



# German sentence accents and embedded prosodic phrases

Caroline Féry\*

Institut für Linguistik, Goethe-Universität Frankfurt am Main, Institut für Linguistik, Grüneburgplatz 1, 60629 Frankfurt/M, Germany

## ARTICLE INFO

### Article history:

Received 31 October 2009  
 Received in revised form 18 July 2011  
 Accepted 18 July 2011  
 Available online 7 September 2011

### Keywords:

German sentence accent  
 Prosody  
 Metrical phonology  
 Information structure  
 Syntax

## ABSTRACT

This paper proposes a new approach to German sentence accent assignment and intonational patterns using embedded prosodic domains. The concept of embeddedness is restricted to prosodic domains embedding and differs from Cinque's (1993) syntactic embeddedness. It is shown that both syntax and prosody play a role in sentence accents. Prosodic domains are projected from syntax, and every syntactic maximal projection is mapped into its own domain. However, some peculiarities of sentence accents are better accounted for in terms of prosodic structure itself. I propose extending the phenomenon called 'integration', which up to now has been exclusively applied to a sequence of argument and predicate: the head of a phrase can be at the same time the head of a larger phrase containing it. In this new account, integration is a prosodic phenomenon and it applies to a larger set of cases than assumed so far. It is shown that an OT account making use of a few well-motivated constraints can explain the default (unmarked) accent pattern, as well as a large number of more complicated data.

© 2011 Elsevier B.V. All rights reserved.

## 1. Introduction

In every German utterance, there is one 'nuclear' accent, which is defined as the main accent of the sentence (see Chomsky and Halle, 1968 for English). In general, it is the last accent of the sentence. In (1), the word *Kombi* 'station wagon' carries the nuclear accent. As has been observed by many authors (see Höhle, 1982; Krifka, 1984 and others), this preverbal accent is the nuclear one in a variety of focus structures, as illustrated in (1a–e).<sup>1</sup> All other accents are prenuclear. Accents are indicated by small caps, the subscript F stands for Focus and the brackets show the portion of the sentence in focus.

- (1) a. [ANNEMARIE hat dem NACHBARN ihr neues KOMBI gezeigt]<sub>F</sub>  
 b. ANNEMARIE [hat dem NACHBARN ihr neues KOMBI gezeigt]<sub>F</sub>  
 c. ANNEMARIE hat dem NACHBARN [ihr neues KOMBI gezeigt]<sub>F</sub>  
 d. ANNEMARIE hat dem NACHBARN [ihr neues KOMBI]<sub>F</sub> gezeigt  
 e. ANNEMARIE hat dem NACHBARN ihr neues [KOMBI]<sub>F</sub> gezeigt  
 Annemarie has the neighbour her new station.wagon shown  
 'Annemarie showed the neighbour her new station wagon.'

When the word that would carry the 'normal' nuclear accent (Höhle, 1982) is deaccented, or when the word carrying the nuclear accent is not the last one in the sentence, focus domains are more restricted (Gussenhoven, 1983, 1984; Selkirk,

\* E-mail address: [caroline.fery@googlemail.com](mailto:caroline.fery@googlemail.com).

<sup>1</sup> For definitions of information structural notions, see Krifka (2008).

1984, 1995; Höhle, 1982). In such cases, only a narrow focus reading is available. In (2a), with a nuclear accent on *Annemarie*, only the subject is focused; the remainder of the sentence is given, in the present case because it has been mentioned in the previous discourse. In (2b), the indirect object carries the nuclear accent. It is narrowly focused and the other constituents are given, again because they have been mentioned in the preceding question. Prenuclear accents may be realized on given material, and it is often difficult to decide whether a prenuclear accent is on truly new material or not (see Gussenhoven, 1984 for experiments bearing on prenuclear accents in English).

- (2) a. Wer hat ihren neuen Kombi dem Nachbar gezeigt?  
 ‘Who showed her new station wagon to the neighbour?’  
 [ANNEMARIE]<sub>F</sub> hat dem Nachbarn ihren neuen Kombi gezeigt
- b. Wem hat Annemarie ihren neuen Kombi gezeigt?  
 ‘To whom did Annemarie show her new station wagon?’  
 ANNEMARIE hat [dem NACHBARN]<sub>F</sub> ihren neuen Kombi gezeigt

When the verb carries the nuclear stress, as in (3), it must be narrowly focused. In this case, as in (2), this nuclear accent is not the default one. Again, in this accent pattern, the prenuclear constituents may or may not be given (though in the example, they are given by the preceding question).

- (3) Was hat Annemarie mit ihrem neuen Kombi und dem Nachbarn getan?  
 ‘What did Annemarie do with her new station wagon and the neighbour?’  
 ANNEMARIE hat dem NACHBARN IHR NEUES KOMBI [GEZEIGT]<sub>F</sub>

Thus, some accents stand for a focus domain that is larger than the accented material itself, and some only identify the accented constituent as focused (see the literature on focus projection, for example Rochemont, 1986; Selkirk, 1995 for English and von Stechow and Uhmann, 1986 for German). The aim of this paper is to propose a syntactic and phonological account of German sentence accent placement, signalling both broad and narrow focus, which builds on earlier accounts and closely considers the role of phonology.

The next section starts with an overview of the role of syntax in different structures and shows how syntax influences the formation of embedded prosodic phrases. Sections 2.2–2.4 address different syntactic configurations and examine how they bear on accent assignment through the formation of prosodic phrases. The formal framework used to illustrate the syntax–accent placement interface is Optimality Theory. Section 3 sums up the role of phonology for phonetic realization of sentence accents. Section 4 shows that the influence of information structure has to be accounted for differently than the role of syntax. More specifically, with unchanged syntax, information structure does not act on prosodic phrasing, but only on register and the height of pitch accents. Section 5 concludes.

## 2. The role of syntax in all-new sentences

### 2.1. Formation of prosodic phrases and integration

Starting with Fuchs (1976), the literature on German sentence accent has repeatedly addressed the phenomenon of ‘integration’, which posits that in a sequence of an argument and a predicate, the predicate is integrated into the p-phrase (or accent domain) of the argument (see also Schmerling, 1976; Selkirk, 1984; Krifka, 1984; Jacobs, 1993; Cinque, 1993; Truckenbrodt, 2006; Féry and Samek-Lodovici, 2006 for accounts of integration in German). Illustrations appear in (4). In (4a), the NP *ein Buch* is the object of the following verb *gekauft* and the accent on the direct object is the only one of the whole VP *ein Buch gekauft*. In (4b), the PP *nach Berlin* behaves in the same way. It is an argument of the verb *fahren* and the accent on *Berlin* is the only one in the VP. In (4), the subject is placed in Spec,CP, the first position of the sentence, by ‘Formal Fronting’, the operation of fronting to the prefield the highest constituent of the middle field.<sup>2</sup> The position of the auxiliary is an instance of V2. Further syntactic assumptions will be addressed shortly below.

- (4) a. [CP [NP MARIA<sub>1</sub>] hat [TP t<sub>1</sub>[VP[VP[NP ein BUCH] gekauft]]]]  
 Maria has a book bought  
 ‘Maria bought a book.’
- b. [CP [NP MARIA<sub>1</sub>] ist [TP t<sub>1</sub>[VP[VP[PP nach BERLIN] gefahren]]]]  
 Maria is to Berlin driven  
 ‘Maria drove to Berlin.’

<sup>2</sup> The name Formal Fronting is taken from Frey (2005), although his analysis is coached in Rizzi’s cartographic model, which is not adopted here.

Integration has a long history in the literature on German sentence accent assignment. Gussenhoven's (1983, 1992) Sentence Accent Assignment Rule (SAAR), formulated for English and Dutch, but easily transferable to German, simply posits that an accent domain is formed on an argument plus predicate, and that it is headed on the argument. Cinque (1993) proposes that syntactic embeddedness of constituents is enough to account for sentence accent placement. In his view, there is no need for the creation of prosodic domains. Projection of pitch accents is a further account, developed by Selkirk (1984, 1995) and Rochemont (1986) among others. Pitch accents project on domains larger than themselves according to the syntactic structure of the sentence. In an OT version of Gussenhoven's SAAR, combining prosody and syntax, Truckenbrodt (2006) and Féry and Samek-Lodovici (2006) propose that the assignment of sentence accents proceeds through the formation of headed prosodic phrases. Pitch accents always correspond to heads of prosodic phrases. Kratzer and Selkirk (2007) add a minimalist component to the prosodic approach: prosodic phrases correspond to spellout domains.<sup>3</sup> The proposal laid out in the present paper is close to those assuming the formation of prosodic phrases as a necessary step for the assignment of accents. However, crucially, it adds the idea of embeddedness of prosodic domains, which has been absent in all accounts so far. It disagrees with models which directly assign pitch accents on focused constituents or on syntactic constituents without going through the formation of prosodic constituents.

The heart of the present proposal is the insight that the phenomenon of integration is a consequence of the embeddedness of *prosodic domains* into larger ones that contain them. The smaller and larger prosodic phrases (p-phrases) share their head, which is realized as a pitch accent. The formation of p-phrases itself is based on the syntactic structure. In addition to the usual integration between head and adjacent argument, it is proposed below that integration can be generalized to other cases as well. Integration is an economical strategy since it restricts the number of pitch accents in a sentence.

