

(16) shows that sentence stress is predicted to fall on the VP-internal argument in unaccusative structures. The predictions would be the same if the sentence stress determining prominence statements were added after copy deletion.

- (16) a. Syntax-prosody mapping:
 (Johnson)_φ (died (Johnson)_φ)_φ
 Prominence: Johnson > died
- b. Copy deletion:
 (Johnson)_φ (died)_φ)_φ
- c. Repair:
 (Johnson died)_φ
- d. Determining sentence stress based on prominence statements:
 ((Johnson died)_φ)_ι

In comparison, (17) illustrates an unergative structure, in which sentence stress is predicted to fall on the verb, again irrespective of the timing of the prominence statements.

- (17) a. Syntax-prosody mapping:
 (John)_φ (whistled)_φ
 Prominence: whistled > John
- b. Determining sentence stress based on prominence statements:
 ((John)_φ (whistled)_φ)_ι

3.3.3 Relative clauses

Under the proposed model of syntax-prosody mapping, the predictions for object relative clauses depend on the syntactic analysis. Below, I will show what the model would predict for restrictive relative clauses under two different syntactic analyses (see section 2.2.2 for the details of these analyses): (i) a head raising analysis, according to which the head NP originates from the relativization site, (ii) a matching analysis with the assumption that the relative operator is merged with a full NP complement in the relativization site. The syntactic structures are repeated below. Note that in both approaches, it is assumed that a full NP has been present in the relativization site at some point during the derivation; this is supported empirically by evidence from “anti-pronominal contexts”, in which full NPs but not pronouns are licensed (Pankau 2014).

- (18) Head raising:
 Mary liked the [proposal] [which [~~proposal~~]] George left [~~which~~ [~~proposal~~]]
- (19) Matching:
 Mary liked the [proposal] [which [~~proposal~~]] George left [~~which~~ [~~proposal~~]]
-

Another crucial question concerns the prosodic status of the relative clause. I will follow Selkirk (2011) in assuming that restrictive relative clauses are not matched to intonation phrases, in contrast to non-restrictive relative clauses and parentheticals (see Dehé 2009 for prosodic properties of the latter), even though they form their own clause syntactically.

Match Phrase would favor phrasing the whole VP *like the proposal which George left* and the whole NP *proposal which George left* as nested phonological phrases. However, this structure would require to realize more than one pitch accent within the large phonological phrase. This is ruled out in Selkirk’s (2011) system. I will assume that as much of the VP as possible without contradicting the single-stress requirement is phrased together (*liked the proposal*) and the relative clause forms its separate phonological phrase.

(20) shows the predictions of the proposed model under the movement analysis and with the assumption that prominence statements are added before copy deletion (i.e., that there is reconstruction for sentence stress). As in Bresnan’s (1971) model, sentence stress is predicted to fall on the relative head.

- (20) Movement analysis, reconstruction for sentence stress:
 a. Syntax-prosody mapping:

(Mary)_ϕ (liked the proposal)_ϕ (which proposal)_ϕ
 (George)_ϕ (left (which proposal)_ϕ)_ϕ

Prominence: proposal > left, proposal > George, proposal > Mary, ...

b. Copy deletion:

(Mary)_ϕ (liked the proposal)_ϕ (which)_ϕ (George)_ϕ (left)_ϕ

c. Repair:

(Mary)_ϕ (liked the proposal)_ϕ (which George left)_ϕ

d. Determining sentence stress based on prominence statements:

((Mary)_ϕ (liked the proposal)_ϕ (which George left)_ϕ)_ι

For comparison, (21) shows that different predictions emerge if the prominence statements are added after copy deletion. This would predict surface-oriented mapping, with sentence stress falling on the subject of the relative clause. Again, the predictions of the reconstruction-based approach, but not of the surface-oriented approach, are in line with Bresnan's (1971) data on English.⁷

(21) Movement analysis, surface-oriented sentence stress:

a. Syntax-prosody mapping:

(Mary)_ϕ (liked the proposal)_ϕ (which proposal)_ϕ
 (George)_ϕ (left (which proposal)_ϕ)_ϕ

b. Copy deletion:

(Mary)_ϕ (liked the proposal)_ϕ (which)_ϕ (George)_ϕ (left)_ϕ

Prominence: George > left, George > proposal, George > Mary, ...

c. Repair:

(Mary)_ϕ (liked the proposal)_ϕ (which George left)_ϕ

d. Determining sentence stress based on prominence statements:

((Mary)_ϕ (liked the proposal)_ϕ (which George left)_ϕ)_ι

⁷Truckenbrodt (in press) presents intuitive data on German relative clauses that is in line with Bresnan's English data as far as prosodic reconstruction within the verb phrase is concerned. Truckenbrodt also reports judgments suggesting that it is possible to have a stressed subject within the relative clause (if it is a full, non-pronominal phrase that is discourse-new), as surface-oriented sentence stress assignment would predict. This however seems to block the possibility of reconstruction for the verb-object asymmetry, so that the verb also needs to be stressed. If this interesting data point can be confirmed empirically, it could be understood as an indication that reconstruction-based mapping is preferred, unless it leads to the violation of other principles (such as the preference to stress a discourse-new phrase), and surface-oriented mapping can be used as a last resort.

(22) illustrates what the model would predict under the matching analysis, assuming that the relative operator has a full NP complement at early stages of the derivation. This would lead to deaccentuation of the verb within the VP. However, if sentence stress is determined before deletion (which is not copy deletion here⁸—I will nevertheless assume that it happens at the same point during the derivation), the constituent that should be the most prominent one according to the prominence statements is no longer present in the phonological representation. Crucially, the head NP of the relative clause and the NP in the relativization site are distinct syntactic entities and not part of a syntactic chain, which is indicated by the different indices in (22). The distinctness must also be represented in the prominence statements.

Various solutions to that problem are conceivable. The first option is that the element that is the next highest one in the prominence ordering receives sentence stress. However, if the sentence stress determining rule only distinguishes one element from all others (as HI does with the rightmost one), all remaining elements will often not be ordered relative to each other.⁹ I will assume that if the first option fails due to the lack of a unique second most prominent element, the sentence stress determining principle applies again, leading to a surface-oriented prominence pattern. In (22), this means that sentence stress is predicted to fall on the subject of the relative clause. I assume that this last resort solution also applies more generally to structures with ellipsis.

(22) Matching analysis:

a. Syntax-prosody mapping:

(Mary)_ϕ (liked the proposal₁)_ϕ (which proposal₂)_ϕ
 (George)_ϕ (left (which proposal₂)_ϕ)_ϕ

Prominence: proposal₂ > proposal₁, proposal₂ > left, proposal₂ > George

b. Copy deletion:

(Mary)_ϕ (liked the proposal₁)_ϕ (which)_ϕ (George)_ϕ (left)_ϕ

c. Repair:

(Mary)_ϕ (liked the proposal₁)_ϕ (which George left)_ϕ

⁸According to Sauerland's 2003 analysis, the deletion operation involved here is one akin to comparative deletion.

⁹In a cyclic implementation, there can be a unique second most prominent element, if HI promotes different element in different cycles—this would e.g. be the case when rightward, VP-external adjuncts are present. Also, if a different sentence stress determining principle was used, e.g. one based on depth of embedding, each element would be uniquely ordered with respect to the others.

- d. Determining sentence stress based on prominence statements: fails
→ new stress assignment (surface-oriented)
((Mary)_ϕ (liked the proposal₁)_ϕ (which George left)_ϕ)_ι
Prominence: George > proposal₁, George > left, George > Mary...

Under the matching analysis, the cyclic approach makes the same predictions as the post-derivational one. As the derivation in (10)–(12) showed, after all copies of the object that are to the right of the subject have been deleted, the sentence stress principles promote the subject as the rightmost accented element. This cannot change the relative prominence of subject and object, but it makes the subject more prominent than all other elements. Thus, the subject ends up being the second most prominent element according to the prominence statements, and sentence stress is assigned to it. This result contradicts Bresnan’s claim that *the proposal* receives the most prominent accent.

Truckenbrodt (in press, section 3.5) suggests that it is still possible to predict the same reconstructing stress pattern as under the head raising analysis under the assumptions that the relative head “spells out the stress” of the lower NP. Truckenbrodt argues that this is plausible, as the deletion of the lower NP depends on the presence of the semantically related higher NP. Within the model proposed here, this would mean that the prominence statements concerning the lower instance of “proposal” would count towards the higher instance if the lower one is deleted, just like in the case of copies resulting from movement. See Truckenbrodt (in press) for a more detailed discussion of relative clauses and an exploration of the interesting question whether semantic reconstruction effects are correlated with prosodic reconstruction.

For subject relative clauses, the proposed model predicts sentence stress on the object (in transitive structures) or the verb (in intransitive unergative structures) within the relative clause, irrespective of the syntactic analysis.

3.4 Outlook on other constructions

3.4.1 Rightward movement

As discussed in section 2.2.2, findings by Rochemont (1998) and Truckenbrodt & Darcy (2010) point in the direction of surface-oriented mapping in structures involving extraposition. The model proposed here would predict that in languages with a rightward tendency for sentence stress, extraposition to the right will not show reconstruction effects with re-

spect to sentence stress, but the original position of the extraposed constituent can have an effect on elements adjacent to the extraction site.

Following work by Balbach & Hartmann (2012), the following considerations are based on the assumption that extraposed constituents can in principle be of any information-structural category in German (given or new, focus or background). Under the alternative view that extraposition is inherently linked to a certain interpretation (see e.g. Averintseva-Klisch 2009 for a link between extraposition and topicality), prosody-information structure mapping restrictions (which will be discussed in more detail in the following chapter) could override the default syntax-based pattern.

(23)–(24) shows what the proposed model predicts for PP extraposition in German in an information-structurally neutral context (assuming that extraposition is felicitous in such a context—see the note above). In a post-syntactic implementation, the PP *in Maria* emerges as the most prominent one based on the extraposed copy, irrespective of the timing of the sentence stress determining principles—it is the rightmost accented element. In a cyclic implementation, the lower copy of the PP is determined as the most prominent element within the vP phase, and sentence stress is realized on the extraposed copy in the end. In both implementations, the VP-internal copy of the PP leads to deaccentuation of the verb.

- (23) Peter hat sich [~~in Maria~~ verliebt]_{VP} in Maria.
 Peter has himself in Maria fallen.in.love in Maria
 ‘Peter has fallen in love with Maria.’

- (24) a. Syntax-prosody mapping:

(Peter)_ϕ (hat sich (in Maria)_ϕ verliebt)_ϕ (in Maria)_ϕ
Prominence: Maria > in, Maria > verliebt, Maria > Peter, ...

- b. Copy deletion:

(Peter)_ϕ (hat sich verliebt)_ϕ (in Maria)_ϕ

- c. Repair:

(Peter)_ϕ (hat sich verliebt in Maria)_ϕ

- d. Determining sentence stress based on prominence statements:

(Peter)_ϕ (hat sich verliebt in Maria)_ϕ

The prediction of my model for extraposed argument clauses, which are discussed by Truckenbrodt & Darcy (2010), depends on the exact form of the clauses, and the phrasing preferences when they are in situ. For example, to derive predictions for a sentence like

(25), it would be necessary to test first whether the matrix verb *darlegen* is deaccented when the object clause is in situ. If it is, my model predicts that this should also be possible when the object clause is extraposed.

- (25) Der Manager will auf der Versammlung [dass der Millionär die Firma
 the manager wants.to at the assembly that the millionaire the company
 verwalten soll]_{object clause} darlegen.
 administer should present
 ‘The manager wants to present at the assembly that the millionaire is supposed
 to administer the company.’

As for the cases of English extraposition discussed by Rochemont (1998), the predictions of the model are in line with Rochemont’s observation that constituents affected by Heavy Noun Phrase Shift receive sentence stress. However, there are two complications: if it is correct that this operations only affects focused constituents, the default syntax-prosody mapping might be influenced by information-structural rules that will be discussed in more detail in the next chapter. Second, if it is correct that the shifted constituent is phrased into a separate intonation phrase as Rochemont reports, two heads at the level of the intonation phrase need to be assigned. The relevant example is repeated below in (26).

- (26) The Moral Majority elected to the presidency, a man named Ronald Reagan.

The case that a single sentence involves two intonation phrases has not been addressed yet. I will assume that for each intonation phrase that is formed, the most prominent element is determined based on the established prominence statements. If the most prominent element does not have a phonological representation within one of the intonation phrases (because it has been moved to a position that has been mapped to a different intonation phrase), I assume again the same general procedure as outlined above for deletion/ellipsis: first, it is tried to determine the uniquely most prominent element among the phonologically realized ones, based on the given ordering. If there is a tie between two or more elements, the sentence stress determining rules are applied again, this time in a surface-oriented way, as the lower copies are already deleted at this point. For the sentence in (26), this makes predictions that are in line with Rochemont’s observations:

- (27) a. Syntax-prosody mapping:
 (S)_φ (V O)_φ (PP)_φ (O)_φ
 Prominence: O > PP, O > V, O > S

- b. Copy deletion:

$$(\underline{S})_{\phi} (V)_{\phi} (\underline{PP})_{\phi} (\underline{O})_{\phi}$$

- c. Repair:

$$(\underline{S})_{\phi} (V \underline{PP})_{\phi} (\underline{O})_{\phi}$$

- d. Determining sentence stress:

succeeds for the right intonation phrase:

$$((\underline{S})_{\phi} (V)_{\phi} (\underline{PP})_{\phi})_{\iota} ((\underline{O})_{\phi})_{\iota}$$

fails for the left intonation phrase;

new stress assignment within that domain (surface-oriented):

$$((\underline{S})_{\phi} (V)_{\phi} (\underline{PP})_{\phi})_{\iota} ((\underline{O})_{\phi})_{\iota}$$

Prominence: $O > PP$, $O > V$, $O > S$, $PP > V$, $PP > S$

Within the cyclic approach, the same prediction would emerge, but it would come about in a different way. The PP would be determined as the most prominent constituent within the vP phase ($PP > O$, $PP > V$). Thus, there will be no problem later in determining the most prominent element within the first intonation phrase that spans the subject, the verb, and the PP. Although the predictions of the post-syntactic and the cyclic approach converge here, it is conceivable that this is not necessarily always the case when there is more than one intonation phrase—exploring such structures in more detail could help to distinguish which implementation makes better predictions. This is left for future research.

3.4.2 Non-reconstructing movement

Recall from section 2.3 that Legate (2003) proposed to explain the surface-oriented behavior of particle verbs in contrast to the reconstructing behavior in relative clauses in terms of the difference between phase-internal and phase-crossing movement. The idea was that when a movement operation is so short that both copies are contained within the Spell-out domain of the vP phase, the lower one is deleted, and syntax-prosody mapping (which is assumed to follow copy deletion) applies in a surface-oriented way. In the case of movement out of a phase, only one copy is present at Spell-out, deletion applies vacuously, and syntax-prosody affects the lower copy, leading to reconstruction-like effects.

This analysis is not directly compatible with the model I proposed here—I follow Fox & Pesetsky’s (2005) assumption that also the first landing site of longer movement is located at the left edge within the Spell-out domain, which would nullify the distinction

between short and long movement in this respect, and no difference in behavior would be expected based on it. I have decided to adopt Fox & Pesetsky’s model due to the following benefits it provides: it is explicit about linearization (which is important for interface considerations), and it provides an independent motivation for cyclic movement. In my view, these benefits outweigh the benefits of Legate’s argumentation, because—as discussed in the previous sections—there is a potential alternative explanation of her observations in terms of information-structural factors, and it hinges on a specific controversial syntactic analysis.

However, I think that more generally, Legate’s core idea of making a distinction between different types of movement—those that show prosodic reconstruction and those that do not—might be indeed necessary. At this point, I would like to come back to the discussion of Kahnemuyipour’s (2009) proposal that specific objects do not carry sentence stress because they leave the first Spell-out domain. I argued above that at least for German, the relation between specificity and accentuation is not as direct as Kahnemuyipour assumes. However, I think that the part of his argument that objects which leave the VP do not carry sentence stress is correct.

This would mean that scrambling of arguments does not reconstruct for stress—otherwise, scrambled objects would be predicted to carry sentence stress just like VP-internal ones. There are some further hints in the literature that scrambling does not show prosodic reconstruction effects; for example, Selkirk (1995, footnote 10) writes: “Angelika Kratzer reports that traces of scrambled constituents cannot project focus in German.”

Whether an object has undergone scrambling or not is clearer in structures that include a particle or adverb. If the object precedes such an element, the verb intuitively needs to carry sentence stress:

- (28) a. Er hat den Hund gestreichelt.
he has the dog petted
‘He petted the dog.’
b. Er hat den Hund wohl/wahrscheinlich gestreichelt.
he has the dog PART/probably petted
‘He probably petted the dog.’

One approach to derive non-reconstructing behavior could be to assume that scrambling does not involve movement, and instead the arguments of the verb can be base-generated in different orders (see Neeleman & Reinhart 1998 or Fanselow 2001 for base-generation approaches to scrambling, with flexible case and theta-role assignment). Note that this would

however only work under the assumption that the object in (29) can be base-generated outside the VP—only then is the verb predicted to form its own phonological phrase and be accented under the Match-Theoretical approach adopted here.

If scrambling is analyzed as syntactic movement, it would be necessary to assume that lower copies of (at least) this type of movement are unavailable for syntax-prosody mapping in order to derive non-reconstructing prosodic patterns. Based on correlations between prosodic reconstruction and reconstruction for condition C effects in relative clauses, Truckenbrodt (in press) tentatively proposes that the presence/absence of prosodic/semantic reconstruction could have the same underlying reason—i.e. in certain cases, lower copies in syntactic chains are not accessible for interface purposes. Rochemont’s (1998) suggestion that the presence/absence of prosodic reconstruction might be related to the distinction between A-movement and A’-movement points in a similar direction. However, note that Rochemont’s point was based on extraposition data; in the model proposed here, rightward movement is not predicted to alter the prosodic pattern in a language with rightward sentence stress assignment like English anyway, irrespective of whether there is prosodic reconstruction or not.

3.4.3 Non-transformational dependencies

In the proposed model, prosodic connectivity effects between two syntactic positions are predicted to occur only if there is a transformational dependency between two structural positions. There are constructions that involve a relation between a left-peripheral element and a position deeper in the structure, but the two are usually not assumed to be linked via syntactic movement. This has been argued for Clitic Left Dislocation in Romance languages (see Grohmann 1997 for an overview of analyses) as well as for the *Hanging Topic* construction in German. The latter is exemplified in (29): the XP in the left periphery is coreferent with a pronoun in a clause-internal argument position, but it can differ in case. The syntactic status of the type of left dislocation illustrated in (30) (where the left-peripheral XP shows connectivity with respect to case with the pronoun, and the pronoun typically occurs at the left clause edge) is more controversial; there are movement analyses (Grohmann 2000, Grewendorf 2002a) as well as base-generation analyses (Frey 2004).

(29) Der Roman, er hat den gelesen. *Hanging Topic*

(30) Den Roman, den hat er gelesen. *Left Dislocation*

Examining the prosody of these constructions comes with the complication that they are often assumed to be linked to a certain information structure, namely a topical interpretation of the dislocated phrase (but see Frey 2004 for qualifications of that view). As will be discussed in more detail in the next section, information structural properties influence the prosody and can cause deviations from the default syntax-prosody mapping. (31) is the attempt to control for this potential confound by comparing object fronting to the prefield, left dislocation and the Hanging Topic construction in a broad focus context.

- (31) Was hat er gemacht?
- a. Den Roman hat er gelesen. *fronting to the prefield*
 - b. Den Roman, den hat er gelesen. *Left Dislocation*
 - c. Der Roman, er hat den gelesen. *Hanging Topic*

Intuitively, it seems to me that the left dislocation in (31b) patterns with prefield fronting in (31a) in that it is acceptable in this context if the left-peripheral XP carries sentence stress. (31c) does not sound felicitous in this context to me, which might indicate that it is information-structurally more limited.

If the intuition concerning the similarity between left dislocation and movement to the prefield can be confirmed, it would be in line with the predictions of the proposed reconstruction model under a movement analysis of left dislocation. However, to what extent left dislocation can be used at all when in focus contexts needs to be investigated more before stronger conclusions can be drawn. Frey (2004) provides an example that suggests that a left dislocated element can be narrowly focused, but typically only the more common case of a topical interpretation is considered. In that case, the verb would be stressed, but this is independently motivated when the object is a topic.

3.5 Outlook on other languages

In the sections above, I focused on examples from German and English, which have similar syntax-prosody mapping principles: within the VP, it is the object rather than the verb that receives an accent, and sentence stress tends to fall to the right. What would the predictions of the proposed model be for other types of languages?

The predictions depend (i) on properties of the involved movement operation, (ii) on the language-specific syntax-prosody mapping rules.

As for (i), I tentatively assume, based on the discussion of scrambling above and sugges-

tions in the same direction made by Rochemont (1998) and Truckenbrodt (in press), that there are movement operations that show prosodic reconstruction effects and movement operations that do not, and that this distinction might be related to the traditional distinction between A-movement and A'-movement and correlate with the presence/absence of semantic reconstruction effects (as explored in more detail by Truckenbrodt in press). If this line of reasoning and the general architecture of grammar assumed here is on the right track, prosodic reconstruction effects would generally be predicted for A'-movement across languages.

The details of the prosodic reconstruction will then depend on the mapping rules. For example, in languages with a leftward tendency for sentence stress like Hungarian (Szendrői 2003, who cites Vogel & Kenesei 1987, 1990 and É. Kiss 1992 for that claim), an opposite sentence stress determining principle will be active, marking the leftmost element as the most prominent one at Spell-out. In a cyclic approach, the leftmost element within each Spell-out domain would be marked as more prominent than all other elements in that domain, leading to sentence stress assignment on the leftmost element in the whole sentence in the end.

The Persian data reported by Kahnemuyipour (2003, 2009) suggest that stress assignment is to the left within the vP, and to the right at the sentence level. To capture such a pattern in the proposed model, a parametrized approach as the one employed by Kahnemuyipour (2003) could be used: the verb phrase is mapped to a phonological phrase, stress assignment is to the left. At the higher prosodic level determining the most prominent one in a series of phonological phrases, stress assignment is to the right. As a result, sentence stress is predicted to fall on the leftmost word within the rightmost phonological phrase, just as in Kahnemuyipour's (2003) account.

Chapter 4

Partial fronting of foci and contrastive topics in German

4.1 The phenomenon

In this chapter, I will develop a new approach to the phenomenon of partial fronting of foci and contrastive topics in German that is based on the idea of prosodic reconstruction.

As mentioned briefly in section 2.2.2, it has been argued that prosodic reconstruction allows to keep information-structure related mapping rules simple and local even if the focused/topical constituent is realized in a discontinuous way. For example, sentence stress on the object allows to interpret the whole VP as focused in German, even if the object has left the VP. This has been reported several times in the literature, as the following examples show.

- (1) Was hat Karl getan? ‘What did Karl do?’ (Höhle 1982)
Den Hund hat Karl geschlagen.
the dog has Karl beaten
‘Karl beat the dog.’
- (2) Was hat er dann gemacht? ‘What did he do then?’ (Büring 1997)
Die Küche hat er gestrichen.
the kitchen has he painted
‘He painted the kitchen.’
- (3) Was hat Maria dann gemacht? ‘What did Maria do next?’ (Krifka 1998)

Einen Roman hat sie gelesen.
 a novel has she read
 ‘She read a novel.’

- (4) Was ist letztes Wochenende passiert? ‘What happened last weekend?’ (Fanselow 2004)

Ein Buch hab ich gelesen.
 a book have I read
 ‘I read a book.’

The basic structure that these examples have in common is illustrated schematically in (5): just like in canonical SOV word order (as found e.g. in subordinate clauses), a broad focus interpretation is possible also in the derived object-initial word order if the object carries the most prominent accent:

- (5) a. S [Q V (aux)]_{foc}
 b. Q (aux) S [\ominus V]_{foc}

In the following sections, I will review experimental evidence from the literature that corroborates this data, and that even shows that the whole sentence can be focused in this type of structure under certain conditions (when the subject is deaccentable). This interpretation option is also available in canonical word order with sentence stress on the object.

- (6) a. [S Q V (aux)]_{foc}
 b. Q (aux) [S \ominus V]_{foc}

At the same time, the experiments indicate that a broad focus interpretation is not available for the object-initial structure when sentence stress falls on the subject. Again, the same is observed for canonical word order. Under a surface-oriented view of interface mapping, this is puzzling: in a sequence of arguments, putting sentence stress on the rightmost argument should lead to higher rather than lower acceptability.

- (7) a. # [S O V (aux)]_{foc}
 b. # Q (aux) [S \ominus V]_{foc}

I propose to account for these findings by reconstruction for sentence stress, as it was outlined in the last chapter. To incorporate the dependency on focus, I will adjust the

NSS mapping rule and assume that the rightmost phonological phrase *within the focus* should be the most prominent one.

References to a similar pattern are also sporadically found in the literature for partial fronting of contrastive topics:

- (8) Was haben sie mit ihm gemacht? ‘What did they do to him?’ (Büring 1997)
 Den Garaus hat man ihm nicht gemacht.
 the GARAUS have they him not made
 ‘They haven’t killed him...’
- (9) Wer war der Regisseur von “Bananas”? ‘Who was the director of “Bananas”?’
 (Büring 1997)
 Die Hauptrolle hat Woody Allen gespielt.
 the leading.part has Woody Allen played
 ‘Woody Allen played the leading part.’
- (10) Wie wird Grass wohl auf die schlechten Kritiken reagieren? ‘How is Grass going
 to react to the negatives reviews?’ (Jacobs 1997)
 Nun, die Haare wird er sich nicht gerade raufen (, aber ein bißchen ärgern
 well the hair will he REFL not quite tear.out but a bit be.upset
 wird er sich schon).
 will he REFL PART
 ‘Well, he will not tear his hair out (, but he will be a bit upset).’

In these examples, the rising accent that marks a contrastive topic is reported to fall on the fronted object, but the verb is also part of a broad contrastive topic (the idiomatic VP *den Garaus machen* ‘to kill’ in (8), the VP *die Hauptrolle spielen* ‘play the leading part’ in (8), the idiomatic VP *sich die Haare raufen* ‘to tear one’s hair out’ in (10)). The examples involving idioms make it especially clear that it cannot be the fronted object alone that is contrasted.

My proposal is that these examples can also be explained by reconstruction for interface mapping. In particular, I make the assumption that the rising accent is left-aligned with (the original position of) the contrastive topic, both in canonical and object-initial word order. I will present some support for the claim about object-initial structures from previous experiments in the following section. The assumption about the mapping in canonical word orders is based on intuition at this point and will be put to the test in the new experiments that will be presented in chapter 5.

- (11) a. S /O ... V
b. /O S [\ominus V]_{CT}

4.2 The mapping between prosody and information structure

Before discussing the phenomenon of partial focus and contrastive topic fronting in more detail, I will first consider how these information-structural categories influence prosody. Special attention will be paid to the question how the prosody-interpretation mapping works when the information-structural category spans larger constituents like the VP or a whole clause.

4.2.1 The prosodic correlate of focus and givenness

Focus correlates with sentence stress

In some systems like Selkirk's (1984) focus projection rules or Gussenhoven's (1984) SAAR model, there are no default syntax-prosody rules independently of information structure. The distribution of all accents in an utterance depends on focus. In these systems, focus is understood as discourse-new information. Under this view, the accentuation of each constituent indeed depends on whether it is "focused" or "unfocused".

Other authors understand focus and givenness as orthogonal notions. Chomsky (1971) and Jackendoff (1972), for example, consider the part of the sentence that contrasts with something in the context or answers a context question as the focus. Under this view, focus correlates with sentence stress: the most prominent accent in a sentence needs to fall within the focus (Chomsky 1971). Where sentence stress falls within the focus is governed by the default syntax-prosody rules (Jackendoff 1972).

This view is the prevalent one in the current literature on information structure. The idea that focus has to do with contrast and question-answer correspondence has been formalized in Rooth's (1985, 1992) alternative semantics and Roberts's (1996) formal theory of discourse structure.

Rooth proposed that besides the ordinary semantic value, each linguistic expression is also assigned a *focus semantic value*. The focus semantic value of a focus-marked expression is the set of all elements of the same semantic type. For example, the focus semantic value of a focus-marked expression *Peter* is the set of all individuals. Rooth assumes that if

something is marked as focused, this set of *alternatives* needs to correspond in a certain way to the context: there must be some semantic object in the context that is a subset or an element of the focus semantic value. One way in which this requirement can be satisfied is via contrasting phrases like (12). Here, the denotation of *Susie* is the required semantic object: an element of the focus semantic value of the DP *Mary* (the set of individuals: {*Mary, Susie, Peter, ...*}) in the answer.

- (12) I think Peter invited Susie.
 No, Peter invited [Mary]_{loc}.

Another way in which the requirement can be satisfied is via question-answer correspondence as in (13). The semantic value of a question can be seen as the set of all possible answers (Hamblin 1973; here: {*Peter invited Susie, Peter invited Mary, ...*}). The answer is a sentence that contains a focus-marked expression. Its focus semantic value is a set of denotations building on the alternatives to the focus-marked expression (here: {*Peter invited Susie, Peter invited Mary, ...*}). Thus, the denotation of the question constitutes the required semantic object: it is a subset (though not necessarily a proper subset) of the focus semantic value of the answer.

- (13) Who did Peter invite?
 Peter invited [Mary]_{loc}.

Question-answer correspondence is also an essential part of Roberts's (1996, 1998) formal discourse model. Roberts argues that discourse can be modeled as a tree structure of sub- and superquestions (which can be explicit or implicit). Focus marking indicates relevance to the current question under discussion (QUD), i.e. the question to which the interlocutors are currently committed to answering. This will be especially important in the discussion of contrastive topics below. Roberts (1998, p. 29) assumes that "the string-final pitch accent in the focused constituent is assigned the most prominent stress in the intonation phrase".

In recent Optimality-Theoretic accounts, the idea that focus corresponds to sentence stress is often implemented in terms of the constraint FOCUS in Truckenbrodt (1995, p. 160). It was adopted in much following work (often under the name STRESS-FOCUS, e.g. by Féry & Samek-Lodovici (2006)). Truckenbrodt's formulation is given in (14).

- (14) FOCUS: if F is a focus and DF is its domain, then the highest prominence in DF

will be within F.

The domain of focus (“DF”) is defined in semantic terms based on alternative semantics. In the case of a question-answer pair as in (13) (which will be the main method to determine focus in the remainder of this thesis), the focus domain is the whole sentence, because alternatives of the form *Peter invited x* play a role; for these cases, (14) states that sentence stress falls within the focus. To make sure that within the focus, sentence stress falls to the right in English and German, a combined version of the HI/NSR (favoring rightmost sentence stress) and FOCUS can be used, similar to Roberts’s formulation. The exact formulation of the constraint and how it figures in the prosodic model that was proposed in the previous chapter will be discussed in more detail below.

The interaction of focus and givenness

If focus and newness/givenness are orthogonal notions, the question arises how givenness is defined and what the prosodic correlate of givenness is. Semantically, givenness is typically understood in terms of discourse-anaphoricity: roughly, an expression is given if there is an antecedent in the context whose denotation is equal to the expression’s meaning or entails it (Schwarzschild 1999); e.g., an expression like *fruit* is given if the word *fruit* itself or a hyponym like *apple* has been mentioned in the preceding discourse.

It has been observed that givenness influences the realization of pitch accents; for example, Baumann & Grice (2006) have shown in an experimental study on German that different degrees of givenness/accessibility (synonymy between a preceding expression and the target word, hyponym-hypernym relation, part-whole relation, etc.) correlate with the choice of accentuation patterns, from complete deaccentuation over low/falling pitch accents (H+L*) to high pitch accents (H*).

It is more controversial whether givenness can also alter the position of sentence stress. Féry & Samek-Lodovici (2006) argue that the principle that given elements are prosodically non-prominent (DESTRESS-GIVEN) outranks the rightward preference for sentence stress. As a consequence, givenness can cause sentence stress to deviate from the default preference. This is illustrated in (15) (from Féry & Samek-Lodovici 2006, p. 145).

- (15) What did John’s mother do?
- a. She [went to Rome with John_{giv}]_{loc}.
 - b. #She [went to Rome with John_{giv}]_{loc}.

However, convincing evidence has been provided in favor of the position that sentence stress shift cannot be caused by givenness alone and is always linked to focus/alternatives as well. Wagner (2005, 2012) presents examples like the following.

- (16) Sally’s uncle, who is incredibly rich and produces high-end convertibles, came to her wedding. I wonder what he brought as a present.
- a. Guess what: He brought a blue convertible.
 - b.?#Guess what: He brought a blue convertible.
 - c. Guess what: He brought a cheap convertible.

Here, givenness of *convertible* is not enough to license sentence stress shift to the adjective. In addition, there must be a meaningful contrast to *blue*. From the perspective of Roberts’s QUD approach, a question of the form “What color was the convertible?” is not relevant in this context, but a question of the form “What quality was the convertible?” is. Analogously, the dialogue in (15) is felicitous only because a question of the form “What did John’s mother do with John?” is salient. Following Wagner’s argumentation, I assume that givenness can alter the position of sentence stress only in combination with focus (similar predictions actually also follow from Schwarzschild’s 1999 system of givenness and focus). For further discussion of this, see also Kadmon & Sevi (2011) and Büring (2015, 2016).

4.2.2 The prosodic correlate of contrastive topics

Contrastive topics in English

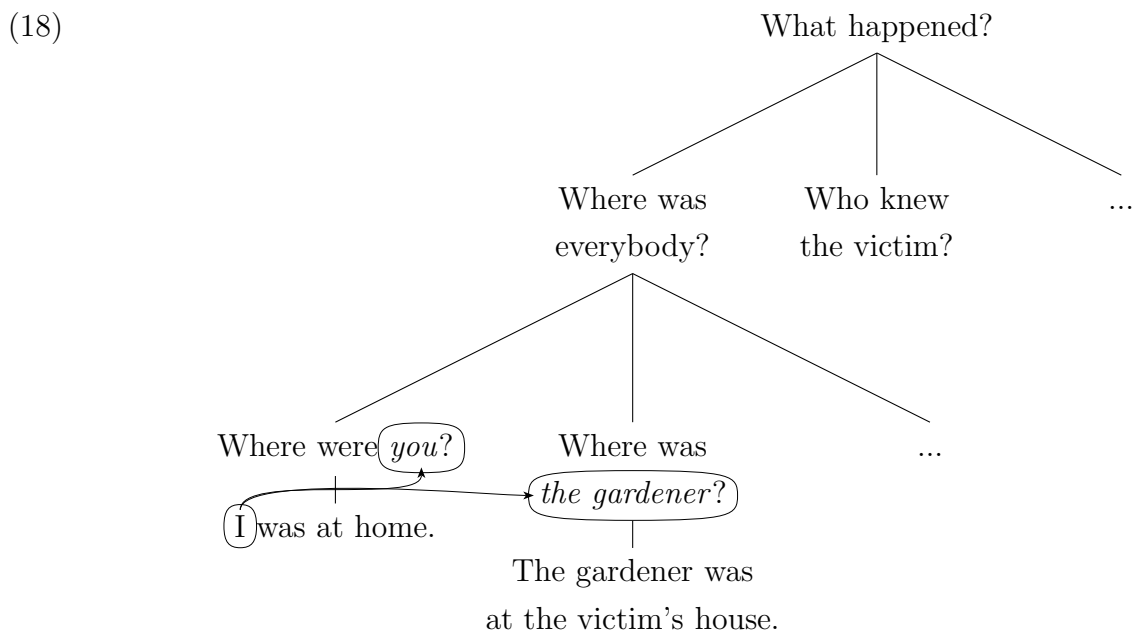
Similar to foci, contrastive topics (CTs) can be defined in terms of alternatives. I will follow Büring’s (2003) definition in terms of discourse trees, based on Roberts’s (1996) model of discourse structure. I assume that the category of contrastive topics is not directly related to aboutness topics (see Reinhart 1981, Frey 2000).

In contrast to foci, which, as argued above, are related in a certain way to the current question under discussion, contrastive topics indicate the presence of further questions other than the QUD. Consider the examples in (17) (adopted from Büring 2003, p. 523).

- (17) Where were you at the time of the murder?
 IV was at home \.

