

# Phase theory and prosodic spellout:

The case of verbs

Angelika Kratzer and Elisabeth Selkirk.

University of Massachusetts Amherst

In this paper we will explore the consequences of adopting recent proposals by Chomsky 2000, 2001, 2005a, 2005b, according to which the syntactic derivation proceeds in terms of *phases*. The notion of phase—through the associated notion of *spellout*-- allows for an insightful theory of the fact that syntactic constituents receive default phrase stress not across the board, but as a function of yet-to-be-explicated conditions on their syntactic context. We will see that the phonological evidence requires us to modify somewhat the theory of which functional categories actually define a phase. Patterns of default, syntax-determined, phrase stress are argued to result from a prosodic spellout requiring the highest phrase in the spellout domain to correspond to a major prosodic phrase in phonological representation, and carry major phrase stress.

## 1. Classic puzzles in the pitch accenting of verbs

There are a number of classic puzzles concerning the circumstances under which verbs may or may not bear neutral, default phrase stress in languages like English, German or Dutch. Earlier approaches characterized these puzzles in terms of the ability of a verb to bear an intonational pitch accent (e.g. Schmerling 1976, Gussenhoven 1983, 1992, Selkirk 1984, 1995), but more recent work (e.g. Ladd 1996, Féry and Samek-Lodovici 2006, Selkirk 2006a) suggests that the presence of pitch accents reflects patterns of phrase stress. So it is the variation in the ability of verbs to bear default phrase stress in neutral sentences that needs to be explained. We will argue that verbs in certain syntactic configurations may simply fail to be organized into the constituents over which phrase stress is defined in neutral, all-new, sentences while in other configurations they may themselves constitute such a constituent (Kahnemuyipour 2004, Kratzer and Selkirk 2005, Selkirk 2006c). The observed organization of verbs into phrase stress domains has a ready account in terms of phase-based spellout.

A central question is why there should be a difference between verbs and their arguments in their potential for pitch accenting or phrase stress. In an all-new neutral sentence where an argument of the verb is present, the argument DPs will necessarily show a pitch accent. But the pitch accenting/stressing possibilities of the verb are more varied. One puzzling fact involves verbs that are transitive, which in all-new sentences never necessarily carry an accent. As (1a) shows, a pitch accent may be present on a transitive verb in medial position in an all-new sentence, though its presence is only optional there. This is true both in German and in English. When the verb is in final position, which is the required order in German embedded sentences, there is no pitch accent on the verb in neutral all-new sentences, as in (1b). A pitch accent on *studiert* in 1(b) would necessarily lead to a contrastive interpretation.

(1) Pitch accent in all-new, neutral sentences with transitive verbs

a. Transitive verbs in medial position: optional pitch accent

María studiert/studiert die Gesetze.  
Maria is studying the laws  
“Mária is studying/stúdyng the láws.”

b. Transitive verbs in final position: no pitch accent (if not contrastive)

Ich glaube, dass María die Gesetze studiert/#studiert.  
I think that M. the laws is studying

c. Verbal arguments in *any* position: necessary pitch accent (see (1ab))

Facts such as these have been widely observed and have been given widely varying accounts (see e.g. Gussenhoven 1983, 1992, Selkirk 1984, 1995, Cinque 1993, Truckenbrodt 1995, Wagner 2005, Féry and Samek-Lodivici 2006). This three-way distinction in possibilities of pitch accenting in neutral sentences is a reflection, we now think, of a three-way distinction in phrase stress. The appearance of pitch accent would be associated with the appearance of some degree of phrase stress (Ladd 1996, Féry and Samek-Lodivici 2006, Selkirk 2006a). Where pitch accent is categorically required, as with verbal arguments in (1ab), a major phrase stress would be present. Cases of optional pitch accent, as in (1a), would show the optional presence of a minor phrase stress. Where pitch accent is categorically excluded, as in (1b), the relevant word would bear neither major nor minor phrase stress. For the transitive verbs, then, the problem would be to explain, first, the categorical absence of major phrase stress/necessary pitch accent and, second, the order-based alternation seen in (1ab) between the presence and absence of optional minor phrase stress/pitch accent. We will argue in section 3 that the distribution of major phrase stress/necessary pitch accent in all-new sentences is determined by principles of phase-based spellout (namely by principles of the syntax-phonology interface). The distribution of minor phrase stress, on the other hand, is apparently a matter for the phonology per se, and, specifically, principles of prosodic structure organization (cf. section 4).

Already the well-known fact that certain, but only certain, intransitive verbs in sentence-final position must bear a pitch accent in all-new neutral sentences indicates that verbs as a class do not have a uniform prosodic treatment, and that syntactic and/or semantic properties play a role in determining their prosody.

(2) Pitch accent in all-new sentences with intransitive verbs/predicates

(i) Unaccusatives or eventive unergatives: no pitch accent on verb

- a. Ich hab' gerade im Radio gehört, dass *der König von Bayern ertrunken ist*.  
I have just in.the radio heard that the king of Bavaria drowned is  
"I just heard on the radio that *the King of Bavaria has drowned*."
- b. Ich hab' gelesen, dass *die Metallarbeiter gestreikt haben*.  
I have read that the metal workers gone.on.strike have  
"I read that the metal workers went on strike."

(ii) Stative unergatives: pitch accent on verb

- a. Ich hab' irgendwo gelesen, dass *der König von Bayern gesponnen hat*.  
I have somewhere read that the king of Bavaria is.crazy  
"I read somewhere that *the King of Bavaria was crazy*"
- b. Ich hab' gehört, dass *der Rhein stinkt*.  
I have heard that the Rhine stinks  
"I've heard that *the Rhine stinks*."

In the sentences in (2-ii), a pitch accent is required on the verb in an all-new neutral sentence. Absence of a pitch accent on the verb in these cases would only be possible if the verb itself were old information, given in the discourse:

- (3) a. Ich hab' irgendwo gelesen, dass *der König von Bayern gesponnen hat*  
(*gesponnen* must be given information)
- (ii) Ich hab' gehört, dass *der Rhein stinkt*.  
(*stinkt* must be given information)

In her treatment of the prosodic contrasts in comparable intransitive sentences, Diesing 1990 argues that the presence/absence of pitch accents on intransitive verbs in all-new neutral sentences is a function of the position of the subject of the verbs in syntactic structure, which at least in the case of unergatives, depends on whether the verb is an eventive ('stage-level') or stative ('individual-level') predicate. If this sort of analysis of different subject positions for different types of intransitives is correct, it supports the idea that obligatory phrase stress is assigned (or not assigned) to a verb in function of hierarchical syntactic structure, and not merely in terms of its position in the word order of the sentence.

Section 3 will make the case that the aspects of syntactic structure which are relevant to defining default patterns of necessary pitch accent/phrase stress find an insightful characterization in terms of the theory of phases and multiple spellout. Section 4 addresses the role for phrase stress in characterizing the distribution of pitch accents and

the role for prosodic phrasing in the generation of default phrase stress.

## 2. Background

### 2.1 Focus-related phrase stress

There are two semantic/pragmatic properties that have an impact on phrase stress. One is the given/new organization of the sentence, which is arguably represented via an interpretable G-feature on given constituents (cf. Féry and Samek-Lodovici 2006, Selkirk 2006ab). The other is contrastive focus, which we take to be represented via an interpretable F-feature (cf. Jackendoff 1972, Rooth 1992, 1996) that may be borne by a constituent in syntactic structure. In this paper, we are interested in principles of stress assignment that are independent of G-marking or F-marking, and this is why we are primarily looking at syntactic representations that do not contain given or contrastively focused constituents, hence are ‘neutral’. Ultimately, the interaction between principles spelling out the syntactic-constituent-structure-dependent ‘default’ phrase stress and F- and G-marking-dependent principles of phrase stress has to be taken into account. The full array of stress patterns we observe in language are the result of this interaction.

It is a well-known fact about English, German and Dutch that a discourse-given phrase may fail to receive a pitch accent. This is illustrated in the discourse in (4):

(4) A: *Ánscombe* has been féuding with her cólleagues.

B: *Wíttgenstein* brought a glass of *whískey* over to *Anscombe<sub>G</sub>*.  
Perháps they have made *úp*.

In the B response to A, there is no pitch accent (or phrase stress) on *Anscombe*, which has been used in the previous sentence in the discourse. But there is a necessary pitch accent (and phrase stress) on *Wittgenstein* and (*a glass of*) *whiskey*, which are new in the discourse.

The necessary absence of pitch accent/phrase stress on a discourse-given entity is argued in recent work by Féry and Samek-Lodovici 2006 and Selkirk 2006ab to be the consequence of a G-marking in the syntax for discourse-given entities and an interface principle Destress Given, part of spellout, which calls for the absence of phrase stress on G-marked elements:

(5) Destress Given (Féry and Samek-Lodovici 2006, see also Selkirk 2006a)

A given [G-marked] constituent cannot contain phrase stress.