Let us see how the account works in the simplest case, starting with a sentence with a lexical subject and a single verbal argument, such as those in (4), reproduced in (5) with the prosodic phrasing added. Such a simple sentence corresponds to an intonation phrase (i-phrase), which is the domain where the sentence intonation is realized, see Nespor and Vogel (1986:188–190), Selkirk (1984:295–296), Truckenbrodt (2005:275) among others. The i-phrase is divided into smaller p-phrases. I assume that a sentence is exhaustively parsed in prosodic domains at the highest level of phrasing (thus at the i-phrase level), and that this is guaranteed by a high-ranking constraint EXHAUSTIVEPROSODICPARSING, formulated in (8) below (see Selkirk, 2000). All candidates in the tableaux in this paper obey this constraint, and thus, in order to save place, it will not be displayed. In many cases, there is only one i-phrase, as illustrated in (5a).<sup>4</sup> An i-phrase is equivalent to a syntactic clause, and is typically bounded by a boundary tone at the i-phrase level. Both i-phrases and p-phrases are syntactically motivated. The subject *Maria*, as well as the VP form p-phrases at the p1-level (p-one). And inside the VP, the object *ein Buch* 'a book', a lower maximal projection, projects a p-phrase at the immediately lower level (p2). In (5b), the VP contains a directional argument, but the reasoning is the same as for (5a). Notice that only i-phrases, the highest level of phrasing, are subject to EXHAUSTIVEPROSODICPARSING, which requires that a sentence is entirely phrased in prosodic domains. All other levels may phrase the sentence only partially. This constraint is responsible for the fact that the auxiliary is included into the p-phrase formed on the lexically-headed VP.

- (5) a. [[*MARIA*]<sub>p1</sub> [hat [*ein BUCH*]<sub>p2</sub> gekauft]<sub>p1</sub>]<sub>i</sub>  
 b. [[*MARIA*]<sub>p1</sub> [ist [nach *BERLIN*]<sub>p2</sub> gefahren]<sub>p1</sub>]<sub>i</sub>

The same sentence can have two i-phrases, thus two prosodic domains at the highest level of phrasing. This happens when the subject is an aboutness or a contrastive topic, as for instance in a situation where the speaker wants to make a comment about Maria as opposed to somebody else (contrastive topic), or just to pick out Maria in the context (aboutness topic) and make a comment about her. In prosody, the topic projects a phrase at the highest level of phrasing (i-phrase), as shown in (6), and the vP is included in a separate i-phrase which also contains the direct object, see (7). Both i-phrases are included in a larger i-phrase, which shows that not only p-phrases are recursive, but also i-phrases. Recursive i-phrases are largely ignored in this paper.

- (6) a. [*MARIA*]<sub>i</sub> [hat [*ein BUCH*]<sub>p1</sub> gekauft]<sub>i</sub>  
 b. [*MARIA*]<sub>i</sub> [ist [nach *BERLIN*]<sub>p1</sub> gefahren]<sub>i</sub>

It is assumed that the different prosodic structure is the consequence of a different syntactic structure: the subject is placed in the Spec,TopP (Specifier of Topic Phrase) position (Rizzi, 1997). In other words, when the subject is a contrastive or an aboutness topic, it is also syntactically displaced. It is to be noted that the subject is in a position existing independently in the syntax, and which is called Spec,TopP here for lack of an alternative. More generally, I think that there is no need to postulate special positions for information structure in syntax. Rather the information structural needs of certain constituents have to be satisfied with what syntax proposes independently. The crucial property of TopP is that it is higher in syntactic projection than CP.

<sup>3</sup> See also Ishihara (2003, 2007) and Kahnemuyipour (2009) for a minimalist approach to prosodic structure in non-Germanic languages.

<sup>4</sup> A subscripted *i* indicates an i-phrase and a subscripted *P* a p-phrase.

Syntactic and prosodic structures act together to deliver the right sentence accent placement, corresponding to the intended information structure. The syntactic structure of (6a) is shown in (7). In case the subject *Maria* is not a topic, it is in Spec,CP, as shown in (4).

- (7) a. [<sub>TOPP</sub> [<sub>NP</sub> MARIA<sub>1</sub>] [<sub>CP</sub> hat [<sub>TP</sub> t<sub>1</sub> [<sub>VP</sub> [<sub>VP</sub> [<sub>NP</sub> ein BUCH] gekauft]]]]]]  
 b. [<sub>TOPP</sub> [<sub>NP</sub> MARIA<sub>1</sub>] [<sub>CP</sub> ist [<sub>TP</sub> t<sub>1</sub> [<sub>VP</sub> [<sub>VP</sub> [<sub>PP</sub> nach BERLIN] gefahren]]]]]]

An important component of the approach proposed here is that every argument is contained in its own prosodic domain (p-phrase or i-phrase) by virtue of being a maximal projection. This is accounted for by the constraint XP=PROSODIC-DOMAIN in (8a), where prosodic domain stands for p-phrase or i-phrase.<sup>5</sup> XP=PROSODIC-DOMAIN only accounts for prosodic parsing of syntactic maximal projections, but because of EXHAUSTIVEPROSODICPARSING in (8b) the entire phonetic material is parsed into prosodic domains, also when it does not correspond to a maximal projection. Functional material is attached to a p-phrase projected by a maximal projection, and unfinished parts of sentences, for instance, are parsed as i-phrases. This will not be addressed any further.<sup>6</sup> All candidates in the tableaux satisfy EXHAUSTIVITY.

- (8) a. XP=PROSODIC-DOMAIN (XP-Pro)

A syntactic maximal projection including at least a prosodic word is contained in its own prosodic domain.<sup>7</sup>

- b. EXHAUSTIVEPROSODICPARSING

A grammatical sentence is parsed entirely in prosodic domains.

Every p-phrase has a head, realized with a pitch accent. This is guaranteed by a high-ranking constraint ACCENTASSIGNMENT (AccAss), formulated in (9).<sup>8</sup>

- (9) ACCENTASSIGNMENT (AccAss)

The head of a prosodic domain (i-phrase and p-phrase) is realized by a pitch accent.

Each embedded p-phrase is labelled one level lower than the one containing it. As a result, if the head of a constituent forms its own p-phrase, this p-phrase is labelled one step lower than the constituent itself. And every p-phrase at a certain level of phrasing is at the same level of prominence as all other p-phrases at the same level of phrasing. This is expressed by a fourth OT constraint, SIMILARITY, in (10), adapted from Féry and Kentner (2010); see also Wagner (2005) for the idea that syntactic embedding is important for prosodic prominence.<sup>9</sup> Relative prominence will be represented in section 3 by metrical grids.

- (10) SIMILARITY

Constituents at the same level of embedding are realized at a similar level of prosodic prominence, irrespective of their inherent complexity.

As we will see below, the effect of SIMILARITY is cancelled at the i-phrase level by another constraint which assigns strongest stress to the rightmost constituent of an i-phrase. This accounts for the effect of Nuclear Stress Rule (NSR, Chomsky and Halle, 1968). The nuclear accent does not necessarily have more phonetic prominence than the other accents (see Gussenhoven, 1992; Selkirk, 2008 for the same claim). In fact, the last one of a series of accents at the same level of phrasing is often lower in pitch than the preceding ones in terms of F0 because of downstep, which is a regular feature of the tonal structure of German; see section 3.

The next constraint, NoPHRASE, in (11), militates against the creation of unnecessary structure. But again, it is not the same as the one used in Féry and Samek-Lodovici (2006), which consider all p-phrases equally bad. Here, the formation of high-level p-phrases is worse than the formation of lower-level p-phrases.<sup>10</sup> NoPHRASE is a family of constraints, organized in a

<sup>5</sup> This constraint may be compared to Selkirk's Match constraints (Selkirk, 2009), formulated for Japanese but easily transferable to other languages, which require that every higher syntactic constituent be matched by a constituent of a corresponding prosodic type in phonological representation.

<sup>6</sup> In particular, spontaneous spoken material, which is prone to false starts and unfinished constructions, is not considered here.

<sup>7</sup> The restriction that a p-phrase must contain at least a prosodic word is discussed in section 2.3.

<sup>8</sup> The constraints XP=PROS-DOM and ACCENTASSIGNMENT differ from STRESS-XP from Truckenbrodt (1995), adopted by Féry and Samek-Lodovici (2006), which posits that every maximal projection has a phrasal accent. As a result, a single pitch accent can be the head of a smaller or a larger XP at the same time. In the present approach, STRESS-XP is divided into two constraints: one responsible for the emergence of p-phrases (XP=PROS-DOM), and another responsible for pitch accents related to headedness (ACCENTASSIGNMENT). Crucially, in accounts using STRESS-XP, embeddedness of p-phrases is avoided rather than predicted. A second, more conceptual difference is that in a model using STRESS-XP, prosodic domains are the results of pitch accents, which are themselves assigned to syntactic constituents. In the embedding model proposed here, the formation of prosodic domains is primary and triggers accenting, but we will see below that the reverse is not true: pitch accents are not necessary for the presence of prosodic constituents.

<sup>9</sup> See also Ishihara (2003, 2007) and Ito and Mester (2009) for prosodic embedding in Japanese.

<sup>10</sup> As suggested to me by Karsten Koch (p.c.), it is less costly to form p-phrases, because they are separated from adjacent phrases with less tonal effort. For instance, high boundary tones do not reach as high a F0 value as those of i-phrases.



heads of p1-phrases and are thus at the same level of prominence. We need a new constraint stating that the rightmost head is the head of the immediately higher level. This is HEAD OF I-PHRASE, formulated in (13). This constraint is an alignment constraint requiring that the head of every i-phrase be aligned with its right edge (McCarthy and Prince, 1993; Truckenbrodt, 1995; Féry and Samek-Lodovici, 2006). It mimics the effect of the Nuclear Stress Rule.