The answer could be uttered with a specific intonation pattern, which Büring characterizes

using the terms A accent and B accent (adopting terminology from Bolinger 1965 and Jackendoff 1972). An A accent involves a high pitch accent ending in a falling contour; a B accent also contains a fall, but “concludes with a rise” (Jackendoff 1972, p. 259). I mark the former type of accent by \ and adopt Wagner’s (2012) notation ∨ for the latter. In (17), Büring (2003) predicts an A accent on the PP *at home*, because it is the focused part of the sentence—it directly answers the current question. The subject *I* can carry a B-accent. According to Büring’s (2003) model, B accents are carried by contrastive topics and point to a different question than the one that was asked in the immediately preceding discourse. In this case, the speaker could use this kind of intonation to signal that there is another relevant question—e.g., that the location of other people during the time of the murder might be more relevant. The part of the sentence in which that other question would differ from the current question is considered as the contrastive topic. In (17), this would be the subject *I*. The corresponding discourse tree is shown in (18).



In Büring’s (2003) model, there is a one-to-one-correspondence between accents and information-structural categories, and focus and CT are treated as distinct notions (A-accent ↔ focus, B-accent ↔ CT); see Wagner (2012) and Constant (2014) for decompositional accounts, in which CTs are analyzed as a higher-level foci in nested focus structures.

Contrastive topics in German

German is similar to English in that foci are typically marked by a falling pitch accent, whereas CTs tend to carry a rising accent. Example (17) could therefore be uttered with a similar intonational contour (with a rising accent on the subject and a falling accent on the PP), if the speaker wants to convey that other people should be interrogated, too. In German, the rising CT-accent and the falling focus-accent tend to form a contour called “hat pattern” (Féry 1993), with a high pitch plateau connecting the two accents. I will mark the left edge of the ‘hat’ by / and the right edge by \.

- (19) Where were you at the time of the murder?
 /Ich war zu Hause\.
 I was at home
 ‘I was at home.’

However, there are some crucial differences between the languages. According to Büring (2003), in English both A-B and B-A accent sequences are possible; in German, reversing the two accents, which would preclude forming a hat contour, is not possible. For example, in (20), the focus (the negation, which answers the polar question) can precede the CT (the object), whereas in German, the word order has to be reversed if an explicit CT-focus-prosody is to be used.

- (20) Did you buy everything that I asked you for, especially milk?
 a. I didn't\ buy milkV... but I bought everything else!
 b. /Milch habe ich nicht\ gekauft... aber alles andere!
 milk have I not bought but everything else

Jacobs (1997) is more specific about the rising accent and argues that in contexts like the ones discussed here, where the intonation is meant to hint at a certain potential continuation, a slight pitch fall precedes the rise; Jacobs calls this intonation *root contour* (“Wurzelkontur”, p. 93), notated as \surd (the symbol iconically mirrors the pitch contour). He assumes that sometimes the contour is simplified to a mere rise in the concrete realization; but if the root contour is present, it unambiguously signals a missing continuation and it cannot be used when a complete answer has been given.

Contrastive topic ‘projection’?

It has been noted in the literature that larger constituents like VPs or IPs can also constitute a (broad) contrastive topic, analogously to broad foci (e.g. Jacobs 1997, p. 96, Büring 1997, pp. 72–74, Constant 2014, pp. 42, 105–106). However, the question how exactly the accentuation relates to possible sizes of the CT (i.e., how a CT accent ‘projects’) has received much less attention than in the case of foci.

Büring (1997, pp. 72–73) proposes a CT projection algorithm that is identical to focus projection. Constant (2014, p. 42) makes a similar suggestion: “the position of stress within a broadly focused phrase (either CT or Exh) is determined through the interaction of various phonological, syntactic and semantic factors. See the literature on ‘focus projection’ (as mentioned above, Constant treats CTs as kinds of foci; he uses the term *Exh* to refer to the ‘standard’ type of focus).

However, at least in German the relation between a rising accent and a broad contrastive topic intuitively seems to differ from the relation between sentence stress and a broad focus. The difference is not visible when the focus/CT is the VP: in this case, a rising/falling accent on the object marks the broad information-structural category in both cases:

- (21) a. Ich denke, dass Peter [Milch gekauft]_{loc} hat.
 I think that Peter milk bought has
 ‘I think that Peter bought milk.’
- b. Ich denke, dass Peter [/Milch gekauft_{CT}] hat...
 (...aber er hat vergessen aufzuräumen).
 ‘I think that Peter bought milk... (but he forgot to tidy up).’

However, in a ditransitive structure, sentence stress under broad focus would fall on the direct object; but in the case of a broad CT, I think the left edge of the hat contour would rather fall on the indirect object—i.e., the leftmost constituent within the contrastive topic. Note that if there are discourse-new elements between the rising and the falling accent, they can receive a rising pitch accent, too, analogous to accented discourse-new elements within a broad focus. Thus, a continuously flat high pitch plateau (the characteristic hat contour) is more likely to be found when the intervening material does not require pitch accents, e.g. due to givenness.

- (22) a. Ich denke, dass Peter [Kindern Milch ausgeschenkt]_{loc} hat.
 I think that Peter children.DAT milk.ACC served has
 ‘I think that Peter served milk to children.’

- b. Ich denke, dass Peter [/Kindern (/)Milch ausgeschenkt]\]_{CT} hat... (aber sonst hat er heute keine gute Tat vollbracht).
'I think that Peter served milk to children... (but this was his only good deed today.)'

For sentences containing a direct object and a directional PP (S O PP V), I showed in Wierzba (2011) that a rising accent on the direct object can license interpreting the VP (O PP V) as the CT, whereas a rising accent on the PP cannot (the evidence will be presented in more detail below). This was however shown only for marked word orders in which the direct object or the PP was fronted. It remains to be tested whether this holds also for canonical order.

For now, I tentatively propose that in German, CTs are left-aligned with the hat/root contour. This hypothesis will be tested empirically in chapter 5.

4.2.3 Summary

The most important generalizations from the previous sections concerning the prosodic correlates of information-structural categories are the following: focus needs to contain sentence stress, and within the focus, the position of sentence stress is governed by the standard language-specific preferences. The realization of pitch accents is influenced by givenness, but givenness alone cannot license a shift of sentence stress. Contrastive topics are marked by a rising or fall-rising accent. In German, the hat contour spans the region between CT and focus.

4.3 Previous findings

During the last decade, partial fronting of foci and topics has received attention also in experimental work. I will discuss the relevant studies in the next sections. The main findings include that object-initial sentences are compatible with a VP-focus and sentence-focus interpretation (Féry & Drenhaus 2008, Fanselow et al. 2011). A broad focus interpretation is however excluded when sentence stress falls on the subject (Féry & Drenhaus 2008). Object-initial, broad-focus sentence are most acceptable with pronominal and given subjects and less acceptable with discourse-new, non-pronominal subjects (Fanselow et al. 2011, Wierzba & Fanselow, under revision). Object-initial sentence also allow to interpret the whole VP as a contrastive topic (Wierzba 2011).

4.3.1 Partial fronting of foci

Féry & Drenhaus (2008): subpart of focus fronting—production and perception of single-accent utterances

Overview The main goal of the series of production and perception experiments reported in Féry & Drenhaus (2008) was to investigate whether the effect that information-structural factors like focus or givenness on the scaling of pitch accents is a relative or absolute phenomenon. The question is whether it depends on the presence and shape of preceding and following accents, or whether the effect is invariably the same, irrespective of the surrounding prosodic pattern.

The study is relevant in connection with this thesis, because Féry & Drenhaus need to look at utterances containing a single pitch accent to distinguish between the hypotheses, and they choose to look at object-initial sentences with narrow focus on the object or a broader focus on the VP. The reasoning of the authors is that if the effect of information structure on pitch scaling is an absolute phenomenon, it is expected that narrow object focus should raise the pitch in comparison to a wide-focus context, just as it was observed for sentences involving several pitch accents in earlier studies like the one reported in Féry & Ishihara (2009). In contrast, if it is a relative phenomenon, then differences in information structure should not affect the pitch contour in single-phrase, single-accent utterances: in that case, there are no other accents in relation to which the pitch maximum could be raised.

Féry & Drenhaus present three production studies, whose results turned out to support the relational view on pitch scaling, and two perception studies. I will only report the latter here, as they provide insight into factors that influence the acceptability of partially fronted foci.

Design Féry and Drenhaus conducted an auditory and a written perception experiment with the same materials, as exemplified in (23)–(24). In the auditory version, two versions of the sentence with a full DP subject were tested: one in which the subject was accented, and one in which it was deaccented.

(23) *context 1 (broad focus): ‘Why are the neighbors complaining?’*

- a. Die Miete haben sie wieder mal erhöht.
the rent have they again once raised

- b. Die Miete hat der Hauswirt wieder mal erhöht.
the rent has the landlord again once raised
- c. Die Miete hat der Hauswirt wieder mal erhöht.
‘They/The landlord raised the rent once again.’

(24) *context 2 (object focus): ‘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.

Results The results are shown in Table 4.1. Higher numbers represent higher acceptability, which is additionally indicated by lighter shading of the table cell to facilitate visual comparison. In the auditory perception experiment, an object-initial utterance with a pronominal subject was rated as highly acceptable both in narrow and broad focus. When the subject was an unaccented full DP, it got lower ratings by about 1 point on a 6-point scale in the broad focus context as compared to the narrow object focus context. When the subject was an accented full DP, the utterance got ratings near the scale’s floor in both types of context. The authors report that there was a significant main effect of both focus and subject type, and also a significant interaction; the details of the interaction are not specified further for the individual levels of the subject type factor.

In the written perception experiment, the broad focus conditions got equally low ratings irrespective of subject type (comparable to the conditions with an accented full DP in the auditory experiment). In the narrow focus conditions, the ratings were lower than in the auditory study.

| fronted XP | subject type | Mean acceptability (1–6) in... | | data source |
|------------|--------------------|--------------------------------|-------------|---------------|
| | | narrow focus | broad focus | |
| object | unaccented pronoun | 5.8 | 5.5 | auditory exp. |
| object | unaccented full DP | 5.8 | 4.8 | auditory exp. |
| object | accented full DP | 2.0 | 2.2 | auditory exp. |
| object | pronoun | 3.6 | 2.5 | written exp. |
| object | full DP | 4.1 | 2.5 | written exp. |

Table 4.1: Mean acceptability ratings on a 1–6 scale (6 being the highest) for the perception studies reported in Féry & Drenhaus (2008)

Discussion The difference between the auditory and the written perception experiment is attributed by the authors to the informants' failing to assign the "intended prosodic pattern onto the sentences they read" (p. 29).

The most striking result within the auditory perception study is the low acceptability of an accented full DP subject in broad focus in comparison to an unaccented subject (DP or pronominal). The authors note that there is no explanation for this purely in terms of the syntax-prosody interface: in principle, a full DP subject should be able to form its own prosodic phrase and to carry a phrasal accent (p. 26). They conclude that the low acceptability must also be related to interpretation. The authors conjecture that object-initial, single-accent sentences in German are mapped to a certain type of interpretation, namely a thetic one, without a division into topic and comment. Féry & Drenhaus draw a parallel to intransitive utterances in English, which are also interpreted as thetical (without a topic) when they are realized as a single-phrase, single-accent utterance, and as categorical (with a topic-comment structure) when they are realized with accents on both the subject and the verb. In other words, according to Féry & Drenhaus a requirement concerning the prosody-interpretation mapping (a thetic interpretation requires a single-accent realization) licenses the violation of a syntax-prosody mapping preference (a full subject phrase should be accented).

Fanselow, Lenertová, and Weskott (2011): subpart of focus fronting—acceptability of written materials

Overview Fanselow et al. (2011) report a series of acceptability rating experiments on object-initial sentences in German. The goal of the study was to test whether sentences with a (partially or narrowly) focused object in the prefield position can be as acceptable as their subject-initial counterparts if an appropriate context is provided, despite the increased processing cost (Fanselow et al. cite, among others, Hemforth 1993 for this finding) and low frequency of object-initial clauses (e.g., Kempen & Harbusch 2004). In a previous study by Weskott et al. (2004), object-initial sentences were found to be fully acceptable when the object was a topic, but degraded when the object was a focus. Fanselow et al. (2011) hypothesize that this difference might have been caused by a confounding factor, namely the presence of a sentence adverb in pre-subject position, which might have impeded the intended interpretation, and they aim to test the focus case again without the potential confound.

Design of the experiments In the first experiment, it was tested whether there is any difference in acceptability between a narrowly focused object in situ and in the prefield. In addition, it was tested whether it plays any role if the subject is pronominal or a full DP. An example item is given in (25).

- (25) *‘Who did the nurse want to leave because of Rick?’*
- a. Die Krankenschwester wollte den Medizinstudenten wegen Rick
the nurse wanted the student.of.medicine because.of Rick
verlassen.
leave
‘The nurse wanted to leave the student of medicine because of Rick.’
 - b. Sie wollte den Medizinstudenten wegen Rick verlassen.
she wanted the student.of.medicine because.of Rick leave
‘She wanted to leave the student of medicine because of Rick.’
 - c. Den Medizinstudenten wollte die Krankenschwester wegen Rick verlassen.
 - d. Den Medizinstudenten wollte sie wegen Rick verlassen.

In a further experiment (their third experiment; the second one investigated animacy and general sensitivity to question-answer congruence that are not immediately relevant here), the authors tested the acceptability of object fronting in broad focus contexts. Context 1 (inducing narrow object focus) can be considered as a baseline condition. Context 2 induced VP focus, context 3 and 4 IP focus. The latter two conditions differed in whether the subject was pronominal or not.

- (26) *context 1 (narrow object focus): ‘What did he fix yesterday morning?’*
context 2 (VP focus): ‘What did he do yesterday morning?’
context 3 (IP focus): ‘Why did he take the tools?’
- a. Das Fahrrad hat er repariert.
the bicycle has he fixed
‘He fixed the bicycle.’
- (27) *context 4 (IP focus, non-pronominal subject): ‘Why are so many tools lying around here?’*
- a. Das Fahrrad hat der Nachbar repariert.
the bicycle has the neighbor fixed
‘The neighbor fixed the bicycle.’

Results The narrow focus experiment revealed no significant effect of any of the two manipulated factors (object- vs. subject-initiality; status of the subject) with all means lying closely together around 6.1–6.2 (on a 7-point scale, 7 being the highest rating).

The results of the broad focus experiment are summarized in Table 4.2. The authors report that there was no significant difference between the narrow and the VP focus condition, but the IP focus condition with a pronominal subject differed significantly both from the VP focus condition, and from the IP focus condition with a non-pronominal subject.

| fronted XP | subject type | Mean acceptability (1–7) in... | | |
|------------|--------------|--------------------------------|----------|----------|
| | | narrow focus | VP focus | IP focus |
| object | pronoun | 6.34 | 6.23 | 5.19 |
| object | full DP | | | 4.48 |

Table 4.2: Mean acceptability ratings on a 1–7 scale (7 being the highest) for the different conditions of the broad focus experiment reported in Fanselow, Lenertová, and Weskott (2011)

Discussion The authors conclude from the absence of acceptability differences in the narrow focus experiment that object-initial sentences *can* be as acceptable as subject-initial ones if the right context is provided; a wh-question inducing narrow object focus seems to be such a context. However, the fronting is fully optional—leaving the focused object in situ is equally acceptable.

As for the broad focus experiment, the authors argue that the equal acceptability of object fronting in narrow and VP focus supports the prosody-related approach of Fanselow & Lenertová (2011)¹: it predicts that the leftmost accented category should be able to move freely to the left periphery; in the VP focus condition, the leftmost accented element was the object, and indeed, it was found to be as acceptable as fronting a narrow focus. Among the two IP focus conditions, the version with a pronominal subject was predicted to be more acceptable than the version with a full DP subject, as the latter is likely to carry an accent and should thus block movement of the object. The significant difference that was found here conforms to the prediction. What remains unexplained by Fanselow & Lenertová (2011) is the significant difference between VP focus and IP focus with a pronominal subject—in both cases, the object is the only accented category and should thus equally readily undergo fronting. The authors suggest that this difference might be

¹An earlier manuscript version of this publication is cited by Fanselow et al. (2011), but the predictions that are relevant for the discussion also follow from the published version; the account will be discussed in more depth later in section 4.4.4.

due to syntactic priming, as the question and the answer were syntactically parallel in the VP focus condition, but not in the IP focus condition.

Wierzba & Fanselow (under revision)

Wierzba & Fanselow (under revision) tested the acceptability of subpart of focus fronting (acceptability of written materials), manipulating the status of the crossed subject with respect to pronominality and givenness. The motivation for the study was to determine which properties of the subject influence the availability of object fronting in German. In the approach advocated by Frey (2005, 2010), pronominal subjects have a special status in that they are assumed to allow object fronting across them without any effect on semantic or pragmatic interpretation, due to clitic-like properties. We aimed to test whether the distinction between pronouns and full phrases is really the crucial factor, or whether the fact that pronouns are unaccented plays a role. In the latter case, a similar behavior of pronouns and other subjects that do not require an accent (such as given DPs) would be expected.

Design The following two experiments had a similar design, in which the factors word order (object in the prefield vs. subject in the prefield) and subject type were manipulated. The following subject types were tested in both experiments: definite pronoun, indefinite pronoun, given DP (exact repetition), given DP (no exact repetition), new DP. Experiment 2 served to improve on some problematic aspects of experiment 1.

An example item set of experiment 1 is provided in (28). As for the indefinite pronoun, in experiment 1 we tested the obligatorily unaccented *wer* ‘someone’, a homophone of the wh-pronoun *wer* ‘who’. As for given DPs, two types were tested: (i) a DP that was mentioned in exactly the same form in the preceding context, (ii) an anaphoric epithet like ‘the idiot’ that was intended to refer back to a referent introduced in the preceding context (both these DPs were also tested in an indefinite, new variant).

(28) Context sentence 1 (present in all items):

Warum riecht es hier so? ‘*What’s that smell?*’

Context sentence 2 (following the first context sentence in conditions a–c only):

Was hat der Nachbar gemacht? ‘*What did the neighbor do?*’

a. Er hat Würstchen gegrillt.

he has sausages grilled

‘He grilled sausages.’

definite pronoun

- b. Der Nachbar hat Würstchen gegrillt.
the neighbour has sausages grilled
'The neighbor grilled sausages.' repeated DP
- c. Der Idiot hat Würstchen gegrillt.
the idiot has sausages grilled
'The idiot grilled sausages.' epithet
- d. Da hat wer Würstchen gegrillt.
there has someone sausages grilled
'Someone grilled sausages.' indefinite pronoun
- e. Ein Nachbar hat Würstchen gegrillt.
a neighbour has sausages grilled
'A neighbor grilled sausages' new DP 1
- f. Ein Idiot hat Würstchen gegrillt.
an idiot has sausages grilled
'An idiot grilled sausages.' new DP 2

It turned out that not all participants found sentences containing *wer* as an indefinite pronoun acceptable even without object fronting, making it difficult to compare the object-initial clause to the object in-situ structure in this case. This problem was perhaps due to the difficulty to get the intended unaccented reading of the element in the written materials, rather than reading it as an accented interrogative pronoun. In addition, the worry arose that the results concerning the epithets were confounded by their expressive/pejorative nature.

To address these issues, a second version of the experiment was conducted, as exemplified in (29). This time, the indefinite pronoun *jemand* 'someone' was used², which does not have an interrogative homophone. In addition, we changed the epithet condition to a more neutral expression that was intended to be coreferent with an expression in the preceding context. In experiment two, only one 'new DP' condition was included (the two new DP versions in experiment 1 did not differ in properties that were crucial for our design).

(29) Context sentence 1 (present in all items):
Warum riecht es hier so? '*What's that smell?*'

Context sentence 2 (following the first context sentence in conditions a–c only):
Was hat der Nachbar gemacht? '*What did the neighbor do?*'

²The reason why *jemand* was not our first choice in experiment 1 is that *wer* is a clearer case of an unstressable weak pronoun.

- a. Er hat Würstchen gegrillt.
 he has sausages grilled
 ‘He grilled sausages.’ definite pronoun
- b. Der Nachbar hat Würstchen gegrillt.
 the neighbour has sausages grilled
 ‘The neighbor grilled sausages.’ repeated DP
- c. Der Mann hat Würstchen gegrillt.
 the man has sausages grilled
 ‘The man grilled sausages.’ epithet
- d. Jemand hat Würstchen gegrillt.
 there has someone sausages grilled
 ‘Someone grilled sausages.’ indefinite pronoun
- e. Ein Mann hat Würstchen gegrillt.
 a man has sausages grilled
 ‘A man grilled sausages.’ new DP

Results The results of the experiments are shown in Table 4.3. It is crucial to compare the differences between object-initial and subject-initial structures rather than the absolute acceptability of the object-initial structures, as the choice of subject might independently affect the acceptability (e.g., as the results show, it is generally preferred to use a pronoun rather than a repeated noun if a referent was already introduced).

| subject type | mean acceptability in exp. 1 | | | mean acceptability in exp. 2 | | |
|----------------|------------------------------|--------|--------|------------------------------|--------|--------|
| | SVO | OVS | diff. | SVO | OVS | diff. |
| def. pronoun | 6.39 | 4.82 | 1.56 | 6.60 | 4.68 | 1.93 |
| repeated DP | 6.44 | 4.39 | 2.06 | 6.48 | 4.21 | 2.26 |
| coref. DP | 6.06 | 5.07 | 0.99 | 6.17 | 4.12 | 2.05 |
| indef. pronoun | 4.77 | 3.28 | 1.49 | 6.56 | 3.64 | 2.93 |
| new DP 1 | 6.18 | 3.65 | 2.53 | 6.12 | 3.33 | 2.79 |
| new DP 2 | 5.71 | 3.59 | 2.11 | | | |
| | Ø 5.92 | Ø 4.13 | Ø 1.79 | Ø 6.39 | Ø 4.00 | Ø 2.39 |

Table 4.3: Mean acceptability ratings on a 1–7 scale (7 being the highest) of experiments 1 and 2 reported in Wierzba & Fanselow (under revision)

A linear mixed model with random intercepts for subjects and items was used to determine whether the SVO-OVS difference significantly deviated from average (for this, the factor subject type was sum coded). In experiment 1, a significant interaction with word order in the direction of a smaller-than-average SVO-OVS difference was found for the

indefinite pronoun *wer* and epithet subject types. The definite pronoun showed a trend in the same direction, but the interaction was not significant. The subject types repeated DP as well as both new DP conditions showed a significant interaction in the other direction, i.e. a larger-than-average SVO-OVS difference. In experiment 2, a significantly smaller-than-average difference was found for the definite pronoun and given (non-repeated) DP, no significant difference from average was found for the given (repeated) DP, and a larger-than-average difference was found for new DP and the indefinite pronoun *jemand*.

Discussion The clitic-like definite pronouns did not show unique behavior that would set them apart from all other subject types that we tested. Rather, we find a gradient result pattern with definite pronouns and given, non-repeated DPs at one end of the scale (with the smallest SVO-OVS difference) and new, indefinite DPs at the other end of the scale (with the largest SVO-OVS difference). This is compatible with the assumption that accentuation is a decisive factor: definite pronouns and given DPs do not need to be accented. What is more, accenting a definite pronoun would induce a contrastive interpretation that is not supported by the context, and accenting a given DP could impede interpreting it as coreferential with its discourse antecedent. New DPs, on the other hand, need to be accented. What remains unexplained by that factor is the large SVO-OVS difference when the subject is the indefinite pronoun *jemand*, and the intermediate behavior of given, repeated DPs.

Being disyllabic, the indefinite pronoun *jemand* is more likely to be accented than a monosyllabic definite pronoun like *er* (cf. Kügler 2017). However, it can be seen as surprising that it behaves differently from multisyllabic given DPs. An important question in this connection is whether indefinite pronouns are trivially given. Following Schwarzschild's (1999) definition of givenness, an expression counts as given if the denotation of an antecedent in the discourse entails the expression's denotation, after any unfilled arguments have been existentially bound. For an indefinite pronoun like *jemand*, this would mean that it counts as given if there is an antecedent that entails that there is some predicate that holds for somebody. If native speakers consider this as trivially fulfilled in any context, it is unexpected that *jemand* should differ from any other given DP with respect to accentuation. However, more research would be necessary in this direction to establish whether *jemand* is treated as given for accentuation purposes.

The observed difference between repeated and non-repeated given DPs might stem from the fact that whereas the absence of accent is crucial for an anaphoric interpretation of

DPs that are non-identical with their antecedent (cf. Buring’s 2007 examples ‘Did you see Dr. Cremer to get your root canal?’ — ‘Don’t remind me. I want to strangle the butcher.’ vs. ‘I want to strangle the butcher.’), this requirement might be less strong for repeated DPs.

In sum, in my view the consistent results concerning the clear cases definite pronoun and given (non-repeated) DP vs. new DP in both experiments support the view that accentuation is indeed a factor that influences the availability of object fronting, even though the details concerning the less clear cases need to be researched further.

4.3.2 Partial fronting of contrastive topics

Wierzba (2011): subpart of contrastive topic fronting: acceptability of auditory materials

Overview In this study (also reported in Wierzba 2013), my goal was to answer the following questions about partial fronting of contrastive topics in German: (i) Is it acceptable to front a part of a contrastive topic? (ii) Does the availability of a partial fronting reading depend on which part of the contrastive topic was fronted? Both questions aim at testing whether contrastive topics behave in a similar way as it was found for foci in the studies reported in the previous subsections. Question (ii) was intended to address a specific prediction of Fanselow & Lenertová’s (2011) approach to partial fronting, namely that contrastively accented expressions should show a greater syntactic flexibility than information foci. This specific prediction and the consequences of the experimental data for the approach will be discussed in more detail in section 4.4.4.

Design of the experiment The target sentences were presented auditorily and judged for acceptability. They all contained a pronominal subject, negation, a direct object DP, a directional PP argument, and one of the three-place verbs *bringen* ‘take’, *stellen* ‘put’, *räumen* ‘store away’, or *werfen* ‘throw’. One of the internal arguments was fronted, for example:

- (30) Das Päckchen hat Susi nicht zur Post gebracht.
the parcel has Susi not to.the post.office taken
‘Susi did not take the parcel to the post office.’
(more literally: ‘The parcel Susi did not take to the post office.’)

This structure was chosen for testing because the canonical order of the arguments is

clearer than e.g. in the case of a direct and an indirect object: in a verb-final clause, the directional PP usually follows the direct object, and the order cannot be altered by scrambling as easily as in the case of two DP objects.

In addition to varying which phrase was fronted, an additional factor was manipulated: whether the contrastive topic of the utterance was the fronted phrase alone or the whole VP. In order to control this factor, both a preceding context and a continuation sentence were added to the target sentences. They were constructed in such a way that they were compatible with only one of the two discourse strategies shown in Figure 4.1, and thus unambiguously determined which part of the target utterance was the contrastive topic.

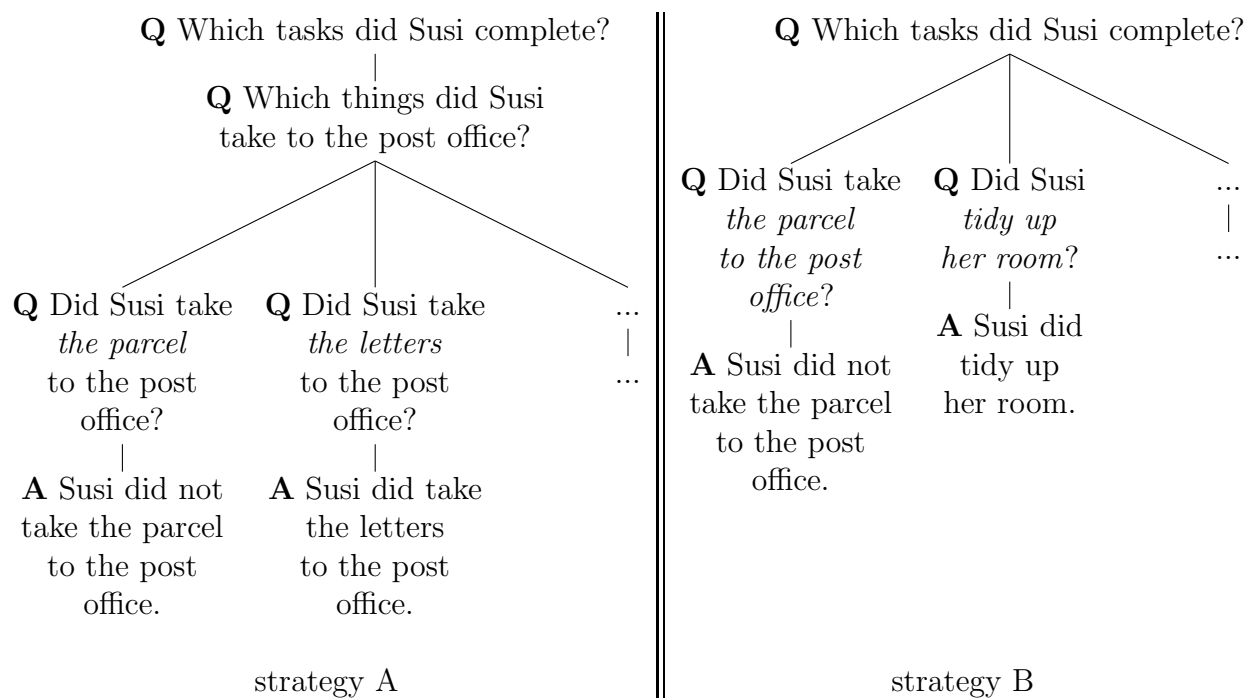


Figure 4.1: Contrastive topics: illustration of different discourse strategies

As discussed in section 4.2.2, I follow Büring’s (2003) assumption that the contrastive topic corresponds to the part of the utterance that varies between the question under discussion and its sibling in the discourse structure. In strategy A in Figure 4.1, where the (sub-)question “Which things did Susi take to the post office?” is a part of the discourse structure, the contrastive topic is just the direct object *the parcel*, which is contrasted with other objects. In strategy B, where there is no such subquestion, the contrastive topic is the whole VP *take the parcel to the post office*, which is contrasted with other activities. In order to make sure that the presented discourse is only compatible with strategy A,

the subquestion was explicitly mentioned before the target sentence, as shown in (31a). The corresponding example with a fronted PP which is the contrastive topic is shown in (31c). The continuation phrase is left unspecific in these conditions (“I don’t know more about that”) because it was not always possible to find plausible alternatives to the directional PP; but the preceding context question already ensures that the example is only compatible with strategy A. In order to make the example only compatible with strategy B, both the preceding question (“Which tasks did Susi complete?”) and the continuation (“at least she went shopping”) were constructed in such a way that they pointed towards contrasting activities rather than objects. The alternative VP mentioned in the continuation always consisted of an intransitive verb (e.g. *einkaufen* ‘do the shopping’) to minimize the likelihood of an object contrasting interpretation.

- (31) a. *context: ‘Do you know what things Susi took to the post office?’*
Das Päckchen hat sie nicht zur Post gebracht, aber mehr weiß ich darüber auch nicht. ‘She did not take the parcel to the post office, but I don’t know more about that.’
- b. *context: ‘Susi had some tasks; do you know which ones she managed to complete?’*
Das Päckchen hat sie nicht zur Post gebracht, aber wenigstens hat sie eingekauft. ‘She did not take the parcel to the post office, but at least she did the shopping.’
- c. *context: ‘Do you know where Susi took the parcel?’*
Zur Post hat sie das Päckchen nicht gebracht, aber mehr weiß ich darüber auch nicht. ‘She did not take the parcel to the post office, but I don’t know more about that.’
- d. *context: ‘Susi had some tasks; do you know which ones she managed to complete?’*
Zur Post hat sie das Päckchen nicht gebracht, aber wenigstens hat sie eingekauft. ‘She did not take the parcel to the post office, but at least she did the shopping.’

(32) provides glosses and illustrates the prosodic realization of the relevant part of the target sentences, marked in boldface in (31):

- (32) a. Das /Päckchen hat sie nicht \ zur Post gebracht...
the parcel has she not to.the post.office taken

- b. Zur /Post hat sie das Päckchen nicht\ gebracht...
 to.the post.office has she the parcel not taken

Results The results provide support for the view that the availability of a partial fronting interpretation depend on which part is fronted: there was a significant interaction between fronted XP and size of the contrastive topic according to an ANOVA ($F_1 = 51.73$, $F_2 = 21.86$; both $ps < 0.001$). The results in absolute values, as reported in Wierzba (2011), are presented in Table 4.4. I add normalized z-scores here (calculated based on all tested materials, including fillers) to potentially facilitate the comparison with the results of similar experiments in the upcoming sections. The plot shown in Figure 4.2 also illustrates z-scores.

| fronted XP | contrastive topic | mean rating (1–7) | mean rating (z-scores) |
|------------|-------------------|-------------------|------------------------|
| DP | fronted XP | 4.94 | 0.04 |
| DP | whole VP | 4.47 | −0.16 |
| PP | fronted XP | 5.18 | 0.16 |
| PP | whole VP | 3.16 | −0.85 |

Table 4.4: Mean acceptability ratings on a 1–7 scale (7 being the highest) of the experiment reported in Wierzba (2011)

Discussion The results provide support for the view that partial fronting is available not only for foci, but also for contrastive topics. At least in structures containing a direct object and a directional PP, a broad contrastive topic reading with the whole VP being interpreted as the contrastive topic, is only possible if it is the direct object that is fronted.

Interpretative options with a fronted PP (unpublished study)

Overview In this follow-up experiment on the study reported in the last subsection, I aimed to test an intuition that is reported in Wierzba (2012): besides a narrow PP interpretation, a fronted PP with a rising accent seems to also be compatible with the interpretation that the PP+V constituent is the contrastive topic.

Design Again, three-place predicates that subcategorize for a DP object and a directional PP were used. This time, a third interpretation besides narrow contrastive topic and VP contrastive topic was tested, according to which the directional PP and the verb

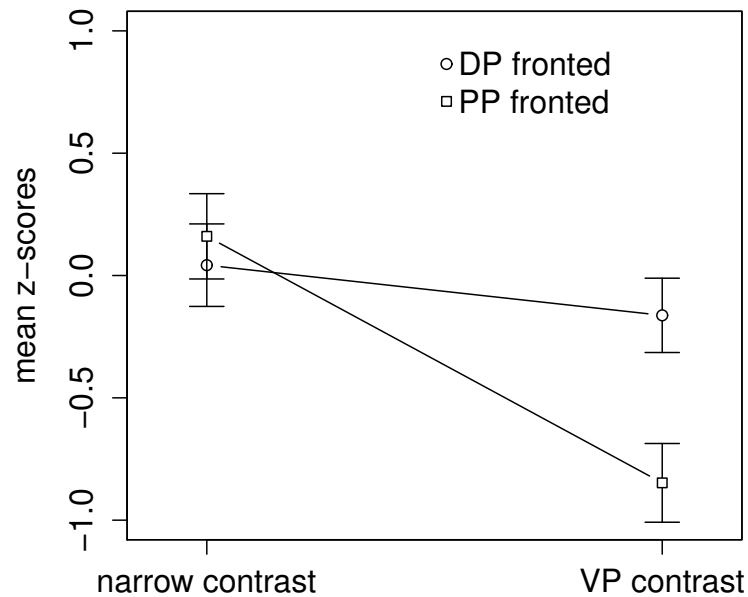


Figure 4.2: Results of the experiment from Wierzba (2011)

constitute the contrastive topic. The preceding context contained two *wh*-questions, inquiring which of two different activities were carried out by which person. One of the activities corresponded to the three-place predicate used in the target sentence, whereas the other one was either completely different (making the whole VP the contrastive topic), or differed in the PP and verb but shared the direct object with the target sentence (making PP+V the contrastive topic), or differed in the argument that was fronted and carried a rising accent in the target sentence (narrow contrastive topic). In contrast to the previous experiment, the subject rather than the negation was in focus and carried sentence stress in all conditions.

- (33) a. *Contrastive topic = PP*
 Wer hat nochmal die Törtchen in den Kühlschrank gestellt und wer ins Tiefkühlfach?
 ‘Who put the cupcakes into the fridge again and who into the freezer?’
In den Kühlschrank hat Peter die Törtchen gestellt und ins Tiefkühlfach
 Saskia.
 ‘Peter put them into the fridge and Saskia into the freezer.’
- b. *Contrastive topic = PP+V*
 Wer hat nochmal die Törtchen in den Kühlschrank gestellt und wer hat sie verziert?

‘Who put the cupcakes into the fridge again and who decorated them?’

In den Kühlschrank hat Peter die Törtchen gestellt und verziert hat sie Saskia.

‘Peter put the cupcakes into the fridge and Saskia decorated them.’

c. *Contrastive topic = VP*

Wer hat nochmal die Törtchen in den Kühlschrank gestellt und wer hat dem Verkäufer geholfen?