Destress Given plays a role in an additional puzzle about the pitch accenting/stressing of verbs. Consider the discourse in (6), which is a variant of a classic example of Ladd’s (1980, 1996):

- (6) A. Why don't you háve [some Frénch tóast]?  
 B: I've forgóttén how to máke [French toast]<sub>G</sub>.  
 C: (#I've forgóttén how to make [French toast]<sub>G</sub>.)

The verb bears a pitch accent/phrase stress when the object DP is discourse-given, as in (6B), but we see in (6C) that, if the verb *make* also lacks a pitch accent when the direct object is given, the verb and the entire verb phrase would be interpreted, erroneously, as given in the discourse. This means that when the direct object lacks phrase stress, the adjacent transitive verb here *necessarily* bears phrase stress if it is discourse-new. Compare this to the case where a similarly discourse-new transitive verb like *have* appears before a discourse-new and accented/phrase stressed direct object, shown in (6A). In this case, the appearance of a pitch accent on the discourse-new verb is optional, not necessary. There are similar facts in German, where the so-called deaccenting of a discourse-given direct object can also entail the presence of pitch accent/phrase stress on the transitive verb. This is true regardless of the relative order of the verb and the direct object, as the B/B' sentences in the discourse in (7) show:

(7) Verb with G-marked direct object

A: I have great respect for the laws.

B: María studíert die Gesetze<sub>G</sub>.  
 Maria is studying the laws  
 "Mária is stúdying the laws."

B'. Ich hab' gehört, dass María die Gesetze<sub>G</sub> studíert.  
 I have heard that M. the laws is studying  
 "I've heard that Mária is stúdying the laws."

We assume that the simple prominence spellout principle *Destress Given* is responsible for the absence of phrase stress on the discourse-given DPs in the sentences above. But we will have to explain why main phrase stress is therefore required to appear on the verb adjacent to the G-marked direct object. This will be taken up in section 3.

The second principle of focus-related prominence spellout involves contrastive focus. The term 'contrastive focus' will be used here to designate the status of a constituent in sentences like *I gave one to SARAH, not to CAITLIN*, or *I only gave one to SARAH* where the meaning of the sentence includes a specification that there exist alternatives to the proposition expressed by the sentence which are identical to that proposition except for different substitutions for the contrastively focused constituent<sup>1</sup>. The alternatives set here would include {I gave one to Sarah, I gave one to Caitlin, I gave one to Stella, ...}.

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<sup>1</sup> This type of focus is referred to variously as contrastive focus, identificational focus, alternatives focus, or simply focus (Jackendoff 1972; Jacobs 1988; Krifka 1992; Rooth 1992; Rooth 1996a; Kiss 1998; Kratzer 2004).

This type of focus has a direct role in determining the semantic interpretation of the sentence, affecting truth conditions and conversational implicatures. It also has an effect on stress patterns. Truckenbrodt 1995 and Rooth 1996b independently proposed a principle for the phonological interpretation of contrastive focus, which we consider here to be a principle of prosodic spellout.

(8) Contrastive Focus Prominence Rule (CFPR; Truckenbrodt 1995, Rooth 1996b)

Within the scope of a focus interpretation operator, the corresponding F-marked [contrastive focus] constituent is the most metrically prominent.

Subsequent work by Féry-Samek-Lodovici 2006 and Selkirk 2006ab has shown this principle to have very desirable consequences, and we adopt it here. Its effect on verbs is straightforward. Like virtually any other constituent in a sentence of English, a verb that is F-marked can bear the stress prominence called for by the Contrastive Focus Prominence Rule (CFPR). If that F-marked verb appears in a sentence containing other discourse-new constituents that bear a phrase stress, as in (9), the CFPR predicts that the F-marked verb would carry a yet higher level of stress, namely sentential stress, which would make it most prominent within the domain. (9) contains a case of contrastively focused verbs in a right-node raising construction in English (Selkirk 2002):

- (9) A. What evidence do you have that the mother of the bride was stressed out?  
 B. She *assémbled<sub>F</sub>*, and then *lóst<sub>F</sub>* the invitations.

(Italics indicate the greater stress that is associated with contrastive focus, cf. Katz and Selkirk 2006.) In this case, default stress assignment is responsible for the normal phrase stress that appears on the discourse-new direct object, while prominence spellout, in the form of the CFPR, requires the additional presence of phrase stress at an even higher level on the verb. There is no optionality to the phrase stress/pitch accent on the verb in (9). Compare the case where *lost* is not a contrastive focus:

- (10) A. What's going on?  
 B. My móther lost/lóst the invitations!

Here, as in (1a), the pitch accent on the medial transitive verb is optional, reflecting an absence of major phrase stress.

In sum, the theory of prosodic spellout needs to include the G-marking and F-marking spellout principles Destress Given and Contrastive Focus Prominence Rule, which give rise to stress patterns that are not predicted by the default principles of phrase stress on their own<sup>2</sup>. For this reason, in our analysis of default phrase stress patterns below, we will largely confine our attention to sentences that are 'neutral' in that they lack any contrastive focus or discourse-given constituents.

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<sup>2</sup> For the interaction of these principles when a constituent is both F-marked and G-marked, see Selkirk 2006a.

## 2.2 Prosodic structure representation of phrase stress

Neither Destress Given nor the CFPR presupposes any particular theory of the phonological representation of phrase stress. Whatever phrase stress is, the CFPR says that an F-marked element must have a higher level of it than other elements in the same focus scope. And whatever phrase stress is, Destress Given says that a G-marked element can't have any. However, the investigation of the interaction of CFPR and Destress Given with the principles of default phrase stress by Féry-Samek-Lodovici 2006 and Selkirk 2006a provides evidence that we have to distinguish *levels* of phrase stress that are defined in terms of phrases of the prosodic hierarchy, namely intonational phrase, major phrase and minor phrase, cf. section 4. So in what follows we opt to understand the patterns of default phrase stress in terms of that prosodic phrasing.

Evidence for a theory of phonological representation which includes a hierarchical prosodic phrasing structure that is independent of but related to the syntactic structure of the sentence is provided by a wide range of segmental and suprasegmental phenomena, both phonological and phonetic (see Nespor & Vogel 1986, Selkirk 1986, 2003, Inkelas & Zec 1990, Truckenbrodt 1999, Frota 2000, for example, as well as the papers in the current volume). According to the prosodic structure theory of stress (Selkirk 1980, Hayes 1981, 1995, Nespor and Vogel 1986, and other more recent work), the different types of prosodic constituents into which a sentence is parsed in phonological representation may each be prosodically headed, and the notion 'stress' is defined in terms of this prosodic headedness. A 'stressed syllable' is the syllable that's the head of a foot, for example, while a syllable that carries 'word stress' or 'main word stress' is the head of the foot that is the head of the prosodic word. This sort of stress representation can be depicted with a prosodic-constituent-bracketed metrical grid (Halle and Vergnaud 1987, Hayes 1995), in which the position of a grid mark *x* within a constituent marks the locus of the head-prominent, stressed constituent at the next level down in the prosodic structure:

$$\begin{array}{llll}
 (11) & ( & x & ) & \text{prosodic word} & \text{'(main) word stress'} \\
 & ( x ) ( x ) & & \text{foot} & \text{'stress'} \\
 & \text{bal.le.ri.na} & = & \text{ballerina} & & 
 \end{array}$$

Above the level of the word, prosodic structure theorists (Selkirk 1978, 1986, 2005, Nespor and Vogel 1983, 1986, Beckman and Pierrehumbert 1986, 1899, and others) concur in isolating at least two distinct levels of prosodic phrasing which play a role in the phonology and which have a reliable relation to syntactic constituency—the intonational phrase and a lower level of prosodic phrasing variously referred to as phonological phrase, major phrase, or intermediate phrase<sup>3</sup>. We'll use the term 'major phrase' for this level and 'major phrase stress' to refer to the head of major phrase (MaP).

<sup>3</sup> An additional lower level of phrasing, variously referred to as minor phrase or accentual phrase, has also been isolated in Japanese (Poser 1984, Kubozono 1993) and Korean (Jun 1995, 1998) and will play a role in section 4 in our analysis of pitch accenting in English and German.

‘Sentential stress’ and ‘intonational phrase stress’ can be used interchangeably to refer to the higher level of phrase stress found in intonational phrase (IP).