(13) HEAD OF I-PHRASE (HIP)

Align the right boundary of every i-phrase with its head.

There is an asymmetry between the need to posit the NSR at the level of the i-phrase, expressed by HIP, and the effect of SIMILARITY at all other levels of phrasing. Candidate b. in T2 locates the head of p1 to the left, and thus violates HIP. Both Candidates a. and b. violate SIMILARITY, since both have an asymmetry in the prominence of their two phrases at the same level of phrasing. But a candidate with identical prominence of these two p-phrases, like candidate c, violates higher-ranking HIP.

SIMILARITY controls the prominence of lower p-phrases. If there are more than one p1-phrase in an i-phrase, it is not possible to satisfy both SIMILARITY and HIP at the same time, but if there are more than two, all of them except for the rightmost one will be at the same level of prominence.

In T2, it is visible that HIP has to dominate SIMILARITY. These are the two constraints responsible for relative accent strength. If SIMILARITY were ranked higher, candidate c. would be the winner. We now get the ranking: EXHAUSTIVITY, TOPIC, XP-PRO, AA >> NoPHRASE >> HIP >> SIMILARITY. HIP and SIMILARITY are ranked below NoPHRASE to block the addition of accents fulfilling HIP and SIMILARITY.

| T2: [Maria hat ein Buch gekauft] <sub>F</sub>   | XP-PRO | AccASS | NoPHRASE                    | HIP | SIMILARITY |
|---|--------|--------|-----------------------------|-----|------------|
| a. $\sigma$<br>x                  x          i-ph<br>x                  x          p1<br>[[Maria] <sub>p1</sub> [hat [ein Buch] <sub>p2</sub> gekauft] <sub>p1</sub> ] <sub>i</sub> |        |        | * (ip)<br>** (p1)<br>* (p2) |     | *          |
| b.<br>x                  x          i-ph<br>x                  x          p1<br>[[Maria] <sub>p1</sub> [hat [ein Buch] <sub>p2</sub> gekauft] <sub>p1</sub> ] <sub>i</sub>          |        |        | * (ip)<br>** (p1)<br>* (p2) | *!  | *          |
| c.<br>x                  x          i-ph<br>x                  x          p1<br>[[Maria] <sub>p1</sub> [hat [ein Buch] <sub>p2</sub> gekauft] <sub>p1</sub> ] <sub>i</sub>          |        |        | * (ip)<br>** (p1)<br>* (p2) | *!  |            |

The remainder of section 2 shows that this simple approach can explain a number of cases in sentence accent assignment that have proven difficult in past models.

## 2.2. Intransitive verbs

All-new German sentences with a subject, a verb, and nothing else have two accent patterns: either both the subject and the verb carry a pitch accent, or only the subject does. We will first take a look at sentences with a unique accent on the subject and then turn to sentences with double accents below.

When there is no topic, the subject, being an argument, is an embedded p-phrase and carries the accent of the i-phrase that comprises the whole sentence. This is the normal case with unaccusative (14), passive (15) and stage-level (16) predicates (see Diesing, 1988; Gussenhoven, 1983; Krifka, 1984, among others).

(14) [[Die KANZLERIN]<sub>p1</sub> ist gekommen]<sub>i</sub>  
       the chancellor is come  
       ‘The chancellor came.’

(15) [[Der RASEN]<sub>p1</sub> wurde gemäht]<sub>i</sub>  
       the lawn was mowed  
       ‘The lawn was mowed.’

(16) [[FEUERWEHRMÄNNER]<sub>p1</sub> sind verfügbar]<sub>i</sub>  
       firemen are available  
       ‘Firemen are available.’

Intransitive sentences with an eventive reading may also have a unique accent on the subject (but compare the examples (17), with one accent, to (18), the same sentences with two accents). In this case, it does not matter whether the predicate is unergative or unaccusative (see Sasse, 1987; Lambrecht, 1994 for the difference betweenthetic and categorical

propositions). There is simply no topic in such sentences, and as a result, the whole sentence forms just one i-phrase (see also Zubizarreta, 1998 for such sentences). This is illustrated in (17).

- (17) {Why have you come so late?}
- a. [[Die LOKFÜHRER]<sub>P1</sub> streiken]<sub>i</sub>  
 the engine-drivers go-on-strike  
 ‘The engine drivers have gone on strike.’
- b. {Why are you so happy?}  
 .... [weil [MARIA]<sub>P1</sub> getanzt hat]<sub>i</sub>  
 ... because Maria danced has  
 ‘because Maria danced’
- c. {Why are you pulling such a face?}  
 [[Mein AUTO]<sub>P1</sub> ist stehen geblieben]<sub>i</sub>  
 my car is stand remained  
 ‘My car broke down.’

In the other accent pattern, both the subject and the verb are accented. I assume that the presence of a topic interpretation of the subject is obligatorily expressed by fronting the subject to Spec,TopP, as illustrated above, and that the subject projects an independent i-phrase, because of its syntactic position.

This happens in sentences with an unergative verb (18) when these sentences do not have an eventive reading and in sentences with an individual-level predicate (19) (see Diesing, 1988). See section 2.3 for the accent on the second i-phrase.

- (18) a. ... [dass die LOKFÜHRERTOP]<sub>i</sub> [GESTREIKT haben]<sub>i</sub>  
 that the engine-drivers gone-on-strike have  
 ‘that the engine drivers have gone on strike.’
- b. ... [weil MARIA<sub>TOP</sub>]<sub>i</sub> [GETANZT hat]<sub>i</sub>  
 because Maria danced has  
 ‘because Maria danced’
- (19) [FEUERWEHRMÄNNERTOP]<sub>i</sub> [sind ALTRUISTISCH]<sub>i</sub>  
 firemen are altruistic  
 ‘Firemen are altruistic.’

The presence of a topic (contrastive or simply an aboutness topic) is dependent on the context, which means that a topic-comment articulation is always possible, also in sentences with an unaccusative verb. In such a case, the topic is again phrased in its own i-phrase. The sentences in (17), which could be realized with a single accent on the subject, are realized with an accent on the subject and another on the verb in (20). This is illustrated with (17c).

- (20) {Was ist mit deinen Verkehrsmitteln?}  
 ‘What happened with your vehicles?’  
 [Mein AUTO<sub>TOP</sub>]<sub>i</sub> [ist STEHEN geblieben]<sub>i</sub> (aber mein Motorrad nicht)  
 my car is stand remained but my motorbike not  
 ‘My car broke down, but not my motorbike.’

These two grammatical options co-exist in all intransitive sentences, since the positioning of the subject in Spec,CP or in Spec,TopP is an option provided by the syntax of German, even though the choice of one option over the other one may not be equal or indifferent for some verbs. Some verbs prefer a topic as subject more often than others. The choice between the two, which has a consequence for the prosodic structure and thus for the accent pattern of these sentences, is determined by the preferred role of the subject, as well as by the contextual needs of the speaker.

In the present model, sentences like those in (15) to (17), with a single accent on the subject, are the neutral or default case, since they have the simpler prosodic structure. This analysis differs from the one advanced by Kratzer and Selkirk (2007), who follow Jäger (2001). In their analysis, all sentences have a topic, and the default case is one in which the topic is overtly realized. They propose that sentences with only one accent also have a topic, but it is a covert spatio-temporal one, and it is thus a special case. In sentences with a stative (or individual-level) verb, like in (19), only the subject can fulfil the topic role. Such subjects typically move into a higher Spec,TopP position in the syntactic structure, as proposed here. The

main difference of the present proposal from Kratzer and Selkirk's approach, besides the optionality of topic, is the fact that filling Spec,TopP is a marked syntactic choice, whereas it is the default option in Kratzer and Selkirk's model.

The presence of a topic explains the two-accent pattern in (18) to (20). As a result, it is possible to analyze intransitive sentences in the same way as transitive ones, which can also have a topical or a non-topical subject, as discussed in the preceding section. Some sentences are just eventive, and do not create a TopP in the grammar. In the case of our examples, there is one i-phrase in such sentences and the accent is by default on the single argument.

T3 shows an all-new eventive sentence (subscript Ev in the input) with an unaccusative predicate, and T4 a topic-comment sentence with an unergative predicate. In T3, the subject is not a topic, and integration between verb and subject takes place. XP-PRO forces the emergence of a prosodic domain, obligatorily an i-phrase because of EXHAUSTIVITY, and NOPHRASE acts against the formation of more than one i-phrase.

| T3: [Die Kanzlerin ist gekommen] <sub>EV</sub>  | XP-PRO | NOPHRASE         | HIP | SIMILARITY |
|---|--------|------------------|-----|------------|
| a. $\text{X}$ i-ph<br>[[Die KANZLERIN] <sub>P1</sub> ist gekommen] <sub>i</sub>           |        | * (ip)<br>* (p1) |     |            |
| b. $\text{X}$ $\text{X}$ i-ph<br>[Die KANZLERIN] <sub>i</sub> [ist GEKOMMEN] <sub>i</sub> |        | **! (ip)         |     |            |

In T4, the subject is a topic and forms its own i-phrase under the pressure of TOPIC. The remainder of the sentence is a second i-phrase with its head on the verb. The optimal candidate violates NOPHRASE(\*i-PHRASE) more often than Candidate b., but Candidate b. is eliminated by TOPIC, a higher constraint.

| T4: [weil Maria <sub>TOP</sub> getanzthat] <sub>ALL-NEW</sub>   | TOPIC | XP-PRO | NOPHRASE         | HIP | SIMILARITY |
|---|-------|--------|------------------|-----|------------|
| a. $\text{X}$ $\text{X}$ i-ph<br>[weil MARIA <sub>TOP</sub> ] <sub>i</sub> [GETANZT hat] <sub>i</sub> |       |        | ** (ip)          |     |            |
| b. $\text{X}$ i-ph<br>[weil [MARIA] <sub>P1</sub> getanzt hat] <sub>i</sub>                           | *!    |        | * (ip)<br>* (p1) |     |            |

To conclude this section, let us go back to (17c), an eventive sentence, and augment it with a locational PP, as shown in (21). This adjunct projects its own p-phrase and prevents a direct integration between subject and verb. Both the subject and the PP project their own p-phrase by virtue of XP-PRO, and the PP *in Golm* carries the nuclear stress because of HIP, as shown in T5. As a result, the eventive and the topic-comment reading of this sentence do not differ in terms of the number of prosodic phrases.<sup>12</sup> Alternative realizations of sentences with a directional or locational PP are addressed in section 2.4.