‘Who put the cupcakes into the fridge again and who helped the vendor?’

In den Kühlschrank hat Peter die Törtchen gestellt und dem Verkäufer hat Saskia geholfen.

‘Peter put the cupcakes into the fridge and Saskia helped the vendor.’

d. *Contrastive topic = direct object*

Wer hat nochmal die Törtchen in den Kühlschrank gestellt und wer die Sorbets?

‘Who put the cupcakes into the fridge and who the sorbets?’

Die Törtchen hat Peter in den Kühlschrank gestellt und die Sorbets Saskia.

‘Peter put the cupcakes into the fridge and Saskia the sorbets.’

e. *Contrastive topic = PP+V*

Wer hat nochmal die Törtchen in den Kühlschrank gestellt und wer hat sie verziert?

Die Törtchen hat Peter in den Kühlschrank gestellt und verziert hat sie Saskia.

‘Peter put the cupcakes into the fridge and Saskia decorated them.’

f. *Contrastive topic = VP*

Wer hat nochmal die Törtchen in den Kühlschrank gestellt und wer hat dem Verkäufer geholfen?

Die Törtchen hat Peter in den Kühlschrank gestellt und dem Verkäufer hat Saskia geholfen.

‘Peter put the cupcakes into the fridge and Saskia helped the vendor.’

Results The results are summarized in Table 4.5 and illustrated in terms of z-scores in Figure 4.3.

The right plot shows a trend towards a replication of the pattern from the experiment reported in Wierzba (2011) concerning the comparison of narrow and VP-wide contrastive topic: a broad contrastive topic interpretation is possible when the DP is fronted and less so when the PP is fronted. However, the interaction is less pronounced here than in the previous experiment, and not significant statistically ($t = -1.19$ according to a linear mixed model with random intercepts for subjects and items; $|t| > 2$ would indicate significance

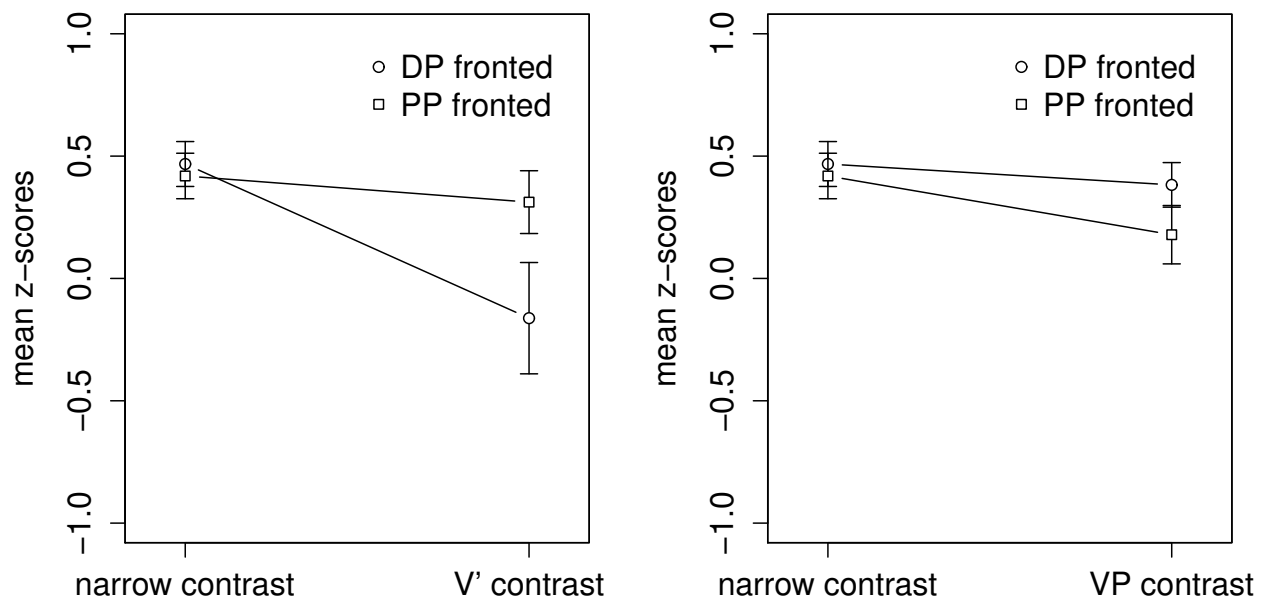


Figure 4.3: Results of the follow-up experiment to Wierzba (2011), investigating interpretative options with a fronted PP. The left plot illustrates the narrow contrast conditions in comparison to the V' (PP+V) contrast conditions. The right plot illustrates the narrow contrast conditions in comparison to the broad contrast (VP) conditions.

| fronted XP | contrastive topic | mean rating (1–7) | mean rating (z-scores) |
|------------|-------------------|-------------------|------------------------|
| DP | fronted DP | 6.58 | 0.47 |
| DP | whole VP | 6.43 | 0.38 |
| DP | PP + verb | 5.58 | −0.16 |
| PP | fronted PP | 6.51 | 0.42 |
| PP | whole VP | 6.10 | 0.18 |
| PP | PP + verb | 6.34 | 0.31 |

Table 4.5: Mean acceptability ratings on a 1–7 scale (7 being the highest) in the follow-up experiment to Wierzba (2011), investigating interpretative options with a fronted PP.

at level $\alpha = 0.05$). This could be due to differences in other materials in the two studies, both within the experimental items and the fillers. The overall mean acceptability of all materials contained in the previous study was 4.8, whereas in the follow-up it was 5.8, both times on a 7-point scale.

The left plot shows that the reversed pattern is found when the narrow contrastive topic interpretation is compared to a V+PP contrastive topic interpretation: the latter reading is available when the PP is fronted, but not when the DP is fronted. The stronger interaction (significant according to a linear mixed model: $t = 4.02$) in this case can probably be explained by the fact that in the deviating condition in this pattern, it is not only the “wrong” part of the contrastive topic that is fronted and carries the rising accent, but it is not even a part of the contrastive topic (as determined by the context) at all. This more severe problem might also have contributed to diminishing the effect size of the other interaction in the right plot.

4.3.3 Summary of the generalizations

Generalization I: OVS(PP) can map to wide focus and wide contrastive topic.

The results reported by Féry & Drenhaus (2008), Fanselow et al. (2011), and Wierzba (2011) suggest that object-initial sentences are not only compatible with a narrow focus or CT interpretation of the fronted object, but the focus or CT can span (at least) the whole VP.

Generalization II: PPVSO can map to narrow contrastive topic or PP+V contrastive topic.

The results of the follow-up study on contrastive topics suggest that the contrastive topic can be broader than just the fronted constituent also when it is the third

argument (in terms of linear order and syntactic hierarchy) of a three-place predicate that is fronted. However, in this case, the CT cannot span the entire VP, but just the fronted argument and the verb.

Generalization III: accentuation matters: OVS can map to wide focus only with initial sentence stress. Discourse-new subjects are problematic in that structure. Féry & Drenhaus (2008) provide evidence that accentuation matters for the acceptability of object-initial sentences in broad focus: they report a very clear acceptability difference between sentences with a single accent on the fronted object (highly acceptable) and sentences in which both the object and the subject are accented (unacceptable).

The experiments reported by Wierzba & Fanselow (under revision) provide some further support that properties of the subject matters for the acceptability of object fronting. The observed higher acceptability of object-initial structures in which the subject is a definite pronoun or a given DP (as opposed to a discourse-new, non-pronominal DP) is in line with Féry & Drenhaus’s findings under the assumption that native speakers find it more problematic to not accent a discourse-new DP than a given or pronominal DP—the preferred realization with sentence stress on the object is possible only if the subject can be deaccented.

4.4 Previous accounts

4.4.1 Operator movement

In cartographic approaches like É. Kiss’s (1998) or Rizzi’s (1997) proposals, certain positions in the syntactic structure are associated with certain interpretations. Rizzi models this in terms of *Criteria*, which are requirements that a phrase must fulfill in order to move to the specifier of certain functional projections. In contrast to the concept of movement-triggering uninterpretable features (Chomsky 1995), *Criteria* can have an interpretative impact in that they are often interpreted as semantic operators with scopal properties and do not necessarily need to be checked/deleted. Rizzi (1997) discusses Wh, Neg, Foc, and Top as instances of *Criteria*. Topical and focal elements are licensed to move to a specific position in the left periphery (SpecTopP, SpecFocP) in a similar way that wh-elements are licensed to be fronted. A FocP is also assumed for German e.g. in the analyses of operator movement by Grewendorf (2002b) and Fanselow (2002).

This type of analysis explains why foci can move to the left periphery. However, it would in principle be expected that if the movement is triggered by a focal/topical criterion in parallel to movement that is triggered by a *wh*-feature, it should be the whole focused/topical constituent that is attracted to the left periphery (or potentially, a larger constituent in the case of pied piping), not just a part of it. Partial focus and topic movement thus remains unexplained.

Molnár & Winkler's (2010) model is related, but differs in that it is not the focus or topic category that is assumed to be relevant for fronting, but the notion of coherence. Coherence with the preceding discourse can be established via continuity (picking up an already introduced referent) or contrast (contradicting/complementing something that was introduced earlier). Contrast is understood as a notion that is compatible with both topics and foci. Molnár & Winkler propose that in German, both continuity or contrast can license movement of an object to the prefield.

4.4.2 *Pars pro toto* movement

Fanselow (2004) addresses the issue of partial fronting in German. The phenomenon makes it look as though *pars pro toto* movement is possible in the case of focus fronting (only a part of the XP that triggers the movement-triggering feature moves). It seems to be the opposite of pied piping, which is known to be possible in *wh*-movement (where more material than necessary is moved). However, Fanselow argues that focus fronting can be analyzed fully in parallel to *wh*-movement. Under Minimalist assumptions, what is attracted in *wh*-constructions is a feature. When the movement happens overtly, a syntactic unit moves that expresses this feature—this is at least a word, but it can also be a whole phrase; but in principle, all cases of overt movement can be seen as pied piping (the movement-triggering feature drags behind more syntactic material). Analogously, in focus/topic movement, only a feature is attracted. But what moves is the syntactic unit that formally expresses this feature. Fanselow argues that whereas the formal expression of the *wh*-feature is morphological, focus is expressed prosodically by pitch accents. It is therefore expected that at least the syntactic unit that is prosodically marked for focus has to move. Based on examples like (34) (where the idiomaticity of the VP ensures that there is a broad and not a narrow focus), Fanselow proposes that if the focused part of the sentence includes more than one pitch-accent-bearing constituent, the highest/leftmost one of them needs to be fronted. The leftmost accented phrase is not necessarily identical to the phrase that

carries sentence stress—this would be *in die Traufe* in (34).³

- (34) a. Er ist vom Regen in die Traufe gekommen.
he has from.the rain in the eaves come
'He jumped out of the frying pan into the fire.'
b. Vom Regen ist er in die Traufe gekommen.
c. #In die Traufe ist er vom Regen gekommen

4.4.3 Focus exponents

Similar approaches have been put forward in terms of the notion of *focus exponents*. The term goes back at least to Fuchs (1976). Fuchs introduced it for the purpose of discussing syntactic configurations in which elements can remain accentless even if they are new and informative—e.g., in object-verb sequences, where the object would be the exponent in Fuchs's terms, which can exempt the verb from being stressed (Fuchs 1976, p. 307). In later publications the term is used in a more general way to refer to the element that must be the prosodically most prominent one within a focus (even if further accents are present). A comprehensive set of rules determining the focus exponent is provided by Uhmann (1991), which makes similar predictions to the prosodic theories discussed in chapter 2 (the rightmost internal argument is the focus exponent).

Büring (1997) establishes a connection between the notion of exponent and the ability to undergo movement to the prefield in German. Interestingly, he introduces the term *topic exponent* in analogy to focus exponents, and he assumes that they are determined by the same rules (which are similar to Selkirk's 1984 focus projection rules)—roughly, the most deeply embedded argument within the focus/topic is the exponent, and it can be moved to the prefield in broad focus/topic contexts.

Korth (2014, p. 230–234) also makes use of the concept of exponents with the goal of restricting movement to the prefield. In contrast to Büring, she assumes that the highest argument within the focused constituent is the exponent in order to account for the examples from Fanselow (2004), which show that it is not necessarily the phrase that carries sentence stress that can be fronted, but rather the phrase that carries the leftmost pitch accent.

³Although it is often possible to deaccent a directional PP that is adjacent to the verb in German (see e.g. Jacobs 1991), this seems to be blocked in this case—this might be an idiosyncratic property of the idiomatic VP.

4.4.4 Cyclic linearization

Fanselow & Lenertová (2011) propose a system which also aims to capture partial fronting data, and especially the observation that only the leftmost accented element can be fronted. They provide more examples that corroborate this proposed generalization also for other languages (mainly Czech), and confirm that accentuation is indeed a decisive factor. In the Czech example in (35) (p. 180, judgments as reported there), the whole sentence is focused. In (35a), the subject *matka* ‘mother’ is discourse-new, and thus requires to be accented. Thus, fronting the object across the subject either violates the accent-crossing generalization, or the principle that discourse-new expressions must receive a phrasal accent. This problem does not arise in (35b), where the subject is mentioned in the preceding context and thus discourse-given in the answer utterance. Here, fronting of the object is reported to be acceptable.

- (35) a. *context: ‘What’s new?’*
#[Guláš]_i matka uvařila t_i.
goulash mother cooked
‘Mother cooked goulash.’
- b. *context: ‘What’s new with mother?’*
[Guláš]_i matka uvařila t_i.

Fanselow & Lenertová develop a theoretical account of the generalization in terms of cyclic linearization. They follow Fox & Pesetsky’s (2005) proposal that linearization statements are added in a cumulative way during the derivation and cannot be altered, deleted or contradicted at a later point. Fanselow & Lenertová assume that linearization statements can be added freely at any point, and at the latest at Spell-out, which is compatible with Fox & Pesetsky’s model. Under these assumptions, the accent-crossing generalization can be accounted for by adding the following principle (Fanselow & Lenertová, p. 185):

- (36) Early Accentuation (EA)
Structural accents are determined when phrases are merged.

In other words, syntax-prosody mapping is assumed to happen (extremely) cyclically, after each merge operation. Fanselow & Lenertová further argue that accent assignment presupposes linearization. As a consequence, a syntactic element that is to receive a structural accent has to be linearized immediately after it is merged. (Note that linearization statements are not affected by copy deletion in this model, in contrast to my proposal.)

The authors argue that the system ensures that only the leftmost accented category can move to the left periphery. The line of their argumentation is illustrated in (37), applied to the case of object fronting to SpecCP in German. In order to assign a structural accent to the object (the accenting is indicated by underlining here), it has to be linearized with respect to the verb. Once the subject is merged, in order to assign a structural accent to it, it has to be linearized with respect to the object and the verb. If the object moves to SpecCP at a later point in the derivation, where it would precede the subject, a linearization statements would be added which contradicts an already established one (marked by ‘!’).

| (37) | syntax | linearization statements |
|------|---|---------------------------------------|
| | [<u>object</u> verb] | object \prec verb |
| | [<u>subject</u> [<u>object</u> verb]] | !subject \prec object |
| | | subject \prec verb |
| | [<u>object</u> [C [... <u>subject</u> [object verb]]]] | !object \prec subject |

If the subject remains unaccented (because it is a functional element or because it is discourse-given), it does not need to be linearized immediately. It can be linearized at a later point in the derivation, after the object has moved to SpecCP. In this case, the problematic *subject* \prec *object* statement would not be introduced. The problematic statement would also be avoided if the object remained unaccented.

Fanselow & Lenertová distinguish between “structural accents”⁴, which are assigned early (and depend on syntactic structure and givenness), and other ones that can be assigned later and do not restrict the movement possibilities. The latter type of accent includes contrastive ones. It plausibly also includes accents that are assigned to given elements for rhythmic reasons, for example to avoid too long stretches of unstressed material (“ornamental accents” in Buring’s 2007 terms).

In sum, the model predicts that syntactic objects that are discourse-new and accented cannot be reordered. If either the crossing or the crossed object is deaccented or carries a contrastive/ornamental accent, the reordering is predicted to be possible.

Besides these restrictions, left-peripheral movement is free from a syntactic point of view according to Fanselow & Lenertová. They assume that movement of any constituent can be triggered by an unspecific Edge feature in C. The aim is to nevertheless provide a

⁴I take this to correspond to what I call phrasal accent here, i.e. prominence at the level of the phonological phrase.

model that “allows all and only pragmatically appropriate choices of the categories moved to the left periphery” (p. 199), even if no information-structure specific restrictions are implemented directly in the syntax. Fanselow & Lenertová argue that their proposal is empirically more adequate than cartographic approaches, because “what goes to SpecCP may be smaller, larger, or identical with the focus and the topic” (p. 201).

4.4.5 Other triggers for movement

Besides the categories focus and (contrastive) topic, it has also been proposed that other interpretative effects are associated with movement to the left periphery. For example, even though Frey’s (2004) proposal adopts some aspects of cartographic models (e.g., a split C domain with several functional projections), he does not assume that a fronted constituent necessarily needs to be a focus, but that it is interpreted exhaustively. Frey (2010) builds on this idea, but in view of additional data adjusts it by assuming that the fronted constituent is either interpreted as exhaustive or as emphatic. The latter means that the fronted constituent is interpreted as being ranked high on a scale (e.g., a scale of unexpectedness). This interpretative requirement does not hold if it is the closest phrase in the TP that moves to the prefield (typically the subject or an adverbial, but also topics). Such “Formal Fronting” to the prefield does not have any semantic/pragmatic impact.

In Wierzba (2014), I argued that at least a part of the interpretative effect might be due to prosodic differences between subject- and object-initial sentences rather than directly to the syntactic differences. A prosody-related approach is also proposed by Féry & Drenhaus (2008). They suggest that the realization of a whole sentence as a single phonological phrase that they find to be obligatory with a fronted object under broad focus is linked to a marked pragmatic interpretation, namely a *thetic* one (similar to other structures with a single pitch accents, like *unergatives*).

Comparable predictions to Frey’s model emerge from the pragmatic approach proposed by Skopeteas & Fanselow (2011). They argue that syntactically marked constructions like object-initial ones need to be motivated by a marked interpretation. This can be an exhaustive interpretation, but, like in Frey’s model, it can also have to do with low predictability/unexpectedness. In contrast to Frey, the authors do not anchor the interpretative effect directly in syntax, but assume that it arises due to conversational principles and pragmatic reasoning.

In a similar vein, Zimmermann (2008) and Hartmann (2008) argue from a cross-linguistic perspective that (contrastive) focus does not always need to be expressed prosod-

ically or syntactically. If speakers choose a marked syntactic structure or prosodic realization, they do so to mark an unexpected discourse move, which leads to an emphatic effect.

All these approaches share the assumption that there is not necessarily a 1:1-relation between left-peripheral movement and focus—rather, a speaker must have some more specific motivation to front a phrase (and thus attract the addressee’s attention to it), otherwise a focused constituent can remain in situ. Under this view, partial focus fronting is expected to be possible only if there is a pragmatic/discourse-semantic motivation for it.

4.4.6 Discussion

Approaches in terms of topic, focus, or contrast features associated with syntactic positions in the left periphery face the empirical problem that it is not always the whole topical, focused or contrasted phrase that is fronted. Fanselow’s (2004) *pars pro toto* approach and Korth’s (2014) account in terms of focus exponents are in line with the observation that a part of the focus or topic can be moved, but the restrictions with respect to accentuation (that only the leftmost accented part can be moved) need to be captured by a specific stipulation. Fanselow & Lenertová (2011) attempt to derive the relevant generalizations from a single, more general assumption concerning the relation between realization and linearization. In what follows, I will try to go a step further and propose that the empirical generalizations can also be accounted for by independently motivated interface-mapping principles under the assumption that they apply under reconstruction, without introducing an additional principle.

4.5 New proposal: reconstruction for prosody-interpretation mapping

4.5.1 Prosody-interpretation mapping principles

In the previous chapters, reconstruction for syntax-prosody mapping was considered. I will now extend the proposed model to prosody-interpretation mapping and show that the assumption that it happens under reconstruction contributes to explaining the partial focus topic patterns, and, in contrast to previous approaches, also the partial contrastive topic patterns.

I assume that the following prosody-interpretation principles are active in German:

- (38) FOC: The head of the rightmost phonological phrase within the focus receives maximal prominence.
- (39) CT: Align the left edge of a contrastive topic with the left edge of a hat contour.

FOC is an adjustment of Sato’s (2012) NSS rule. It limits the assignment domain of sentence stress to the focused part of the structure. In my model, it will be implemented in terms of prominence statements. CT requires the (fall-)rise accent at the left edge of the hat contour to demarcate the left edge of a contrastive topic. I assume that this information is also introduced and preserved throughout the derivation in terms of unalterable statements.

4.5.2 Illustrating reconstruction for focus mapping

The core idea is that these prosody-interpretation principles also apply to copies in the prosodic representation. This is illustrated for the post-derivational implementation in (40) (abbreviating the steps of copy deletion and repair; see section 3.2 for the details). Here, the whole sentence is focused. Reconstruction for FOC therefore leads to the same results as reconstruction for the NSS in the previous chapter. This is illustrated schematically in (40).⁵ I continue to mark only lexical phrases, with the exception of the CP. I assume that Selkirk’s (2011) *Match Clause* constraint favors mapping the CP to an intonation phrase.

(40) Post-derivational implementation, broad focus:

a. Building the syntactic structure:

[[O]_{NP} [S]_{NP} [[O]_{NP} V]_{VP}]_{CP} *syntax*

b. Syntax-prosody mapping:

(x)_ϕ (x)_ϕ ((x)_ϕ)_ϕ *prosody*
[[O]_{NP} [S]_{NP} [[O]_{NP} V]_{VP}]_{CP} *syntax*

c. **Prosody-information structure (IS) mapping:**

(x)_ϕ (x)_ϕ ((x)_ϕ)_ϕ *prosody*
[[O]_{NP} [S]_{NP} [[O]_{NP} V]_{VP}]_{CP} *syntax*
{ }_{focus} *IS* *Prominence:*
O > V, O > S

⁵In a concrete German sentence, the verb would only stay in situ if it was a non-finite form and a finite auxiliary was present. For the purpose of illustration, I am leaving out functional elements in the schematic examples. Without an auxiliary, the verb would move to C.

- d. ... copy deletion + repair ...
- e. Determining sentence stress based on prominence statements:
- | | | | | | |
|---------------------|---------------------|--------------------------------|-----------------------------------|--------------------|--------------|
| (x |) | _ι | | | |
| (x) _φ | (x |) _φ | <i>prosody</i> | <i>Prominence:</i> | |
| [O] _{NP} | [S] _{NP} | [⊖] _{NP} | V] _{VP}] _{CP} | <i>syntax</i> | O > V, O > S |
| { | | | } _{focus} | <i>IS</i> | |

The following examples illustrate the same idea within the cyclic implementation of prosodic reconstruction.

- (41) Cyclic implementation, broad focus:

vP phase (spelling out the VP):

- a. ... building the syntactic structure, syntax-prosody mapping ...
- b. **Prosody-IS mapping:**

| | | | | | |
|---------------------|-----------------------|-------------------|--------------------|----------------|--------------------|
| (x) _φ | ((x) _φ |) | _φ | <i>prosody</i> | |
| [O] _{NP} | [[O] _{NP} | V] _{VP} | | <i>syntax</i> | <i>Prominence:</i> |
| { | | | } _{focus} | <i>IS</i> | O > V |

- c. ... copy deletion, repair ...

- (42) CP phase (spelling out the TP):

- a. ... building the syntactic structure, syntax-prosody mapping ...
- b. **Prosody-IS mapping:**

| | | | | | | |
|---------------------|---------------------|---------------------|--------------------------------|--------------------|----------------|--------------------|
| (x) _φ | (x) _φ | (x |) | _φ | <i>prosody</i> | |
| [O] _{NP} | [S] _{NP} | [O] _{NP} | [⊖] _{NP} | V] _{VP} | <i>syntax</i> | <i>Prominence:</i> |
| { | | | | } _{focus} | <i>IS</i> | O > V, O > S |

- c. ... copy deletion, repair ...

- (43) Root phase (spelling out the remainder of the structure):

- a. ... building the syntactic structure, syntax-prosody mapping ...
- b. **Prosody-IS mapping:**

| | | | | | | |
|-----------------------|---------------------|---------------------|--------------------------------|--------------------------------|-----------------------------------|---------------|
| (x) _φ | (x) _φ | (x |) | _φ | <i>prosody</i> | |
| [[O] _{NP} | [O] _{NP} | [S] _{NP} | [⊖] _{NP} | [⊖] _{NP} | V] _{VP}] _{CP} | <i>syntax</i> |
| { | | | | | } _{focus} | <i>IS</i> |

Prominence: O > V, O > S, S > V

(S > O cannot be added—contradictory)

- c. ... copy deletion, repair ...
- d. Determining sentence stress based on prominence statements:

$$\begin{array}{rllll}
 (\text{ x })_\phi & & & &)_\iota \\
 (\text{ x })_\phi & & (\text{ x } & &)_\phi & \textit{prosody} \\
 [[\text{ O }]_{\text{NP}} \ \ \cancel{[\text{ O }]_{\text{NP}}} \ [\text{ S }]_{\text{NP}} \ \ \cancel{[\text{ O }]_{\text{NP}}} \ [\text{ V } \ \cancel{[\text{ O }]_{\text{NP}}}]_{\text{VP}}]_{\text{CP}} & & & & & \textit{syntax} \\
 \{ & & & & & \}_{\text{focus}} & \textit{IS}
 \end{array}$$

Prominence: O > V, O > S, S > V

If there is narrow focus on the subjects, the predictions of a model including FOC differ from one with the default, non-focus related NSS rule. This is illustrated for a post-derivational implementation in (44): the head of the rightmost phonological phrase is assigned maximal prominence.

- (44) Post-derivational implementation, narrow subject focus:

- a. ... building the syntactic structure, syntax-prosody mapping ...
- b. **Prosody-IS mapping:**

$$\begin{array}{rllllll}
 (\text{ x })_\phi & (\text{ x })_\phi & ((\text{ x })_\phi & &)_\phi & \textit{prosody} & \\
 [[\text{ O }]_{\text{NP}} \ [\text{ S }]_{\text{NP}} & & [[\text{ O }]_{\text{NP}} \ \text{ V }]_{\text{VP}}]_{\text{CP}} & & & \textit{syntax} & \textit{Prominence:} \\
 & \{ & & & & \}_{\text{focus}} & \textit{IS} & \text{S} > \text{V}, \text{S} > \text{O}
 \end{array}$$

- c. ... copy deletion + repair ...
- d. Determining sentence stress based on prominence statements:

$$\begin{array}{rllllll}
 (& & \text{ x } & & & &)_\iota \\
 (\text{ x })_\phi & & (\text{ x } & & & &)_\phi & \textit{prosody} & \textit{Prominence:} \\
 [\text{ O }]_{\text{NP}} \ [\text{ S }]_{\text{NP}} & & [\cancel{[\text{ O }]_{\text{NP}}} \ \text{ V }]_{\text{VP}}]_{\text{CP}} & & & & & \textit{syntax} & \text{S} > \text{V}, \text{S} > \text{O} \\
 & & \{ & & & & & \}_{\text{focus}} & \textit{IS}
 \end{array}$$

In a cyclic approach, no prominence statements would be added in this case until the subject is present in the structure, i.e. until the CP phase. At that point, the subject is assigned maximal prominence via the prominence statements, and it becomes the head of the intonation phrase in the end. This is illustrated in the following examples.

- (45) Cyclic implementation, narrow subject focus:

vP phase (spelling out the VP):

- a. ... building the syntactic structure, syntax-prosody mapping ...

b. **Prosody-IS mapping:**

$$\begin{array}{l} (x)_\phi \quad ((x)_\phi \quad)_\phi \quad \textit{prosody} \\ [O]_{NP} \quad [[O]_{NP} \quad V \quad]_{VP} \quad \textit{syntax} \\ \textit{IS} \end{array}$$

c. ... copy deletion, repair ...

(46) CP phase (spelling out the TP):

a. ... building the syntactic structure, syntax-prosody mapping ...

b. **Prosody-IS mapping:**

$$\begin{array}{l} (x)_\phi \quad (x)_\phi \quad (x \quad)_\phi \quad \textit{prosody} \\ [O]_{NP} \quad [S]_{NP} \quad [O]_{NP} \quad [\cancel{[O]}_{NP} \quad V \quad]_{VP} \quad \textit{syntax} \quad \textit{Prominence:} \\ \quad \quad \quad \{ \quad \}_{\textit{focus}} \quad \textit{IS} \quad S > V, S > O \end{array}$$

c. ... copy deletion, repair ...

(47) Root phase (spelling out the remainder of the structure):

a. ... building the syntactic structure, syntax-prosody mapping ...

b. **Prosody-IS mapping:**

$$\begin{array}{l} (x)_\phi \quad (x)_\phi \quad (x \quad)_\phi \quad \textit{prosody} \\ [[O]_{NP} \quad [O]_{NP} \quad [S]_{NP} \quad \cancel{[O]}_{NP} \quad [\cancel{[O]}_{NP} \quad V \quad]_{VP}]_{CP} \quad \textit{syntax} \\ \quad \quad \quad \{ \quad \}_{\textit{focus}} \quad \textit{IS} \end{array}$$

Prominence: S > V, S > O

c. ... copy deletion, repair ...

d. Determining sentence stress based on prominence statements:

$$\begin{array}{l} (\quad \quad \quad x \quad)_i \\ (x)_\phi \quad (x \quad)_\phi \quad \textit{prosody} \\ [[O]_{NP} \quad \cancel{[O]}_{NP} \quad [S]_{NP} \quad \cancel{[O]}_{NP} \quad [\cancel{[O]}_{NP} \quad V \quad]_{VP}]_{CP} \quad \textit{syntax} \\ \quad \quad \quad \{ \quad \}_{\textit{focus}} \quad \textit{IS} \end{array}$$

Prominence: S > V, S > O

4.5.3 Illustrating reconstruction for CT mapping

Reconstruction for the contrastive topic mapping principle CT is illustrated in (48). The left edge of the contrastive topic (the VP) is mapped to the left edge of a hat contour. This prosodic information is introduced and preserved in terms of an unalterable statement saying that the beginning of the hat contour (“hat onset”) is on the object. The focus is mapped to maximal prominence in the same way as in the previous example. In the

last step, sentence stress is determined based on the prominence statements as usual. In addition, the intonation contour is determined based on the prosodic structure and the hat contour statements. A rising accent (indicated by / in the example) is assigned to the element that has been determined as the hat onset during the prosody-IS mapping, and a falling accent (indicated by \) is assigned on the element with sentence stress. A plateau is preferably realized in between, forming a hat contour.

(48) Post-derivational implementation, VP = contrastive topic, narrow subject focus

a. ... building the syntactic structure, syntax-prosody mapping ...

b. **Prosody-IS mapping:**

| | | | | | |
|--------------|-----------------|--------------|-------------------|----------------|---------------------|
| $(x)_\phi$ | $(x)_\phi$ | $((x)_\phi)$ | $)_\phi$ | <i>prosody</i> | <i>Prominence:</i> |
| $[[O]_{NP}$ | $[S]_{NP}$ | $[[O]_{NP}$ | $V]_{VP}]_{CP}$ | <i>syntax</i> | $S > V, S > O$ |
| | $\{ \}_{focus}$ | $\{$ | $\}_{CT}$ | <i>IS</i> | <i>Hat onset: O</i> |

c. ... copy deletion + repair ...

d. Determining stress and intonation contour based on unalterable statements:

| | | | | | |
|--------------|-----------------|-----------------------|-------------------|--------------------|---------------------|
| / | \ | | <i>contour</i> | | |
| $($ | x | $)_i$ | | <i>Prominence:</i> | |
| $(x)_\phi$ | $(x$ | $)_\phi$ | <i>prosody</i> | $S > V, S > O$ | |
| $[O]_{NP}$ | $[S]_{NP}$ | $[\cancel{[O]_{NP}}$ | $V]_{VP}]_{CP}$ | <i>syntax</i> | <i>Hat onset: O</i> |
| | $\{ \}_{focus}$ | $\{$ | $\}_{CT}$ | <i>IS</i> | |

The same contour would be predicted in the cyclic implementation; there, the hat onset statements would be added once the CT is mapped (in the first phase), and the prominence statements would be added once the focus is mapped (in the CP phase), resulting in the same pattern.

4.5.4 Rephrasing vs. non-rephrasing approaches

There are different ways to handle sentence stress shift for information-structural reasons (see Ishihara 2015 for comprehensive discussion). In some models it is assumed that focus can affect prosodic phrasing, for example by causing the deletion of prosodic boundaries. In systems in which sentence stress is defined as the last pitch accent in an utterance, rephrasing is necessary to achieve a shift in sentence stress (all phonological phrases in the postnuclear domain need to be deleted).

In other models, information-structural properties are assumed to only influence the

phonetic realization of the prosodic structure, for instance in terms of the height of pitch accents. This view is adopted a.o. by Féry & Kügler (2008), Féry & Drenhaus (2008), and Féry & Ishihara's (2009). The assumption is that focus boosts the height of pitch accents in relation to a default downstep pattern, whereas givenness lowers their height.

Both views are compatible with the proposed model. The prominence statements are interpreted only at the end of the derivation. At this point, restructuring processes like boundary insertion/deletion could apply to make sure that the head of the intonation phrase is in accordance with the prominence statements, or the prominence statements could come into play when the prosodic structure is translated to a phonetic signal and influence the scaling of pitch accents at that point. Empirical support for non-rephrasing approaches is provided by Kügler & Féry (2016), who show that there is evidence for prosodic phrasing in the domain following the nuclear, focal accent, but the domain is phonetically compressed.

I will follow Wagner (2005, 2012) in assuming that givenness cannot affect the position of sentence stress. I therefore think that it is advantageous to assume that givenness only affects the phonetic realization of accents and does not cause complete deaccentuation / rephrasing. To incorporate the preference to accent discourse-new phrases (Baumann & Grice's 2006) into the model, I will assume that givenness mapping applies at the point when the prosodic structure is translated to a phonetic signal. At that point, discourse-new phrases are preferably realized as full pitch accents. In some cases, this is impossible, e.g. if a discourse-new phrase is in the postnuclear domain—due to postnuclear compression, no full pitch accents can be realized there in German. This point will be important to derive the generalizations concerning partial fronting, as discussed below.

4.5.5 Deriving the partial fronting generalizations

The generalizations that were drawn from previous experiments on partial focus and CT fronting are repeated below.

- Generalization I: OVS(PP) can map to wide focus and wide contrastive topic.
- Generalization II: PPVSO can map to narrow contrastive topic or PP+V contrastive topic
- Generalization III: accentuation matters: OVS can map to wide focus only with initial sentence stress. Discourse-new subjects are problematic in that structure.

According to my model, prosody-IS rules take into account the lower copies. Therefore, if the VP or the whole sentence is focused, the most prominent accent is predicted to fall on the object, because (before copy deletion) its lower copy is the head of the rightmost phonological phrase. This explains Féry & Drenhaus's (2008) finding that object-initial sentences are unacceptable with sentence stress on the subject, even though they satisfy the rightward tendency of sentence stress placement on the surface. My model thus provides an alternative explanation for the finding which the accounts based on focus exponents / early accentuation explain in terms of principles that only allow the leftmost accented phrase to move.

The generalization that discourse-new subjects are less acceptable in this kind of structure than deaccentable, given ones follows from the impossibility to satisfy the mapping preference that new elements receive a full pitch accent. This requirement cannot be realized in that position domain due to postnuclear compression. As this is a different source of unacceptability, the effect can differ in strength from the problem described above.

A benefit of the proposed model is that it can also account for the generalizations concerning partial fronting of contrastive topic. Under the assumption that contrastive topics are left-aligned with a hat contour in German, and that there is reconstruction for this mapping rule, it follows that a fronted object with a rising accent allows for the interpretation that the VP is the contrastive topic, whereas fronting the directional PP only allows for narrower contrastive topics. Under Büring's approach in terms of topic exponents it would be expected that it is the deepest embedded argument that can be moved, both in partial focus and CT fronting. This would wrongly predict that a fronted PP should allow the broader interpretation. In Fanselow & Lenertová's approach, movement of contrastive elements is not affected by the Early Accentuation principle. This wrongly predicts that any part of a CT should be able to undergo movement to the prefield.

In the following chapter, I will re-test the data from which I derived my hypotheses, and also extend the data set to further structures.