- (12)
- |    |         |   |   |                     |                       |              |                         |   |               |
|----|---------|---|---|---------------------|-----------------------|--------------|-------------------------|---|---------------|
| (  |         | x | ) | intonational phrase | (“sentential stress”) |              |                         |   |               |
| (x |         | ) | ( | x                   | )                     | major phrase | (“major phrase stress”) |   |               |
| (x |         | ) | ( | x                   | )                     | (            | x                       | ) | prosodic word |
| ó  | fficers |   | e | scorted             |                       | b            | allerínas <sub>F</sub>  |   |               |

The syntax-driven default theory of phrase stress with which this paper is concerned can arguably be understood as a theory of phrase stress at the major phrase level. In the materials investigated for English, each of the stresses accompanied by a necessary pitch accent in English is separated by a major phrase (= intermediate phrase) boundary (Selkirk 2006a), whose mark in English declaratives is the presence of a peripheral low (L-) phrase edge tone (Beckman and Pierrehumbert 1986).

Within the prosodic phrases of phonological representation, according to this theory, properly phonological constraints determine the presence and position of the prosodic heads which represent the main stress of those phrases (cf. section 4). Patterned on the theory of word stress, the prosodic theory of phrase stress leaves it as a language-particular option whether the main stress within a major phrase will fall at the right or left edge of that phrase. In English and German, for example, the main stress of major phrase falls on the right. A major phrase consisting of an adjective followed by a noun will carry main stress on the noun:

- (13) English and German: the head of major phrase is on the right

- a.
- |   |   |   |   |   |  |   |   |               |
|---|---|---|---|---|--|---|---|---------------|
| (   |   | x | ) | ( |  | x | ) | major phrase  |
|   | x |   | x | x |  | x | x | prosodic word |
| [ The young ballerinas] hate [the new laws] |   |   |   |   |  |   |   |               |
- b.
- |  |   |   |   |   |  |   |   |               |
|--|---|---|---|---|--|---|---|---------------|
| (  |   | x | ) | ( |  | x | ) | major phrase  |
|  | x |   | x | x |  | x | x | prosodic word |
| [Die jungen Ballerinas] hassen [die neuen Gesetze] |   |   |   |   |  |   |   |               |

In Persian, by contrast, default main stress of the major phrase falls on the leftmost element (Kahnemuyipour 2003):

- (14) Persian: the head of major phrase is on the left

- |                   |   |   |   |               |
|-------------------|---|---|---|---------------|
| (                 | x |   | ) | major phrase  |
|                   | x | x | x | prosodic word |
| [ in do ketâb ]   |   |   |   |               |
| ‘these two books’ |   |   |   |               |

With this theory, then, a prosodic phrasing organization would be established as part of spellout. Within prosodic constituents, the words must have been linearized into the



order that appears on the surface, a linearization which presumably also is part of spellout. And any main stress/prosodic head within the prosodic constituent is determined by the phonological principles for defining the presence and rightmost or leftmost position of that main stress. According to this theory of default stress assignment, then, any influence of syntactic structure on the location of default stress in neutral sentences is understood as a matter of how the prosodic phrasing is spelled out on the basis of the syntax, not as a direct assignment of stress on some syntactically defined domain (cf. section 3.1 below). It is also predicted that the same spelled-out prosodic phrasing that is appropriate for characterizing the distribution of phrase stress in the sentence provides the domains over which other phonological and phonetic phenomena are defined as well, whether tonal or segmental. (See, e.g., Hayes and Lahiri 1991 for evidence of this sort from Bengali.)

Earlier theories of the relation between syntax and prosodic structure have understood that relation to be established in non-derivational fashion, and entirely crosscategorially, on the final output of the syntactic component (e.g. Selkirk 1986, 1995 et seq, Nespor and Vogel 1986, Truckendbrodt 1999). But recent developments in syntax, in particular the theory of phases, encourage the examination of the phonological effects of (i) derivationally interweaving the syntactic derivation and the interface with phonology, and (ii) privileging only certain syntactic configurations, namely the syntactic complements of phase heads, as the locus of that spellout. The phenomena that we will examine below certainly do argue that the syntax-prosodic structure interface is not blandly cross-categorical but involves relations between prosodic structure and only certain constituents of the extended verbal projection, as predicted by phase theory.

### 2.3 Phases and spellout: the basics

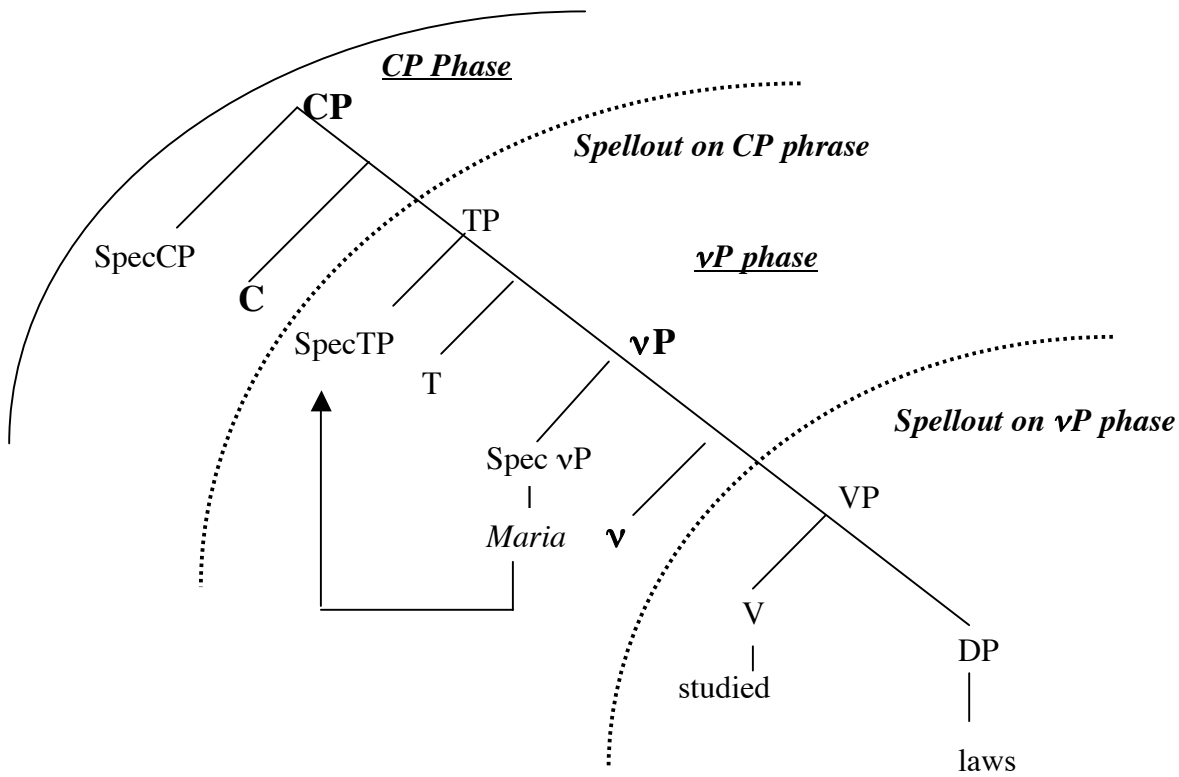
Phases provide the infrastructure of a theory of the syntactic derivation. For Chomsky (2000 et seq), the phrase vP, headed by the external argument-introducing little v, and the phrase CP, headed by the complementizer C, correspond to phases. Within a phase, lexical material is inserted and constituents may move up to higher phase-internal syntactic positions. At the end of a phase, the material in the complement to the head of the phase head is spelled out. It is during spellout that phonological form is given to words. According to recent proposals, including the present one, it is also during spellout that any higher order prosodic structure, be it phrase stress or prosodic phrasing, would be assigned. Because there may be more than one phase in the derivation of the sentence, there may be more than one instance of spellout, hence the term *multiple spellout* for the phasal derivation of phonological form.

Figure 1 illustrates the theory of phases and spellout as it applies to (15).

(15) Maria studied laws.

The phrases corresponding to phases are indicated with the solid curved lines. Spellout will assign a phonological representation to the elements of the *spellout domain* in each

phase, indicated by the dotted curved line. The spellout domain of a phase is the complement of the phase head. The lowest spellout domain in Figure 1 is then the VP complement of the lowest phase head, which is  $v$ . Spellout takes place during the  $vP$  phase on the VP, which contains the direct object *laws* and the verb. The subject of a transitive sentence, which is generally assumed to be introduced in the Spec of  $vP$ , is unaffected by spellout during the  $vP$  phase; it is not in the VP spellout domain of that phase. On the next higher phase in Figure 1, which is the CP phase, the not-yet-spelled-out subject might rise to Spec of TP and will be assigned a phonological representation at that point, since TP, as the complement of C, is the spellout domain of the CP phase. Subject and object of transitive sentences like (15) are thus spelled out in different phases, and this has consequences for the prosody, as we will see.