- (21) [[Mein AUTO]<sub>P1</sub> [ist [in GOLM]<sub>P2</sub> stehen geblieben]<sub>P1</sub>]<sub>i</sub>  
 my car is in Golm stand remained  
 'My car broke down in Golm.'

| T5: [Mein Auto ist in Golm stehen geblieben] <sub>ALL-NEW</sub>   | XP-PRO | NOPHRASE          | HIP | SIMILARITY |
|---|--------|-------------------|-----|------------|
| a. $\text{X}$ $\text{X}$ i-ph<br>$\text{X}$ $\text{X}$ p1<br>[[mein AUTO] <sub>P1</sub> [ist in [GOLM] <sub>P1</sub> stehen geblieben] <sub>i</sub> |        | * (ip)<br>** (p1) |     | *          |
| b. $\text{X}$ i-ph<br>[[mein AUTO] <sub>P1</sub> [ist in Golm stehen geblieben] <sub>P1</sub> ] <sub>i</sub>  | *!     | * (ip)<br>* (p1)  |     | *          |

### 2.3. Resultative predicatives and detachable particles

In (18a–b) and (20a), only part of the verb of the second i-phrase has a pitch accent, although neither the verb nor the accented part of the verb projects a p-phrase. In (18a–b), the accented word is a prosodic word, whereas the unaccented auxiliary is just a function word. However in (20a), both parts, the infinitive and the participle, are prosodic words (see Féry, 1995; Wiese, 1996; Hall, 1999; Raffelsiefen, 2000 for prosodic words in German). Together they form a complex prosodic word. I assume that, in an all-new sentence, the minimal prosodic domain that can be assigned a sentence accent is a prosodic word.<sup>13</sup> Which part of a complex prosodic word carries the accent is determined by word accent rules and has to be formulated elsewhere. If there is a competition between a p-phrase and a prosodic word for the sake of accenting, the p-phrase wins. A prosodic word (written as a subscript PW in the following examples) does not

<sup>12</sup> But the phonetic separation between the subject and the remainder of the sentence and the height of the rising accent on the subject may change because the boundary between the two parts differs in strength.

<sup>13</sup> In case of narrow contrastive or corrective focus, any syllable or even segment can be accented.

necessarily carry a pitch accent, whereas a p-phrase does (at least in an all-new sentence). And when a prosodic word carries a pitch accent, it is because it is the head of a p-phrase. In fact, only prosodic words are heads of p-phrases and carry pitch accents.

With a lexical argument, resultative predicatives and verbs with a particle may be unaccented, as shown in (22). They are predicates and integrated. As prosodic words they do not compete with p-phrases for sentence accent, and consequently, the argument bears the sentence accent, as before.<sup>14</sup> In the examples (22), the predicate is a complex prosodic word comprising two prosodic words, the verb and the adjective *tot* 'dead' or *leer* 'empty'. To keep things simple, let us assume that the subject is a topic and that it forms a i-phrase, which is ignored in the examples below.

- (22) a. Der JÄGER [hat [die FÜCHSE]<sub>P1</sub> [tot<sub>PW</sub> geschossen<sub>PW</sub>]<sub>PW</sub>]<sub>i</sub>  
 the hunter has the foxes dead shot  
 'The hunter shot the foxes dead.'
- b. CARLOTTA [hat [die FLASCHE]<sub>P1</sub> [leer<sub>PW</sub> getrunken<sub>PW</sub>]<sub>PW</sub>]<sub>i</sub>  
 Carlotta has the bottle empty drunk  
 'Carlotta drank the bottle empty.'

The same applies to detachable verbal particles. Together with their host, they form a prosodic word. And both the verb and the particle are prosodic words.<sup>15</sup>

- (23) MARIA [hat [ihre MUTTER]<sub>P1</sub> [an<sub>PW</sub>gerufen<sub>PW</sub>]<sub>PW</sub>]<sub>i</sub>  
 Maria has her mother called  
 'Maria called her mother.'

With pronominal objects, the complex predicate is the only prosodic word of the prosodic domain and the resultative adjective or the particle is accented; see (24). This is because pronouns are functional words and no prosodic words, and thus they do not form their own p-phrase. Either the adjective or the particle is the last PW in the sentence, as in (24a), or they form a compound with the predicate, in which case they also get the accent, as in (24b). For this reason, the adjective or the particle gets the nuclear stress, and the predicate is integrated into the same prosodic domain.

- (24) a. [Er schoss<sub>PW</sub> sie TOT<sub>PW</sub>]<sub>i</sub>  
 he shot them dead.
- b. MARIA [hat (wen/sie) AN<sub>PW</sub>gerufen<sub>PW</sub>]<sub>P1</sub>  
 Maria has (somebody/her) called.

By the same logic, the verb may be accented by virtue of being the only prosodic word in its i-phrase, as in (25).

- (25) MARIA [hat es GEKAUFT<sub>PW</sub>]<sub>i</sub>  
 Maria has it bought  
 'Maria bought it.'

To close this section, let us consider the following cases. In a sentence with a pronominal and a full argument, where the pronominal argument (the direct object *was* 'something') is preverbal, as in (26a), both arguments are in their own p-phrase. The verb is a prosodic word and heavy enough to be the head of a p-phrase. *Was* forms a p-phrase together with the verb, as predicted by XP-PRO. And of course the full argument *einem Kind* projects a p-phrase too. If both arguments are pronominal, as in (26b), only the verb is a prosodic word (and thus accentable), and consequently only one i-phrase is formed on the whole VP. And if the pronoun comes before the lexical argument, the latter forms a p-phrase with the verb again, as shown in (26c). In this case, the pronoun is just part of the same prosodic domain (see also Gussenhoven, 1992; Truckenbrodt, 2006 for integration of pronouns in prosodic domains).

- (26) a. MARIA [hat [einem KIND]<sub>P1</sub> [was GEGEBEN<sub>PW</sub>]<sub>P1</sub>]<sub>i</sub>  
 Maria has a child something given  
 'Maria gave something to a child.'

<sup>14</sup> Resultative predicatives must be accented in another type of construction, as in (i), where *unter den Tisch* is a maximal projection and thus carries a pitch accent.

(i) Hans hat Maria unter den TISCH getrunken.  
 Hans has Maria under the table drunk  
 'Hans drunk Maria under the table.'

<sup>15</sup> Non-detachable particles are not prosodic words. Rather they are proclitics or prefixes to their verbal hosts.

- b. MARIA [hat es ihm GEGEBEN]<sub>PPW</sub>]<sub>l</sub>  
 Maria has it him given  
 ‘Maria gave it to him.’
- c. MARIA [hat es [einem KIND]<sub>P1</sub> gegeben]<sub>l</sub>  
 ‘Maria gave it to a child.’

T6 illustrates the OT analysis of (26a). Both candidates b. and c. violate XP-PRO, albeit for different reasons: candidate b. because it has an XP not projecting a p-phrase, and candidate c. because was ‘something’ is not a prosodic word (see the formulation of XP-PRO in (8)): It is too light to be the head of a p-phrase.

| T6: [Maria <sub>TOP</sub> hat einem Kind was gegeben] <sub>F</sub> |   |   |   |      | XP-PRO | HIP | SIMILARITY |
|--|---|---|---|------|--------|-----|------------|
| a.   | x   |   | x | i-ph |        |     |            |
| ⊗  | x   | x | x | p1   |        |     | *          |
|  | [Maria] <sub>i</sub> [hat [einem Kind] <sub>P1</sub> [was gegeben] <sub>P1</sub> ] <sub>i</sub> |   |   |      |        |     |            |
| b.   | x   |   | x | i-ph | *!     |     |            |
|  | [Maria] <sub>i</sub> [hat einem Kind was gegeben] <sub>i</sub>                                  |   |   |      |        |     |            |
| c.   | x   |   | x | i-ph |        |     |            |
| ⊗  | x   | x | x | p1   | *!     |     | *          |
|  | [Maria] <sub>i</sub> [hat [einem Kind] <sub>P1</sub> [was] <sub>P1</sub> gegeben] <sub>i</sub>  |   |   |      |        |     |            |

2.4. More arguments and adjuncts

We now turn to sentences with more than two lexical arguments. In (27), the subject is a topic again. There remain two arguments in the VP which compete for being the head of the i-phrase. The competition is decided by HIP, and the rightmost wins, as illustrated in T7, which displays only the most relevant constraints.<sup>16</sup>