4.5.6 Architecture

The architecture of grammar that I assume is illustrated in Figure 4.4, including the newly introduced assumptions about prosody-interpretation mapping from this chapter. In a cyclic implementation, the processes in the first box would be repeated at each point of interface mapping.

Important features of the proposed model are listed below:

- Interface mapping before copy deletion allows to model prosodic reconstruction effects.
- Unalterable prosody-related statements allow to preserve information resulting from mapping throughout the derivation.
- Compatibility with both cyclic, phase-based syntactic approaches as well as with models with a single, post-derivational point of interface mapping.
- Compatibility with Fox & Pesetsky's (2005) model that provides an independent motivation for successive cyclic movement.
- Compatibility with both rephrasing and non-rephrasing approaches to prosody-information structure mapping.
- Compatibility with various approaches to the verb-object asymmetry: although I implemented Selkirk's (2011) solution in terms of Match Theory for concreteness, the model would also allow to preserve the locally computed asymmetry throughout the derivation if it was implemented in terms of STRESS-XP and WRAP-XP or e.g. Korth's (2014) head-complement approach.
- Empirical coverage of reported prosodic reconstruction effects from the literature (wh-movement, VP-internal subjects, relative clauses) and partial fronting data, including partial fronting of foci and contrastive topics.

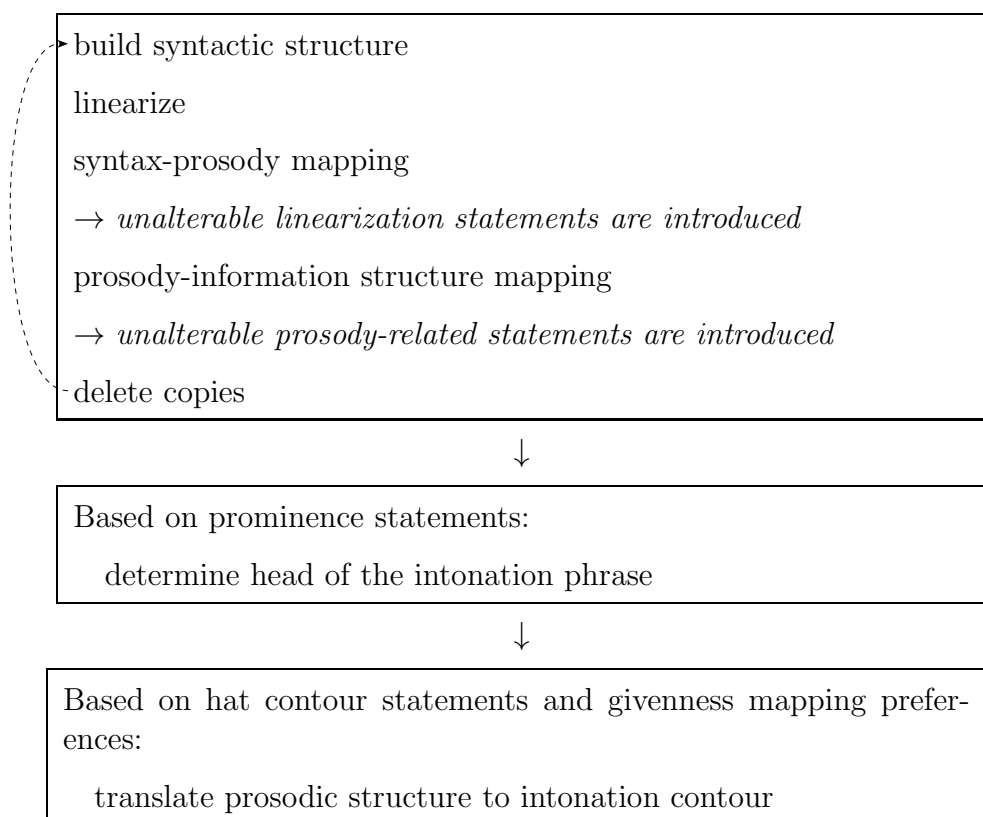


Figure 4.4: Proposed architecture of grammar

Chapter 5

Testing the hypotheses: new experiments on German

5.1 Preliminary remarks: aim and scope

In this chapter, I will present the results of an acceptability rating study with auditory dialogues as stimuli. The aim is to test the empirical adequacy of the proposed approach to partial focus and CT fronting.

Overarching goals The overarching goals of the study are: (i) to test my hypotheses concerning partial focus and CT fronting—can the patterns be explained by reconstruction for syntax-prosody and prosody-IS mapping principles?, (ii) to test the model against further data, using structures in which the same principles are assumed to play a role, and (iii) to compare the empirical adequacy of the proposed model to other approaches, in particular Fanselow & Lenertová’s (2011) claim that the pragmatic restrictions of left-peripheral movement can be reduced to the principle of Early Accentuation.

Experiment 1 The first experiment is about partial focus fronting. It is designed to replicate similar experiments (Féry & Drenhaus 2008, Fanselow et al. 2011, Wierzba & Fanselow under revision) while reducing the influence of potential confounding factors like animacy asymmetries, which might have played a role in the previous studies, to get a clearer idea of the structural factors. Based on the previous findings it is expected that sentence stress on the subject is less acceptable than sentence stress on the object under broad focus, both in subordinate clauses with canonical order as well as in marked object-

initial structures. If the assumption that the lower acceptability of subject stress under broad focus is related to a problem with focus-prosody mapping, structures with subject stress should be rated better in a context favoring a narrow subject focus interpretation. If the assumption is correct that object-initial structures with object stress and a new subject were found to be degraded because of postnuclear compression, these structures are expected to be more acceptable if the subject is given and thus deaccentable.

Experiment 2 The second experiment is also about partial focus fronting. It serves to extend the data set to further structures that have not been previously tested experimentally: structures with three-place predicates, in which the second out of the three arguments is fronted. I chose to add this type of structure because it allows to tease apart the predictions of Fanselow & Lenertová’s (2011) *Early Accentuation* and the reconstruction-based approach proposed in the previous chapter, which largely overlap for the structures tested in experiment 1. Fanselow & Lenertová’s model predicts for this type of structure that givenness of the object and/or the subject should be a sufficient condition for object movement. The reconstruction-based model does not predict any influence of givenness, because only the position of sentence stress is relevant, which invariably falls on the sentence-final argument in this experiment.

Experiment 3 The third experiment is about partial contrastive topic fronting. Similar to experiment 1, it is designed to test a hypothesis derived from previous experiments (Wierzba 2011, and the follow-up experiment described in section 4.3.2), namely that the hat contour needs to be left-aligned with the contrastive topic. For a VP of the form ‘DP PP V’ this predicts that a broad contrast reading (where the whole VP is interpreted as a contrastive topic) is possible if the hat contour begins at the left edge of the DP. If the idea is correct that there is reconstruction for prosody-information structure mapping principles, a similar pattern should be found in subordinate clauses (which have not been tested before in this respect) and main clauses involving object or PP fronting. I added a further type of structure to test if the proposed principles extend beyond the already tested cases: if the hat contour is left-aligned with the subject in a transitive clause, it should be possible to interpret the whole clause as a contrastive topic.

Experiment 4 The purpose of the fourth experiment is to test a set of structures that have featured prominently in the discussion about prosodic reconstruction in the literature, namely structures involving wh-movement. Here, I test wh-questions, exclamatives, and

split wh-questions in direct comparison to corresponding canonical SOV clauses. This makes it possible to compare the empirical adequacy of reconstruction-based and surface-based accounts in a direct way. If the previously made claim that there is reconstruction for the distribution of accents (Bresnan 1971) is correct, it is expected that the accentuation of the verb depends on the type of object, irrespective of its position (in situ or fronted): if the object is a phrase, it should be preferred to deaccent the verb; if the object is a pronoun, it should be preferred to accent the verb. If my proposal is correct that there is reconstruction for the assignment of sentence stress, similar patterns in the subordinate clause and the wh-constructions are expected: if the object is a phrase, it should carry sentence stress.

Experiment 5 The fifth experiment is designed to test the claim that the clash between postnuclear compression and the requirement to stress new XPs is responsible for the observation that discourse-new subjects are problematic in object-initial broad-focus sentences: if this idea is correct, not stressing a new XP should have the same acceptability-lowering effect both in the prenuclear and postnuclear domain. Furthermore, failing to stress two new XPs should have a stronger negative effect than failing to stress just one new XP.

Modeling the whole data set After analyzing and discussing each experiment individually, I will fit different models representing different theoretical approaches to the whole data set and evaluate which set of principles fits the data better.

Filler materials Besides the materials from experiments 1–5, a number of further stimuli were included as fillers. A part of them served as control items for the present study, in particular: (i) items with clear mismatches between the position of focus and the position of sentence stress (to get an idea whether participants were sensitive to prosodic deviations at all), (ii) items with direct DP objects in the postfield, which are generally assumed to be unacceptable in German (to get an idea whether participants were sensitive to word order deviations), (iii), items in which word order and the animacy of the arguments was manipulated (to get an idea whether this factor could have caused differences between this and previous studies). The results from these filler materials will be discussed in section 5.9.

5.2 Participants and procedure

43 people took part in the experiment for study program credit or payment. The data of one speaker was removed because she reported to be a non-native speaker of German; the remaining 42 participants reported to be native speakers. The participants read the instructions (as found in the appendix) on the computer screen. The task was illustrated by two examples, which were presented via headphones. Then, the first stimulus was presented (also auditorily). All stimuli had been pre-recorded, with a trained phonologist/phonetician reading the target utterances. Information about the exact realization of the materials can be found in the appendix. After the whole dialogue had been played, a scale from 1 to 7 appeared on the screen. Participants chose a rating (1 for completely unacceptable and 7 for completely acceptable) using the keyboard. There was no time limit. After pressing a key, the next stimulus was presented. All subexperiments that I report in this chapter were tested together within one experimental setup. In total, each participants heard 168 stimuli in pseudo-randomized order (32 from experiment 1, 16 from experiment 2, 32 from experiment 3, 48 from experiment 4, 24 from experiment 5, 16 fillers). On average, the experiment took about 45 minutes to complete.

5.3 Experiment 1: replicating partial focus movement

5.3.1 Goals

The main goal of this subexperiment was to explicitly test the hypotheses derived in a post-hoc manner from previous studies. Parts of Wierzba & Fanselow's (under revision) study design were adopted—new subjects are compared to discourse-given ones with respect to their effect on the availability of object fronting—but auditory materials were used this time. This makes it possible to evaluate the various proposed accent-related explanations more directly. It also allows to re-test Féry & Drenhaus's (2008) findings concerning object-initial structures with a single accent/multiple accents, and to relate them more directly to Wierzba & Fanselow's observations.

Besides replicating some aspects of these previous studies, the data set was complemented by some further conditions. In addition to the marked object-initial word orders, corresponding subordinate clauses with unmarked SOV word order were included in the design. This allows one to test to what extent the pattern found for the marked orders can be reduced to principles that are also active in structures with canonical word order, and

whether these principles apply in a surface-oriented or reconstructing manner. Embedded clauses with SOV order rather than main V2 clauses were used because the latter also involve movement to the prefield, which I wanted to avoid. Furthermore, conditions with subject focus were added in order to test whether object-initial structures with accents on both the subject and the object, which were previously found to be unacceptable, can be felicitous in an appropriate context.

5.3.2 Design and materials

The examples (1) and (2) illustrate the design of the target sentences. The factors structure (subordinate clause, main clause with the object in the prefield) and position of sentence stress (on the subject, on the object) were manipulated. The exact accentuation patterns of the different conditions are illustrated in the appendix. In order to reduce the influence of potential pragmatic confounds, I aimed to choose the subject and object in such a way that they would be entirely interchangeable without any pragmatic impact. Masculine forms were used because they show a distinction between accusative and nominative case, which disambiguates the sentences. Because length and inherent phonological properties of a phrase might influence the severity of unlicensed deaccentuation, the order of the lexical content was kept constant, even when the order of subject and object was varied (compare (1) vs. (2)).

(1) Subordinate clause

- a. Ich denke, dass der Tontechniker den Kameramann beleidigt
I think that the.NOM sound.engineer the.ACC cameraman offended
hat.
has
'I think that the sound engineer offended the cameraman.
- b. Ich denke, dass der Tontechniker den Kameramann beleidigt hat.

(2) Object in the prefield

- a. Den Tontechniker hat der Kameramann beleidigt.
The.ACC sound.engineer has the.NOM cameraman offended
'The cameraman offended the sound engineer.'
- b. Den Tontechniker hat der Kameramann beleidigt.

The third factor that was manipulated was context. Each of the four target sentences was either preceded by an information-structurally neutral broad-focus question as in (3), or

by a context as in (4) that I hypothesized to facilitate the use of one of the syntactically or prosodically marked structures. For the target sentences with sentence stress on the object ((1a), (2a)), the subject was given in the facilitating context; for those with sentences stress on the subject ((1b), (2b)), the subject was focused.

- (3) Neutral (all new, broad focus) Es scheint Ärger im Team gegeben zu haben. Weißt du, was passiert ist? ‘It seems that there was trouble among the team. Do you know what happened?’
- (4) Facilitating context (given subject in a and c, or focused subject in b and d):
- a. Es scheint Ärger mit dem Tontechniker gegeben zu haben. Weißt du, was passiert ist? ‘It seems that there was trouble with the sound engineer. Do you know what happened?’ *given subject*
 - b. Es scheint Ärger im Team gegeben zu haben. Weißt du, wer den Kameramann beleidigt hat? ‘It seems that there was trouble among the team. Do you know who offended the cameraman?’ *focused subject*
 - c. Es scheint Ärger mit dem Kameramann gegeben zu haben. Weißt du, was passiert ist? ‘It seems that there was trouble with the cameraman. Do you know what happened?’ *given subject*
 - d. Es scheint Ärger im Team gegeben zu haben. Weißt du, wer den Tontechniker beleidigt hat? ‘It seems that there was trouble among the team. Do you know who offended the sound engineer?’ *focused subject*

A further property that varied systematically between the items, but will not be analyzed here, is whether the context question made the lexical material in the answer predictable/accessible. For example, in (3), the word “team” in the first context sentence does not raise the expectation that the answer will be about a cameraman and a sound engineer, whereas “film team” would to some extent. The influence of this variation in the items will be looked at later in section 5.8.3. Also, the proportion of items containing definite and indefinite arguments was balanced.

32 item sets were constructed. One item was excluded from analysis due to a recording

error (two conditions were accidentally interchanged for this item).

5.3.3 Results

The results are shown in Figure 5.1 and Table 5.1.

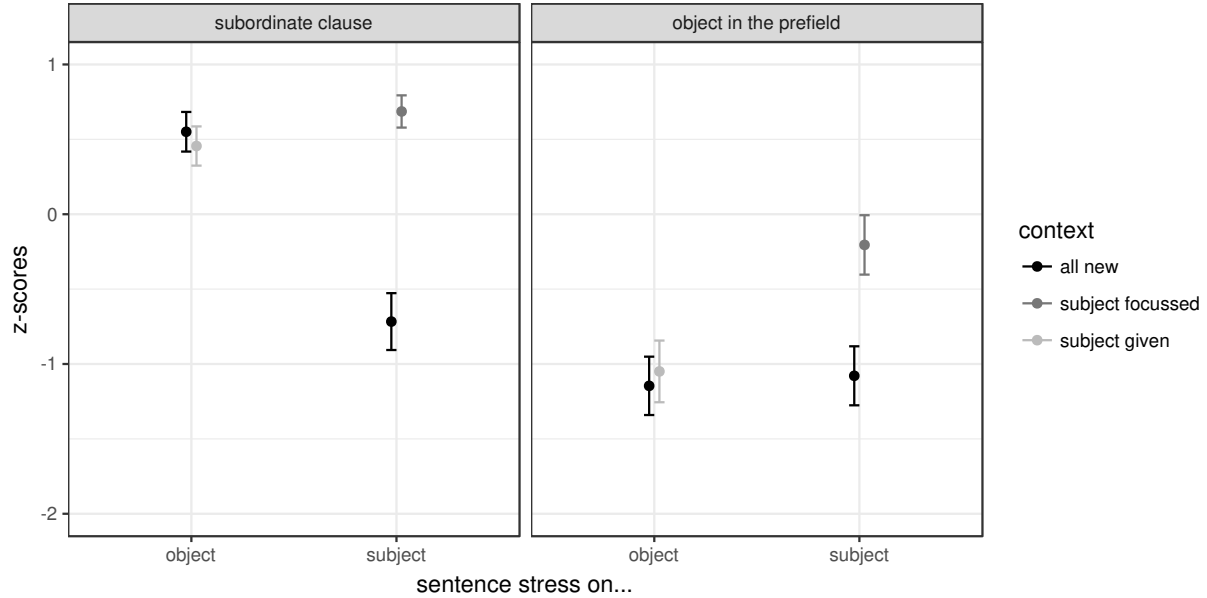


Figure 5.1: Results (mean z-scores with 95% confidence intervals) of experiment 1: replicating partial focus movement

| structure | stress | context | rating 1–7 (SE) | z-score (SE) |
|----------------------|---------|------------------|-----------------|--------------|
| subord. clause | object | all new | 6.07 (0.10) | 0.55 (0.07) |
| subord. clause | object | subject given | 5.89 (0.10) | 0.46 (0.07) |
| subord. clause | subject | all new | 3.93 (0.13) | −0.72 (0.10) |
| subord. clause | subject | subject focussed | 6.29 (0.09) | 0.69 (0.05) |
| obj. in the prefield | object | all new | 3.23 (0.12) | −1.15 (0.10) |
| obj. in the prefield | object | subject given | 3.42 (0.13) | −1.05 (0.10) |
| obj. in the prefield | subject | all new | 3.29 (0.14) | −1.08 (0.10) |
| obj. in the prefield | subject | subject focussed | 4.84 (0.14) | −0.20 (0.10) |

Table 5.1: Mean acceptability ratings and z-scores (standard error in parentheses) for experiment 1: replicating partial focus fronting

Prior to analysis, z-scores were computed based on all available data for each speaker, including filler sentences. Z-scores represent normalized values in relation to each subject’s

mean rating; for example, a z-score of 1 corresponds to a rating that is one standard deviation above the mean. The conditions “given subject” and “focused subject” were grouped together as a uniform level (“facilitating”) of the factor context, with the other level being “all new”. All factors were treatment-coded (with “subordinate clause” / “object stress” / “all new” as baseline levels). According to a linear mixed model with structure, stress, and context as fixed factors and the maximal converging random effect structure¹, there were two significant two-way interactions: stress interacted significantly with structure ($\hat{\beta} = 1.35$, $SE = 0.15$, $t = 9.18^2$) in that sentence stress on the object was much less acceptable in the object-initial structure than in the subordinate clause. Stress also interacted significantly with context ($\hat{\beta} = 1.49$, $SE = 0.11$, $t = 13.04$) in that providing a facilitating context raised the acceptability of structures with subject stress much more than of those with object stress. There was also a significant three-way interaction ($\hat{\beta} = -0.73$, $SE = 0.16$, $t = 4.54$): the acceptability-raising effect of the facilitating context on structures with subject stress was more pronounced in the subordinate clause than in the object-initial clause.

5.3.4 Discussion

The results for the subordinate clauses with canonical SOV word order (in the left plot) show that under broad focus, sentence stress is preferred to fall on the object. Sentence stress on the subject is considerably degraded under broad focus. Under narrow subject focus, sentence stress on the subject is perfectly acceptable.

In the object-initial sentences (in the right plot), sentence stress on the subject is also clearly more acceptable under narrow subject focus than under broad focus. Both structures with object stress show a relatively low acceptability; givenness of the subject only had a small facilitating effect.

The small effect size of subject givenness is in line with Wierzba & Fanselow’s (under revision) findings for discourse-new vs. repeated DPs. Based on the other conditions tested by Wierzba & Fanselow, we could expect the difference to be more pronounced if pronouns or given but non-repeated DPs were used. This was avoided here to enable using exactly the same recording in both contexts and thus minimize potential phonological differences between conditions sharing the same order and prosody.

¹The maximal converging model was $zscores \sim stress * structure * context + (1|item) + (stress * structure + context|subject)$

² $|t| > 2$ indicates significance at level $\alpha = 0.05$.

For the question whether sentence stress is assigned under reconstruction or in a surface-oriented way, it is important that the facilitating effect of narrow subject focus was found both in SOV and OVS clauses. If the rightward sentence stress preference was surface-oriented, the difference between broad and narrow focus would remain unexplained in OVS structures (without adding further principles): both structures satisfy the requirement that sentence stress is on the rightmost argument within the focus (compare $OV[S]_{\text{foc}}$ to $[OVS]_{\text{foc}}$). This problem can be resolved by the assumption that there is reconstruction for sentence stress, favoring it to fall on the object under broad focus. This would explain why subject stress is only possible under narrow subject focus but not under broad focus, both in canonical and derived word order; the acceptability difference would have the same source in both word orders. An alternative solution is provided by Fanselow & Lenertová's (2011) assumption that syntactic reordering of two constituents is problematic only if both are accented and new. Under this assumption, OVS is better in the subject focus context because it involves a given object, and thus the reordering is not problematic. In the following experiments, it will be examined which of the solutions extends best to further types of structures.

The conditions with object-initial sentences with sentence stress on the object show a difference to previous studies: under broad focus, OVS structures received approximately equally low ratings as OVS. In Féry & Drenhaus's (2008) study, a considerable difference was found between these two realizations. The dissonance with respect to the acceptability of the object-initial structures between the present study and previous ones could be due to my attempt to reduce the influence of potential confounds by choosing formally and pragmatically interchangeable arguments; as a result, the object-initial structures might lack the necessary pragmatic motivation for fronting. The now observed similar acceptability poses a potential problem for the reconstruction model: the OVS structures conform to reconstruction-based sentence stress assignment, whereas OVS structures do not. Thus, the latter should be less acceptable than the former. A model with surface-oriented sentence stress assignment does not explain the equal level of acceptability without further assumptions, either: in that case, OVS should be more acceptable than OVS.³ In 5.8, it will be explored in more detail whether reconstruction-based or surface-oriented sentence stress assignment provides a better fit in view of the whole data set.

³With mean ratings above 3 on a 7 point scale in the lowest rated conditions, a floor effect is not a plausible explanation for the lack of a difference, either.

5.4 Experiment 2: extending the data set of partial focus movement

5.4.1 Goals

The goal of this experiment was to extend the data set on partial focus movement to object-initial structures that involve a PP argument in addition. Féry and Drenhaus (2008) tested the acceptability of this kind of structure, but without manipulating the givenness of the subject and object. This was done here in order to potentially tease apart the predictions of the different approaches to partial focus movement.

5.4.2 Design and materials

All target sentences contained a three-place predicate, a subject in nominative case, a direct object in accusative case as well as a PP argument. Two different word orders of the target sentence were tested: subordinate clause with unmarked subject \prec object \prec PP word order, and sentences with the direct object in the prefield.

(5) Subordinate clause

Ich glaube, dass der Gärtner den Koch gegen den Chauffeur
I think that the.NOM gardener the.ACC cook against the.ACC driver
aufgebracht hat.
turned has
'I think that the gardener turned the cook against the driver.'

(6) Object in the prefield

Den Gärtner hat der Koch gegen den Chauffeur aufgebracht.
The.ACC gardener has the.NOM cook against the.ACC driver turned
'The cook turned the gardener against the driver.'

Both structures were tested in an all-new context as illustrated in (7).

(7) All new

Ich würde gerne wissen, wie aus deiner Sicht der Streit zwischen dem Hauspersonal
abgelaufen ist. 'I would like to know your perspective on the conflict among the
staff.'

In addition, the object-initial target sentence was tested in the following two types of

contexts: one making the object in the target sentence given, and one making the subject given.

(8) a. Given object

Ich würde gerne wissen, wie aus deiner Sicht der Streit zwischen dem Hauspersonal abgelaufen ist, an dem der Gärtner beteiligt gewesen sein soll. ‘I would like to know your perspective on the conflict among the staff, in which the gardener was allegedly involved.’

b. Given subject

Ich würde gerne wissen, wie aus deiner Sicht der Streit zwischen dem Hauspersonal abgelaufen ist, an dem der Koch beteiligt gewesen sein soll. ‘I would like to know your perspective on the conflict among the staff, in which the cook was allegedly involved.’

Like in experiment 1, in half of the items, the arguments were not predictable at all from the context, which mentioned only a generic set like “team”. In the other half of the items, the arguments were predictable to some extent. Also, the items were balanced with respect to definiteness of the arguments. The influence of these additional manipulations will be addressed below in section 5.8.3. 16 item sets were constructed.

The motivation for including this experiment was to add structures for which Fanselow & Lenertová’s (2011) *Early Accentuation* makes different predictions than the *reconstruction-based mapping* approach proposed in the previous chapter. For structures with two arguments, the predictions largely overlap (in the modeling study on the whole data set in section 5.8, this will be supported by the fact that both approaches raise the model quality for experiment 1 in comparison to a baseline model). The interesting property of sentences like (6) is that the position of sentence stress is not influenced by fronting the object—it remains at the rightmost edge of the sentence. Thus, the proposal based on reconstructing focus alignment predicts no influence of the context whatsoever. In contrast, the *Early Accentuation* approach, according to which accent-requiring new constituents cannot be crossed, predicts a problem in the all-new context, but not when either the object or the subject is given.

5.4.3 Results

The results are shown in Figure 5.2 and Table 5.2.



Figure 5.2: Results (mean z-scores with 95% confidence intervals) of experiment 2: extending the data set of partial focus movement

| structure | context | rating 1–7 (SE) | z-score (SE) |
|----------------------|---------------|-----------------|--------------|
| subord. clause | all new | 5.83 (0.09) | 0.41 (0.07) |
| obj. in the prefield | all new | 3.84 (0.14) | −0.78 (0.11) |
| obj. in the prefield | subject given | 3.71 (0.13) | −0.85 (0.10) |
| obj. in the prefield | object given | 3.83 (0.13) | −0.77 (0.10) |

Table 5.2: Mean acceptability ratings and z-scores (standard error in parentheses) for experiment 2: extending the data set of partial focus movement

All factors were treatment-coded (with “subordinate clause” / “all new” as baseline levels). According to a linear mixed model with structure, stress, and context as fixed factors and the maximal converging random effect structure⁴, there was a significant main effect of structure ($\hat{\beta} = -1.19$, $SE = 0.17$, $t = -7.06$), but no significant main effect of context ($\hat{\beta} = -0.07$, $SE = 0.08$, $t = -0.86$) nor a significant interaction between structure and context ($\hat{\beta} = 0.005$, $SE = 0.08$, $t = 0.06$).

⁴The maximal converging model was $zscores \sim structure * context + (structure * context|subject) + (structure|item)$

5.4.4 Discussion

Under the view that the only restriction on movement to the left periphery is that two discourse-new, accented elements cannot cross each other and all pragmatic effects follow from that, it would be expected that givenness of either the moved or the crossed constituent is sufficient for the availability of movement. However, no indication of effect of givenness in the predicted direction was found. The absence of a difference between the object-initial conditions is compatible with the predictions of the reconstruction for prosody-IS mapping approach: in all tested structures, sentence stress would fall on the PP. This is not affected by the fronting of the direct object here, so no differences are expected. However, the fact that the object-initial structures are overall considerably less acceptable than the subject-initial one remains unexplained by both approaches. Taken together with the observation that all object-initial structures were degraded also in experiment 1, this points in the direction that in both experiments there is a general penalty for deviations from canonical subject-initial order—perhaps due to the lack of a salient pragmatic/discourse-semantic motivation along the lines of Hartmann (2008), Zimmermann (2008), Frey (2010), and Skopeteas & Fanselow (2011). This observation will be taken up again in the discussion of the whole data set in 5.8.

5.5 Experiment 3: replicating and extending partial CT fronting

5.5.1 Goals

The first goal of this experiment was to replicate the earlier findings concerning the interpretation possibilities of partially fronted contrastive topics. To this end, structures including a direct object and a PP argument were tested again, as in my previous experiments. A further aim was to extend the data base by including a further, so far untested type of structure: transitive sentences in which either the subject or the object was fronted. This provides a further test case for the hypothesis that the left edge of a contrastive topic needs to be aligned with the left edge of the hat contour. The prediction for the unmarked subject < object word order is that if the rising accent is left-aligned with the subject, it should be possible to interpret the whole sentence as the contrastive topic; if it is left-aligned with the object, only the VP should be interpretable as the contrastive topic. If the mapping principle applies under reconstruction, the same pattern should be found when

one of the arguments is fronted to the prefield.

5.5.2 Design and materials

In all items, sentence stress and a falling pitch accent (the right edge of a hat contour) fell on the sentence-final verb, inducing verum focus. This made it possible to felicitously form a hat contour in all tested word orders.

Direct object / PP Half of the items involved a direct object and a PP. In these items, a rising pitch accent (the left edge of a hat contour) was left-aligned either with the direct object or the PP. For more information on how the hat contour was realized in detail, see the appendix. Two word orders were tested: canonical order direct object < PP order in a subordinate clause, and marked order with the constituent carrying the rising accent (direct object/PP) in the prefield.

(9) Subordinate clause

Ich glaube, dass er den /Angeklagten zu seinem Anwalt begleitet\
I think that he the.ACC defendant to his lawyer accompanied
hat.
has
'I think that he accompanied the defendant to his lawyer.'

a. Ich glaube, dass er den Angeklagten zu seinem /Anwalt begleitet\ hat.

(10) Direct object or PP in the prefield

a. Den /Angeklagten hat er zu seinem Anwalt begleitet\.
the.ACC defendant has he to his lawyer accompanied
'He accompanied the defendant to his lawyer.'

b. Zu seinem /Anwalt hat er den Angeklagten begleitet\.
to his lawyer has he the.ACC defendant accompanied
'He accompanied the defendant to his lawyer.'

Two different context variants were used to restrict the possible interpretations. The first context was intended to be compatible only with the interpretation that the whole VP (the constituent spanning the direct object, the PP, and the verb) was the contrastive topic (called 'broader CT' below). The other context was intended to be compatible only with the interpretation that the constituent spanning the PP and the verb was the contrastive topic (called 'narrower CT') below. To enforce the intended interpretation as efficiently as possible, an alternative to the constituent that was supposed to be interpreted

as the CT was provided both in the preceding context and in a continuation following the target sentence. In the case of the broader CT, the alternative was an entirely different activity, denoted by an intransitive verb like *einkaufen* ‘do the shopping’, in order to exclude a narrow contrast interpretation of the object. In the case of the narrower CT, the alternative was a different two-place predicate that would be compatible with the direct object of the target sentence, e.g. *anrufen* ‘call’. The two context variants are illustrated in (11) and (12).

- (11) a. Preceding context for broader CT
 Herr Bach behauptet, letzten Freitag den Angeklagten zum Anwalt begleitet zu haben und danach einkaufen gegangen zu sein. Ist das wahr? ‘Mr. Bach claims that he accompanied the defendant on his way to the lawyer last Friday and that he went shopping later. Is this true?’
- b. Continuation for broader CT
 ...Aber dass er einkaufen war, stimmt nicht. ‘But it is not true that he went shopping.’
- (12) a. Preceding context for narrower CT
 Herr Bach behauptet, letzten Freitag den Angeklagten zum Anwalt begleitet zu haben und ihn später angerufen zu haben. Ist das wahr? ‘Mr. Bach claims that he accompanied the defendant on his way to the lawyer last Friday and that he called him later. Is this true?’
- b. Continuation for narrower CT
 ...Aber dass er den Angeklagten auch angerufen hat, stimmt nicht. ‘But it is not true that he also called the defendant.’

Subject/object The other half of the items involved a transitive structure with a two-place verb, a subject and an object. The rising accent was left-aligned either with the subject or the object. The different variants of the target sentence are illustrated in (13).

- (13) Subordinate clause
- a. Ich glaube, dass der /Pfleger den Arzt kritisiert\ hat.
 I think that the.NOM nurse the.ACC doctor criticized has
 ‘I think that the nurse criticized the doctor.’
- b. Ich glaube, dass der Pfleger /den Arzt kritisiert\ hat.
- (14) Subject or object in the prefield

- a. Der /Pfleger hat den Arzt kritisiert\\.
the.NOM nurse has the.ACC doctor criticized
‘The nurse criticized the doctor.’
- b. Den /Arzt hat der Pfleger kritisiert\\.
the.ACC doctor has the.NOM nurse criticized
‘The nurse criticized the doctor.’

The contexts were set up in a similar way as described above, but in the case of the subject / object structure, ‘broader CT’ refers to the whole sentence and ‘narrower CT’ refers to the VP (direct object + verb). As alternatives to the whole sentence, I mainly used zero-place predicates (e.g., ‘it rained’) or at least impersonal constructions (like ‘it was a busy day in the example below’) in order to eliminate the possibility to construe one of the arguments as narrowly contrasted. As alternatives to the VP, again intransitive verbs were used.

- (15) a. Preceding context for broader CT
Hr. Müller behauptet, dass am Montag der Pfleger den Arzt kritisiert hat und dass an dem Tag sehr viel los war. Stimmt das? ‘Mr. Müller claims that the nurse criticized the doctor on Monday and that it was a very busy day. Is that true?’
- b. Continuation for broader CT
...Aber dass an dem Tag viel los war, stimmt nicht. ‘But it is not true that it was a busy day.’
- (16) a. Preceding context for narrower CT
Hr. Müller behauptet, dass am Montag der Pfleger den Arzt kritisiert hat und außerdem während seiner Schicht geschlafen hat. Stimmt das? ‘Mr. Müller claims that the nurse criticized the doctor on Monday and that he slept during his shift. Is that true?’
- b. Continuation for narrower CT
...Aber dass der Pfleger geschlafen hat, stimmt nicht. ‘But it is not true that the nurse slept.’

5.5.3 Results

The results are shown in Figure 5.3 and Table 5.3. ‘Left argument’ refers to the direct object in items of the ‘direct object + PP’ type and to the subject in items of the ‘subject

+ object’ kind. ‘Right argument’ refers to the PP in items of the ‘direct object + PP’ type and to the object in items of the ‘subject + object’ type.

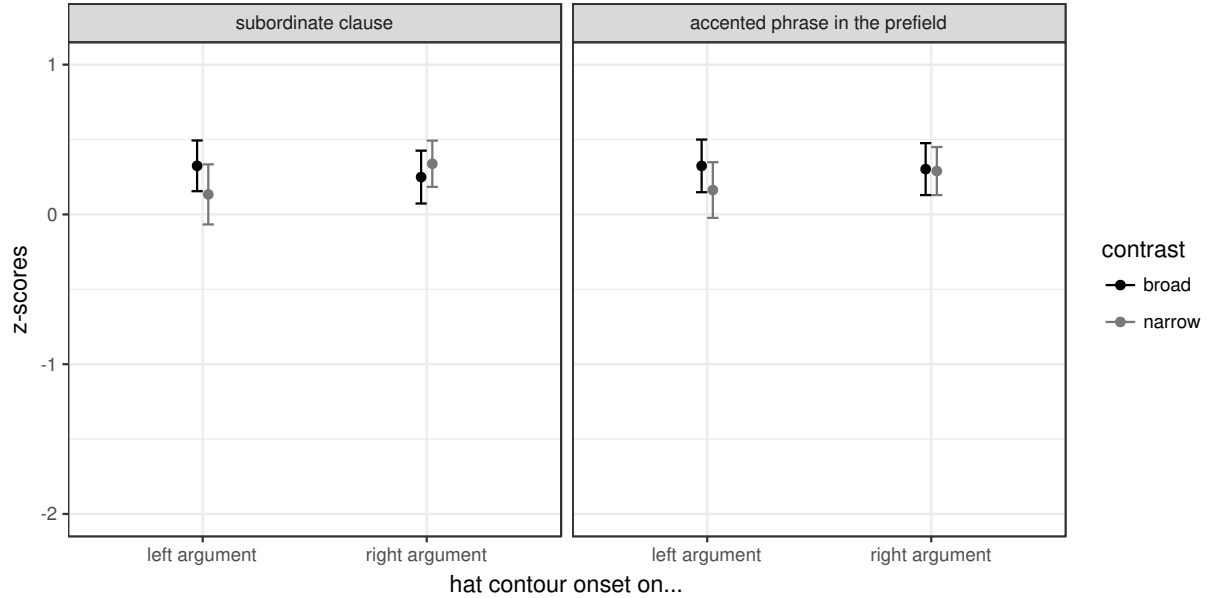


Figure 5.3: Results (mean z-scores with 95% confidence intervals) of experiment 3: replicating and extending the data set on partial CT fronting

| structure | rising accent | contrast | rating 1–7 (SE) | z-score (SE) |
|-----------------------------|---------------|----------|-----------------|--------------|
| subord. clause | left arg. | broad | 5.74 (0.12) | 0.32 (0.09) |
| subord. clause | left arg. | narrow | 5.48 (0.13) | 0.13 (0.10) |
| subord. clause | right arg. | broad | 5.58 (0.13) | 0.25 (0.09) |
| subord. clause | right arg. | narrow | 5.72 (0.11) | 0.34 (0.08) |
| acc. phrase in the prefield | left arg. | broad | 5.79 (0.11) | 0.32 (0.09) |
| acc. phrase in the prefield | left arg. | narrow | 5.50 (0.12) | 0.16 (0.09) |
| acc. phrase in the prefield | right arg. | broad | 5.67 (0.12) | 0.30 (0.09) |
| acc. phrase in the prefield | right arg. | narrow | 5.65 (0.12) | 0.29 (0.08) |

Table 5.3: Mean acceptability ratings and z-scores (standard error in parentheses) for experiment 3: replicating and extending the data set on partial CT fronting

All factors were treatments coded (with “subordinate clause” / “hat contour onset on the left argument” / “broad contrast” as baseline levels). According to a linear mixed model with structure, hat contour onset, and contrast as fixed factors and the maximal converging random effect structure⁵, there was a significant interaction between the factors hat contour

⁵The maximal converging model was $z\text{scores} \sim \text{structure} * \text{onset} * \text{contrast} + (\text{structure} + \text{contrast} * \text{onset})$

onset and contrast ($\hat{\beta} = 0.29$, $SE = 0.13$, $t = 2.31$), suggesting the hat contour onset position affected acceptability differently in narrow contrast / broad contrast contexts: in narrow contrast contexts, a hat contour onset on the right argument was more acceptable than on the left one. In broad contrast contexts, this preference was less pronounced and reversed in its direction. No other interaction reached a significant level (in particular, the three-way interaction between structure, hat contour onset, and contrast was insignificant: $\hat{\beta} = -0.14$, $SE = 0.16$, $t = -0.89$).