**Figure 1**

The notion of phase provides a new way of thinking about the cycle in both syntax and phonology. For phonology what stands out is the idea that not all syntactic constituents are “cyclic domains” for phonological realization, rather it is only those that are defined in terms of phase-based spellout. Our purpose in this paper is to understand the manner in which prosodic phrasing and consequent default phrase stress are assigned to a sentence. Phase theory leads to the hypothesis that such properties will be produced as a consequence of prosodic spellout on phase-dependent spellout domains.

### 3. A phase-based theory of default phrase stress

#### 3.1 Transitive sentences: What constituents are prosodically spelled out?

The simplest, minimal, theory of prosodic spellout would simply say that the spellout domain of a phase, namely the complement of a phase head, corresponds to the domain over which phrase stress is defined.

(16) Prosodic spellout: the simplest theory

The spellout domain of a phase is the prosodic domain for phrase stress

Adger 2006 has made this proposal, assuming that phrase stress is assigned directly on the syntactic structure. Ishihara 2006 has proposed that the spellout domain of a phase corresponds to a prosodic major phrase in phonological representation, in order to account for certain non-stress phenomena of Japanese sentence tonology. But Kahnemuyipour 2004 offers an important critique of the simple theory in (16). It cannot account for the fact that, universally, in the default stress pattern of all-new transitive sentences, phrase stress always falls on the direct object, never the verb, regardless of the order in which they appear:

(17) Kahnemuyipour's generalization:

No phrase stress on a transitive verb in all-new sentences.

Universally:        $\overset{\text{X}}{\text{[ object verb ]}}$  and        $\overset{\text{X}}{\text{[ verb object ]}}$


As Kahnemuyipour points out, this fact is not predicted by a theory that places the verb and the direct object in the same domain for assignment of phrase stress, since, within that domain, prosodic theory would allow for either rightmost or leftmost placement of main phrase stress (as seen with (13) vs. (14)).

Kahnemuyipour 2004 proposes that it is not the entire spellout domain of the phase which forms the domain on which phrase stress is assigned, but rather that only *the highest constituent within the spellout domain* is the domain with respect to which phrase stress is assigned. But this characterization does not pick out the direct object as the highest constituent within VP in the configuration of Figure 1, for example, unless the object moves into a higher position within the VP itself, which might not always be the case. Kahnemuyipour's condition would also not pick out the PP as the highest constituent in cases where a VP consists of just a PP and the verb. It seems that a slightly different formulation of Kahnemuyipour's condition is needed. We suggest that the generalization is instead that only the highest *phrase* within the spellout domain is selected for prosodic spellout. Direct objects and VP-internal PPs would therefore be eligible for prosodic spellout but verbs would not, since they are not phrasal. We therefore arrive at the formulation in (18).

- (18) The Highest Phrase Condition on prosodic spellout (cf. Kahnemuyipour 2004; also Selkirk and Kratzer 2005)—stress-based version

Assign phrase stress within the *highest phrase within the spellout domain*

(19) provides an example of how this proposal would work:

- (19)
- $$[ \dots [ v \ [ \overset{x}{\text{object}} \text{ verb} ]_{VP} ] ]_{VP} \xrightarrow{\text{spellout}} \overset{x}{\text{object}} \text{ verb}$$
- 
- vP phase:      spellout domain

VP is the spellout domain of the lowest phase vP. Within that spellout domain, according to (18), only the highest phrase in the spellout domain will receive phrase stress. The direct object is the highest, and in this case the only, phrase within VP.

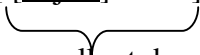
We would like to suggest a further friendly revision to the Kahnemuyipour 2004 proposal, one which states prosodic spellout in terms of prosodic phrasing, not phrase stress. The proposal is that the highest phrase within the spellout domain is *spelled out as a prosodic major phrase*.

- (20) The Highest Phrase Condition on prosodic spellout—phrasing-based version

The highest phrase within the spellout domain of a phase corresponds to a prosodic major phrase in phonological representation.

In proposing (20) we assume that phonological principles that account for the presence and location of main stress (the prosodic head) within a prosodic constituent provide the phrase stress patterns at issue. The phrase stress facts to be reviewed in Section 3 do not choose between the phrasing-based condition (20) and the stress-based condition (18). But it can be argued that further theoretical and empirical considerations concerning the phonology favor phrasing-based prosodic spellout. (See section 2.2 and section 4.) The next paragraphs review the positive predictions of the Highest Phrase Condition on prosodic spellout in terms of the phrasing-based formulation, first looking at what's predicted within the spellout domain of the lowest phase in the sentence, namely within the VP that is complement to the phase-head v. (Underlining marks the highest phrase within the spellout domain.)

- (21) Direct object, not the verb, gets phrase stress in an all-new sentence

- $$[ \dots [ [ \text{object} ] \text{ verb} ]_{VP} v ] ]_{VP} \xrightarrow{\text{spellout}} \overset{x}{(\text{object})_{MaP}} \text{ verb}$$
- 
- vP phase:      spellout domain

The Highest Phrase Condition on prosodic spellout also predicts the pattern of phrase stress observed with VP-internal prepositional phrases in German (Uhmann 1991, Jacobs 1993). When a directional or locative PP intervenes between the direct object and a verb in final position, it does not get phrase stress, as seen in the cases in (22), but when the VP does not contain a direct object, a low PP will receive the phrase stress, as in (23):

a.                x                      x  
... dass ein Jünge [ eine Géige *im Supermarkt* kaufte ].  
... that a boy     a violin in.the supermarket bought  
“... that a boy bought a violin in the supermarket.”

b.                      x                      x  
... dass ein Jünge [eine Géige *an einen Freund* schickte ].  
... that a boy a violin to a friend sent  
“... that a boy sent a violin to a friend.”

c. ... dass María [Kínder <sup>X</sup> <sup>X</sup> *in die* *Schule* fuhr].  
 ... that Maria children in the.ACC school drove  
 “... that Maria drove children to school.”

a. ... dass ein J n ge [*in einem S permarkt* lebte ].  
 ... that a boy in a supermarket lived  
 “...that a boy lived in a supermarket.”

b.

	x		x
... dass ein J�nige	[nach Berlin]	fuhr	].
... that a boy	to	Berlin	went
“... that a boy went to Berlin.”			

13



out (p.c.), that if a transitive verb were universally required to move out of VP on the v-phase, Kahnemuyipour's generalization about the necessity of phrase stress on the direct object could be derived by assuming a version of the simplest theory of prosodic spellout. But obligatory verb movement would be of no help in deriving the fact that low directionals and locatives within the VP do not receive phrase stress. The avoidance of phrase stress in these cases requires a Highest Phrase Condition on prosodic spellout. This condition has moreover the advantage that it predicts the appearance of phrase stress on any and all arguments that appear as highest phrase in the spellout domain of some phase. For the simplest theory to predict this, it would have to assume that all such arguments themselves constitute phases and hence themselves constitute the domain for phrase stress. Indeed, Adger 2006 proposes that DP is a phase, and with this derives Kahnemuyipour's generalization. However, this proposal would still fail to account for the stresslessness of low PPs following direct objects within VP in all-new sentences like those above<sup>4</sup>.

Let us turn next to a consideration of the phrase stress patterns that would be observed if it were not possible to satisfy the Highest Phrase Condition within VP because the direct object is ineligible to receive phrase stress. This would arise when the direct object is pronominal, for example. (26) contains sentences from German illustrating these stress patterns. The direct object is the weak indefinite *was* 'something'.

- (26) a. Ich hab' gehört, dass María [was            gekáuft hat]  
           I    have heard    that Maria. something bought has  
           "I've heard that Mária has bóught something."
- b. Ich hab' gehört dass María [was    im Súpermarkt            gekauft hat]  
           I    have heard    that Maria something in the supermarket bought has  
           "I've heard that Maria bought something in the supermarket."

In (26a) the presence of phrase stress on the embedded verb is related to the absence of phrase stress on its pronominal direct object. (26b) shows that a low PP following a (stressless) pronominal direct object will now appear with phrase stress, with the verb remaining stressless. The ineligibility of pronouns (and function words in general<sup>5</sup>) to receive phrase stress must be specified in the grammar. Note that the inability of phrase stress to appear on the pronoun, which is the highest phrase in the spellout domain does not result in failure of prosodic spellout within VP. In (26b) the phrase stress appears on the next highest phrase in the VP, the low PP. To account for this case, we might want to say that the prosodic spellout principle (20) picks out the *highest eligible phrase* in the spellout domain for spellout as a major phrase:

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<sup>4</sup> Truckenbrodt 2005 proposes that there is an interface principle Stress XP that is responsible for deriving patterns of phrase stress. This proposal runs into the same problem with VP-internal PPs in German that Adger's does.