- (27) a. [MARIA<sub>TOP</sub>]<sub>l</sub> [hat [ein BUCH]<sub>P1</sub> [einem KIND]<sub>P1</sub> gegeben]<sub>l</sub>  
 Maria has a.ACC book a.DAT child given  
 ‘Maria gave a book to a child.’
- b. [MARIA<sub>TOP</sub>]<sub>l</sub> [hat [einem KIND]<sub>P1</sub> [ein BUCH]<sub>P1</sub> gegeben]<sub>l</sub>  
 Maria has a.DAT child a.ACC book given  
 ‘Maria gave a book to a child.’

| T7: [Maria <sub>TOP</sub> hat einem Kind ein Buch gegeben] <sub>F</sub> |   |   |   |      | XP-PRO | HIP | SIMILARITY |
|---|---|---|---|------|--------|-----|------------|
| a.  | x   |   | x | i-ph |        |     |            |
| ⊗   | x   | x | x | p1   |        |     | *          |
|   | [Maria] <sub>i</sub> [hat [einem Kind] <sub>P1</sub> [ein Buch] <sub>P1</sub> gegeben] <sub>i</sub> |   |   |      |        |     |            |
| b.  | x   | x | x | i-ph | *!*    |     |            |
|   | [Maria] <sub>i</sub> [hat einem Kind ein Buch gegeben] <sub>i</sub>                                 |   |   |      |        |     |            |
| c.  | x   |   | x | i-ph |        |     |            |
| ⊗   | x   | x | x | p1   |        | *!  | *          |
|   | [Maria] <sub>i</sub> [hat [einem Kind] <sub>P1</sub> [ein Buch] <sub>P1</sub> gegeben] <sub>i</sub> |   |   |      |        |     |            |

According to Kratzer and Selkirk (2007:106), who provide a minimalist account of German sentence accent assignment, “[t]he highest phrase within the spellout domain of a phase corresponds to a prosodic major phrase in phonological representation.” This implies that in their sentences in (28), only *Geige* or *Kinder* are accented in the VP. *Supermarkt* or *Schule* are not, and of course the verb is not either. Kratzer and Selkirk (2007:107) only consider locational and directional PPs, where this accenting option is borne out (see their examples in (28)).

- (28) a. ... dass ein JUNGE eine GEIGE im Supermarkt kaufte  
 that a boy a violin in-the supermarket bought  
 ‘that a boy bought a violin in the supermarket’
- b. ... dass MARIA KINDER in die Schule fuhr  
 that Maria children in the school drove  
 ‘that Maria drove children to school’

<sup>16</sup> See Lenerz (1977) for word order according to different principles, like definiteness, animacy, length, pronominality and case.

The examples in (28) contrast with those in (27), where two arguments each project their own p-phrase and are accented. The accent pattern of (27) cannot be changed, but the accent pattern of (28) is only optional. Both (29a and b) are possible, and similarly in (28b), *Schule* can be accented as well. We again assume that the subject is a topic.

- (29) a. ... [dass ein JUNGE]<sub>i</sub> [[eine GEIGE]<sub>p1</sub> [im SUPERMARKT]<sub>p1</sub> kaufte]<sub>i</sub>  
 b. ... [dass ein JUNGE]<sub>i</sub> [[eine GEIGE]<sub>p1</sub> [im Supermarkt]<sub>p2</sub> kaufte]<sub>i</sub>

Moreover, in the variant with an accented adjunct (29a), the verb can be accented or not. This is shown in (30). In the variant (29b) in an all-new reading, the verb is never accented. A rendering of this sentence with an accented verb and an unaccented adjunct conveys narrow focus on the verb.

- (30) a. ... [dass ein JUNGE]<sub>i</sub> [[eine GEIGE]<sub>p1</sub> [im SUPERMARKT]<sub>p1</sub> [KAUFTE]<sub>p1</sub> ]<sub>i</sub>  
 b. ... [dass ein JUNGE]<sub>i</sub> [[eine GEIGE]<sub>p1</sub> [im SUPERMARKT]<sub>p1</sub> kaufte]<sub>i</sub>

The sentences with variable accent in (28), (29) and (30) have all the same preverbal adjunct, which means that the accent optionality is not a consequence of a variable syntactic structure. Rather this optionality is inherent to the nature of the adjunct, and to its position between the verb and the argument of the verb. Leaving the optional accent on the verb aside for the moment, the prosodic structure projected from the syntax allows for two different accent patterns, one which respects the linear arrangement of the constituents, as in (29a), where the last p1-phrase gets the nuclear accent, and one in which the predicate-argument relation is stronger, as in (29b). The accent pattern (29a) is identical to the one of sentences with two arguments, as in (27) and in T6. In such a configuration, the verb is integrated into the adjacent adjunct (or it gets its own accent, see below), and HIP is responsible for the rightmost head.

Alternatively, the integration between the verb and its non-adjacent argument (*eine Geige* 'a violin' in (29b)) is a stronger requirement. The only way to express the object-verb integration phonologically is to avoid the intervention of a pitch accent between object and verb. An account in which a p-phrase can be embedded into another one is compatible with this accent avoidance. In the case at hand, the phrase formed by the adjunct is prosodically embedded into the phrase formed by the object and the verb, an i-phrase in our example. The adjunct projects its own p-phrase, but its prosodic status can vary. In the accent structure of (29b), it is prosodically weaker than the p-phrase on the argument-predicate complex. In this case, it is prosodically subordinate to it, and ultimately, because of its postnuclear status, its accent is deleted.<sup>17</sup>

In T8, it is shown how the OT account proposed here accounts for this accent pattern. The adjunct is rendered metrically invisible by the constraint ADJUNCTSUBORDINATION (ADJ<sub>SUB</sub>), formulated in (31), which requires that the prosodic phrase of an adjunct is subordinate to the prosodic phrase of the argument-predicate complex. This constraint forces the argument-predicate integration across an intervening adjunct. It requires prosodic subordination of the prosodic constituent built on an adjunct relative to the larger argument-predicate complex. This constraint is on a tie with HIP, accounting in this way for the optionality of the two accent patterns. When HIP wins, accent pattern (29a) emerges, see T8; when ADJUNCTSUBORDINATION wins, (29b) emerges, see T9. The optionality of accent is not available in a sentence with two arguments, as in (27), because arguments are obligatorily at the same level of prosodic embedding (see T7), and are not subject to ADJUNCTSUBORDINATION.

- (31) ADJUNCTSUBORDINATION (ADJ<sub>SUB</sub>)  
 The p-phrase of an adjunct is subordinate to the p-phrase of an argument-predicate complex

In the configuration just described, *eine Geige* is the nuclear accent of the sentence, and all postnuclear accents are deleted, the one on *Supermarkt*, but also the one on the verb. This is accounted for by POSTNUCLEARDEACCENTING formulated in (32). Deletion of accents due to postnuclearity is stronger than ACCENTASSIGNMENT. It should be noted that none of the examples used above is touched by this constraint. Beside the directional or locational adjunct under discussion, POSTNUCLEARDEACCENTING is needed most of all in sentences containing an early narrow focus, realized with an early nuclear accent and postnuclear accent deletion. The effect of POSTNUCLEARDEACCENTING also explains the absence of optional accent on the verb in case the adjunct is unaccented, see below. All postnuclear material, adjunct and verb, are deaccented.

- (32) POSTNUCLEARDEACCENTING  
 Postnuclear pitch accents are deleted.

T8 and T9 are optional prosodic structures of the same syntactic structure. In T8, (ADJ<sub>SUB</sub>) is higher-ranking than HIP and in T9, the reverse ranking applies. In T8, *Geige* is the head of the i-phrase. This is because (ADJ<sub>SUB</sub>) requires the adjunct to be prosodically subordinate, and thus the adjunct *im Supermarkt* cannot be the head of the VP. Candidate a. fulfils (ADJ<sub>SUB</sub>), but violates equally ranked HIP. Candidate b. violates (ADJ<sub>SUB</sub>), but it is the optimal candidate in T9, when (ADJ<sub>SUB</sub>) is violated and HIP fulfilled. In this case, HIP dominates (ADJ<sub>SUB</sub>), and the last p-phrase, on the adjunct, is the head of the i-phrase.<sup>18</sup>

<sup>17</sup> An alternative account of the accent pattern (29b) is to assume that *im Supermarkt* forms a complex predicate with the verb. In this case, the accent pattern resembles the one of resultative predicatives discussed in section 2.3.