Figure 5.4 shows the results split by the factor argument structure (direct object + PP / subject + object). This shows that the interaction goes in the same direction both for direct object + PP structures and subject + object structures.

5.5.4 Discussion

The observed interaction is in line with the expectations based on previous studies: a narrow CT interpretation is more acceptable when it is the right argument that carries the rising accent than when it is the left argument. For broad contrast, a slight preference in the reverse direction is observed. It is a novel finding that the same trend is seen consistently in the ratings for ‘direct object + PP’ structures and ‘subject + object’ structures, and that this holds both in the subordinate clause with canonical order as well as when one of the arguments is fronted. This is in line with the assumption that the relevant mapping principle applies under reconstruction; if it applied in a surface-oriented way, it should not play any role which of the arguments is fronted in the marked syntactic structures, so no differences should be observed there.

The shape of the interaction goes in the direction predicted by the proposed CT mapping principle—left-alignment of contrastive topics with the hat contour—but the interpretation options seem to be limited more rigorously when the hat contour begins at the left one out of two arguments, as illustrated in (17) (where ‘/’ marks the onset of the hat contour):

- (17) a. $/[\text{arg}_1 \text{ arg}_2 \text{ verb}]_{\text{CT}}$ is more acceptable than $/\text{arg}_1 [\text{arg}_2 \text{ verb}]_{\text{CT}}$
 b. $[\text{arg}_1 / \text{arg}_2 \text{ verb}]_{\text{CT}}$ is similarly acceptable as $\text{arg}_1 /[\text{arg}_2 \text{ verb}]_{\text{CT}}$

It can also be noted that the formal manipulations (word order, accentuation) had an overall much smaller effect in this experiment than in the previous ones. A possible explanation

onset|subject) + (1|item).

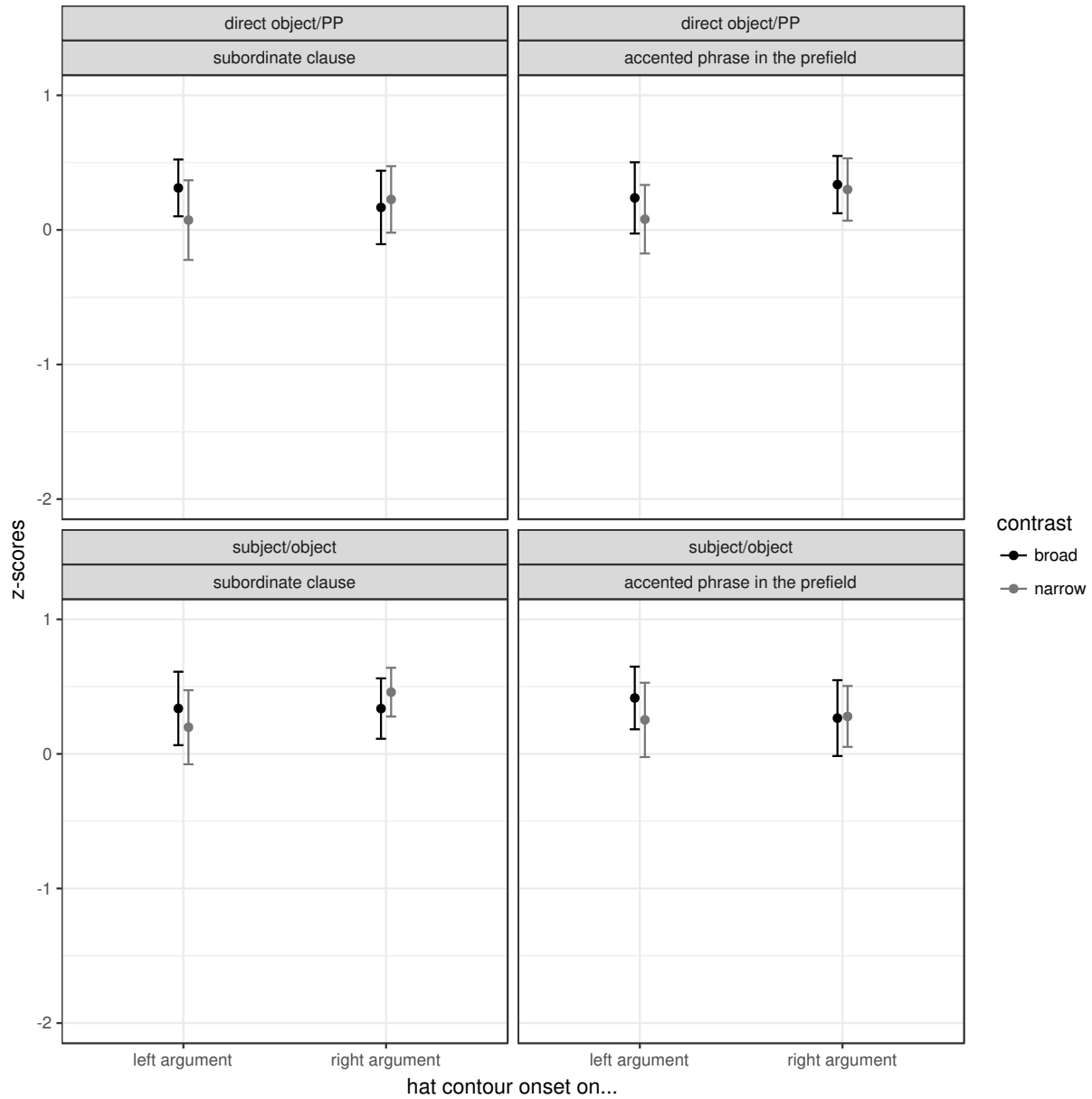


Figure 5.4: Results (mean z-scores with 95% confidence intervals) of experiment 3, split by the factor argument structure

for this and for the observation in (17) will be discussed in section 5.9.

5.6 Experiment 4: wh-movement

5.6.1 Goals

This subexperiment aims to test whether the predictions of the reconstruction-based approach are compatible with further data, namely wh-constructions. If sentence stress is really assigned based on traces/lower copies, this should also be observable for wh-movement. Although the focus of the series of experiments was on the question whether there is reconstruction for prosody-interpretation mapping, in this experiment I also included conditions that allow to test the assumption that there is reconstruction for syntax-prosody principles which are responsible for the verb-object asymmetry in canonical structures.

In addition to standard object questions, in which the whole object is fronted, split questions were tested, in which a wh-determiner is fronted but its NP complement remains in the object position. Split questions are thus different from standard object questions and similar to subordinate sentences in that the accentable part of the object follows the subject. Furthermore, exclamatives were included as a further structure involving wh-movement, but with a different interpretation in order to see if this affects the accentuation options.

5.6.2 Design and materials

Three factors were manipulated within this subexperiment: structure (subordinate clause, wh-question, split wh-question, exclamative), position of sentence stress (on the subject, on the object, on the verb), and type of object (full phrase, pronoun). The design was not fully crossed: the level wh-pronoun of the last factor was only tested for subordinate clauses and wh-questions, resulting in 12 conditions, as illustrated in (18).

(18) Subordinate clause

- a. Ich habe gelesen, dass Emma Anderson ein Buch geschrieben hat.
I have read that Emma Anderson a book written has
'I read that Emma Anderson has written a book.'
- b. Ich habe gelesen, dass Emma Anderson ein Buch geschrieben hat.
- c. Ich habe gelesen, dass Emma Anderson ein Buch geschrieben hat.

- d. Ich habe gelesen, dass Emma Anderson was geschrieben hat.
 I have read that Emma Anderson something written has.
 ‘I read that Emma Anderson has written something.’

(19) Wh-question

- a. Was für ein Buch hat Emma Anderson geschrieben?
 what for a book has Emma Anderson written
 ‘What book has Emma Anderson written?’
- b. Was für ein Buch hat Emma Anderson geschrieben?
- c. Was für ein Buch hat Emma Anderson geschrieben?
- d. Was hat Emma Anderson geschrieben?
 what has Emma Anderson written
 ‘What has Emma Anderson written?’

(20) Split wh-question

- a. Was hat Emma Anderson für ein Buch geschrieben?
 what has Emma Anderson for a book written
 ‘What book has Emma Anderson written?’
- b. Was hat Emma Anderson für ein Buch geschrieben?

(21) Exclamative

- a. Mann, was für ein Buch Emma Anderson geschrieben hat!
 man what for a book Emma Anderson written has
 ‘Man, what a book Emma Anderson has written!’
- b. Mann, was für ein Buch Emma Anderson geschrieben hat!

In addition to these main manipulations, some other properties were varied to arrive at a more diverse set of stimuli. In half of the items, proper names were used as the subject; in the other half, the subject was a definite description. Half of the proper names were made up combinations of a first and a last name as in the example above and the sentence was about an event that would be likely to be mentioned on the news, like creating a new book/movie/building etc. In the other half, only a first name was used and the described event was something that would be noteworthy among friends or family, like baking a cake. The definite descriptions were balanced in a similar fashion: half of them involved a DP denoting a unique individual at the national or international level like ‘the minister of the interior’; the other half denoted an individual that might plausibly be unique at a smaller scale like ‘your daughter’.

I aimed to enforce an all-new interpretation in all conditions by providing an appropriate

context. For the subordinate declarative clauses, I used questions like “Did you read anything interesting in the newspaper?”, “Has anything interesting happened while I was away?”, etc. For the questions, the context was always a variant of “You said you wanted to ask me something, what was it?”. For the exclamatives, a context like “You seem upset/happy/suprised/... (by the news/the documentary/...), what is going on?” was provided (with the exact choice of words depending on the content of the target sentence).

48 item sets were constructed.

5.6.3 Results

The results of experiment 1 are shown in Figure 5.5 and Table 5.4.

| structure | stress | object | rating 1–7 (SE) | z-score (SE) |
|-------------------|---------|---------|-----------------|--------------|
| subord. clause | object | phrase | 6.08 (0.10) | 0.54 (0.07) |
| subord. clause | subject | phrase | 4.26 (0.14) | −0.55 (0.11) |
| subord. clause | verb | phrase | 3.92 (0.14) | −0.70 (0.10) |
| subord. clause | verb | pronoun | 5.74 (0.11) | 0.34 (0.08) |
| wh-question | object | phrase | 5.59 (0.12) | 0.21 (0.09) |
| wh-question | subject | phrase | 5.98 (0.10) | 0.48 (0.07) |
| wh-question | verb | phrase | 5.63 (0.12) | 0.25 (0.09) |
| wh-question | verb | pronoun | 5.40 (0.13) | 0.14 (0.09) |
| exclamative | object | phrase | 5.18 (0.14) | 0.00 (0.09) |
| exclamative | subject | phrase | 4.63 (0.14) | −0.34 (0.10) |
| split wh-question | object | phrase | 6.10 (0.11) | 0.55 (0.07) |
| split wh-question | subject | phrase | 5.22 (0.12) | 0.03 (0.09) |

Table 5.4: Mean acceptability ratings and z-scores (standard error in parentheses) for experiment 4: wh-movement

All factors were treatment-coded (with “subordinate clause” / “object stress” / “object phrase” as baseline levels). According to a linear mixed model with structure, stress, and object type as fixed factors with the maximal converging random effect structure⁶, there was a significant interaction between structure and position of sentence stress at each level of the factor structure: for all non-canonical structures, placing sentence stress on the subject rather than the object affects acceptability in a different way than in the canonical subordinate clause. The interaction is strongest for the wh-question ($\hat{\beta} = 1.36$, $SE = 0.13$,

⁶The maximal converging model was $zscores \sim stress * structure * objecttype + (stress + structure|subject) + (1|item)$.

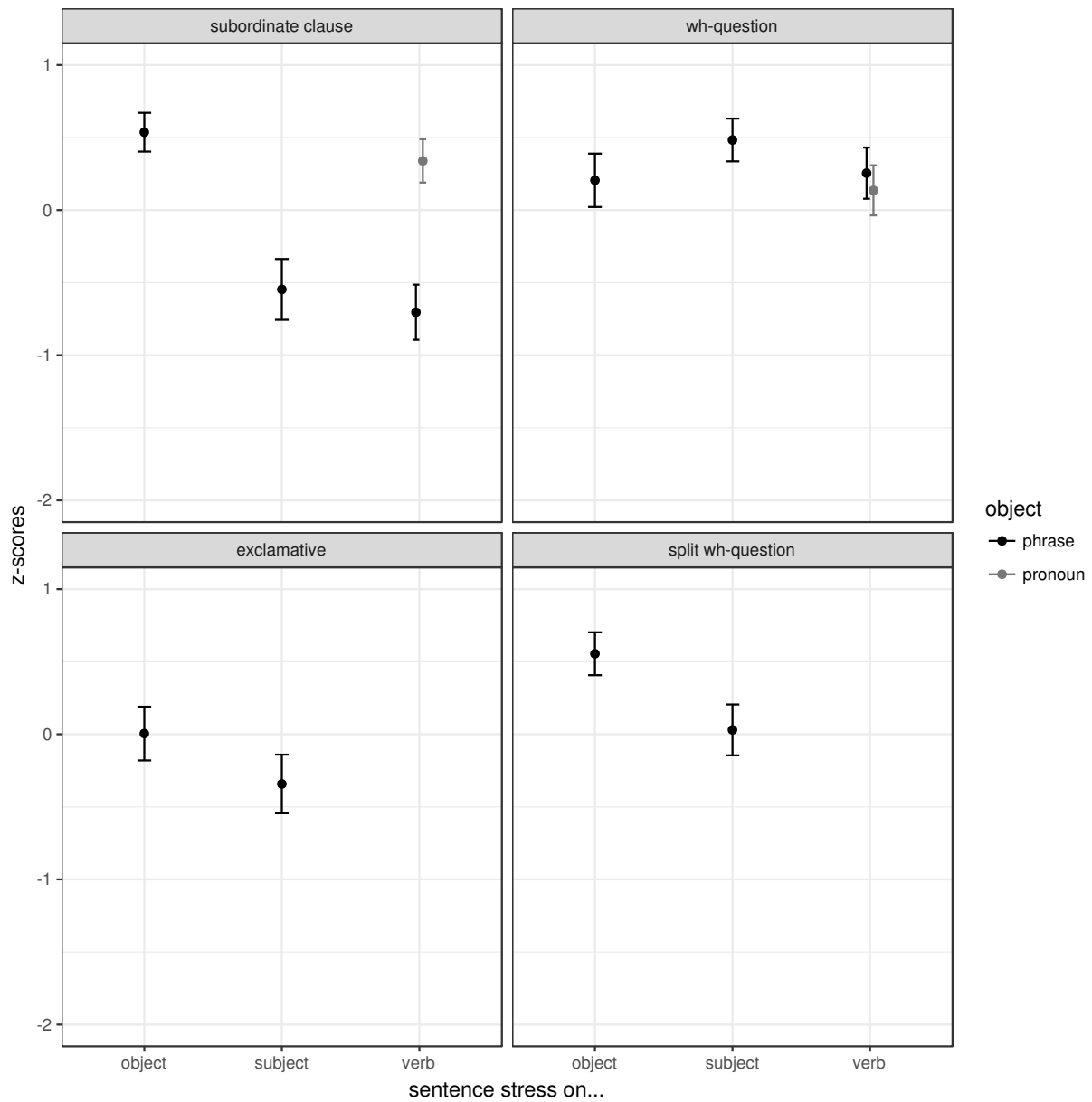


Figure 5.5: Results (mean z-scores with 95% confidence intervals) of experiment 4: wh-movement

$t = 10.57$), in which the pattern found in the subordinate clause is even reversed: sentence stress on the subject is more acceptable than on the object. In exclamatives and split wh-questions, sentence stress on the object is more acceptable than on the subject as in the subordinate clause, but the acceptability difference is smaller ($\hat{\beta} = 0.74$, $SE = 0.13$, $t = 5.71$ / $\hat{\beta} = 0.56$, $SE = 0.13$, $t = 4.34$). The factor object type interacted significantly with structure as well: in the wh-question, the difference between phrase and pronoun (within the condition with verb stress) is smaller than in the subordinate clause ($\hat{\beta} = -1.16$, $SE = 0.13$, $t = -9.03$). Sentence stress on the verb is significantly more acceptable in wh-questions than in subordinate clauses (interaction of these levels of stress and structure: $\hat{\beta} = 1.29$, $SE = 0.13$, $t = 10.02$).

5.6.4 Discussion

The results for subordinate clauses with canonical word order conform to the expectations: sentence stress on the object is the preferred option under broad focus, sentence stress on the subject is clearly degraded. Sentence stress on the verb is only acceptable when the object is a pronoun. This is compatible with claims that the verb-object asymmetry and the rightward sentence stress preference indeed hold in German. The finding of a verb-object asymmetry is interesting in comparison to a production study by Féry & Kügler (2008). They report that in transitive sentences, the sentence-final verb was accented in the majority of cases, whereas in my data, deaccenting the verb is clearly preferred. This difference must either be due to the different task (production/perception), or to a difference in the materials—for production studies, the choice of lexical items is typically limited by the need to choose words with sonorant phonemes, comparable syllable structure, etc. to facilitate the phonetic analysis. The resulting materials therefore often have a higher degree of artificiality, which might increase the risk that the participants employ a monotonous prosody, accenting each lexical word. A more detailed examination of the verb-object asymmetry in perception and production would be an interesting topic for further research.

The results for wh-questions show much less pronounced differences between the conditions, and a clearly different pattern. On average, speakers find a realization with sentence stress on the subject to be optimal, although the option with sentence stress on the object is not degraded by much. Sentence stress on the verb is acceptable to a similar extent as sentence stress on the object, irrespective of the object type. The latter observation speaks against a reconstructing behavior of the principles that govern the verb-object accentuation

pattern in canonical structures. If the trace/lower copy of an accented fronted wh-phrase or wh-pronoun counted for the evaluation of syntax-prosody mapping with respect to the VP, we would expect to see the same pattern as in the subordinate clause. However, a fully surface-oriented application of the principles would predict that the verb would *need* to be stressed if the object has moved away—in that case, stressing the verb is the only possibility to satisfy the requirement that each phrase is stressed for the VP. However, putting sentence stress on the subject and destressing the verb is also a fully acceptable option according to the data.

Within surface-based approaches, the possibility to deaccent the verb can be explained by certain syntactic assumptions proposed by Truckenbrodt (2012). Truckenbrodt assumes that the verb raises to the head of the phrase that contains the accented argument when the VP is empty. Thus, it is exempted from the stress requirement. A related vP-emptying mechanism, motivated by more economical syntax-prosody mapping, is part of Kratzer & Selkirk's (2011) proposal. However, the observed equal acceptability of an accented / deaccented verb in wh-questions would make it necessary to assume that these processes are optional.

The observed advantage of subject stress over object stress in wh-questions speaks for a surface-oriented application of the principle governing which out of two arguments receives sentence stress—stressing the rightmost one seems to be preferred both in canonical and derived word order. This finding poses a problem for the reconstruction-based explanation of the partial fronting data: if reconstruction for sentence stress is used to explain the low acceptability of the QVS there, it would be expected that a reconstructing pattern is also found in wh-structures. This problem will be discussed in more detail in section 5.8, where I will try to fit a unified model to the data from all experiments.

The opposite pattern is found in exclamatives. They show a behavior that is closer to the pattern in subordinate clauses: stress on the fronted object is preferred over stress on the subject. This would be compatible with a reconstructing behavior of the relevant mapping constraints.

The split questions also show a pattern that is closer to the subordinate clauses and different from the standard wh-questions, with higher acceptability for object stress than for subject stress. This is expected, because in this case no mapping conflict is involved: sentence stress on the object is at the same time sentence stress on the rightmost argument. These results are therefore in line with both reconstructing and surface-oriented accounts of syntax-prosody mapping.

5.7 Experiment 5: prenuclear and postnuclear deaccentuation

5.7.1 Goals

The aim of this experiment was to investigate whether deaccentuation of new XPs in the prenuclear and postnuclear domain influences acceptability in the same way. This is predicted by the model proposed in the previous chapter, in which the degradedness of object-initial structures with a new subject is attributed to a violation of the principle that new XPs must be accented. In addition, the problem is predicted to be more severe if more than one new XP remains unaccented.

5.7.2 Design and materials

In all items, sentence stress fell on the rightmost argument. Three different sentence forms were tested: a subordinate clause with pitch accents on all arguments preceding the nuclear accent, a subordinate clause without accents on the arguments preceding the nuclear accent, and a structure in which the sentence-stress bearing argument was in the prefield and all following arguments were accentless in the postnuclear domain. That there was a real phonetic difference between the ‘accented’ and ‘deaccented’ constituents in the prenuclear domain is supported by phonetic measures of pitch, intensity, and duration, which can be found in the appendix. The three structures were tested in two different contexts: one neutral one (all new), and one in which the subject of the target sentence was mentioned.

Two further factors were manipulated between items: number of arguments and predictability. Half of the items involved a transitive verb, a subject, and an object; the other half contained a three-place verb with a subject, an object, and a PP argument. Furthermore, in half of the items, some scene-setting description was included in the context that made it easier to predict what the arguments in the target sentence might be, whereas no such hint was included in the other half.

The following examples illustrate an item with a transitive structure and low predictability.

(22) Subordinate clause

- a. Es war so, dass der Kobold einen Riesen besiegt hat.
 it was so that the.NOM goblin a.ACC giant defeated has
 ‘It so happened that the goblin defeated a giant.’
- b. Es war so, dass der Kobold einen Riesen besiegt hat.
- (23) Rightmost argument in the prefield
 Einen Riesen hat der Kobold besiegt.
 a.ACC giant has the.NOM goblin defeated
 ‘The goblin defeated a giant.’
- (24) All new context (nothing inferable)
 Wie ist die Geschichte weitergegangen?
 ‘How did the story continue?’
- (24) Subject given
 Wie ist die Geschichte mit dem Kobold weitergegangen?
 ‘How did the story with the goblin continue?’
- The examples below illustrate an item with a structure with three arguments and high predictability.
- (25) All new (situation participants inferable)
 Hast du eine Ahnung, was das gestern für ein Vorfall im Restaurant war?
 ‘Do you have any idea about the incident yesterday in the restaurant?’
- (26) Hast du eine Ahnung, was das gestern für ein Vorfall im Restaurant mit dem Kellner und dem Koch war?
 ‘Do you have any idea about the incident yesterday in the restaurant with the waiter and the cook?’
- (27) Subordinate clause
- a. Ich denke, dass der Kellner den Koch gegen einen kritischen
 I think that the.NOM waiter the.ACC cook against a critical
Gast verteidigt hat.
 guest defended has
 ‘I think that the waiter defended the cook against a critical guest.’
- b. Ich denke, dass der Kellner den Koch gegen einen kritischen Gast verteidigt hat.
- (28) Rightmost argument in the prefield

Gegen einen kritischen Gast hat der Kellner den Koch verteidigt.
 against a.ACC critical guest has the.NOM waiter the cook defended
 ‘The waiter defended the cook against a critical guest.’

5.7.3 Results

The results for the three factors structure, accent, and context are shown in Figure 5.6, averaging over definiteness and number of arguments. In the plots for this experiment, “object in the prefield” refers to transitive structures in which the direct object is in the prefield or ditransitive structures in which the PP argument is in the prefield.

| arg. | structure | accentuation | context | rating 1–7 (SE) | z-score (SE) |
|-------|----------------------|--------------|-------------|-----------------|--------------|
| three | subord. clause | accented | all new | 6.08 (0.11) | 0.55 (0.08) |
| three | subord. clause | accented | part. given | 6.12 (0.11) | 0.54 (0.09) |
| three | subord. clause | deaccented | all new | 6.12 (0.13) | 0.58 (0.09) |
| three | subord. clause | deaccented | part. given | 5.89 (0.18) | 0.45 (0.11) |
| three | obj. in the prefield | deaccented | all new | 3.00 (0.18) | −1.27 (0.14) |
| three | obj. in the prefield | deaccented | part. given | 3.50 (0.20) | −1.00 (0.15) |
| two | subord. clause | accented | all new | 6.20 (0.11) | 0.64 (0.07) |
| two | subord. clause | accented | part. given | 5.93 (0.14) | 0.44 (0.10) |
| two | subord. clause | deaccented | all new | 5.85 (0.14) | 0.46 (0.09) |
| two | subord. clause | deaccented | part. given | 6.02 (0.14) | 0.55 (0.08) |
| two | obj. in the prefield | deaccented | all new | 3.46 (0.20) | −0.96 (0.14) |
| two | obj. in the prefield | deaccented | part. given | 3.64 (0.20) | −0.90 (0.15) |

Table 5.5: Mean acceptability ratings and z-scores (standard error in parentheses) for experiment 5: prenuclear and postnuclear deaccentuation

All factors were treatment-coded (with “subordinate clause” / “all new” as baseline levels). According to a linear mixed model with structure, accent, context, and number of arguments as fixed factors⁷, there was a significant interaction of structure with the number of arguments in the direction that placing the rightmost argument in the prefield is more acceptable when there are two arguments than when there are three ($\hat{\beta} = 0.43$, $SE = 0.17$, $t = 2.53$). Structure also interacted significantly with context in that the conditions with partially given arguments were more acceptable in sentences with an object in the prefield ($\hat{\beta} = 0.39$, $SE = 0.15$, $t = 2.56$). This difference tended to be larger in structures

⁷The maximal converging model was $z\text{scores} \sim \text{structure} * \text{arguments} * \text{accent} * \text{context} + (\text{accent} + \text{arguments} * \text{struct} + \text{context} | \text{subject}) + (1 | \text{item})$.

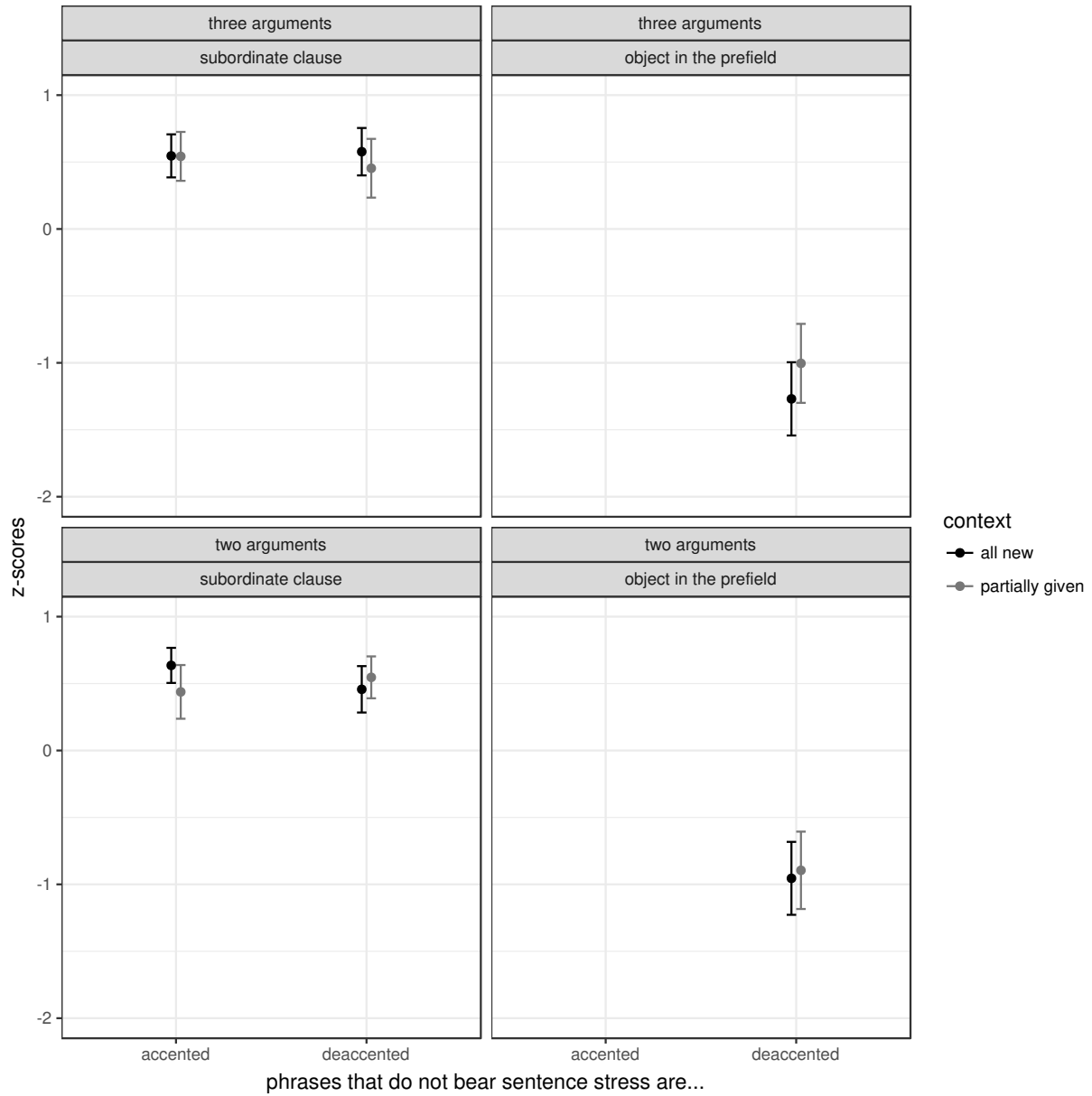


Figure 5.6: Results (mean z-scores with 95% confidence intervals) of experiment 5: prenuclear and postnuclear deaccentuation

with three arguments; this interaction was marginally significant (interaction of structure, context, and number of arguments: $\hat{\beta} = -0.42$, $SE = 0.21$, $t = -1.95$).

5.7.4 Discussion

The results show that object fronting is more problematic if two new XPs end up in the postnuclear domain than if it is only one new XP. Givenness of the in situ arguments raises the acceptability of the object-initial structure, and this facilitating effect tends to be larger when there are more arguments. This is in line with the hypothesis that discourse-new constituents are problematic in the postnuclear domain because they need to be accented. Under this assumption, it is expected that the problem is larger the more deaccented, new arguments there are.

In contrast, context and accentuation do not interact systematically in the prenuclear domain. This suggests that the relation between accents at the level of the phonological phrase and givenness is less strong there than in the postnuclear domain. If this is a stable finding, it would call for incorporating this differentiation into the relevant mapping rule. A potential caveat concerning the materials will be addressed in section 5.9.

5.8 A view on the whole data set

5.8.1 Modeling methodology

In this section, I will fit theory-based models to the whole data set. The goal is to identify the benefits and problems of the different approaches. I will focus on the new proposal from the last chapter, which is based on reconstruction for prosody-IS mapping principles, in comparison to the idea that only the leftmost discourse-new, accented element can be fronted (as predicted by Fanselow & Lenertová 2011; similar predictions emerge from Fanselow's 2004 *pars pro toto* account and Korth's 2014 analysis in terms of focus exponents).

To interpret the data, I will adhere to the following steps. First, I will conceptualize the different grammatical models that are to be tested as sets of 'principles', formulated in as theory-neutral terms as possible with the aim to make their empirical predictions comparable, even if they stem from different theoretical frameworks (for example, Selkirk's 2011 MATCH PHRASE is a constraint in an Optimality Theoretical framework, whereas Fanselow & Lenertová's *Early Accentuation* is an architectural principle within a deriva-

tional syntactic framework, governing at which point during the derivation a specific part of the syntax-prosody mapping happens). Where possible, I will formulate both reconstructing and surface-oriented variants of the principles. For each tested condition, I will annotate in the data set whether the principle is violated or not. I will assume that each principle always leads to a fixed decrease in perceived acceptability when it is violated (the “cost” of the principle violation).

There is empirical support for the assumption that the violation of grammatical principles leads to a consistent acceptability decrease: e.g., Hofmeister et al. (2014) show that in contrast to processing costs, which can lead to super-additive effects, multiple violations of grammatical principles add up in a cumulative way. This is also supported by the data from the series of acceptability rating experiments presented by Keller (2000). The reasoning outlined here and especially the assumption that violations costs add up in a linear way is inspired by Keller’s (2000) Linear Optimality Theory. However, it is important to point out a difference between the approaches: weighted constraints (whose violations costs add up in a cumulative way) are an immediate part of the grammar that Keller develops. Although the ‘problems’ and their associated ‘costs’ that I refer to here are a related concept, they are not intended to be part of a grammar as such. Rather, I use them as a tool to enable the comparison of different existing grammars by mapping the proposed grammatical principles to numerical predictions of acceptability. The same approach was employed in Šimík & Wierzba (in press).

After translating the models to a set of principles and annotating the data set, the second step is to use the statistical method of multiple regression to determine the best estimate for the fixed violation cost associated with each principle, and to evaluate to what extent each set of principles provides a good fit for the data.

To that end, I will treat the principles as numeric predictors and translate the different models into a linear model formula. I will not include interactions in the formula. This is theoretically motivated by the assumption that principle violations always lead to a consistent acceptability decrease. The function *lm* of *R* (R Core Team 2017) will be used to compute the model. I will interpret the model coefficients as estimates of the violation cost for each principle. The models will be compared using model quality measures and, more importantly, visual inspection of the differences between the fitted and the actual condition means. The model quality measures are a useful indication of whether a model provides any improvement over a baseline model, but it is difficult to conclude more from the exact numerical values, as they depend e.g. on the proportion of each sentence type

in the data set. The visualization of the models therefore provides crucial supplementary information and helps to identify the most important benefits and weaknesses of each model.

5.8.2 Modeling all data from experiments 1–5

Principles

First, as described above, I will formulate the relevant theoretical rules in form of principles that represent the core idea and abstract away from the concrete implementation.

I take it to be uncontroversial that there are syntax-prosody mapping rules governing the distribution of phrasal accents and the position of sentence stress. As it was discussed in chapter 2 they can be captured by different theoretical means, but the predictions of the different models converge in many cases. I will represent them by the following principles:

- (29) MinAcc: A discourse-new syntactic (lexical) XP contains at least one accent.⁸
- (30) MaxAcc: A syntactic (lexical) XP contains at most one accent.
- (31) RightStress: Sentence stress falls on the rightmost phrase within the focus.

(29) and (30) capture the verb-object asymmetry: (29) makes sure that there is a prominent element in the VP (and any other XP), whereas (30) makes sure that the verb and the object are not both equally prominent and that it is the object that is more prominent if it is a phrase. The formulation of the principles is close to the implementations in terms of STRESS-XP/WRAP-XP or Match Theory, but Selkirk’s (1984)/Rochemont’s (1986) focus projection rules would have a very similar effect, for example. (31) captures the rightward preference of sentence stress in German.⁹

Each of the principles could come in two variants—a surface-oriented one and one that takes into account lower copies/traces. I will differentiate between these versions by the subscripts *s* and *r*. This is illustrated for the RightStress principle in (32).