<sup>5</sup> German, Pierrehumbert and Kaufmann (2006) provide evidence from English of a resistance of verb particles to phrase stress and pitch accenting.

(27) Spellout of low PP as a MaP/phrase stress following when direct object is pronoun:

$$\begin{array}{ccc} \text{a. } [ \dots [ [ \text{object}_{\text{pro}} [ \text{PP verb} ] ]_{\text{VP}} \text{v} ] ]_{\text{vP}} & \xrightarrow{\text{spellout}} & \text{object } (PP)_{\text{MaP}}^{\text{x}} \text{ verb} \\ \text{vP phase:} & & \text{spellout domain} \end{array}$$

But the prosodic spellout of the verb in (26a) would not be derivable by the Highest Phrase Condition. Verb stress is in some sense the elsewhere case for prosodic spellout: if within the spellout domain there is no phrase available to spell out as major phrase, then the head gets prosodically spelled out.

(28) Elsewhere spellout of the verb as major phrase when other element(s) within VP are ineligible:

$$\begin{array}{ccc} [ \dots [ [ \text{object}_{\text{pro}} \text{ verb} ] ]_{\text{VP}} \text{v} ] ]_{\text{vP}} & \xrightarrow{\text{spellout}} & \text{object } (verb)_{\text{MaP}}^{\text{x}} \\ \text{vP phase:} & & \text{spellout domain} \end{array}$$

The Elsewhere Condition for prosodic spellout could be formulated as in (29).

(29) The Elsewhere Condition on prosodic spellout

A spellout domain with eligible material must contain a major phrase.

Material *eligible* for spellout with major phrase is neither silent, a function word, or G-marked. A spellout domain consisting only of ineligible material will not contain a major phrase at spellout. But as long as there is eligible material, a major phrase will be spelled out. So a verb that is the sole eligible element within a spellout domain will get major phrase stress.

In sum, this section has put forward a hypothesis concerning the conditions under which a constituent within a spellout domain may be spelled out as a prosodic major phrase and bearer of major phrase stress. The hypothesis consists of two conditions on prosodic spellout—(20), the Highest Phrase Condition (with its roots in Kahnemuyipour (2004)), and (29), the Elsewhere Condition. Together they specify that on any phase a spellout domain with eligible material will contain exactly one major phrase. In section 3.2 we will see that this theory of prosodic spellout, motivated here in connection with transitive verbs, provides an account of patterns of phrase stress with intransitive verbs as well.

### 3.2 Intransitive verbs, topics, and the definition of phase heads

One of the classic puzzles we mentioned at the beginning is the contrast in verb stress/pitch accenting in the case of intransitive verbs in all-new sentences.



- (30) a. Ich hab' geträumt, dass *der Rhéin ausgetrocknet ist*.  
 I have dreamed that the Rhine dried.up is  
 "I dreamt that *the Rhíne dried up*."
- b. Ich hab' gehört, dass *Metállarbeiter gestreikt haben*.  
 I have heard that metal workers gone.on.strike have  
 "I heard that *métal workers went on strike*."
- (31) Ich hab' irgendwo gelesen, dass *der König von Báyernt spínnt*.  
 I have somewhere read that the king of Bavaria is.crazy  
 "I read somewhere that *the King of Bavária was crázy*."

The subjects of the embedded intransitives in (30) and (31) bear phrase stress. The crucial observation is that in (31) the predicate also has to bear phrase stress, but in the examples of (30) no phrase stress on the predicates is necessary in all-new utterances: even without phrase stress, those predicates do not have to be understood as given in the discourse. The embedded verb in (30a) has an unaccusative verb, as shown by the fact that it takes the auxiliary *sein* ('to be') for its perfect forms. (30b) and (31) both have unergative verbs, as shown by the fact that they form the perfect with the auxiliary *haben* ('to have'). The difference between (30b) and (31) is usually seen as a contrast between eventive (or stage-level) and stative (or individual-level) predicates. Supported by a battery of syntactic tests, Diesing 1990 argues that subjects of stage-level predicates and subjects of individual-level predicates do not occupy the same syntactic positions. Subjects of stage-level predicates can appear in lower positions than subjects of individual-level predicates. For example, in contrast to subjects of individual-level predicates, subjects of stage-level predicates are acceptable to the right of certain particles and adverbials in German and can be extracted from. According to Diesing those positional differences are ultimately also responsible for the observation of Carlson 1977 that bare plural subjects of stage-level predicates can have existential interpretations, while bare plural subjects of individual-level predicates can only have generic interpretations.

A central research question that came out of Diesing's work concerns the connection between subject positions and subject interpretations. Jäger 2001, who carefully reviews the large literature on the topic, reaches the conclusion that a lexical property like the distinction between individual-level and stage-level predicates doesn't seem to be *directly* responsible for the differentiated subject behavior Diesing identified. That behavior seems to be a rather indirect reflex of the syntactic representation of information structure. Jäger argues that clauses must have syntactically represented topics, and subjects of stative (or individual-level) predicates like *be crazy*, *know*, *own* and some such are often the only phrases in their clause that could be topics. Since they are typically topics, bare plural subjects of individual-level predicates cannot easily be interpreted as existentials. From the current perspective, we might suspect that non-topical subjects occupy positions somewhere within TP, while topical subjects have moved into a higher topic projection headed by a functional head Topic. This Topic projection could be part of an articulated periphery of the kind proposed in Rizzi 1997, 2004.

A major piece of support for Jäger’s proposal is that, under certain conditions, even ‘hard core’ individual-level predicates can have low, non-topical, subjects. Those predicates can then be deaccented without being given in the discourse and their bare plural subjects can have existential interpretations, one of the main characteristics of low subjects according to Diesing. This phenomenon is illustrated by the examples in (32), which are modeled after English examples from Fernald 2000. In both cases, the italicized part can be understood as all-new and the bare plural subjects can have existential interpretations.

- (32) a. Ich glaube, dass in diesem Baum *Äffen leben*.  
 I think that in this tree monkeys live  
 “I think that *mónkeys live* in this tree.”
- b. Ich weiss, dass dieses Haus<sub>G</sub> *Maffiósi besitzen*.  
 I know that this house Maffiosi own  
 “I know that *Máffiosi own* this house.”

If subjects of individual-level predicates don’t *have* to be topics, why can’t the embedded subject of (31) be low and non-topical? That is, why can’t the embedded subject in (31) remain within TP and *not* move to the Spec position of TopicP? And why is it that the bare plural subject of *spinnen* in (33) cannot have an existential interpretation, which according to Diesing shows that it must be in a higher position?

- (33) Ich vermute, dass Quácksalber spínnen.  
 I suspect that quacks are.crazy

According to Jäger, such facts follow from his requirement that every clause must have a syntactically represented topic, that is, a position that is there to host phrases denoting the individual or location that the main predication of the clause is about. In (32a), the topic is a location denoted by a PP, in (32b) the topic is an individual represented by a scrambled discourse-given object. Since the topic position is filled with other material, the topic requirement can be satisfied even if the subjects remain within TP. With eventive predicates like *dry up* or *go on strike* the topic could also be a salient spatiotemporal location represented by an unpronounced locative or temporal pronoun. (30a) and (30b) would then have implicit topics that might have been overtly expressed as in (34a) or (34b), for example:

- (34) a. Ich hab’ geträumt, dass *dann der Rhéin ausgetrocknet ist*.  
 I have dreamed that then the Rhine dried.up is  
 “I dreamt that *then the Rhíne dried up*.”
- b. Ich hab’ gehört, dass *in Bóchum die Metállarbeiter gestreikt haben*.  
 I have heard that in Bochum the metal workers gone.on.strike have  
 “I heard that *in Bochum the métal workers went on strike*.”

The reason why the embedded subjects of (31) or (33) *must* be topical is then that, unlike

claims about rivers drying up and metalworkers going on strike, claims about the permanent craziness of kings or quacks are not easy to understand as claims about particular spatiotemporal locations: compare (35a), which may talk about some contextually salient spatiotemporal location, to (35b), which can only be about the Bavarian king himself.

- (35) a. The king of Bavaria was getting dressed.  
b. The king of Bavaria was insane.

The only possible topics for (31) or (33) are then the king or the quacks respectively, and consequently, the only possible candidates for topics in (31) or (33) are the subjects. On the account suggested by Jäger, there is still a tight connection between subject positions and the individual-level/stage-level distinction, just as Diesing had claimed. But the connection isn't as direct as e.g. Kratzer 1995 thought it was. The source of the syntactic differences is the requirement that there must be a syntactically represented topic. Silent locatives or temporal adverbials can satisfy the topic requirement with eventive (stage-level) predicates, but such topics are often incompatible with stative (individual-level) predicates.