<sup>18</sup> This interpretation of T8 and T9 goes together with a model of grammatical variation. A tie between constraints expresses optionality between two potential optimal candidates. These candidates cannot be optimal at the same time, and in each realization, a choice between two rankings must be made.

| T8: [...eine Geige im Supermarkt kaufte] <sub>F</sub>   | PONUDEA | MAX-PRO | ADJ <sub>SUB</sub> | HIP | SIMILARITY |
|---|---------|---------|--------------------|-----|------------|
| a.<br>$\begin{matrix} x & & i\text{-ph} \\ \text{☞} & x & p1 \\ & [ [eine Geige]_{p1} [im Supermarkt]_{p2} kaufte ]_{IP} \end{matrix}$  |         |         |                    | *   |            |
| b.<br>$\begin{matrix} & & x & & i\text{-ph} \\ & x & & x & p1 \\ & [ [eine Geige]_{p1} [im Supermarkt]_{p1} kaufte ]_{IP} \end{matrix}$ |         |         | *!                 |     | *          |
| c.<br>$\begin{matrix} x & & i\text{-ph} \\ & x & p1 \\ & [ [eine Geige]_{p1} im Supermarkt kaufte ]_{IP} \end{matrix}$                  |         | *!      |                    |     |            |

| T9: [...eine Geige im Supermarkt kaufte] <sub>F</sub>  | PONUDEA | MAX-PRO | HIP | ADJ <sub>SUB</sub> | SIMILARITY |
|--|---------|---------|-----|--------------------|------------|
| a.<br>$\begin{matrix} x & & i\text{-ph} \\ & x & p1 \\ & [ [eine Geige]_{p1} [im Supermarkt]_{p2} kaufte ]_{IP} \end{matrix}$                    |         |         | *!  |                    |            |
| b.<br>$\begin{matrix} & & x & & i\text{-ph} \\ \text{☞} & x & & x & p1 \\ & [ [eine Geige]_{p1} [im Supermarkt]_{p1} kaufte ]_{IP} \end{matrix}$ |         |         |     | *                  | *          |
| c.<br>$\begin{matrix} x & & i\text{-ph} \\ & x & p1 \\ & [ [eine Geige]_{p1} im Supermarkt kaufte ]_{IP} \end{matrix}$                           |         | *!      |     |                    |            |

Notice that this account predicts that sentence (21) in an all-new context can be optionally realized with only an accent on the subject (*Mein Auto ist in Golm stehen geblieben* 'My car broke down in Golm'). And indeed, this curious fact has been noted in the literature on German sentence accent (see Zubizaretta, 1998 for instance), but has never found a satisfying account so far. In the present account, the possible unaccentedness of the locational adjunct *in Golm* 'in Golm' is a consequence of its intervening position between the unique argument of the sentence *mein Auto* 'my car' and the predicate *stehen geblieben* 'broke down'. Its accent status is thus subject to the same optionality as *im Supermarkt* 'in the supermarket' in T8 and T9.

In an all-new sentence, a temporal adverb is preferably located before an argument in German, as illustrated in (33). The accent on the adjunct is prenuclear and does not intervene between object and verb. There is thus no reason to delete it.

- (33) ... [dass ein JUNGE]<sub>L</sub> [[GESTERN]<sub>P1</sub> [eine GEIGE]<sub>P1</sub> kaufte]<sub>L</sub>  
 that a boy yesterday a violin bought  
 'that a boy bought a violin yesterday'

To sum up, this approach makes a distinction between adjuncts and arguments, which is reflected in the prosody. In syntax, an argument is included in the VP, whereas an adjunct forms a separate maximal projection. As a result, an argument is syntactically closer to the verb than an adjunct, and this is optionally accounted for in the prosodic structure, depending on the linearization of the constituents and their prosodic embedding.

These predictions can be compared to Gussenhoven's SAAR (1983, 1992), which allows an argument followed by an adjunct (or a modifier in Gussenhoven's terminology) and a verb to be integrated into a single accent domain. However Gussenhoven allows this option only when the modifier is given, see also Truckenbrodt (2006). When it is part of an all-new sentence, the p-phrase containing the argument, the modifier, and the verb is split into three smaller domains, one for each constituent. In other words, Gussenhoven does not account for an accent pattern in which both the argument and the adjunct are accented, but the verb is not. However, this is a common pattern, realized in sentences like those in (34b). The accent pattern (34a), predicted by Gussenhoven, with an additional accent on the verb, is also possible, but is less favoured (only in 15% in the experimental results reported by Féry and Herbst, 2004).

- (34) {'I heard that you had a lot of fun with Melina. What did she do?'}  
 a. Melina hat eine ARIE auf der WANDERUNG GESUNGEN.  
 b. Melina hat eine ARIE auf der WANDERUNG gesungen.  
 Melina has an aria on the walk sung  
 'Melina sang an aria during the walk.'

The question thus arises of how the account proposed here explains the additional accent on the verb, see also (30a). Further sentences with only an adjunct and a verb appear in (35) and (36). In order to find out whether the verb is regularly accented, such sentences were tested experimentally by means of a production experiment, with the same methodology as the one used in Féry and Herbst (2004). Ten sentences were produced by 21 speakers, as answered to questions eliciting an all-new context. 208 of the 210 obtained utterances were analyzed for their accent structure.<sup>19</sup> There were 175 realizations with an

<sup>19</sup> Thanks to Anja Gollrad and Verena Thießen for technical help with these data.

accent on the adverb and one on the verb (84%), and 33 with a unique accent on the adverb (16%), showing that the adjunct is obligatorily accented but the verb only optionally so. This time, the optionality of integration is rendered by the optionality of realizing a pitch accent on the verb. The a. versions of (35) and (36) show that the participle can function as the prosodic head of the p-phrase projected by the VP, and does so in most cases in the absence of an argument. The b. versions, without accent on the verb, are cases of optional prosodic integration between adverb and verb. In the b. versions, the adjunct is the only head of the i-phrase because it is the only constituent forming a p-phrase.

- (35) a. Melina [hat [auf der WANDERUNG]<sub>P1</sub> [GESUNGEN]<sub>P1</sub>]<sub>I</sub>  
 b. Melina [hat [auf der WANDERUNG]<sub>P1</sub> gesungen]<sub>I</sub>  
 Melina has on the walk sung  
 ‘Melina sang during the walk.’

- (36) a. [Ich bin [SCHNELL]<sub>P1</sub> [GEFAHREN]<sub>P1</sub>]<sub>I</sub>  
 b. [Ich bin [SCHNELL]<sub>P1</sub> gefahren]<sub>I</sub>  
 I am fast driven  
 ‘I drove fast.’

Integration between adjunct and verb is not obligatory due to the fact that the adjunct is not as tightly connected to the verb as an argument, which is reflected in the syntactic structure. It was shown in (4), repeated here, that an argument is the only maximal projection in the VP. Due to this unique characteristic of the argument, integration of the verb and argument is more or less obligatory, at least when the verb is not too pragmatically loaded, that is, when it is more or less ‘predictable’ from the argument.

- (4) MARIA hat ein BUCH gekauft.  
 ‘Maria bought a book.’

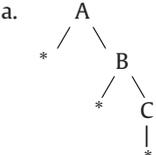
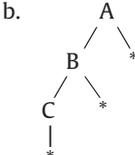
An adjunct is different because it forces the following verb to form a maximal projection and, according to some authors (Gussenhoven, 1992; Truckenbrodt, 2006), a p-phrase on the verb (because of lack of integration). However, as shown in (34) to (36), this is not the whole story, since in the case of an adjunct, integration can optionally also take place. The idea is that the VP as a whole is a constituent as well, and as such, it creates a p-phrase inside of which the adjunct is embedded. Depending on whether the adjunct or the verb is the head of the larger prosodic domain, the nuclear accent will be realized on the one or the other constituent.

To sum up section 2, the phenomenon of integration has been analyzed as a prosodic phenomenon and has been generalized to a larger set of cases than suggested in the earlier literature. It has been shown that integration between a predicate and its lexical argument is the rule, but that integration between an adjunct and a predicate is a special case, allowing variability of the accent structure. Here, adjunct subordination is competing with integration and the result is optionality of the accent on the adjunct and on the verb. In case of subordination, an adjunct intervening between an argument and a predicate can be metrically invisible and deaccented. In this latter case, the verb is also unaccented, showing that the constraint *POSTNUCLEARDEACCENTING* is at play.

Recall that contrary to the hypotheses formulated by Gussenhoven, the accent structure of (30a) and (34a) with accents on argument, adjunct and verb are rare. It can be assumed that no integration takes place in these cases, and that instead p-phrases are formed on all prosodic words, as shown in (30a).

### 3. Role of phonology: F0 interpretation of embedded p-phrasing

The concept of prosodic embeddedness of p-phrases, which was introduced in the preceding section, differs from the syntactic embeddedness of Cinque’s (1993) ‘Null Theory of Phrase Stress’. In Cinque’s approach, the most deeply embedded constituent gets the nuclear stress. In (37), which shows a right- and a left-branching structure, it is C in both cases.

- (37) a.  b. 

In the account proposed above, the last *pn* of a sequence of *pn*-phrases gets the nuclear accent, regardless of syntactic embeddedness. In (38), it is *Park* ‘park’, although from the perspective of syntax, the most deeply embedded constituent

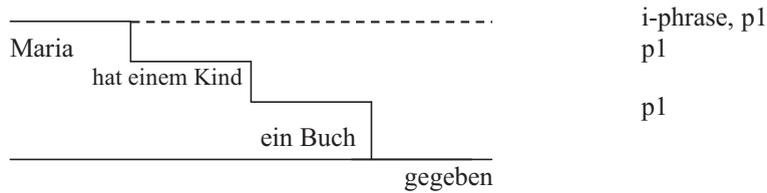


Fig. 1. Downstep.

is *Fell* ‘fur’.<sup>20</sup> *Fell* is the head of the prosodic constituent built on *kämmte den Hund mit weißem Fell* ‘combed the dog with white fur’, *den Hund mit weißem Fell* ‘the dog with white fur’, and on *mit weißem Fell*. The weak accents on *kämmte*, *Hund* and *weißem* come from their status as prosodic words, and from the rhythmic organization of the sentence not addressed in the present paper.

|      |  |          |           |             |   |                         |      |   |          |
|------|--|----------|-----------|-------------|---|-------------------------|------|---|----------|
|      | x  |          |           |             |   |                         |      | x | i-phrase |
|      | x  |          |           |             |   |                         |      | x | p-phrase |
|      | x  | x        |           | x           |   | x                       |      | x | p-word   |
| (38) | [MARIA] <sub>i</sub>                               | [[kämmte | [den Hund | [mit weißem | FELL] <sub>p3</sub> ] <sub>p2</sub> ] <sub>p1</sub> | [im PARK] <sub>p1</sub> |      |   |          |
|      | Maria  | combed   | the dog   | with white  | fur   | in-the                  | park |   |          |
|      | ‘Maria combed the dog with white fur in the park.’ |          |           |             |   |                         |      |   |          |

As we saw, the head of a p-phrase of level *n* is a p-phrase of level *n + 1*. If there is no embedded p-phrase able to function as a head, a prosodic word takes over. The relationship between heads of p-phrases is translated into a metrical grid constructed on the prosodic structure of the sentence, as illustrated in (38). Every head of a p-phrase gets a metrical beat. Because of recursion, there may be more than one grid level for each prosodic category. Metrical grids represent relative accentedness (Lieberman and Prince, 1977). The higher the p-phrase, the higher the grid beat. SIMILARITY requires that all heads of p-phrases be equally high, but higher-ranking HIP requires that in a sequence of heads of p-phrases competing for being the head of the i-phrase, the rightmost wins.