- (32) a. RightStress_s: Sentence stress falls on the rightmost phrase within the focus on the surface (i.e., traces/lower copies do not count).

⁸I assume that a structure can violate a principle more than once. The number of violations of MinAcc was counted in the following way: if the addition of two accents was necessary to satisfy the condition that all lexical phrases are accented, two violations of MinAcc were annotated for it.

⁹I will not treat wh-phrases as focused for the purpose of RightStress in the modeling study, because fronted wh-elements do not behave like focused elements with respect to stress (Truckenbrodt 2012).

- b. *RightStress_r*: Sentence stress falls on the rightmost phrase within the focus under reconstruction (i.e., traces/lower copies do count).

I assume that mapping principles governing the distribution of phrasal stresses and the position of sentence stress must be part of a complete grammatical model of German. Besides these, a number of more controversial principles will be tested. (33) states that in a series of accented, new constituents, only the leftmost can be fronted. Cross represents Fanselow & Lenertová's (2011) idea that reordering accent-requiring, new phrases is problematic. Although the Early Accentuation principle makes reference to accentuation rather than newness (in that the required early assignment of accents prevents changes in the linear order of accented elements), it would not be correct to assume a problem any time when two constituents have been reordered that carry an accent. In Fanselow & Lenertová's model, some kinds of accents—contrastive and rhythmically motivated ones on discourse-given elements—are assigned “late” and thus do not lead to a problem; i.e., the presence of two reordered accented constituents in a sentence is unproblematic when at least one of them is given or carries a contrastive accent. Therefore, a problem with the principle Cross was only annotated in conditions in which a discourse-new, accented constituent crossed another new, accented constituent. Besides the Early Accentuation model, the Cross principle is also close to the predictions of Fanselow's (2004) *pars pro toto* model and Korth's (2014) approach to partial focus movement in terms of focus exponents that are leftmost within the focus.

- (33) Cross: Syntactic movement of a discourse-new, accented constituent cannot cross another new, accented constituent.

A further principle that will be tested is based on my proposal for prosody-contrastive topic mapping. For the CT principle in (34), it is also possible to formulate a surface-oriented and a reconstruction-based version.

- (34) CT: A contrastive topic is left-aligned with the left edge of a hat contour.

Finally, I will also take into account the principle in (35).

- (35) MotivateOS: moving an object rather than a subject to the prefield requires a motivation.

Among the tested principles, (35) is the only data-driven rather than theory-based one,

formulated after inspecting the data. It is motivated by the observation that there is a clear split between the experiments involving *wh*-movement or contrastive topic movement (experiments 3 and 4) and the others: only in these two experiments, object-initial sentences approached similarly high acceptability as found for the subject-initial orders; in experiments 1, 2, and 5, object-initial orders are all clearly degraded. The split is not along the lines predicted by Fanselow & Lenertová’s approach: although givenness of the involved constituent does affect the availability of object fronting across a subject, it leads only to a minor modulation of acceptability and cannot explain the clear split that is observed. The observations point in the direction that fronting of clearly contrastive constituents has a special status in comparison to fronting something that is part of a broad focus. The behavior of contrastive topics is closer to *wh*-elements in this respect. I decided to include the principle in (35) in all tested models, as it allows to capture the coarse difference between subject- and object initial structures and to better see the more subtle differences between the predictions of the models.

There are different ways to account for this special behavior of contrastive elements in my experiments and to implement the principle in (35) in a theoretical model. One way would be to analyze contrast-related movement (in the sense of presence of a closed set of alternatives, as in Molnár & Winkler’s 2010 model) as operator movement, in parallel to *wh*-movement. One problem with this explanation is that experiment 3 involved *partial* fronting of contrastive topics, speaking against the idea that it is exactly the contrasted phrase that is attracted. Also, the review of previous experimental studies in chapter 4 showed that the notion of contrast might be too narrow—object-initial sentences can be perceived as fully acceptable even if they are not contrastive in this sense. Recall for example that Féry & Drenhaus (2008) found ratings close to ceiling for items of the form “Why are the neighbors complaining? — The landlord raised the rent again” with an object-initial structure in the answer. Here, the rent is not explicitly contrasted with any alternative. However, it is plausible that the rent is perceived as having a special pragmatic status in the answer—it is the emotionally loaded reason for the neighbors’ complaints (compare a fragment answer, which I would also find felicitous here: “Why are the neighbors complaining? — The rent!”). Most of the items used in Féry & Drenhaus’s study involved an object that could be said to be emphasized in this way. In the experiments discussed here, this pragmatic effect was plausibly neutralized by choosing two very similar and interchangeable DPs as subject and object; the only experiments that did involve a visible motivation for fronting were experiments 3 (including *wh* as a formal

movement trigger) and 4 (involving explicit contrast). Thus, rather than assuming that it is specifically contrast that is responsible for the split in the data (and what we observe is a split between operator movement vs. non-operator movement), I will assume that the phenomenon is more general than that: there must be a reason for choosing to move the object rather than the subject to the prefield (in the spirit of the different approaches discussed in section 4.4.5 like Zimmermann 2008, Hartmann 2008, Frey 2010, Skopeteas & Fanselow 2011). If no such reason is clearly discernible in the context, an object-initial sentence will be perceived as less acceptable.

In the case of contrastive topics, the reason could be semantic; either because contrast is already motivation enough for fronting (even if it is broad contrast), or due to a preference to realize the semantic status of contrastive topics as the higher one of two nested foci (Wagner 2012, Constant 2014) overtly. The motivation could also stem from prosodic preferences. Féry (2007) assumes that topics are preferably realized in the left periphery because this allows to phrase them as a separate prosodic unit. Alternatively, it is also conceivable that there is a preference for aligning the hat contour with the edge of the intonation phrase, which would also favor leftward movement of contrastive topics (which are in turn aligned with the hat contour). Prosodic preferences like this might also motivate syntactic movement (in the spirit of Zubizarreta’s 1998 “prosodically driven movement”; see Neeleman & Reinhart 1998, Szendrői 2003, Šimik et al. 2014 for related approaches).

I think it is less plausible to assume that the large acceptability penalty for object-initial structures observed in experiments 1, 2, and 5 can be fully or mostly attributed to processing factors. Although it has been shown that object-initiality can cause processing difficulties (Hemforth 1993), if this was the main reason for the large acceptability decrease there, object-initial structures should never be as highly acceptable as they are in wh-questions and contrastive topics. However, it is entirely possible that a small part of the observed penalty is due to increased processing load and that the same effect is present even in experiments 3 and 4.¹⁰ This would mean that the large effect that I subsume here under the label *MotivateOS* could potentially be subdivided into several components, which could partly be processing-related. Since processing-related factors have been found to interact in a super-additive way with respect to acceptability (Hofmeister et al. 2014), they would need to be treated differently within the modeling approach that I adopt below. This would be a very interesting extension of the model, but it would require more knowledge about

¹⁰Häussler et al. (2015, ch. 5) report a small numerical trend towards lower acceptability of object questions in contrast to subject questions in German, which however did not reach statistical significance in their experiments.

how the sentences in the experiments were processed by the participants (stemming from online methods) than is available to me. I therefore leave the incorporation of processing effects for future research and for now limit myself to acknowledging that a part of the MotivateOS effect could be processing-related.

In sum, the principles that will be tested are: MinAcc_s , MaxAcc_s , RightStress_s , Cross , CT , and MotivateOS . It should be kept in mind that they do not represent concrete implementations. Rather, they should be seen as empirical generalizations that can potentially be explained in different ways. The following tests of the empirical adequacy of each principle will therefore be informative for all theoretical models that predict the generalization to hold.

Models

In what follows, I will focus on comparing the empirical adequacy of the following three sets of principles:

- (36) a. Baseline:
 MinAcc_s , MaxAcc_s , RightStress_s , MotivateOS
- b. Crossing:
 MinAcc_s , MaxAcc_s , RightStress_s , MotivateOS , **Cross**
- c. Reconstruction:
 MinAcc_s , MaxAcc_s , **RightStress_r** , MotivateOS

The *baseline model* is one that consists only of the uncontroversial mapping principles as well as MotivateOS . The *crossing model* is intended to represent theories that predict that only the leftmost element within the focus should be able to undergo movement to the prefield in a broad focus structure (Fanselow 2004, Fanselow & Lenertová 2011, Korth 2014). The *reconstruction model* is meant to represent my new approach that was developed in chapters 3 and 4—the core idea is that it is not necessary to posit an additional principle if interface mapping is assumed to apply under reconstruction.

Some further remarks about the models that I chose to compare here are in order. First, I made the decision to include surface-oriented versions of the syntax-prosody mapping principles MinAcc and MaxAcc , in spite of the evidence in favor of reconstruction discussed in chapter 2. This is a data-driven choice: in this data set, surface-oriented application of these principles turned out to lead to a better fit. The improved overall fit can help to see more clearly the strengths and weakness of the models with respect to the crucial factors in

which the tested models differ (Cross, RightStress_r/RightStress_s). The superiority of the surface-oriented versions of MinAcc and MaxAcc is almost exclusively based on some data points from experiment 4 on wh-movement (the other experiments were not designed to test these principles; the focus was on prosody-IS mapping rules). Choosing the surface-oriented versions for the purpose of the modeling study is not intended to mean that I reject the idea of prosodic reconstruction for syntax-prosody mapping; in section 5.9 below, I will address a caveat concerning the wh-data in the present experiments, and conclude that more research is necessary to come to a better informed conclusion with respect to MinAcc and MaxAcc. Importantly, whether surface- or reconstruction-oriented variants of these principles (which are included in all tested models) are used, the relative differences between the compared models do not change, as I will report below.

A second question is whether it makes sense to include the MotivateOS principle in all models. Fanselow & Lenertová (2011) explicitly aim to reduce the influence of information structure on fronting possibilities to the interaction between accentuation and linearization expressed by the *Early Accentuation* principle. Adding a principle like MotivateOS that establishes an additional relation between pragmatics and syntax could thus be seen as going against the aim of their approach. However, if the crossing model is fit without MotivateOS, the fit is considerably worse than with the additional principle (this is true for all compared models). It is possible to see the MotivateOS principle as compatible with Fanselow & Lenertová’s goals if grammatical restrictions (concerning e.g. linearization and accentuation possibilities) are disentangled from pragmatic considerations. Under this view, it is not contradictory to complement the *crossing model* by MotivateOS. The variance attributed to MotivateOS in the modeling results can be seen as extracting any pragmatic effects, allowing to interpret the estimates for all other principles as grammatical restrictions in a stricter sense.

Results

The fitted values (triangles) of each of the three models are illustrated in comparison to the actual condition means (circles) in Figures 5.7–5.12 for experiments 1, 2, 4, and 5. Experiment 3 (partial fronting of contrastive topics) is not included, as none of the models predicts any differences there. It is shown separately in Figure 5.13, illustrating the fit of the reconstruction model complemented by the CT_r principle.

The model coefficients (which can be interpreted as violation costs of the principles) as well as measures of model quality are provided in Table 5.6.

| model | coefficients (SE) | AIC | BIC | R^2 | |
|----------------------------|----------------------------|--------------|-------|-------|--------|
| baseline | MinAcc _s : | -0.03 (0.03) | 19579 | 19620 | 0.1783 |
| | MaxAcc _s : | -1.05 (0.09) | | | |
| | MotivateOS: | -1.01 (0.03) | | | |
| | RightStress _s : | -0.45 (0.05) | | | |
| crossing | MinAcc _s : | -0.00 (0.03) | 19559 | 19606 | 0.1811 |
| | MaxAcc _s : | -1.06 (0.09) | | | |
| | MotivateOS: | -0.92 (0.04) | | | |
| | Cross: | -0.36 (0.07) | | | |
| | RightStress _s : | -0.52 (0.06) | | | |
| reconstruction | MinAcc _s : | -0.15 (0.02) | 19549 | 19589 | 0.1823 |
| | MaxAcc _s : | -1.10 (0.09) | | | |
| | MotivateOS: | -1.11 (0.04) | | | |
| | RightStress _r : | -0.42 (0.04) | | | |
| reconstruction incl. CT | MinAcc _s : | -0.13 (0.03) | 19530 | 19577 | 0.1848 |
| | MaxAcc _s : | -1.13 (0.09) | | | |
| | MotivateOS: | -1.20 (0.03) | | | |
| | RightStress _r : | -0.42 (0.04) | | | |
| | CT _r : | -0.22 (0.05) | | | |

Table 5.6: Coefficients and measures of model quality for the fitted models

That both the crossing model as well as the reconstruction model show a better fit than the baseline model is supported by the higher R^2 value and the lower AIC and BIC values¹¹ (in both cases, the improvement is significant according to an ANOVA). The fit of the reconstruction model can be further improved by adding a reconstructing CT principle.

The model quality measures would be overall lower with reconstructing versions of MinAcc and MaxAcc, but the relative ordering would not be altered (baseline model: $R^2 = 0.1707$, crossing model: $R^2 = 0.1735$, reconstruction model: $R^2 = 0.175$, reconstruction model including the CT principle: $R^2 = 0.1776$). Using models with random intercepts for subject and item would also not affect the relative model quality. Not including random slopes or interaction terms is a deliberate choice. It reflects the theoretical assumption that principle violations affect acceptability in a consistent way for every item and every subject.

¹¹The R^2 can be interpreted as the proportion of variance in the data that is explained by the models' factors. A higher R^2 indicates high model quality. The Akaike information criterion (AIC) and Bayesian information criterion (BIC) provide an information-theory based relative measure of model quality, taking into account the number of predictors. Lower AIC and BIC values indicate higher model quality.

Discussion

The visualization of the fitted models allows to identify the individual problems and benefits of the different theoretical approaches.

The upper plot in Figure 5.7 shows a central problem (marked by a rectangle) of the **baseline model** in experiment 1. If sentence stress is assigned in a surface-oriented way, OVS under broad focus should not be much less acceptable than under subject focus (the only difference is that the VP, containing only the verb, does not receive an accent; this is unproblematic in the narrow subject condition because the verb is given). This leads to a major mismatch between the fitted and the actual means. Experiment 2 only shows an effect of structure type. This can be captured well by the MotivateOS principle.

In experiment 4 (the upper plot in Figure 5.8), the surface-oriented RightStress principle allows for a good fit for the canonical structure in the subordinate clause (where sentence stress on the object was preferred) as well as for the wh-question, where sentence stress on the subject was preferred (although the size of the effect is overestimated for wh-questions, and underestimated for the subordinate clauses). The MaxAcc constraint captures the verb-object asymmetry in the canonical structure. As discussed above, the surface-oriented version of that principle is shown here, which fits the absence of the asymmetry better which was observed in the wh-questions. The surface-oriented RightStress principle also fits the split wh-question data well. A mismatch results for the exclamatives: they show a preference for sentence stress on the object, which is at odds with RightStress_s. This suggests that an additional principle might be needed here, which governs sentence stress specifically in exclamatives. In experiment 5 (the lower plot in Figure 5.8), the baseline model provides a good fit for the difference between canonical and marked structures. The smaller givenness-induced differences remain unaccounted for. This is related to the observation that the estimate for the MinAcc principle is very low in the baseline model (cf. Table 5.6). This is due to the fact that violations of MinAcc almost always coincide with violations of RightStress if the latter applies in a surface-oriented way in this data set: when sentence stress is shifted to the left, the constituent that it is shifted away from is necessarily unaccented due to postnuclear compression, and this is problematic if it is discourse-new. Thus, any potential effect of the MinAcc principle is mostly subsumed under the effect of RightStress.

Adding the Cross principle solves the problem of the baseline model in experiment 1. This is indicated in the upper plot in Figure 5.9 by the dashed rectangle. OVS violates Cross, which allows to capture a large part of the difference between the two conditions with

subject stress, thus improving the fit considerably. The lower plot in that figure shows a problem of the crossing model (indicated by the rectangle): in experiment 2, only the object-initial all-new structure violates Cross, as the other object-initial structure involves a given constituent which should make their reordering less problematic. This leads to a mismatch.

Figure 5.10 shows that in experiments 4 and 5, the fit of the crossing model does not differ much from the baseline model. It also provides a good fit for subordinate clauses, wh-questions, and split wh-questions and a worse fit for exclamatives in experiment 4. In experiment 5, again the large effect of structure is captured, but not the minor differences due to givenness.

Similar to the crossing model, the **reconstruction model** also provides a way to solve the problem of the baseline model in experiment 1 (upper plot in Figure 5.11): if RightStress applies under reconstruction, the OVS is predicted to involve two more problems under broad focus than under narrow focus, making a better fit possible. Another improvement is visible here: RightStress_r and MinAcc are more independent of each other than RightStress_s and MinAcc. Thus, the estimate is not pulled towards zero in those cases in which both MinAcc and RightStress are violated. This allows to find a consistent estimate for MinAcc and to thus capture the effect of givenness, which is small, but relatively consistent across experiments (with the exception of the prenuclear domain in experiment 5). In experiment 2, the reconstruction model does not predict differences, which is in line with the data.

The upper plot in Figure 5.12 shows a problem that is introduced by the assumption that there is reconstruction for RightStress. This contradicts the surface-oriented stress pattern found in wh-questions (indicated by the solid rectangle) in experiment 4. On the other hand, the model provides a better fit for exclamatives (indicated by the dashed rectangle), which show the opposite preference, without introducing an additional principle.

Although the effect of prosody and structure was small in experiment 3 (partial fronting of contrastive topics), the reconstruction model can be further improved by adding the CT_r principle (Figure 5.13, Table 5.6), and more so than adding a surface-oriented CT_s principle (which would have a R^2 value of 0.1836).

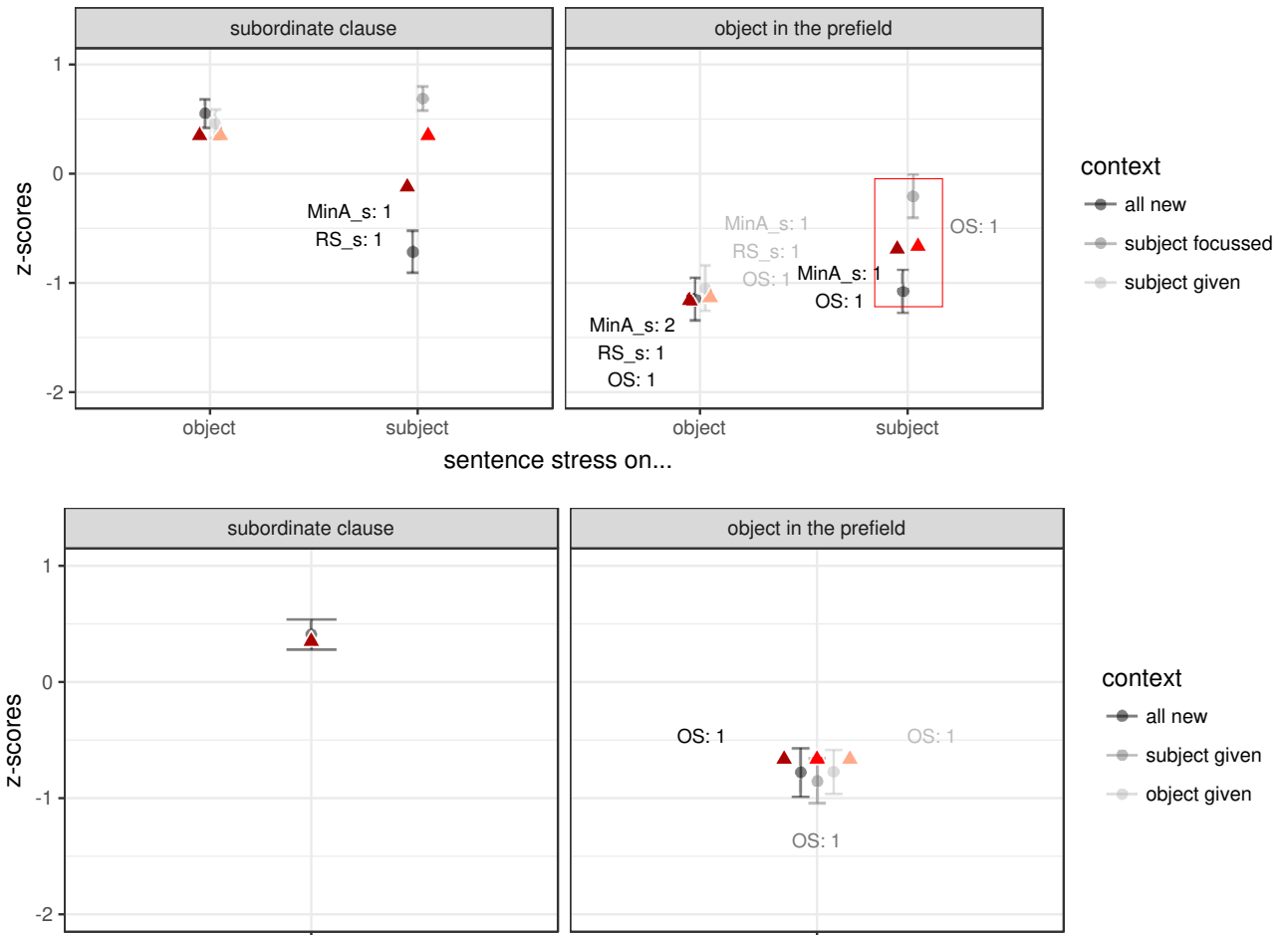


Figure 5.7: Visualization of the *baseline model* for experiments 1 and 2, including the principles MinAcc_s (MinA_s), MaxAcc_s (MaxA_s), RightStress_s (RS_s), and MotivateOS (OS). The numbers next to the principle names express the number of assumed violations in each condition. Triangles represent fitted values. Actual condition means are plotted as circles for comparison. The rectangle indicates a central problem.

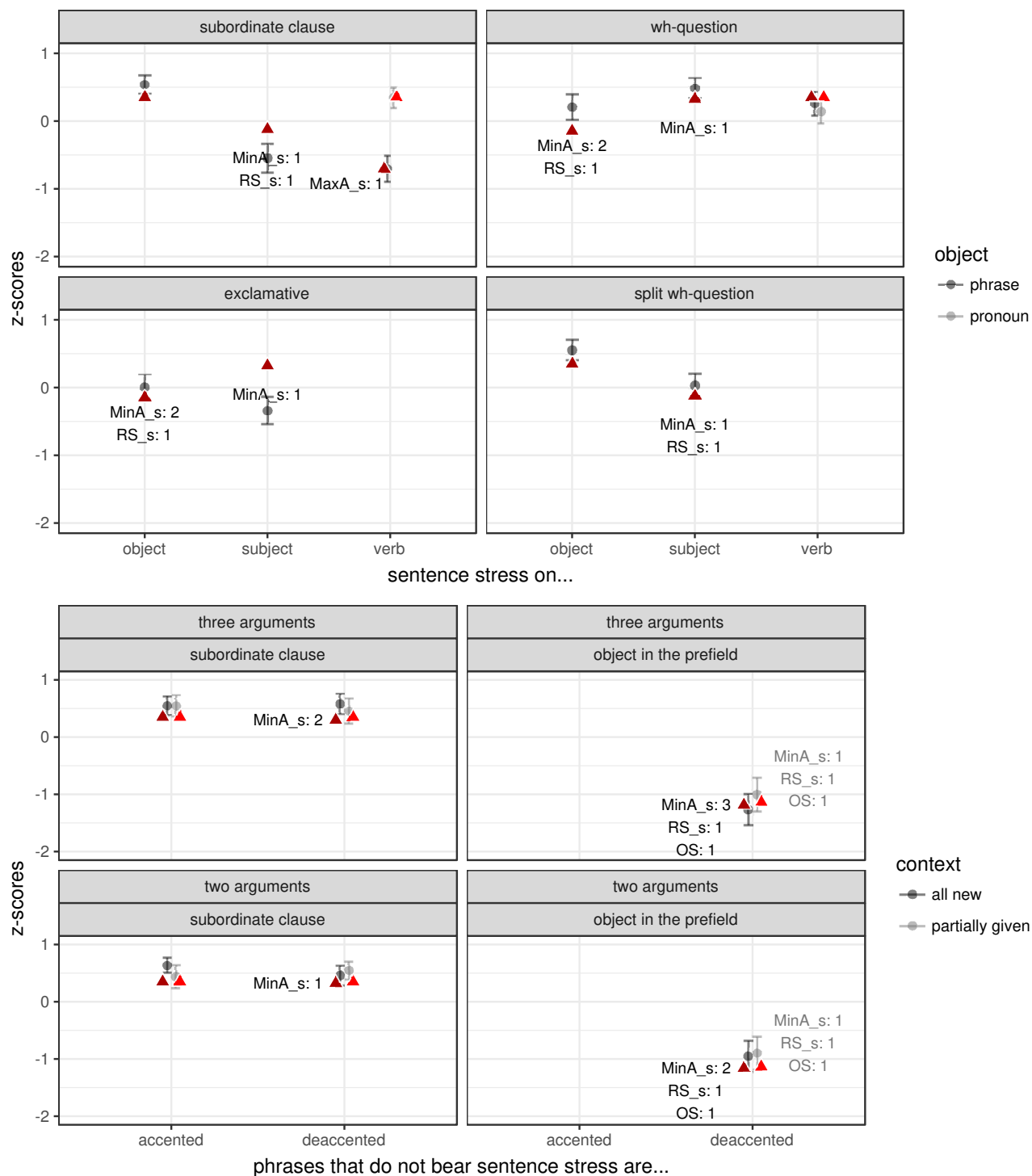


Figure 5.8: Visualization of the *baseline model* for experiments 4 and 5, including the principles MinAcc_s (MinA_s), MaxAcc_s (MaxA_s), RightStress_s (RS_s), and MotivateOS (OS). The numbers next to the principle names express the number of assumed violations in each condition. Triangles represent fitted values. Actual condition means are plotted as circles for comparison.

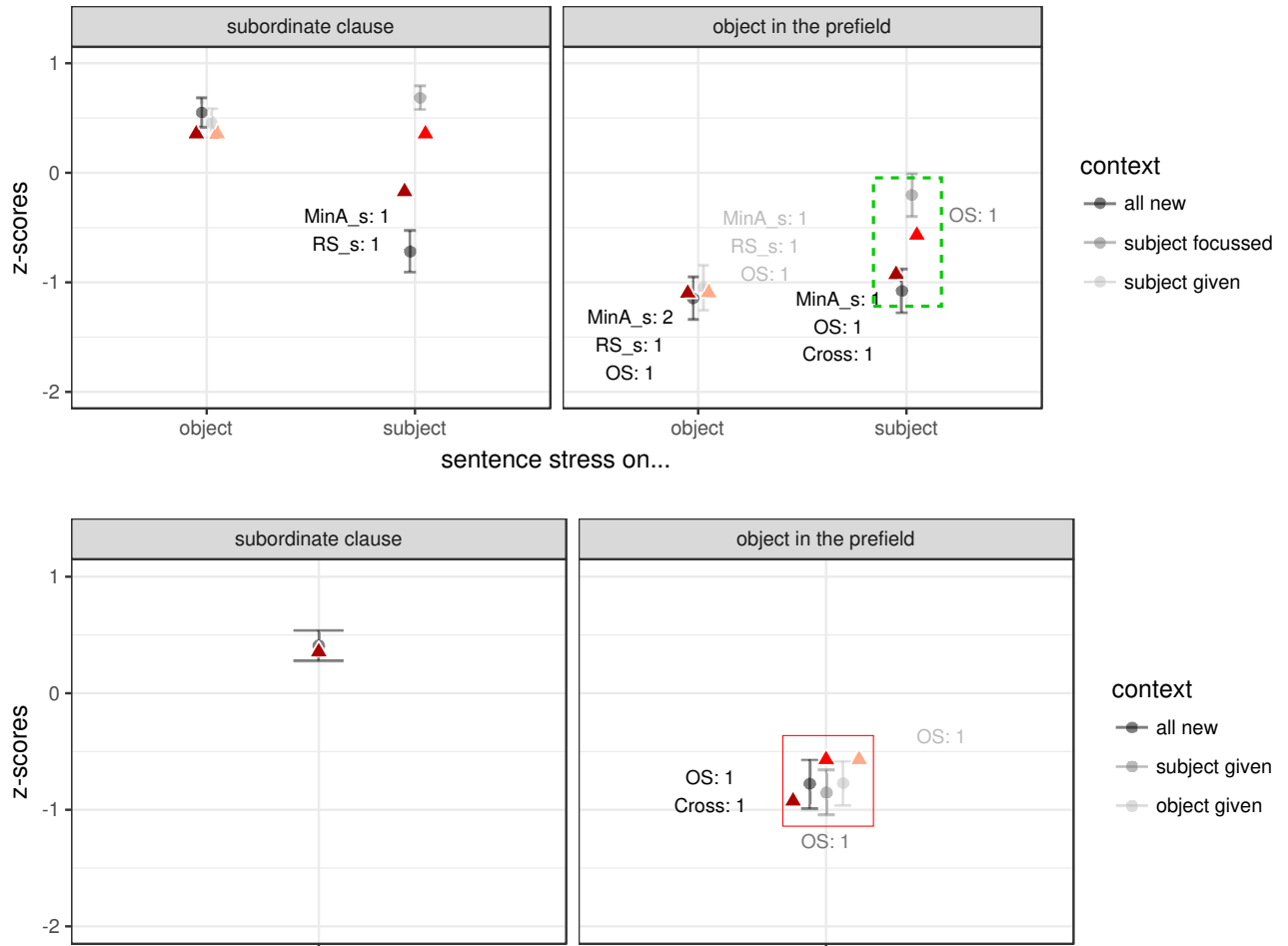


Figure 5.9: Visualization of the *crossing model* for experiments 1 and 2, including the principles MinAcc_s (MinA_s), MaxAcc_s (MaxA_s), RightStress_s (RS_s), MotivateOS (OS), and Cross . The numbers next to the principle names express the number of assumed violations in each condition. Triangles represent fitted values. Actual condition means are plotted as circles for comparison. The dashed rectangle indicates an improvement over the baseline model. The solid rectangle indicates a problem.

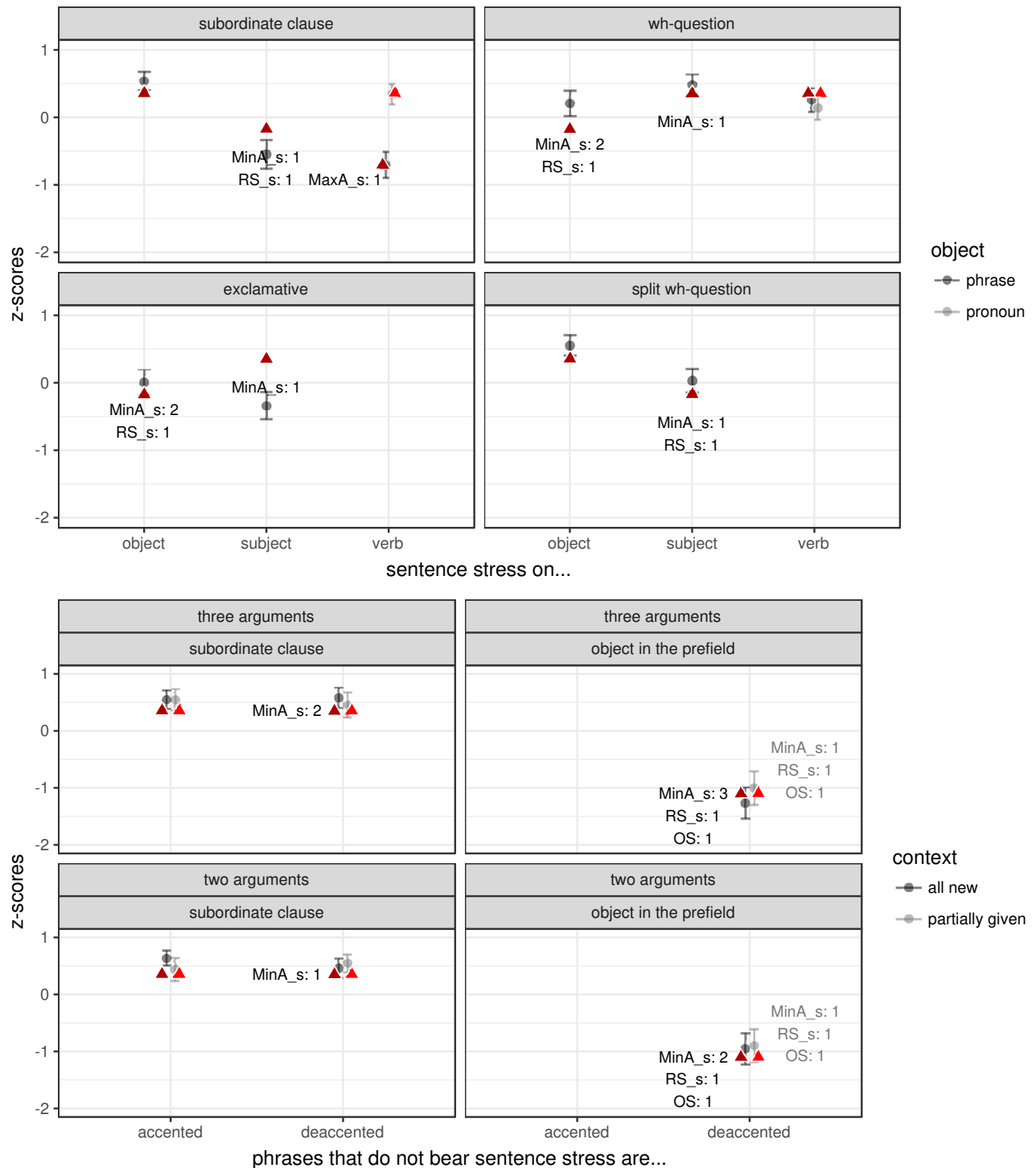


Figure 5.10: Visualization of the *crossing model* for experiments 4 and 5, including the principles MinAcc_s (MinA_s), MaxAcc_s (MaxA_s), RightStress_s (RS_s), MotivateOS (OS), and Cross . The numbers next to the principle names express the number of assumed violations in each condition. Triangles represent fitted values. Actual condition means are plotted as circles for comparison.

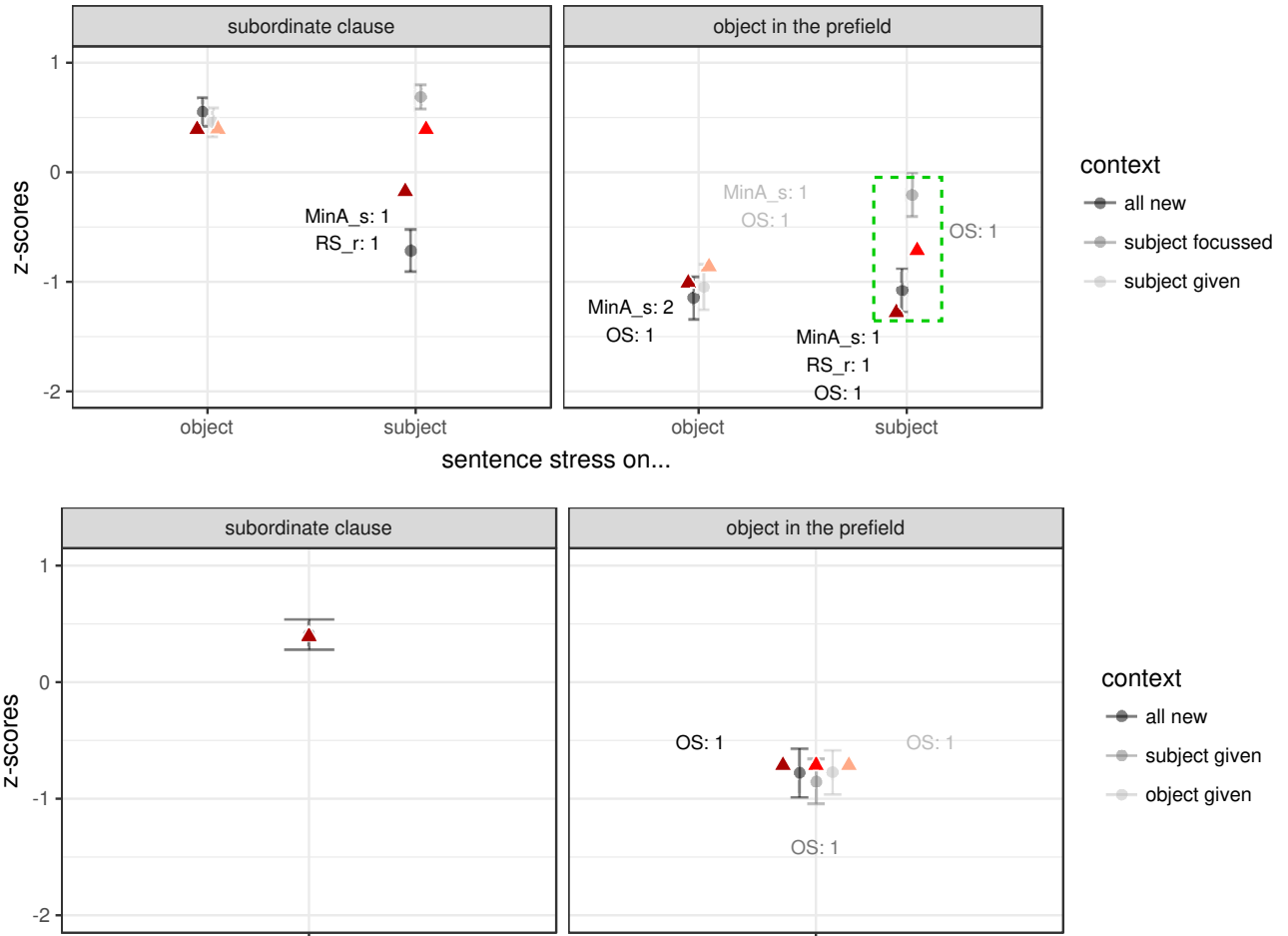


Figure 5.11: Visualization of the *reconstruction model* for experiments 1 and 2, including the principles MinAcc_s (MinA_s), MaxAcc_s (MaxA_s), RightStress_r (RS_r), and MotivateOS (OS). The numbers next to the principle names express the number of assumed violations in each condition. Triangles represent fitted values. Actual condition means are plotted as circles for comparison. The dashed rectangle indicates an improvement over the baseline model.