In what follows we will show that the Topic status of what precedes an intransitive verb has consequences for the phrase stress properties of the verb<sup>6</sup>. Before we proceed we have to clarify the phase status of Topic projections, however. In Chomsky's work phase heads are taken to be C and *v*. There is some discussion in the literature whether *v* is always a phase head, as argued for in Legate 2003, or whether *v* should only count as a phase head if it introduces an external argument, which is the view expressed by Chomsky. We are following Legate's position here, which not only makes it possible to give a promising characterization of the inventory of possible phase heads, but is also consistent with the prosodic facts, as we will see shortly. If there are Topic heads whose specifier positions represent the individual or location that the main predication of a clause is about, we have to ask ourselves whether they might also be phase heads in addition to *v* and C. Ultimately, whatever answer we give to this question will have to be justified by its theoretical success, but it would be good to have at least some initial rationale for why a particular functional head should or should not be a phase head. One property that might characterize phase heads as a class might be the capacity to not merely attract ('internally merge'), but introduce ('externally merge') new material to their specifier positions. The *v* of transitive and unergative verbs introduces the verb's external argument to its specifier position. The *v* of unaccusative verbs, Topic heads, and C seem to have the capacity to introduce higher locatives, in particular framesetting locatives of the kind illustrated in (36) (Maienborn 2001).

- (36) ... weil in Australien Schwäne schwarz sind.  
... since in Australia swans black are  
... since in Australia swans are black.

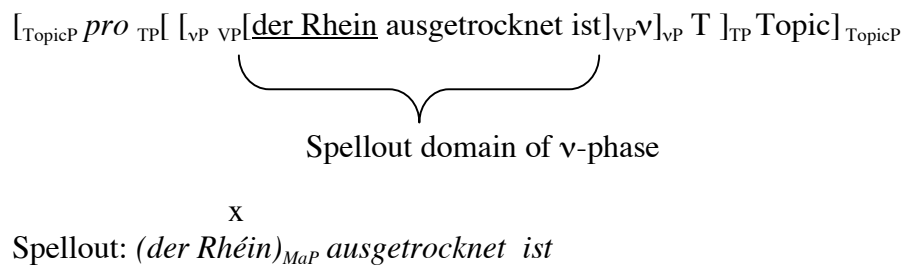
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<sup>6</sup> Tokizaki 1999, 2006 also argues that the topic (categorical) status of subjects is fundamental in determining the pitch accenting of the predicate.

In contrast, heads related to tense or aspect, heads that attract focused constituents, and determiners never seem to genuinely *introduce* new material. Their specifier positions always seem to serve as potential landing sites for material that originates elsewhere. Assuming that the phase heads are precisely those functional heads that, as a class, have the capacity for introducing new material has implications that go beyond the data reviewed here. If higher adverbs are introduced by specialized functional heads, for example, as Cinque 1999 has proposed, and if the adverbs are in fact arguments of those heads, as Morzycki 2005 has argued, then functional heads introducing adverbs would have to be phase heads on our account, with all the expected prosodic effects<sup>7</sup>. Let us tentatively assume that Topic heads are phase inducing heads, then, and see where this assumption takes us. What we expect in particular is that the Topic phase should involve an additional instance of spellout, the TP complement of Topic, and that this will have consequences for the phrase stress possibilities of intransitive verbs.

We are now in a position to apply our theory of spellout to examples like (30) to (32). The embedded clause of (30a) has an unaccusative verb. As has often been observed, the subjects of unaccusatives behave like direct objects in many ways, and are commonly taken to be internal arguments of their verb (Perlmutter 1978). They should therefore originate within VP, and seem to be able to stay there in languages like German under certain conditions (Grewendorf 1989). If the case features of subjects and the tense features of verbs can in principle be valued via Agree, verbs and subjects of unaccusatives might not be forced to leave their VP and may stay *in situ*. For (30a), we might then have an input configuration for spellout as shown in (37):

(37) Unaccusative subjects with no phrase stress on the verb



In (37), the topic position is filled with a silent locative pronoun represented as *pro*. There are three potential spellout domains in (37): TopicP (the complement of C), TP (the complement of Topic), and VP (the complement of v). Within VP, the subject is the highest phrase, hence will receive the phrase stress. The verb complex remains unaccented. All material that is merged during later phases remains silent, hence is not eligible for phrase stress.

<sup>7</sup> As Gussenhoven 1983 observed for English, the presence of an adverb intervening between the subject and an intransitive verb forces the verb to bear pitch accent. Compare *Máry appeared* to *Máry mysteriously appeared*/\**appeared* in an all-new utterance. This follows if the adverb is introduced by a phasal functional head.

With unaccusative verbs, the spellout configuration remains unchanged if the VP also contains a directional phrase, for example, as in (38):

- (38) Ich hab' gehört, dass *ein Kind aus dem Zug gefallen ist*.  
 I have heard that a child from the train fallen is  
 "I heard that a child fell out of the train."

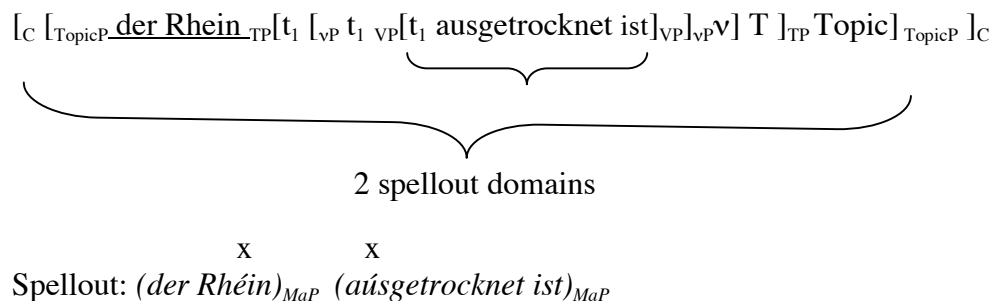
The PP in (38) can be unaccented/unstressed without being given in the discourse, and this is expected on our account. The only non-trivial spellout domain remains VP in this case, and the subject, which is the highest phrase within VP, still receives the phrase stress. The PP and the verb cluster remain unaccented.

There is nothing to prevent unaccusative subjects from being topics, and thus assume a slightly different discourse role. Topics are not necessarily given in the discourse, and this means that (39) and (40) are acceptable all-new utterances, too:

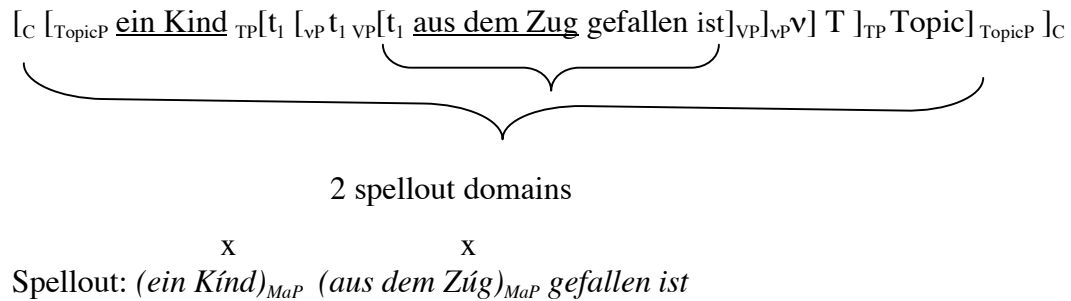
- (39) Ich hab' geträumt, dass *der Rhein ausgetrocknet ist*.  
 I have dreamed that the Rhine dried.up is  
 "I dreamt that *the Rhine dried up*."
- (40) Ich hab' gehört, dass *ein Kind aus dem Zug gefallen ist*.  
 I have heard that a child from the train fallen is  
 "I heard that a child fell out of the train."

In (39) and (40), the subject has moved into the Topic projection to achieve a particular discourse effect, and thus receives phrase stress during the C-phase. The phrase stress/major phrase of the v-phase now has to go to the highest eligible phrase in the VP. In (40), this is the directional PP. In (39), the verb cluster is the only non-silent material in the VP, and in the absence of a highest *phrase*, the Elsewhere Condition parses it as a major phrase. (Major phrase stress will fall on the participle because the auxiliary, a functional element, is not parsed as a prosodic word.) In both cases, the spellout domain of the Topic phase, which is TP, does not contain any non-silent material that is not already contained within VP, hence spellout on that TP can be 'skipped'.

- (41) Unaccusative subject with phrase stress on verb



(42) Unaccusative subject with phrase stress on PP



In our derivations so far, we have been assuming that finite verbs and verb clusters consisting of a participle and an auxiliary originate within the VP and can be spelled out there. We may wonder, however, what guarantees that verbs and verb clusters are indeed spelled out within their VP in the cases we discussed in this and the previous section. What would exclude a scenario where, in some way or other, the verb cluster ends up in a higher position - in *v* or *T*, for example?