The phonological metrical structure is interpreted in order to be phonetically realized. Every p-phrase comes with a f0 register delimited by a topline and a bottomline. In an all-new sentence, the topline of every prosodic domain of level *n* is downstepped relative to the preceding prosodic domain of the same level *n*. Downstep can be recursive. Embedded p-phrases show downstep-within-downstep (van den Berg et al., 1992; Truckenbrodt, 2002). This property if prosodic domains can be expressed in form of a constraint as in (39).

- (39) DOWNSTEP  
 Every prosodic domain of some level *n* (pn-phrase) is downstepped relative to the preceding pn-phrase.

Heads of p-phrases are phonetically realized as bitonal melodies which are rising (L\*H<sub>p</sub>) or falling (H\*L<sub>p</sub>). These bipartite tones consist of the starred tone (the pitch accent proper), and a boundary tone of the p-phrase, with a subscript P. In most cases, the contours realized on heads of p-phrases are rising if the p-phrase is not i-phrase final and falling if final. H tones are adjusted to the topline of their local prosodic domains. Fig. 1 is an illustration of (40), repeated from (27) but without topic interpretation of the subject. The sentence is an i-phrase, and the topline of the i-phrase is available until the end of the i-phrase, as indicated by the dotted line. At the same time, it is the topline of the first p1-phrase *Maria*. The topline of the second p1-phrase (*einem Kind*) is downstepped relative to the first one, and the topline of the third p1-phrase (*ein Buch*) is downstepped relative to the topline of the second p1-phrase. The toplines of p-phrases are only available in their own domain. *Buch* carries the nuclear accent. The postnuclear region (*gegeben*) is compressed so that a pitch accent is no longer possible in this region.

(40) a. [[MARIA]<sub>p1</sub> [hat ein BUCH]<sub>p1</sub> [einem KIND]<sub>p1</sub> gegeben]<sub>i</sub>  
 Maria has a.ACC book a.DAT child given  
 ‘Maria gave a book to a child.’

Fig. 2 shows an alternative realization of the same sentence. *Buch* is still the nuclear accent, but it is adjusted to the highest topline of the sentence (see Truckenbrodt, 2002 for upstep of the last accent in medial i-phrases). In Féry and Kügler (2008), it was shown that this option is as common in all-new sentences as the one illustrated in Fig. 1 with downstep throughout. In the realization illustrated in Fig. 1, the nuclear accent is rather low and not prominent. However in Fig. 2, because of upstep, the accent is as prominent as in a narrow focus realization (see section 4). In this case, there is no topline corresponding to the third P1. The nuclear accent is adjusted to the i-phrase topline, showing in this way that it is the head of the entire i-phrase.

<sup>20</sup> In fact, Cinque’s account does not explain the location of nuclear stress in such an example.

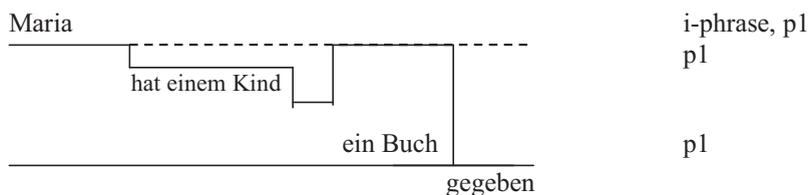


Fig. 2. Downstep and upstep of the last argument.

In sum, the phonological interpretation of prosodic embedding is rather straightforward. F0 interprets the abstract phonological phrasing in terms of toplines and downstep. Two phrases at the same level of phrasing are downstepped relatively to each other. Since the pitch accents realizing the heads of phrases are adjusted to the topline of their domain, a late accent can be realized lower than an early one. And the topline of the entire i-phrase is available until the end of the i-phrase, so that the nuclear accent is sometimes adjusted to this topline rather than to the one of its own downstepped register.

#### 4. The effect of information structure

To close the paper, let us very briefly address the effect of information structure on accent and pitch scaling, especially narrow focus and givenness (see Féry and Samek-Lodovici, 2006 for an OT analysis). Information structure can undo the downstep pattern illustrated in section 3 for all-new sentences, but the prosodic phrasing does not need to be changed.

Let us first examine how accents move their location under the effect of a narrow focus. In an intonation language like German, every syllable can get a pitch accent if it is the bearer of a narrow contrastive or corrective focus. In (41a) a usually unaccented particle bears the nuclear stress, in (41b) it is a function word, in (41c) a suffix, and in (41d) an auxiliary. All these words or morphemes are usually unaccented, but in case of contrastive or corrective focus, they bear the nuclear pitch accent; in these cases the remainder of the sentence (especially the postnuclear region) is deaccented.

- (41) a. Der Laster wurde BEladen, (nicht entladen)  
 the truck was loaded not emptied  
 ‘They loaded the truck (they did not empty it).’
- b. Weil ER der Mörder war  
 because he the murderer was  
 ‘Because he was the murderer.’
- c. Ich habe mir die Haare von einer FriseurIN schneiden lassen  
 I have me.dat the hair by a.fem hair-dresser.fem cut let  
 (nicht von einem Friseur)  
 (not by a.masc hair-dresser.masc)  
 ‘I had my hair cut by a female hairdresser, not by a male one.’
- d. Er IST gekommen  
 he is come  
 ‘He did come.’

In (42), a variant of (4b), *Maria* carries the nuclear accent, because this word is narrowly focused (subscript NF) and everything else is given. In this case, since the whole word is new, the accent must fall together with the lexical stress.

- (42) {Wer ist nach Berlin gefahren?}  
 ‘Who went to Berlin?’  
 [MARIA<sub>NF</sub>]<sub>i</sub> [ist [nach Berlin]<sub>P1</sub> gefahren]<sub>i</sub>

A topic also gets an accent, but, as we saw above, it does not deaccent the post-topical material. It is parsed in its own i-phrase with a rising pitch accent. And the remainder of the sentence retains its accent pattern, as it nearly obligatorily contains a focus.

A narrow focus is often accompanied by given material somewhere else in the sentence. Given material is typically realized less prominently than focused material. Prenuclearly, accents are reduced, and postnuclearly, they are deleted. In the OT account offered here, deaccenting is due to POSTNUCLEARDEACCENTING.

As shown in Féry and Ishihara (2009), the prosodic phrasing is not changed along with the focus structure, but the prominence relationship between accents is. In a sentence like (42), for example, the prosodic phrasing remains as in the all-new context, but the toplines of prosodic domains are changed. A focus raises the topline of its prosodic domain (which

can be equivalent to a p-phrase, or not). And givenness has the effect of lowering the topline of its domain. Postnuclear material is compressed, and there is only very little room for pitch accents (although there may be remnants of intensity and duration). The reader is referred to the literature just cited for illustrations.

## 5. Conclusion

This paper has presented a model of default German sentence accent assignment that takes syntax and phonology into account. Prosody plays a large role, since the assignment of accents proceeds through the creation of prosodic phrases, headed by pitch accents in the default case. Prosodic phrases are embedded into each other, and this means that the accent of a smaller phrase may be at the same time the accent of a larger phrase containing it. This phenomenon, called 'integration' is well known in the literature of German, but has been until now limited to sequences of an (internal) argument and a verb. Here it is shown that integration can be generalized to other syntactic configurations. It is taken to be a purely phonological phenomenon, which restricts the number of prosodic phrases needed in a sentence. The proposed model is couched in Optimality Theory. Only a few well-motivated constraints are needed, which account for default accent placement, as well as for a number of difficult cases, like accent placement in intransitive sentences with unergative and unaccusative verbs, sentences with a resultative secondary predicate, sentences with adjuncts, and sentences with pronominal arguments. A crucial aspect of the proposal is that a topic has an effect on phrasing. A topic is included in its own i-phrase. This has an effect on the number of accents in short sentences.

A different phonological component erects a metrical structure, which represents relative pitch accent strengths according to the embeddedness of prosodic phrases. The prosodic phrases are organized in phonetic phrases, with an F0 range, and the metrical heads of p-phrases are adjusted in their pitch height to the toplines of these domains. An important effect is that downstep takes place between prosodic domains at the same level of embedding. As a result, downstep relationships reflect prosodic phrase embedding. Since some pitch accents can be scaled to different toplines at the same time, by virtue of being the head of more than one p-phrase, some variation in the height of individual accents is predicted.