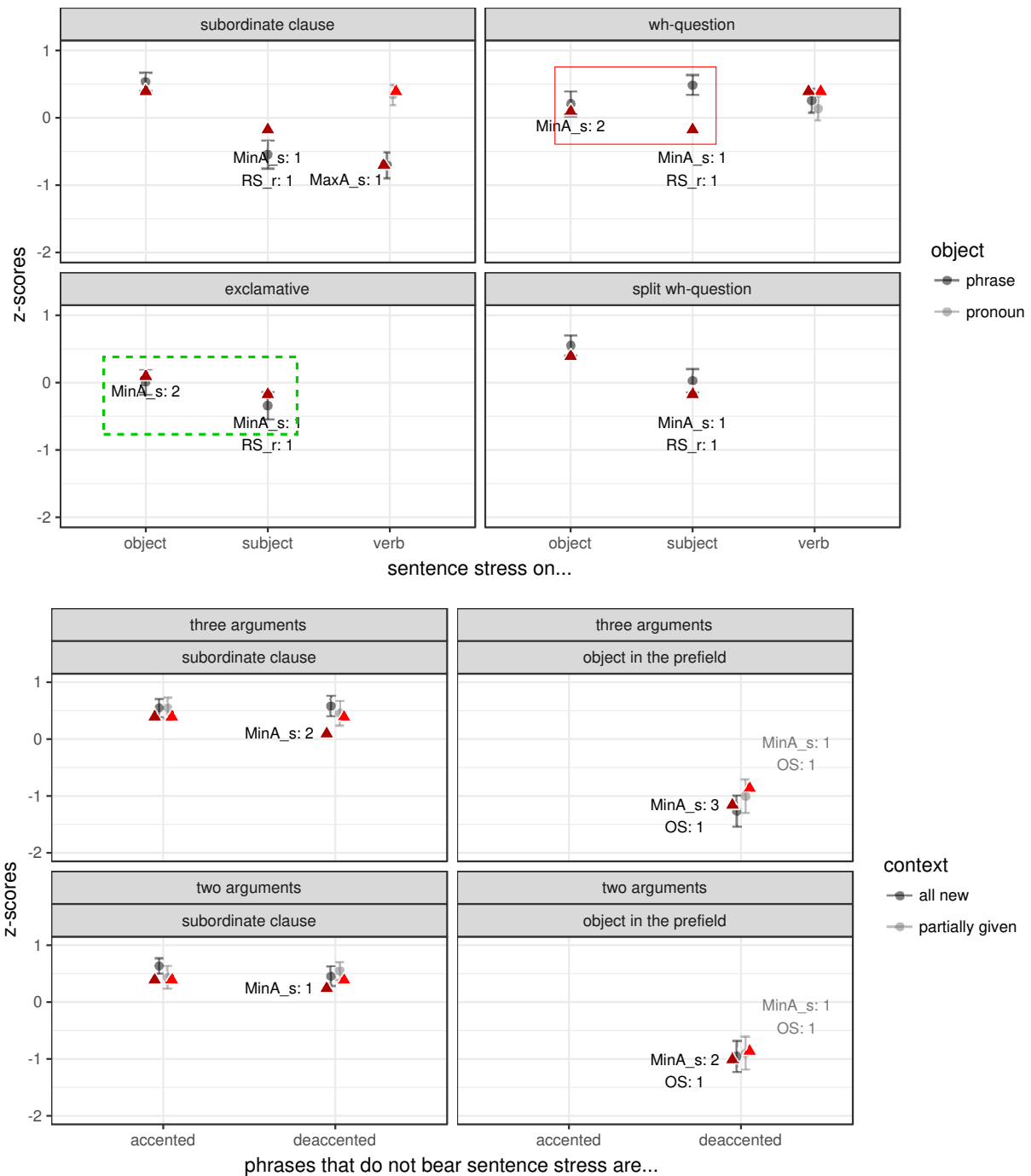


Figure 5.12: Visualization of the *reconstruction model* for experiments 4 and 5, including the principles MinAcc_s (MinA_s), MaxAcc_s (MaxA_s), RightStress_r (RS_r), and MotivateOS (OS). The numbers next to the principle names express the number of assumed violations in each condition. Triangles represent fitted values. Actual condition means are plotted as circles for comparison. The dashed rectangle indicates an improvement over the baseline model. The solid rectangle indicates a problem.

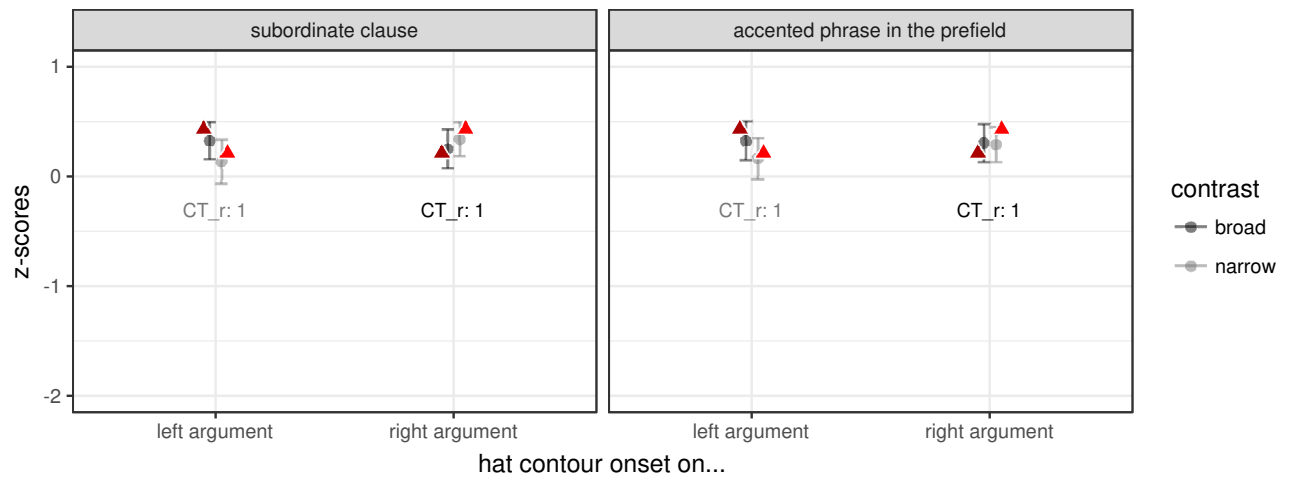


Figure 5.13: Visualization of the *reconstruction model* for experiment 3, including the principles MinAcc_s (MinA_s), MaxAcc_s (MaxA_s), RightStress_r (RS_s), MotivateOS (OS), and CT_r . The numbers next to the principle names express the number of assumed violations in each condition. Triangles represent fitted values. Actual condition means are plotted as circles for comparison.

5.8.3 Further factors

In experiments 1, 2, and 5, givenness was manipulated. This was done by manipulating whether a constituent was explicitly mentioned in the preceding context or not. In addition, I varied to what extent the constituent could be inferred from the context. For example, a context like “What happened on the weekend?” does not allow one to infer that the answer will involve a bride and a groom, whereas it can be inferred from a context like “What happened at the wedding?”. In the terminology of Baumann & Grice (2006), the latter is a bridging context that makes a part of the answer sentence ‘inferentially accessible’. They take this category to be in between completely new and completely given in a gradient spectrum of givenness. Based on this categorization, it could be expected that the behavior of new, but accessible constituents would be closer to given ones. The additional manipulation was included to be able to test whether this is the case.

Accessibility only had a significant effect in experiment 5 (interaction between structure, context, and accessibility: $t = 2.0$). This is illustrated in Figure 5.14. Given subjects were only more acceptable than new ones in the postnuclear, deaccented domain when they are inaccessible. When a bridging context was provided, the difference was much smaller and the trend was even reversed. This difference, however, is only observed in the postnuclear domain. In the prenuclear domain, the only visible trend is that given subjects are slightly worse than new ones when they are accented.

A similar, but much smaller and statistically not significant trend was found in experiment 1. In experiment 2, the acceptability of given subjects (which were always accented in this experiment) was slightly decreased in comparison to the others; this was not significant, either.

The findings from experiment 5 support the view that providing a bridging context makes new subjects behave more similar to given ones; thus, a different annotation (with three levels of givenness, or grouping accessible subjects as given) might lead to a slightly larger effect size of the MinAcc principle. Since in other parts of the data accessibility did not have a significant influence, the change in the model would however be expected to be small.

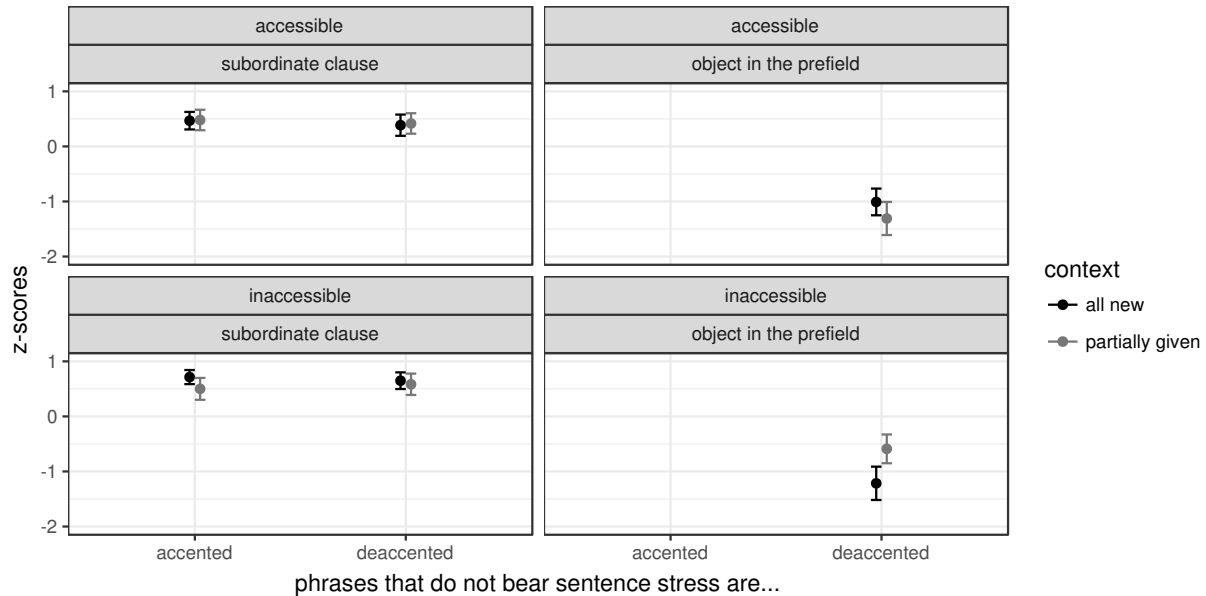


Figure 5.14: Results (mean z-scores with 95% confidence intervals) of experiment 5, split by the factor accessibility.

5.9 Methodological limitations

5.9.1 Materials

Interchangeable arguments One of my goals was to reduce potential pragmatic noise that might have confounded the results in previous studies. I therefore chose to use arguments that were semantically and formally very similar (e.g. with respect to animacy) and could be interchanged without any pragmatic effect. This should exclude the possibility that fronting one of them is facilitated by a pragmatic asymmetry. The hope is that the results then purely reflect effects of syntax, prosody, and only the targeted interpretative manipulations. On the other hand, the choice of two more similar arguments could have introduced a new confound: it is easier to construe a contrast between e.g. a sound engineer and a cameraman than between an animate and an inanimate expression. This contrastive potential could, for instance, motivate accenting both the subject and the object rather than only one of them.

To get an idea whether this was happening, I included a small set of control items among the filler materials in which animacy was manipulated (animate subject + object as in experiment 1, e.g. “The designer knocked over the accountant” vs. animate subject + inanimate object as in previous studies, e.g. “The designer knocked over the waste

basket”). These control materials did not show a trend towards an increased difference between SVO and OVS order for object-initial structures with stress on the object (the trend goes in the opposite direction). Table 5.7 shows mean z-scores:

| | subject-initial | object-initial | difference |
|------------------------|-----------------|----------------|------------|
| S + O animate | 0.50 | -0.81 | 1.31 |
| S animate, O inanimate | 0.81 | -0.73 | 1.54 |

Table 5.7: Results of the control experiment on the effect of animacy in terms of z-scores

This suggests that the S-O-symmetry in animacy does not necessarily lower the relative acceptability of object-initial sentences with object stress. However, only four control items of this form were included, and sentence stress on the subject was not tested. A more comprehensive study in which not only animacy, but also contrastiveness and further pragmatic properties are varied systematically within one experiment would help to determine their exact role in the observed pattern.

Plausibility I tried to construct question-answer pairs that were natural and as plausible as possible. When unusual lexical items were used, I tried to motivate them by making clear in the context that the interlocutors are talking about fictional situations in a movie or book. Especially in those experiments that involved three-place predicates and three arguments, there was a trade-off between my aim to keep the arguments formally and semantically as interchangeable as possible and the aim to construct plausible sentences. That any of the items were perceived as unacceptable solely for this reason can however be excluded because this should have affected the variants with canonical word order as well; the ratings in the canonical structures with appropriate prosody were always high. There is a risk that these considerations could have affected the judgments with respect to prosody due to the tendency to employ more monotonous listing intonation when the described situation is artificial and difficult to imagine. This is a potential caveat to keep in mind about the materials; however, it allowed me to keep the arguments semantically similar and thus hopefully eliminate other potential confounds that could arise from pragmatic/formal asymmetries.

Recordings The prosodic manipulations were achieved by instructing a trained phonetician/phonologist, supervising the recordings, and repeating them in case of deviations from the intended realization. That the sentence stress manipulation in all experiments as well as

the manipulation concerning the presence/absence of accents at the level of the phonological phrase in experiment 5 was instantiated by real phonetic differences between the conditions is verified by the phonetic details in the appendix. However, differences/similarities in objective phonetic measures do not necessarily correspond to differences/similarities in perception. It is possible that in experiment 5, deaccentuation in the prenuclear domain was not perceived in the same way as deaccentuation in the postnuclear domain, even though the phonetic properties of the ‘deaccented’ constituents were comparable in both conditions.¹² This could be part of the explanation why an effect of the MinAcc principle was found only for postnuclear phrases. Another difference in phonetic realization that might have influenced the results is the choice of the utterance-final boundary tone in the wh-questions of experiment 4. For some conditions, two versions of the item sets (ending in a high/low boundary tone) were recorded, and I then subjectively chose the realization that sounded most natural to me. For the questions with subject stress, this was the realization with a low boundary tone, whereas a rise sounded more natural to me with object stress. It would be good to explicitly test whether this choice might have influenced the results in future research.

Accommodation The investigation of the prosody of wh-questions in experiment 4 faces the following methodological problem: it is harder to enforce an all-new interpretation for questions than for declarative clauses. The semantics of wh-questions can be considered as more marked than the interpretation of neutral declarative clauses, as they involve a presupposition.¹³ It is difficult to exclude accommodation of additional preceding context (that would satisfy the presupposition) in these cases. An information question like “What book has Emma Anderson written?” presupposes that Emma Anderson has written some book, and the question would therefore rather be asked if books and/or Emma Anderson have been discussed by the interlocutors before. In contrast, a declarative clause like “Emma Anderson has written a book” can indeed consist of entirely new information. Accommodation of additional context could override form-related mapping constraints by introducing implicit information-structural effects, which might have weakened or altered the differences observed for wh-questions in comparison to declarative clauses. Therefore, the results of this experiment should be seen as tentative at this point, and it would be

¹²Subtle perceptual differences between the deaccented elements in the prenuclear and postnuclear were reported by the speaker of the materials, and I agree with the intuition.

¹³At least according to some approaches to question semantics, e.g. Horn 1972; some authors assume that constituent question do not have systematic existential presuppositions, e.g. Groenendijk & Stokhof 1984. I am following Abusch’s (2009, p. 44) overview of approaches to the semantics of questions here.

desirable to replicate them with a more rigid control of potential accommodation effects as well as extend the data set to further structures, e.g. relative clauses, in which this problem does not arise to the same extent.

Subjective contrast In the discussion of experiment 3 it was noted that it is perceived as more problematic by participants if a non-contrastive element is nevertheless marked as part of the contrastive topic (i.e., it is realized within the hat contour) than if an element remains unmarked (i.e., it is realized outside of the hat contour) although the context suggests that it is part of the contrastive topic. The schematic pattern is repeated in (37).

- (37) a. $/[\text{arg}_1 \text{ arg}_2 \text{ verb}]_{\text{CT}}$ is more acceptable than $/\text{arg}_1 [\text{arg}_2 \text{ verb}]_{\text{CT}}$
b. $[\text{arg}_1 / \text{arg}_2 \text{ verb}]_{\text{CT}}$ is similarly acceptable as $\text{arg}_1 / [\text{arg}_2 \text{ verb}]_{\text{CT}}$

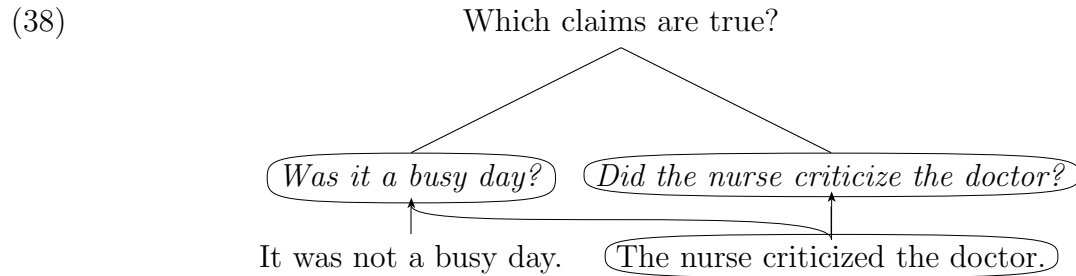
Furthermore, an exceptionally high degree of inter-speaker variability was observed in experiment 3. A by-subject inspection of the data revealed that it is not the case that each participant showed a consistent, though small, interpretation preference in line with the means visible in the plots; rather, most participants display large acceptability differences between the conditions, and the reported overall pattern emerges only when average acceptability scores are calculated across all participants.

Both observations could stem from the fact that contrastive topics necessarily have to do with implicit questions (whose exact assumed form might differ from speaker to speaker), whereas focus is related to the immediately dominating question (which can be and often is explicit, especially in experimental materials).

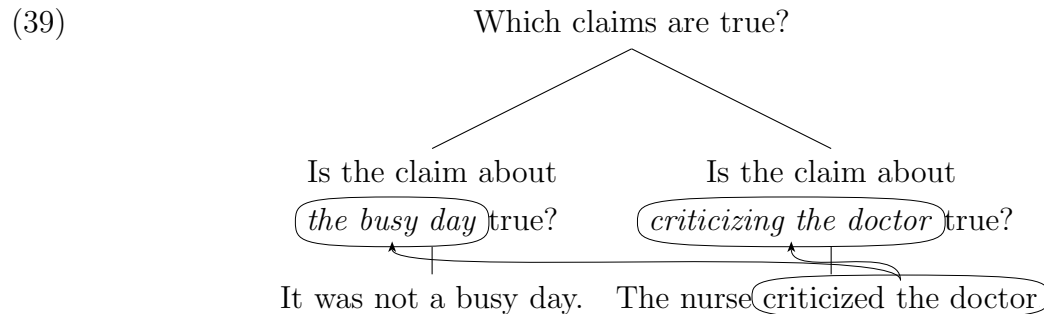
The contexts used in experiment 3 involved a pair of claims, followed by a very general question like “Is this true?” (as it might perhaps be asked by an investigator trying to establish what happened on a particular day). The target utterances involved hat contours, which, following Büring (2003), indicate particular implicit subquestions that the speaker assumes to be part of the discourse structure. The idea behind the experimental design is that the set of claims in the context also makes certain subquestions salient, and if these are not congruent with the subquestions indicated by the prosodic realization, the dialogue should be less acceptable. However, there is some scope for interpretation with respect to the exact form of the implicit subquestions.

Consider, for example, an item in which the context expresses that someone claimed two things about a particular day in the hospital: (i) that it was a busy day, and (ii) that the nurse criticized the doctor. The intention behind this type of context was to enforce

a discourse structure as in (38), where two whole propositions are contrasted. If my assumption that the onset of the hat contour coincides with the left edge of the contrastive topic is correct, then only a prosodic realization in which the hat contour begins on the leftmost argument (*the nurse*) should be acceptable.



However, in this context, a realization in which the hat contour begins later was similarly acceptable. A possible explanation for this is that the participants succeeded in finding an alternative discourse structure which is compatible with this prosodic marking. For example, it is conceivable that they assumed a discourse structure as in (39), where the crucial contrasted part in the second subquestion is just *criticizing the doctor* rather than the whole proposition including *the nurse* as an agent.



In contrast, a clearer acceptability difference was found in the contexts that were intended to favor a narrower contrastive topic. In these cases, the context expressed for example that someone claimed the following things: (i) the nurse slept, (ii) the nurse criticized the doctor. The intention behind this type of context was to enforce a discourse structure as in (40), where *the nurse* is not part of what is contrasted. Therefore, marking the whole target clause as the contrastive topic should be infelicitous.

The experimental results suggest that a prosodic marking that contradicts (40) (by including *the nurse* in the hat contour) was indeed perceived as less acceptable in these cases. A possible interpretation of this finding is that the presence of *the nurse* in both

commonly regarded as ungrammatical in German (it is only possible with PPs).

- (42) Weißt du, was Mark mit den Briefen gemacht hat? ‘Do you know what Mark did with the letters?’
 Er hat zur Post gebracht die Briefe.
 He has to.the post.office taken the letters
 ‘He took the letters to the post office.’

Histograms of the by-subject means for these sets of items are shown in Figure 5.15 (in terms of mean absolute ratings on the 1–7 scale). The patterns show that almost all participants clearly noted and rejected the illicit syntactic structure, but there are many subjects that rated the items containing a prosodic deviation highly.

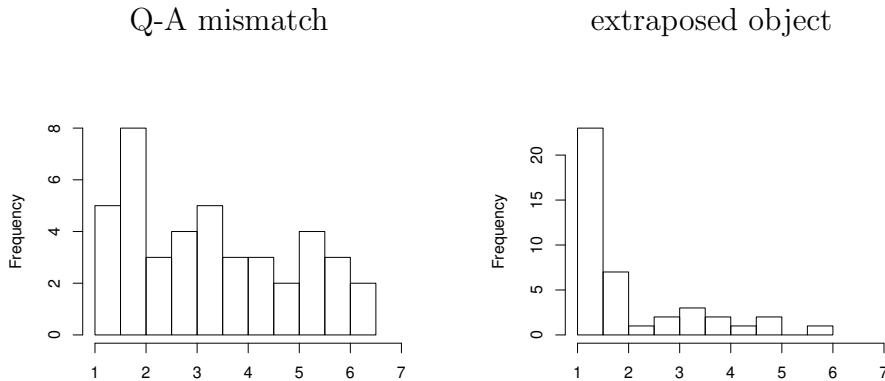


Figure 5.15: Histograms depicting the mean rating by subject for the control items with a prosodic question-answer mismatch / extraposition of an object DP

These findings show that for a considerable part of the participants, prosodic deviations only lead them to lower their ratings by a very small degree or not at all. Syntactic deviations, on the other hand, lead to a clear lowering of the ratings for almost all participants. This could mean that for some subjects, the violation of prosodic principles is considered as much less problematic than syntactic violations. It is however also possible that the effect of prosodic manipulations might be underestimated in the results because not all participants paid attention to them or considered them as relevant for the task. This could be improved in future work by pointing out more clearly within the instructions that prosody should be taken into account when judging the examples. This was done only indirectly by providing examples during the instruction phase that differed only prosodically and suggesting that they should receive different ratings. More direct instructions could help

to further sharpen the judgments. Another potential source for the limited effect of the prosodic manipulations is that participants could only listen to each dialogue once, and perhaps it was easier to memorize the word order than the prosodic realization. Allowing to listen to an item several times might thus also increase the participants' sensitivity to prosody.

5.10 Towards a model of acceptability

Making precise predictions about acceptability and testing them requires an explicit model of acceptability. In Figure 5.16, I provide an extended version of the grammatical architecture that was developed in chapter 4. It includes an acceptability mapping component that explicitly links each problem that can occur during the derivation to a prediction about the effect on acceptability that this is predicted to have.

The hybrid architecture that combines a generative syntactic structure building component with an evaluative constraint-based component is inspired by Broekhuis's (2008) Derivations & Evaluations framework. It is also related to Sorace & Keller's (2005) division between core-syntactic and interface-related principles.

The effect on acceptability could be stated in precise numbers; here I chose to use broader categories of "large" and "small" acceptability decreases that can be interpreted in terms of Cohen's d (Cohen 1988), according to which an effect around 0.2 standard deviations corresponds to a "small effect", around 0.5 to a "medium effect", and around 0.8 to a "large effect". Although the exact numbers will for sure vary between experiments depending on the involved materials etc., I assume that this broader categorization might be stable across studies (as it is also argued for by Keller & Sorace, who report that specific grammatical principles tend to consistently behave as "soft"/"hard" across experiments, i.e. consistently lead to a small/large acceptability decrease).

The presented model leaves open the role of the principle that was represented as "MotivateOS" in the modeling study. One possibility would be to implement it as a general principle that is always violated whenever an object is fronted, but this violation does not always lead to an acceptability decrease. To account for the full acceptability of contrastive topic fronting, it would then be necessary to employ the mechanism of cost-free violations (see Keller 2000, Ellsiepen 2016). The basic idea is to take into account that acceptability is a relative notion that should be considered within a limited set of candidates. If there is no way to express a certain meaning without violating any grammatical principle or

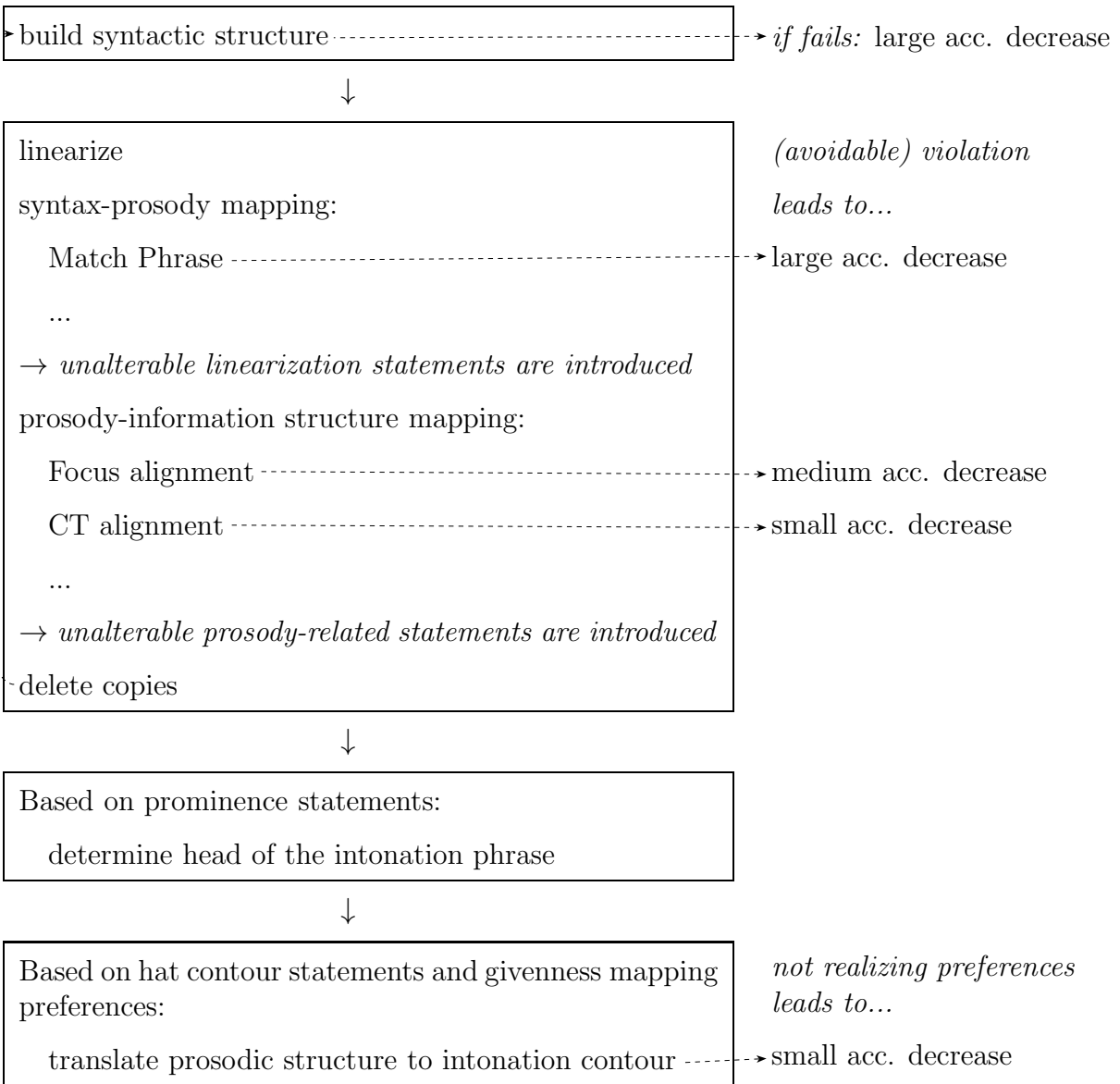


Figure 5.16: Extended architecture of grammar, including mapping to acceptability

preference, the candidate with the least severe problems can still be perceived and judged as perfectly acceptable. In Standard Optimality Theory, this assumption is a core principle of the framework—the winning candidate will usually violate a number of constraints, but as long as none of the violations is fatal (i.e., if there is no candidate that does not violate this nor any higher constraint), the candidate is optimal (which maps to perfect acceptability). For *wh*-movement, an implementation along these lines is for example suggested by Hamlaoui (2011). She proposes the ranking *OP-SPEC* \gg *STAY* for languages/varieties with obligatory *wh*-movement, where *SPEC-OP* requires (*wh*-)operators to be in a specifier (of CP) position and *STAY* penalizes syntactic movement (see also Grimshaw 1997 for the original proposal of the constraints *STAY* and *OP-SPEC*). Alternatively, in a model with a generative, derivational syntactic component, it could be the case that a structure without *wh*-movement cannot even be generated (e.g., because it would crash due to unchecked features). This would mean that there would not be any candidate to begin with that satisfies the *S* \prec *O* preference, so again, the acceptability of all candidates would be determined relative to the optimal structure within these limits.

Contrastive topic movement is different from *wh*-movement in that according to my data, it is fully optional. In that case, it is not true that there are no other candidates that do not violate the subject \prec object preference—the contrastive topic could also be left in situ without violating core-grammatical principles. The equal acceptability of subject-initial and object-initial structures in that case can be understood as an indication that leaving (part of) the contrastive topic in situ would lead to an equally severe problem as fronting it (as discussed in section 5.8, these problems could be semantic or prosodic). Following the line of thought about relative acceptability within candidate sets, this would result in full acceptability of both options.

There are also alternatives to an implementation in terms of cost-free violations. The difference between contrastive topics and (broadly) focused elements can also be captured directly in the generative syntactic component, as proposed by Frey (2004, 2010), or in terms of an entirely pragmatic approach, as sketched by Skopeteas & Fanselow (2011).

Whichever implementation of the word order preference is chosen—a concrete model of acceptability as sketched in Figure 5.16 is crucial for precise testing of theoretical models in which several components interact in an intricate way.

Chapter 6

Conclusion

Many aspects of German and English prosody are well-studied and well-understood as far as sentences with canonical word order are concerned. When it comes to marked syntactic structures, the interaction of the proposed prosodic principles with syntactic movement is still understudied. Since Bresnan (1971), there has been a number of interesting, but relatively unconnected observations and proposals. In my view, convincing arguments have been put forward for reconstruction for syntax-prosody principles, mainly based on observations concerning relative clauses, wh-movement, and VP-internal arguments. After bringing together and comparing all the observations and theoretical ideas concerning prosodic reconstruction here that were scattered throughout the prosodic and syntactic literature, I aimed to provide a unified account of these phenomena that is compatible with recent developments in syntactic and prosodic theory like phase theory, copy theory, and prosodic phonology. The core idea is that prosodic structure building and interface mapping apply before copy deletion, so that the original position of moved constituents can have an effect on the prosodic realization via lower copies that end up unpronounced. I proposed that in cyclic approaches, prosodic information can be preserved throughout the derivation in forms of unalterable statements. I hope that my proposal can serve as a useful basis that can be complemented and refined once more empirical data is available, especially concerning further syntactic constructions and languages. Ultimately, once the mechanism of syntax-prosody mapping in simple as well as complex structures is better understood, prosodic observations could also serve as evidence to decide between different syntactic analyses. I hope to have contributed to working towards that goal.

I showed that when the idea of prosodic reconstruction is extended to prosody-interpretation interface mapping principles, a new approach to the phenomenon of partial focus

fronting becomes possible. I have argued that the main generalizations that can be derived from previous studies of the phenomenon can be accounted for by the assumption that the mapping between sentence stress and focus happens under reconstruction: object-initial structures are compatible with a broad focus interpretation when sentence stress falls on the object, but not when it falls on the subject, just like in corresponding subject-initial structures. The incompatibility with discourse-new subjects then follows from postnuclear compression (which makes it impossible to realize the pitch accent required by new phrases) without further stipulations. I further argued that the approach comes with the additional benefit that it can be extended straight-forwardly to analogous findings concerning contrastive topics.

The proposal was tested against a set of data stemming from five subexperiments. The first one showed that a reconstruction-based analysis indeed contributes to improving the model's fit for partial focus fronting data in comparison to a surface-based approach, without positing extra principles. The second experiment showed that the predictions are also compatible with further, hitherto untested partial focus fronting structures (in which object fronting does not affect the position of sentence stress). The results of the third experiment on contrastive topics are in line with the assumption that prosody-CT mapping principles apply in a reconstruction-oriented way, also when further, previously untested structures are taken into account, although structural factors had a relatively small effect here. Two further experiments aimed at testing whether the proposed mapping principles that were used to account for the partial fronting patterns (a reconstructing version of focus-stress mapping and a principle requiring new phrases to be stressed) have a consistent effect in other types of sentences, too. In the fourth experiment on wh-questions, the results were mixed: the pattern observed for exclamatives showed more of a reconstructing behavior, whereas sentence stress assignment in wh-questions looks more surface-oriented (this surprisingly also holds for the distribution of phrasal stress, which has been argued to be reconstruction-based by Bresnan 1971 and Selkirk 1995). Because the presuppositions associated with wh-questions might have confounded the judgments, further research on other constructions, especially relative clauses, will be useful. The fifth experiment investigated the relation between givenness and accentuation in more detail. The results are compatible with the assumption that new phrases are problematic in the postnuclear domain due to the obligatory deaccentuation. In the prenuclear domain, however, no effects of this sort were found, perhaps due to perceptual differences concerning material that precedes / follows the nuclear accent.