Finite verbs and auxiliaries move to *T* or *C* overtly in many languages. Assuming that movement is always local, that movement must have passed through *v*. There is thus every reason to believe that finite verbs and auxiliaries *can* in principle move to *v*, and movement to *v* is therefore an option that should be provided by Universal Grammar. Non-finite verb forms have been seen to move, too. In languages like German or Dutch, verbs like to form clusters. Verb clusters consisting of two or more verbs have received a fair amount of attention in the literature on West Germanic (see in particular the discussion in Wurmbrand 2005). The order of verbs in a cluster can be quite variable, even within a single language or dialect, suggesting movement. For example, in Dutch both 40(a) and (b) are acceptable (Wurmbrand 2005, example (4), p. 228).

- (43) a. ... dat Jan het boek *gelezen heeft*.  
           ... that Jan the book read has  
           ... that Jan has read the book.
- b. ... dat Jan het boek *heeft gelezen*.

According to Wurmbrand, the predominant view on alternations like that illustrated in (43a) and (43b) is that one of the orders in (43) is basic, and the other one derived. There is, however, no agreement about the exact nature of the derivation. Whether the participle *gelezen* has overtly moved out of its VP in (43b), for example, possibly following earlier movement of the finite verb, is controversial. Bošković 1997 argues that participles in Serbo-Croatian can move out of VP and undergo head movement to a position below *T*. As illustrated in (44b), participles can optionally appear to the left of VP-external adverbs in Serbo-Croatian (Bošković 1997, example (2), p. 144):

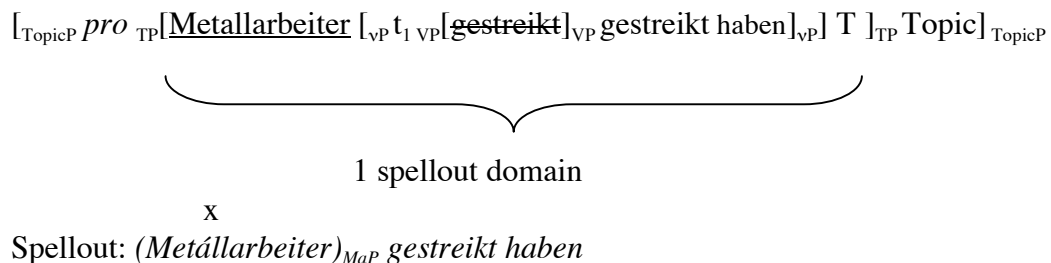
- (44) a. Jovan je potpuno zaboravio Petra.  
 Jovan is completely forgotten Peter  
 'Jovan completely forgot Peter.'

- b. Jovan je zaboravio potpuno Petra.

It seems, then, that movement of participles out of VP to v or T is also an option that should be provided by Universal Grammar. In German, movement of verb clusters to v or T would be string vacuous in embedded sentences, however, so the data we -- or a language learning child for that matter -- can rely on do not exclude the possibility that such movement does in fact take place. However, like any other kind of movement, verb movement should take place for a reason. Everything else being equal, verbs should stay put and value their features via Agree. For verbs to move, there has to be a force to drive them. We want to propose that spellout economy may be a reason for short, string vacuous, verb movement in German. Sometimes, short verb movement can have the effect that a whole spellout domain ends up silent, hence can in fact be 'skipped'. In such a case, we suggest, economy considerations force the verb to move, even though the movement is string vacuous. For the verb to remain all by itself in a spellout domain seems more costly than short movement to a higher spellout domain. The derivation of (30b) from above provides an illustration of such economy-driven verb movement.

In (30b), the subject does not have to be topical and can remain within TP, just as in (30a). But the verb is unergative in this case, rather than unaccusative, and this means that its subject originates in the specifier position of v, hence outside the spellout domain of v. We now have to explain why it is possible for the verb cluster in (30b) to lack phrase stress without being given in the discourse. The answer seems to be that this might be precisely the kind of configuration where the verb cluster has to move into the v-projection and thus out of the spellout domain of the v-phase.

- (45) Unergative subject with no phrase stress on the verb (stage-level predicate)



If verb movement leaves copies that are silent, moving the verb cluster in (45) makes it possible to literally skip a whole spellout domain and thereby serve the cause of economy. But to skip a spellout domain, the computational system that drives the syntax has to be able to register that a potential spellout domain does not in fact have to be sent to the phonological interpretation component. This skipping is possible, so it seems, if the

spellout domain consists entirely of pronouns, functional heads and leftovers of movement that the computational component can recognize—within the  $v$ -phase where verb movement takes place-- as elements that will not have to be spelled out. Interestingly, silent elements, including PRO, traces, elided phrases, and unpronounced heads have always played a central role in syntactic theory, and this suggests that the property of not needing to be spelled out is a property that is represented in the syntax<sup>8</sup>. Whether or not material can remain silent depends in part on whether its semantic content is recoverable. This is not a question that the phonological spellout component can be expected to answer. The decision about what can or cannot remain silent should thus be made in the syntax since that's the place that mediates between phonological spellout and semantic interpretation. It is therefore plausible to assume that material that is to remain silent is marked as such in the syntax. It will then be possible for the computational component to recognize that a potential spellout domain that consists of nothing but elements that are to remain silent does not have to be sent to the phonological interpretation component. The computational component might be guided by an economy principle like (46):

- (46) Skipping spellout domains
- a. Skip spellout if possible
  - b. A spellout domain that consists of nothing but elements that are designated to remain silent can be skipped.

Returning to (45), within the  $v$ -phase of the unergative verb, a decision can be made in the syntax whether or not to move the verb cluster up to  $v$ , based on whether that movement will allow spellout to be skipped on that phase. In (45) the verb cluster moves (together or one verb after the other) to save on spellout. On the other hand, the verb cluster in (42) will not move up to  $v$ , precisely because this would not allow any spellout economy on the  $v$ -phase, since the PP has to be spelled out anyway. (41) now needs a slightly different analysis from the one we gave earlier. In (41), moving the verb cluster to  $v$  will make it possible to skip VP as a spellout domain. Assuming, as seems mandatory in a phase-based system, that no look-ahead is allowed, movement of the verb cluster has to take place in this case, even though it now ends up as the only element in the spellout domain of Topic. Consequently, there is no 'global' gain from moving the verb cluster, as long as it cannot move all the way to Topic. This move, we suggest, is impossible on general grounds. Verbs do not agree with Topic heads in any way, and should therefore never be able to be attracted by Topic. The verb cluster in (38) has to be spelled out during the Topic phase, then, and receives major phrasing (and stress) through the Elsewhere Condition, exactly as on our earlier analysis. A major difference between unaccusatives and unergatives is expected if the VP contains PPs like directional phrases. If unergative subjects originate outside of VP in the specifier position of  $v$ , a VP-internal PP will receive phrase stress during the  $v$ -phase. We expect, then, that with unergative verbs, directional phrases and other PPs which *lack* phrase stress should always have to

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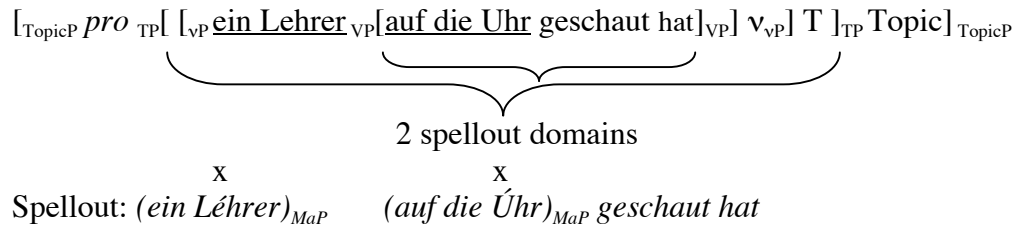
<sup>8</sup> Merchant 2001 posits an E-feature to syntactically license ellipsis.



be interpreted as given in the discourse. The expectation is borne out. (47b) contrasts with (38), in that the directional phrase in (47b) must be interpreted as given in the discourse.

- (47) a. Ich hab' gesehen, wie *ein Léhrer auf die Úhr* geschaut hat.  
 I have seen how a teacher on the watch looked has  
 'I saw a téacher look at his wátch.'
- b. # Ich hab' gesehen, wie *ein Léhrer auf die Uhr* geschaut hat.  
 I have seen how a teacher on the watch looked has  
 'I saw a téacher look at his watch.'