Information structure can change the default or normal scaling of p-phrases. As was shown in Féry and Kügler (2008) and Féry and Ishihara (2009), narrow focus raises the topline of its domain, while givenness lowers it prenuclearly and compresses it postnuclearly. However, since prosodic phrasing reflects syntactic structure, information structure with unchanged syntactic structure does not manipulate the prosodic phrasing. In other words, the model suggests that prosodic phrasing and pitch scaling are partly independent of each other.

The model is superior to previous approaches to sentence accent assignment because it can deal with variations in the presence of accents in certain cases, like in intransitive verbs and also in sentences with locational or directional adjuncts, without assuming a difference in the syntactic structure. Finally, it accounts for the fact that eventive sentences behave like sentences with unaccusative verbs without having to assume a covert topic.

## Acknowledgements

This work is part of project A1 of the SFB 'Information structure' financed by the Deutsche Forschungsgemeinschaft. I am grateful to Shinichiro Ishihara and Lisa Selkirk, who provided valuable comments, helping me to sharpen my views, and to my colleague Gisbert Fanselow, for providing me with helpful feedback for this research. I am also grateful to Anja Arnhold, Nicole Dehé, Ingo Feldhausen, Gerrit Kentner, Frank Kügler and to two anonymous reviewers, whose detailed comments were very helpful in making this paper more readable.

## References

- Chomsky, N., Halle, M., 1968. *The Sound Pattern of English*. Harper and Row, New York.
- Cinque, G., 1993. A null theory of phrase and compound stress. *Linguistic Inquiry* 24 (2), 239–297.
- Diesing, M., 1988. Bare plural subjects and the stage/individual contrast. In: Krifka, M. (Ed.), *Genericity in Language: Proceedings of the 1988 Tübingen Conference, Seminar für natürlich-sprachliche Systeme*. University of Tübingen, Tübingen.
- Féry, C., 1995. Alignment, Syllable and Metrical Structure in German. SFS-Report 02-95 (Habilitation), University Tübingen, Tübingen.
- Féry, C., Herbst, L., 2004. German accent revisited. In: Ishihara, S., Schmitz, M., Schwarz, A. (Eds.), *Interdisciplinary Studies in Information Structures*. 1. Working Papers of the SFB 632. Potsdam, pp. 43–75.
- Féry, C., Ishihara, S., 2009. The phonology of second occurrence focus. *Journal of Linguistics* 45 (2), 285–313.
- Féry, C., Kentner, G., 2010. The prosody of grouping names in German and Hindi. In: *Proceedings of Speech Prosody 2010 in Chicago*.
- Féry, C., Kügler, F., 2008. Pitch accent scaling on given, new and focused constituents in German. *Journal of Phonetics* 36, 680–703.
- Féry, C., Samek-Lodovici, V., 2006. Focus projection and prosodic prominence in nested foci. *Language* 82 (1), 131–150.
- Frey, W., 2005. Zur Syntax der linken Peripherie im Deutschen. In: d'Avis, F.J. (Ed.), *Deutsche Syntax: Empirie und Theorie*. Göteborg, pp. 147–171.
- Fuchs, A., 1976. 'Normaler' und 'kontrastiver' Akzent. *Lingua* 38, 293–312.
- Gussenhoven, C., 1983. Focus, mode and the nucleus. *Journal of Linguistics* 19, 377–417.
- Gussenhoven, C., 1984. On the Grammar and Semantics of Sentence Accents. Foris, Dordrecht.
- Gussenhoven, C., 1992. Sentence accents and argument structure. In: Roca, I. (Ed.), *Thematic Structure: Its Role in Grammar*. Foris, Berlin/New York, pp. 79–106.
- Hall, T.A., 1999. Phonotactics and the prosodic structure of German function words. In: Hall, T.A., Kleinhenz, U.U. (Eds.), *Studies in the Phonological Word*. John Benjamin, Amsterdam, pp. 99–131.
- Höhle, T., 1982. Explikation für "normale Betonung" und "normale Wortstellung". In: Abraham, W. (Ed.), *Satzglieder im Deutschen: Vorschläge zur syntaktischen, semantischen und pragmatischen Fundierung*. Narr, Tübingen, pp. 75–153.
- Ishihara, S., 2003. *Intonation and Interface Conditions*. Unpublished Doctoral Dissertation. Massachusetts Institute of Technology, Cambridge, MA.

- Ishihara, S., 2007. Major phrase, focus intonation and multiple spell-out (MaP, FI, MSO). *The Linguistic Review* 24, 137–167.
- Ito, J., Mester, A., 2009. The extended prosodic word. In: Grijzenhout, J., Kabak, B. (Eds.), *Phonological Domains: Universals and Deviations*. Mouton de Gruyter: Interface Explorations Series, Berlin, pp. 135–194.
- Jacobs, J., 1993. Integration. In: Reis, M. (Ed.), *Wortstellung und Informationsstruktur*. Niemeyer, Tübingen, pp. 64–116.
- Jäger, G., 2001. Topic-Comment structure and the contrast between stage-level and individual-level predicates. *Journal of Semantics* 18, 83–126.
- Kahnemuyipour, A., 2009. *The Syntax of Sentential Stress*. Oxford University Press, Oxford.
- Kratzer, A., Selkirk, E., 2007. Phase theory and prosodic spellout: the case of verbs. *The Linguistic Review* 24, 93–135.
- Krifka, M., 1984. Fokus, Topik, syntaktische Struktur und semantische Interpretation. Manuscript, Munich (<http://amor.rz.hu-berlin.de/~h2816i3x/articles.html>).
- Krifka, M., 2008. Basic notions of information structure. *Acta Linguistica Hungarica* 55, 243–276.
- Lambrecht, K., 1994. *Information Structure and Sentence Form*. Cambridge University Press, Cambridge.
- Lener, J., 1977. Zur Abfolge nominaler Satzglieder im Deutschen. TBL-Verlag Narr, Tübingen.
- Lieberman, M., Prince, A., 1977. On stress and linguistic rhythm. *Linguistic Inquiry* 8, 249–336.
- McCarthy, J., Prince, A., 1993. Generalized alignment. In: Booij, G., van Marle, J. (Eds.), *Yearbook of Morphology 1993*. Kluwer, Dordrecht, pp. 79–153.
- Nespor, M., Vogel, I., 1986. *Prosodic Phonology*. Foris, Dordrecht.
- Raffelsiefen, R., 2000. Evidence for word-internal phonological words in German. In: Thieroff, R., Tamrath, M., Fuhrhop, N., Teuber, O. (Eds.), *Deutsche Grammatik in Theorie und Praxis*. Niemeyer, Tübingen, pp. 43–56.
- Rizzi, L., 1997. The fine structure of the left periphery. In: Haegeman, L. (Ed.), *Elements of Grammar: Handbook of Generative Syntax*. Kluwer, Dordrecht, pp. 281–337.
- Rochemont, M., 1986. *Focus in Generative Grammar*. John Benjamins Publishing Company, Amsterdam/Philadelphia.
- Sasse, H.J., 1987. The 'thetic'-'categorical' distinction revisited. *Linguistics* 25, 511–580.
- Schmerling, S., 1976. *Aspects of English Sentence Stress*. University of Texas Press, Austin.
- Selkirk, E., 1984. *Phonology and Syntax: The Relation between Sound and Structure*. MIT Press, Cambridge.
- Selkirk, E., 1995. Sentence prosody: intonation, stress and phrasing. In: Goldsmith, J. (Ed.), *Handbook of Phonological Theory*. Blackwell, Oxford, pp. 550–569.
- Selkirk, E., 2000. The interaction of constraints on prosodic phrasing. In: Horne, M. (Ed.), *Prosody: Theory and Experiment*. Kluwer, Dordrecht, pp. 231–261.
- Selkirk, E., 2008. Contrastive focus, givenness and the unmarked status of "discourse-new." *Acta Linguistica Hungarica* 55, 331–346.
- Selkirk, E., 2009. On clause and intonational phrase in Japanese: the syntactic grounding of prosodic constituent structure. *Gengo Kenkyu* 136.
- Stechow, A., Uhlmann, v.S., 1986. Some remarks on focus projection. In: Abraham, W., de Meij, S. (Eds.), *Topic, Focus and Configurationality*. Benjamins, Amsterdam, pp. 295–320.
- Truckenbrodt, H., 1995. *Phonological Phrases: Their Relation to Syntax, Focus and Prominence*. Unpublished Doctoral Dissertation. Massachusetts Institute of Technology, Cambridge, MA.
- Truckenbrodt, H., 2002. Upstep and embedded register levels. *Phonology* 19, 77–120.
- Truckenbrodt, H., 2005. A short report on intonation phrase boundaries in German. *Linguistische Berichte* 203, 273–296.
- Truckenbrodt, H., 2006. Phrasal stress.. In: Brown, K. (Ed.), *The Encyclopedia of Languages and Linguistics*, 2nd edition, vol. 9. Elsevier, Oxford, pp. 572–579.
- van den Berg, R., Gussenhoven, C., Rietveld, T., 1992. Downstep in Dutch: implications for a model. In: Docherty, G., Ladd, D.R. (Eds.), *Papers in Laboratory Phonology II: Gesture, Segment, Prosody*. Cambridge University Press, Cambridge, pp. 335–367.
- Wagner, M., 2005. *Prosody and Recursion*. Unpublished Doctoral Dissertation. Massachusetts Institute of Technology, Cambridge, MA.
- Wiese, R., 1996. *The Phonology of German*. Clarendon Press, Oxford.
- Zubizarreta, M.L., 1998. *Prosody, Focus and Word Order*. MIT Press, Cambridge, MA.