From a methodological point of view, I hope to have shown that modeling studies of the kind that I conducted here can help us to evaluate whether an empirical phenomenon can be fully reduced to already established linguistic principles, or whether it is necessary to add new principles and/or adjust existing ones in order to arrive at an empirically adequate model. Especially in empirical areas like the domain of information-structure related phenomena, in which a wide range of factors must be taken into account and judgments are typically gradient and subtle, controlled experiments and statistical modeling can help to disentangle effects of prosody, syntax, and semantics, and to identify problematic predictions of theoretical models.

Besides a solid empirical basis, testing of theories also requires an explicit model of acceptability. Building on core ideas of Keller's (2000) Linear Optimality Theory, I proposed a general template how grammatical models can be complemented to make testable acceptability predictions, as well as a specific model for the domain of object-initial structures in German that can be tested against further data.

I hope to have provided an exemplary demonstration of how theoretical models can be effectively tested in empirical domains where this is not a trivial task, and to have shown that it is desirable to work towards a comprehensive, methodologically uniform collection of data that allows to unravel the sources of acceptability differences for a wide range of phenomena.

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Appendix A

Supplementary experiment information

A.1 Experiment instructions

The following instructions were used in the experiments reported in chapter 5. The instructions were presented in written form, except for the three examples, which were presented auditorily. An English translation will be given below.

Original instructions in German Deine Aufgabe bei diesem Experiment besteht darin, die Akzeptabilität von Äußerungen in einem bestimmten Kontext zu bewerten. Du wirst gleich nacheinander 168 kurze Dialoge hören. Jeder Dialog steht dabei für sich und hat keinen Zusammenhang mit den anderen Dialogen. Jeder Dialog besteht aus zwei Äußerungen. Deine Aufgabe ist es, die Akzeptabilität der zweiten Äußerung zu bewerten, wobei die erste Äußerung als Kontext dient. Stelle dir bei der Bewertung die Frage: Klingt die Äußerung in diesem Kontext natürlich? Würde man das auf diese Weise sagen? Die Bewertung findet auf einer Skala von 1 (völlig unakzeptabel) bis 7 (völlig akzeptabel) statt. Achtung: Du bewertest immer nur die zweite Äußerung, die erste dient lediglich als Kontext.

Zur Verdeutlichung der Aufgabenstellung wirst du nun drei Beispieldialoge hören. Im ersten davon ist die zweite Äußerung im vorgegebenen Kontext passend und sollte dementsprechend eine hohe Bewertung bekommen (etwa 6 oder 7). In den anderen beiden Beispielen klingt die zweite Äußerung jeweils nicht ganz natürlich – man würde das in diesem Kontext eher nicht so sagen. Der zweite und dritte Dialog sollten daher eine

niedrigere Bewertung bekommen.

- (1) a. Example 1 (audio): Ich suche den Schlüssel zum Computerraum. Weißt du, ob ihn gestern jemand benutzt hat?

Michael hat ihn gestern benutzt.

(After the audio file stopped, the following text was shown:) In diesem Dialog war die zweite Äußerung akzeptabel und sollte daher eine hohe Bewertung bekommen.

- b. Example 2 (audio): Ich suche den Schlüssel zum Computerraum. Weißt du, ob ihn gestern jemand benutzt hat?

Michael hat ihn gestern benutzt.

(After the audio file stopped, the following text was shown:) In diesem Dialog war die zweite Äußerung keine passende Reaktion auf die erste Äußerung – man würde das in diesem Kontext eher nicht so sagen. Dieser Dialog sollte daher eine niedrige Bewertung bekommen.

- c. Example 3 (audio): Ich suche den Schlüssel zum Computerraum. Weißt du, ob ihn gestern jemand benutzt hat?

Hat Michael ihn gestern benutzt.

(After the audio file stopped, the following text was shown:) In diesem Dialog war die zweite Äußerung keine passende Reaktion auf die erste Äußerung – man würde das in diesem Kontext eher nicht so sagen. Dieser Dialog sollte daher eine niedrige Bewertung bekommen.

Gleich beginnt das Experiment. Es wird folgendermaßen ablaufen: Höre dir zunächst den Dialog aufmerksam an. Danach erscheint eine Skala von 1 (völlig unakzeptabel) bis 7 (völlig akzeptabel). Verwende die obere Zahlenreihe auf der Tastatur, um deine Bewertung abzugeben. Drücke dann die Leertaste, um zum nächsten Dialog zu kommen. Du kannst an dieser Stelle auch jederzeit eine Pause einlegen, bevor du weitermachst. Jeder Dialog kann nur ein einziges Mal angehört werden. Falls es vorkommt, dass du einen Dialog nicht richtig gehört oder verstanden hast, ist das nicht gravierend. Wähle in diesem Fall einfach trotzdem eine Bewertung und fahre mit dem Experiment fort. Ebenso ist es nicht möglich, eine bereits abgegebene Bewertung zu ändern. Solltest du dabei einen Fehler gemacht haben, kannst du trotzdem einfach mit dem nächsten Dialog weitermachen.

English translation Your task in this experiment is judging the acceptability of utterances in a given context. You are about to hear 168 short dialogues. Each dialogue is to be treated separately and does not have any relation to the other dialogues. Each dialogue consists of two utterances. Your task is to rate the acceptability of the second utterance, with the first utterance serving as a context. Before you give your rating, ask yourself the following questions: Does the utterance sound natural in this context? Would one say it in this way? For the rating, a scale from 1 (fully unacceptable) to 7 (fully acceptable) is provided. Remember: You always judge the second utterance, the first one only serves as a context.

As an illustration of the task, you will now hear three example dialogues. In the first one, the second utterance fits the given context and should therefore receive a high rating (e.g., 6 or 7). In the other two dialogues, the second utterance does not sound fully natural — one would rather not say this in this way in the given context. The second and third dialogue should therefore receive a low rating.

- (2) a. Example 1 (audio): I am looking for the key to the computer pool. Do you know if somebody used it?

Michael hat ihn gestern benutzt.
 Michael has it yesterday used
 ‘Michael used it yesterday.’

(After the audio file stopped, the following text was shown:) In this dialogue, the second utterance was acceptable and should receive a high rating.

- b. Example 2 (audio): I am looking for the key to the computer pool. Do you know if somebody used it?

Michael hat ihn gestern benutzt.
 Michael has it yesterday used
 ‘Michael used it yesterday.’ (with deviating sentence stress placement)

(After the audio file stopped, the following text was shown:) In this dialogue, the second utterance was not a suitable reaction to the first one – one would not say this like this in the given context. This dialogue should therefore receive a low rating.

- c. Example 3 (audio): I am looking for the key to the computer pool. Do you know if somebody used it?

Hat Michael ihn gestern benutzt.
 has Michael it yesterday used

‘Michael used it yesterday.’ (with ungrammatical verb initial word order)
(After the audio file stopped, the following text was shown:) In this dialogue, the second utterance was not a suitable reaction to the first one – one would not say this like this in the given context. This dialogue should therefore receive a low rating.

The experiment is about to start. It will proceed in the following way: first, listen carefully to the dialogue. Then, a scale from 1 (fully unacceptable) to 7 (fully acceptable) will appear. Use the upper number row on the keyboard to give your rating. Then, press the space bar to proceed to the next dialogue. You can use that point in the procedure to take a break at any time during the trial if necessary. You can listen to each dialogue only once. If it happens that you did not fully hear or understand a dialogue, it is not fatal. Please choose a rating nevertheless and proceed with the experiment. It is not possible to change a given rating, either. If you made a mistake during the rating, you can also nevertheless proceed with the next dialogue.

A.2 Phonetic details of the materials

Figures A.1–A.8 show mean normalized F0 contours of the materials used in the experiments reported in chapter 5. For the purpose of normalization, the sentences were divided into relevant subparts. The ProsodyPro script (Xu 2013) for Praat (Boersma & Weenink 2017) was used to obtain the mean normalized F0 values for each part. The dots in the schematic representation above each plot indicate how each sentence’s words were grouped for the purpose of normalization. For example, ‘*I think that* · *S* · *O* · *V AUX*’ in the first plot in Figure A.1 means that the normalized time span from 1 to 10 on the x-axis corresponds to the ‘*I think that*’ part of each item, the time span from 10 to 20 corresponds to the subject of the subordinate clause, the time span from 20 to 30 corresponds to the object, and the time span from 30 to 40 corresponds to the verb and auxiliary at the end of the sentence. The plots for experiment 1, 2, 3, and 5 are based on all tested materials. The plots for experiment 4 are based on a sample of 16 out of the 48 sentences per condition. For experiment 5, in which the exact details of accented/deaccented constituents matter, I additionally report duration and intensity values.

Experiment 1 The F0 contours for the items of experiment 1 are shown in Figure A.1. The difference between subject and object stress is clearly visible in the normalized F0

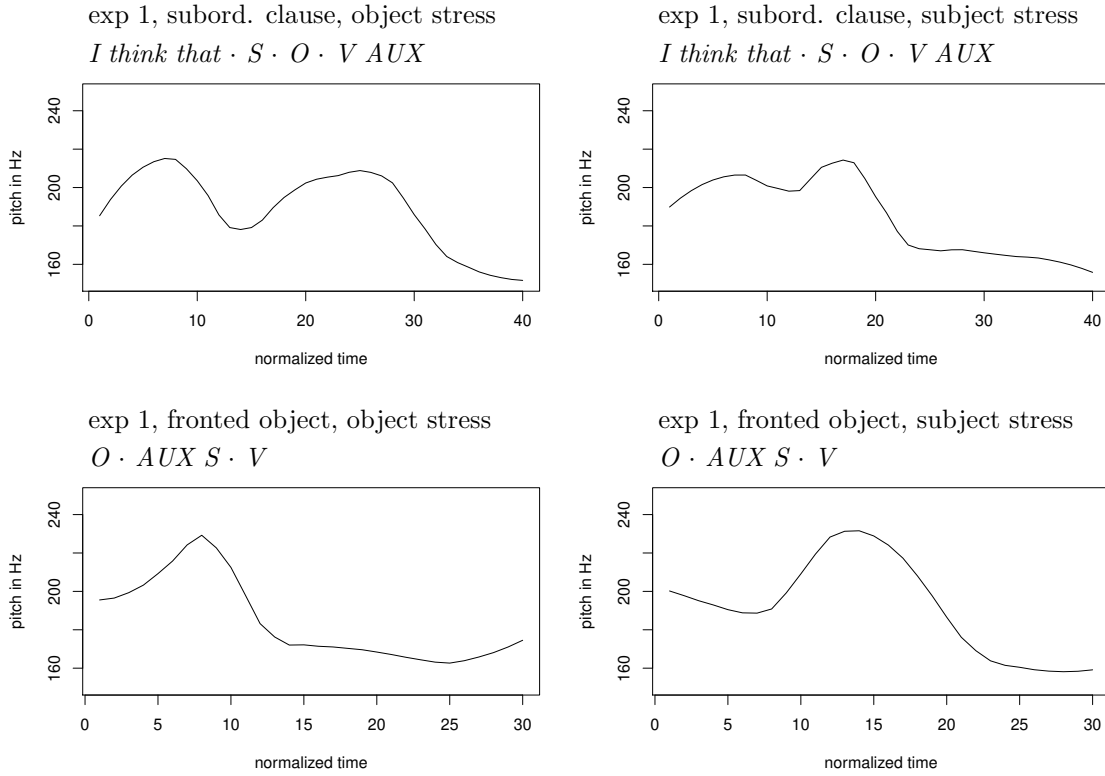


Figure A.1: Normalized F0 contours of the materials for experiment 1. Each part between two dots in the schematic representation corresponds to a normalized time span of 10 units.

contours. In the subordinate clause condition with object stress, a prenuclear pitch accent was realized on the subject (time span 10–20) and the nuclear pitch accent was realized on the object (20–30) (throughout all experimental materials, prenuclear pitch accents were typically realized as L^*+H , nuclear pitch accents as H^*L). In the subordinate clause condition with subject stress, the nuclear pitch accent was realized on the subject (10–20), and all following elements were deaccented. In the condition with a stressed fronted object, the nuclear pitch accent was realized on the object (0–10) and all following elements were deaccented. In the condition with a fronted object and subject stress, a prenuclear pitch accent was realized on the object (0–10) and the nuclear pitch accent on the subject (10–20).

Experiment 2 The F0 contours for the items of experiment 2 are shown in Figure A.2. In the subordinate clause condition, pitch accents were realized on both prenuclear constituents in the subordinate clause, namely the subject (time span 10–20) and the object

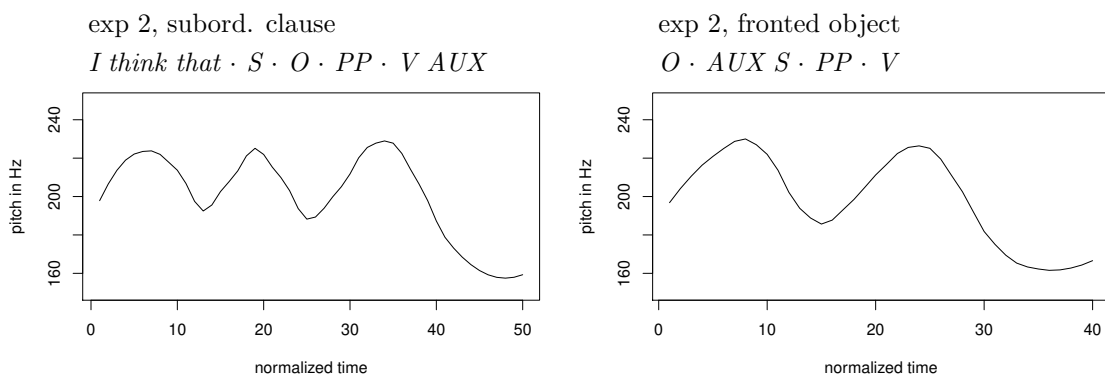


Figure A.2: Normalized F0 contours of the materials for experiment 2. Each part between two dots in the schematic representation corresponds to a normalized time span of 10 units.

(20–30). The PP carried the nuclear pitch accent (30–40). In the fronted object condition, pitch accents were realized on both prenuclear constituents, too: on the object (0–10) and on the subject (10–20). Again, the PP carried the nuclear pitch accent (20–30).

Experiment 3 The F0 contours for the items of experiment 3 are shown in Figure A.3. The plots show a clear difference between the subordinate clause items with the hat contour onset of the left argument vs. the right argument. The onset of the hat contour is clearly marked by a very steep and high rising tone preceded by an especially low valley (the “root” contour). The mean F0 contour does not show an entirely flat plateau, but a somewhat indented one. This pattern emerges from averaging over two different realizations of the contour that were employed. In half of the items, the plateau was kept fully flat at a high pitch level. In the other half of the items, a rising pitch accent was realized on the constituents located between the hat contour onset and offset, resulting in an indented pattern. These two different realizations were chosen to make it possible to have a look at potential effects of the presence/absence of accents within the hat contour. They are illustrated separately for the subordinate clause condition with the hat contour onset on the left argument in Figure A.4. In the subordinate clause conditions, this systematic manipulation did not have any discernible effect on the acceptability ratings. In the conditions with a fronted constituent, the observed acceptability differences were more pronounced with the two-peak realization than with the flat plateau realization. It could be worth investigating this factor in more detail in future experiments.

APPENDIX A. SUPPLEMENTARY EXPERIMENT INFORMATION

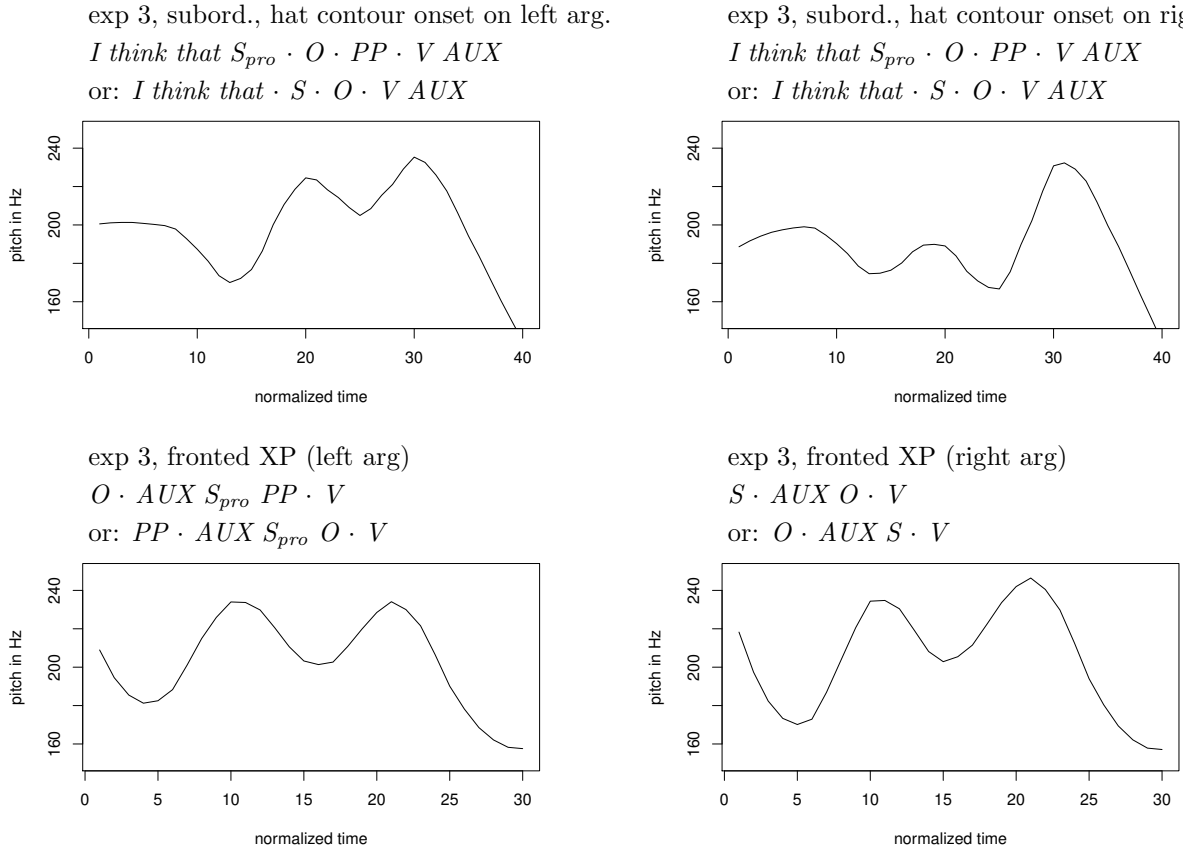


Figure A.3: Normalized F0 contours of the materials for experiment 3. Each part between two dots in the schematic representation corresponds to a normalized time span of 10 units.

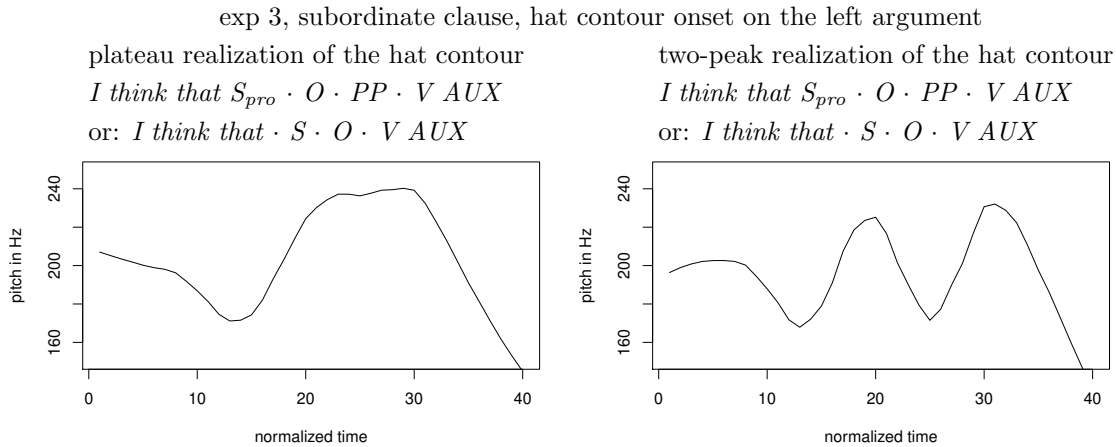


Figure A.4: Illustration of different hat contour realizations in experiment 3

APPENDIX A. SUPPLEMENTARY EXPERIMENT INFORMATION

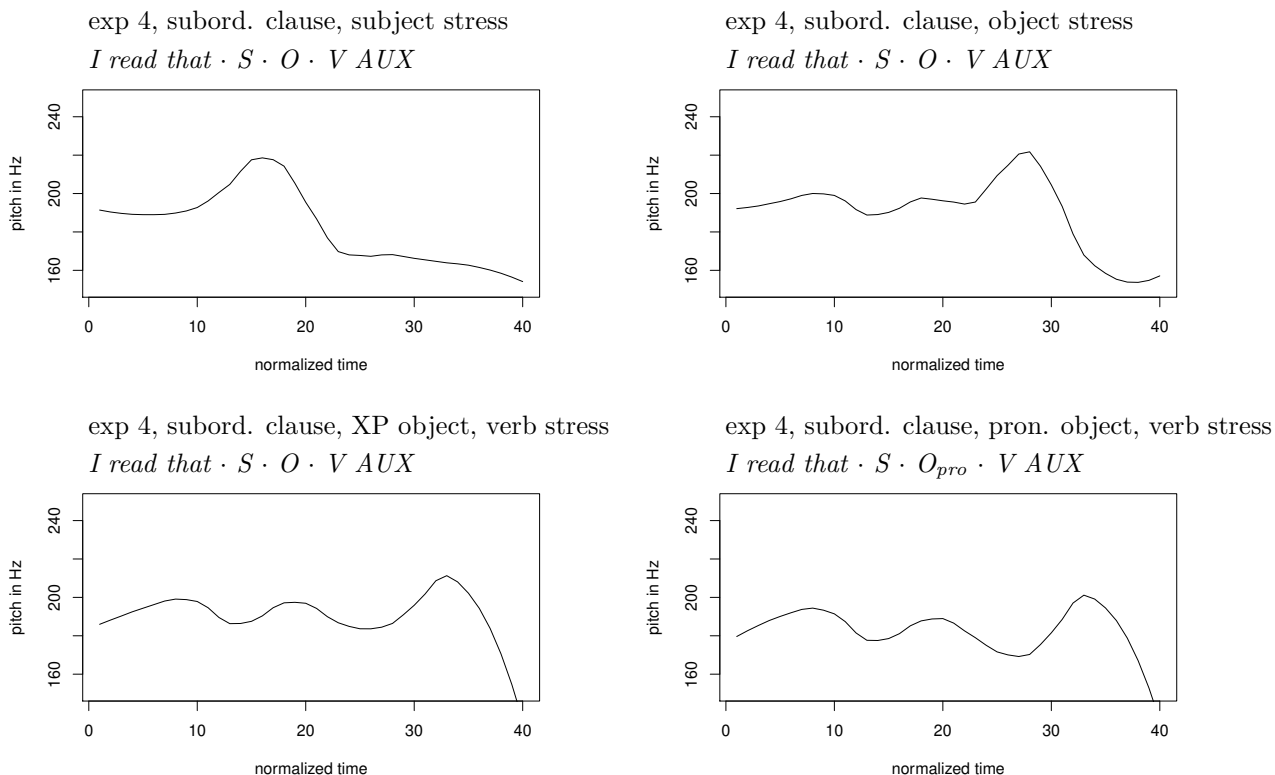


Figure A.5: Normalized F0 contours of the subordinate clause materials for experiment 4. Each part between two dots in the schematic representation corresponds to a normalized time span of 10 units.

Experiment 4 The F0 contours for the subordinate clause conditions of experiment 4 are shown in Figure A.5. Pitch accents were realized on all prenuclear constituents. Postnuclear elements were deaccented. Figure A.6 shows the contours of the wh-question conditions. Again, pitch accents were realized on all prenuclear constituents, postnuclear elements were deaccented. The wh-questions with object stress were realized with a high boundary tone at the end of the utterance, all others were realized with a low boundary tone. Figure A.7 shows the mean F0 contours for the split wh-questions and exclamatives. Pitch accents were realized on prenuclear constituents. The split wh-questions were realized with a high boundary tone, the exclamatives with a low boundary tone.

Experiment 5 The F0 contours for the items of experiment 5 are shown in Figure A.8. The plots show that there was a clear difference between the subordinate clause conditions with ‘deaccented’ prenuclear constituents and the conditions with ‘accented’ prenuclear constituents. The former show a flat pitch contour on the prenuclear phrases within the

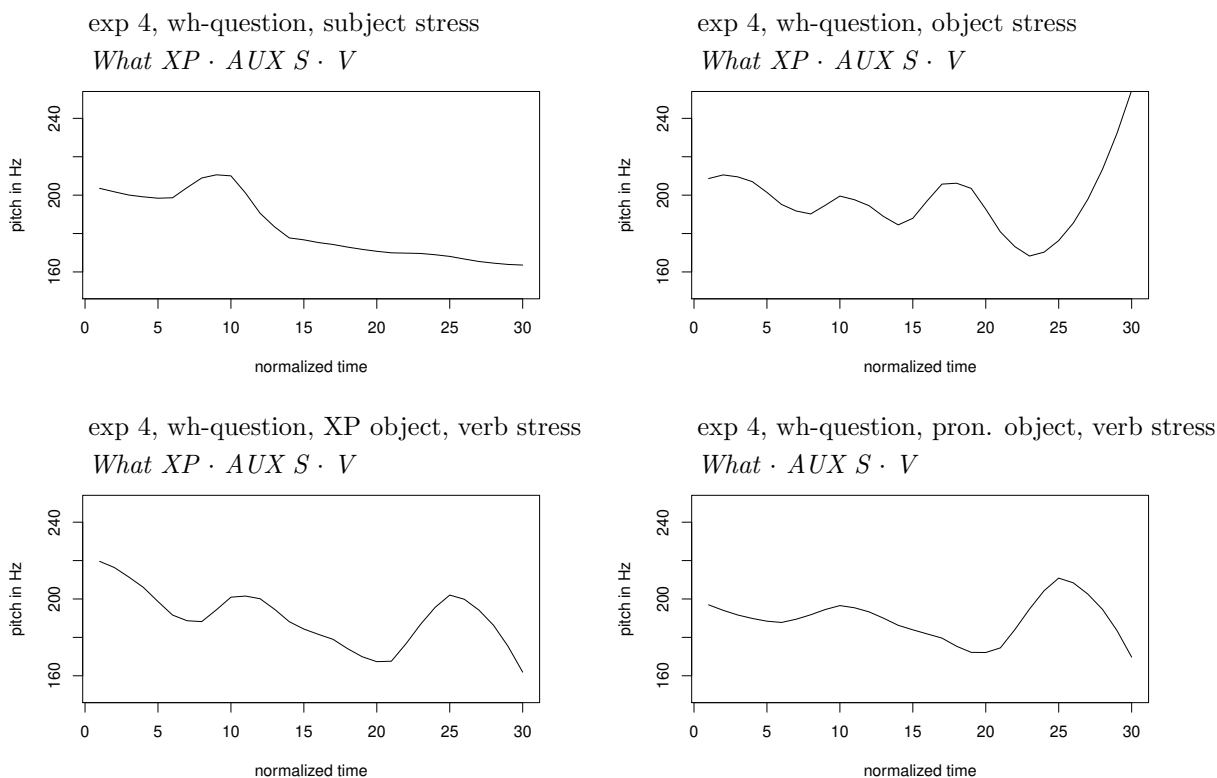


Figure A.6: Normalized F0 contours of the wh-question materials for experiment 4. Each part between two dots in the schematic representation corresponds to a normalized time span of 10 units.

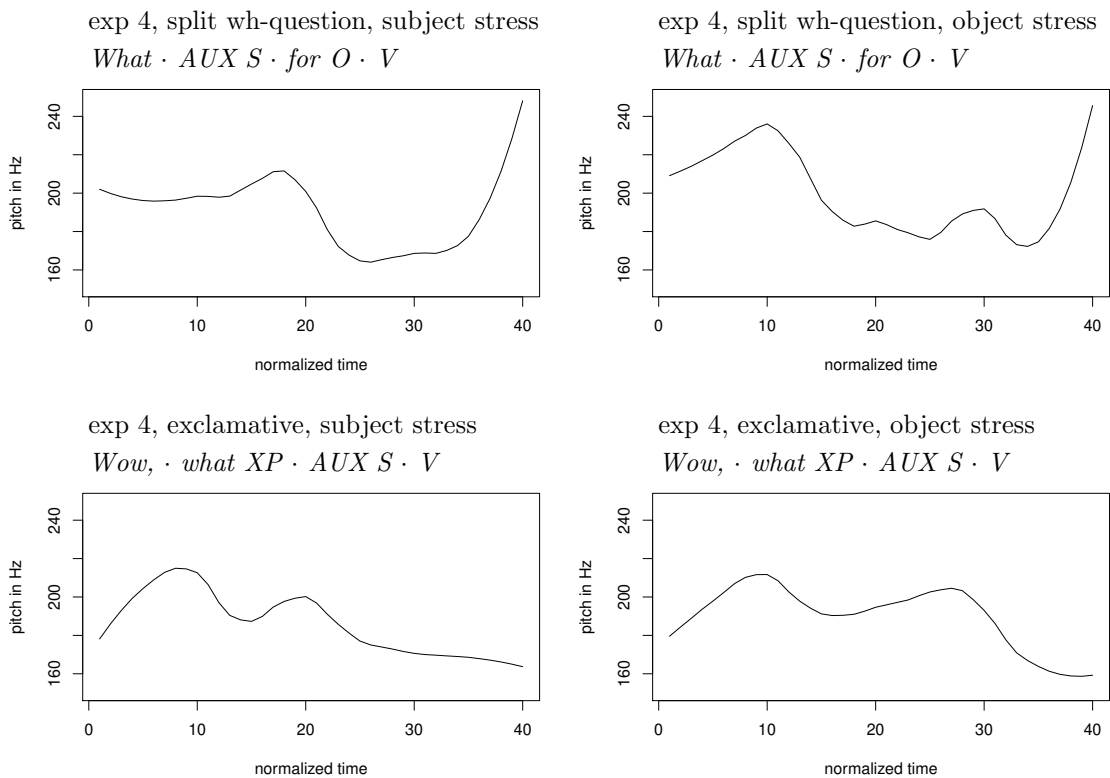


Figure A.7: Normalized F0 contours of the split question and exclamative materials for experiment 4. Each part between two dots in the schematic representation corresponds to a normalized time span of 10 units.

Conditions with two arguments:

| | subject | |
|-------------------------|---------------|----------------|
| | duration (ms) | intensity (dB) |
| prenuclear, accented | 645 | 56 |
| prenuclear, deaccented | 580 | 54 |
| postnuclear, deaccented | 622 | 53 |

Conditions with three arguments:

| | subject | | object | |
|-------------------------|---------------|----------------|---------------|----------------|
| | duration (ms) | intensity (dB) | duration (ms) | intensity (dB) |
| prenuclear, accented | 632 | 58 | 714 | 57 |
| prenuclear, deaccented | 523 | 54 | 589 | 53 |
| postnuclear, deaccented | 570 | 54 | 677 | 53 |

Table A.1: Phonetic details of the prenuclear / postnuclear XPs in experiment 5

subordinate clause (time span 10–20 in the condition with only one prenuclear XP, time span 10–30 in the condition with two prenuclear XPs). The latter show pronounced pitch excursions in the same region, indicating clear pitch accents on the prenuclear constituents. In the conditions with a fronted object/PP, the nuclear accent was on the fronted phrase (time span 0–10). All following elements were deaccented. To make sure that the ‘deaccented’ constituents in the prenuclear domain were comparable in prosodic prominence to the ‘deaccented’ constituents in the postnuclear domain, mean duration and intensity was measured for each subpart. For measuring duration and intensity, in the conditions with a fronted object, the subject was separated from the auxiliary (for the purpose of the normalized F0 contour, they were treated as a unit). The results are shown in Table A.1. The table shows that the prenuclear ‘deaccented’ constituents were indeed comparable in intensity to the postnuclear deaccented constituents, and both of them were different from the accented constituents. As for duration, the ‘deaccented’ constituents were even shorter than in the postnuclear domain on average. This shows that the intended accented/deaccented manipulation in the prenuclear domain was indeed achieved with respect to the phonetic measures of F0 excursion, duration, and intensity.

APPENDIX A. SUPPLEMENTARY EXPERIMENT INFORMATION

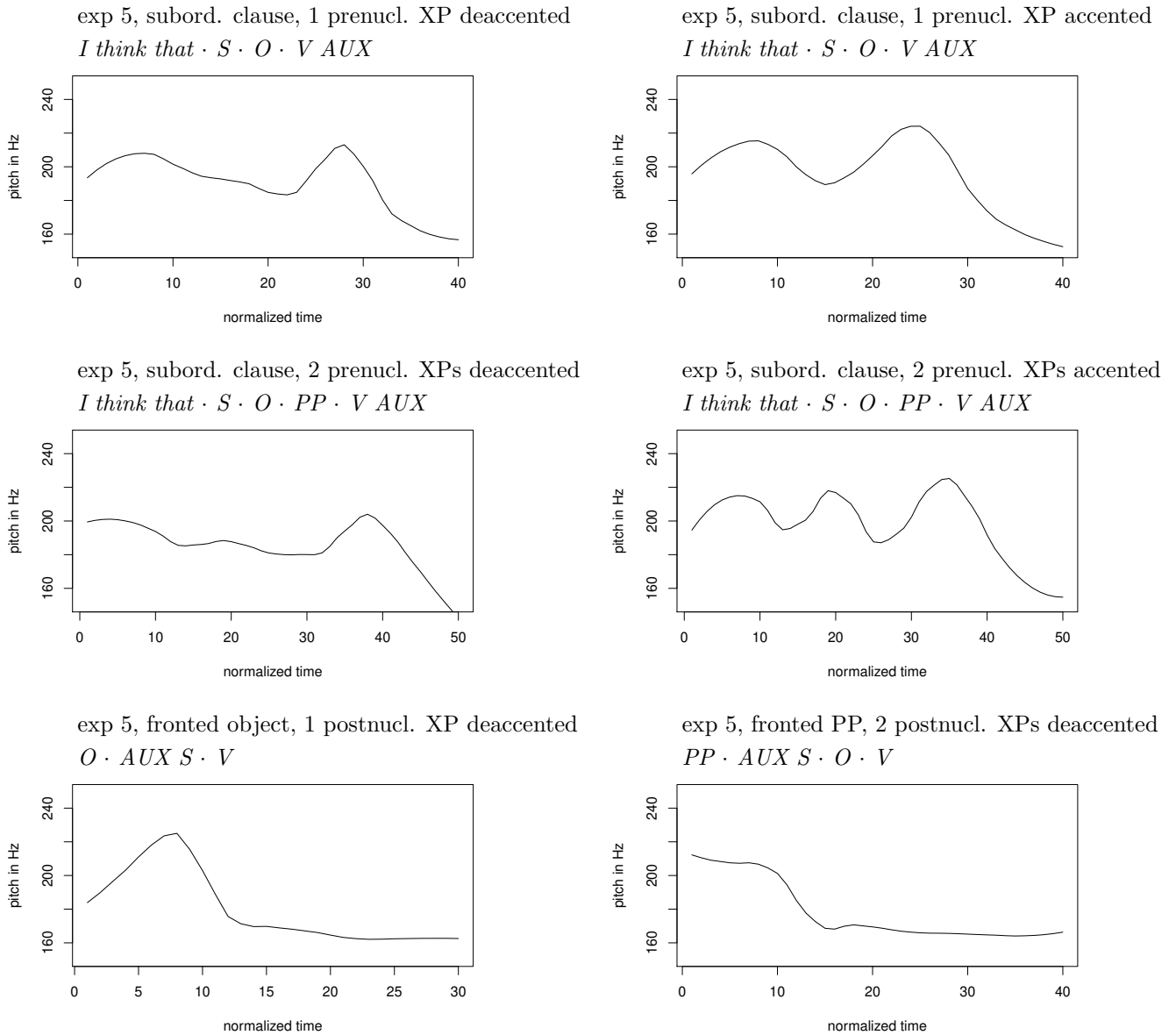


Figure A.8: Normalized F0 contours of the materials for experiment 5. Each part between two dots in the schematic representation corresponds to a normalized time span of 10 units.