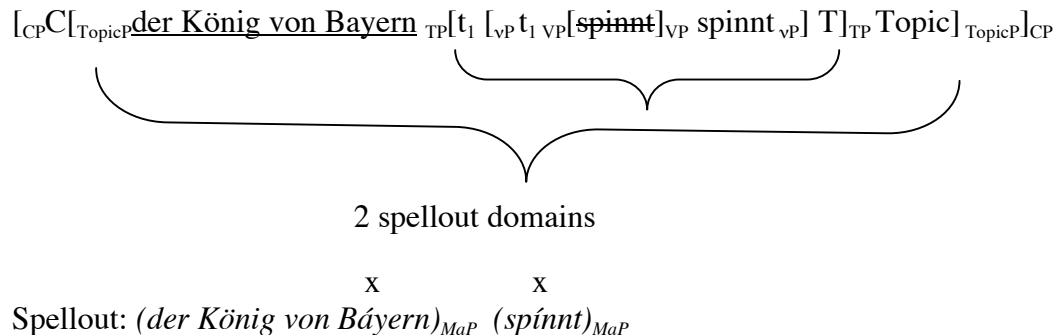
(48) Unergative verb with directional PP



In (48), the presence of the PP within VP makes it impossible to skip the spellout domain of the v-phase by moving the verb cluster out of the VP. We end up with two instances of spellout, then, and with two major phrases. Cases of lone unergative verbs like (45) do not show the expected phrase stress in VP because of spellout economy and the forced movement of the verb (cluster) out of VP.

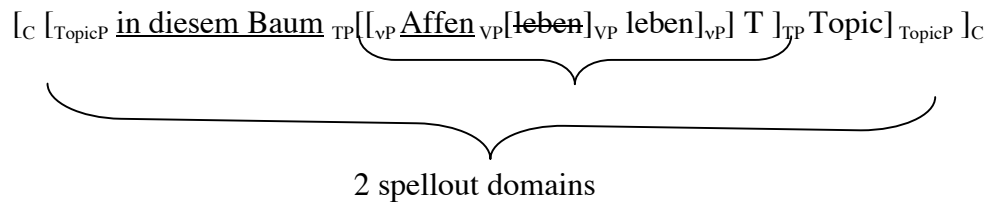
Turning to stative (or individual-level) unergative predicates as in (31), if sentences must have topics, and a silent locative is not an option in such cases, the subject of (31) must be in the specifier position of Topic. The verb should move up to v to skip VP as a spellout domain. Being unable to move up all the way to Topic, it has to be spelled out as the only element during the Topic phase and thus receives the phrase stress via the Elsewhere Condition.

(49) Unergative subject with phrase stress on verb (individual-level predicate)



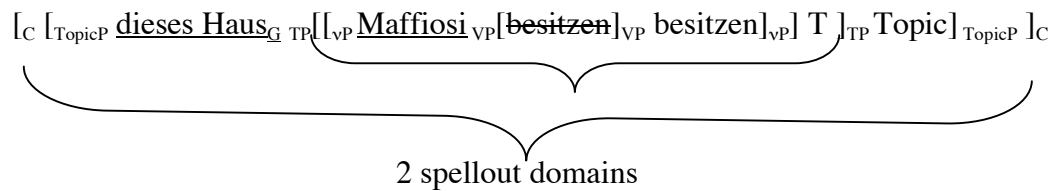
Let us now look at the two sentences in (32), which both have stative (individual-level) predicates. By filling the obligatory topic position with other material, they both allow the subject to remain within TP, possibly even in the position where it originated. In (32a) a PP occupies the specifier of Topic, and in (32b) the direct object (which has to be given in this case) has been moved there. The phrase stress assigned during the Topic phase will then fall on the subject as the highest phrase within TP. The verb can remain unaccented without having been discourse given, provided it moves out of the VP and adjoins to *v*. Our hypothesis of economy-driven verb movement predicts this movement should take place, since it would evacuate the VP, and make it possible to skip it as a spellout domain.

- (50) Unergative subject without phrase stress on verb (individual-level predicate)



X                      X  
Spellout: (*in diesem Báum*)<sub>MaP</sub> (*Áffen*)<sub>MaP</sub> *leben*

- (51) Transitive sentence with scrambled object<sup>9</sup> (individual-level predicate)



X  
Spellout: *dieses Haus* (*Maffiósi*)<sub>MaP</sub> *besitzen*

If the verb were left within the VP in (32a) and (32b), it would have to receive phrase stress during the *v* phase, and the result would be (52a) and (52b):

- (52) a. # Ich glaube, dass in diesem Baum *Áffen* *leben*.  
           I think that in this tree monkeys live  
           “I think that *mónkeys líve* in this tree.”

<sup>9</sup> This example shows that the givenness of a direct object does not entail the stressing of the verb, as one might be led to think on the basis of the sentences in (6-7) in section 2.1.

- b. # Ich weiss, dass dieses Haus<sub>G</sub> *Maffiösi besitzen*.  
 I know that this house Maffiosi own  
 “I know that *Máffiosi own* this house.”

It is hard to understand the embedded verbs of (52a) and (52b) as non-contrastive. Our account predicts this, in that the only way the verbs could receive phrase stress here is if the verb were F-marked and subject to the Contrastive Focus Prominence Rule.

The final case to discuss involves the stressing of the verb with an adjacent G-marked given direct object that was observed in section 2.1. As we have just seen in the *Maffiosi* sentence above, a given direct object can move to a higher Topic position. In (53b), too, the direct object is likely to have moved out of its VP, this time to a position below the subject. That given definite objects like to leave their VP is shown by the grammaticality contrast between (53b) and (53c), where we are using negation to mark the left edge of VP.

- (53) a. x x  
 Ich hab’ gehört, dass María die Gesetze<sub>G</sub> studiert.  
 I have heard that Maria the laws is studying  
 “I’ve heard that *Mária is stúdying* the laws.”
- b. x x  
 Ich hab’ gehört, dass María die Gesetze<sub>G</sub> nicht studiert.
- c. ? Ich hab’ gehört, dass María nicht x die Gesetze<sub>G</sub> studiert.

In (53ab), where the subject is not itself necessarily a Topic, the direct object might be in a lower Topic position, assuming that there can be multiple Topic positions (Rizzi 1997, 2004). Indeed, given our theory, we would need to assume the presence of a Topic-phase in the case of the moved direct object in (53), in order to derive the phrase stress on the verb. Movement of the object out of the VP forces verb movement to *v* on our account, and the spellout domain for the *v*-phase can then be skipped. The verb would as a consequence be the only element in the spellout domain of the lower Topic phrase and receive phrase stress at that point by the Elsewhere Condition.

### 3.3 Summary

Phase-based spellout has allowed us to make sense of the distribution of major phrase stress on verbs and phrases in German. A single major phrase is introduced for any phasal spellout domain containing eligible material (material that is not G-marked, a function word, or silent). Verb movement out of VP appears to be driven by an economy principle that favors skipping spellout on a phase if that is possible. Modulo such spellout skipping, there is a direct relation between the number of phases and the number of major phrase stresses in a sentence. Key to our understanding of the necessity of phrase stress

on stative (individual-level) verbs has been the idea that the topic status of the subject, which is independently motivated, implies the presence of an additional spellout domain, produced by a Topic-phase<sup>10</sup>.

The Highest Phrase Condition for prosodic spellout says that within the spellout domain of a phase only the highest eligible phrase will get major phrasing (and stress). The consequence is that any non-highest phrases within the VP will not receive default phrase stress even when discourse-new, since VP is the lowest spellout domain of the sentence. By contrast, eligible phrases that appear in VP-external position, always in specifier positions of higher projections, can all receive phrase stress, if they are the highest phrase in the spellout domain of some phase. This is true of phrases that move up out of VP and of phrases that are generated in higher specifier positions. Amongst phrases themselves, bearing phrase stress is a function of position within a spellout domain. As for verbs, only in the absence of eligible highest phrases within a spellout domain will the presence of major phrase stress on an eligible verb be derived—through the Elsewhere Condition. These principles can result in all-new sentences in German where a succession of phrase stresses on specifiers is followed by a VP where, after the first stressed phrase, a potentially long stretch of non-phrase-stressed material is found.

As a final reminder, the G-marking of a discourse-given constituent renders it ineligible for major phrasing and stress, and can therefore lead to different patterns of major phrasing and stress from those that the Highest Phrase and Elsewhere Conditions would predict in all-new sentences. Similarly, the F-marking of a contrastive focus constituent may produce a phrase stress that would not be predicted by these two principles of default major phrasing and stress. The prosodic organization of a sentence is a function of both its constituency in terms of phases and its semantic/pragmatic properties, as represented by F-marking and G-marking.

#### **4.0 The phonological interpretation of prosodic spellout structure**

In the introduction to this paper we suggested that the distribution of default pitch accents in German and English is a function of the default phrase stress patterns defined in these languages. In subsequent sections we suggested that these default phrase stress patterns were themselves a function of a prosodic phrasing that is assigned as part of the phase-based spellout of syntactic structure. The formulation of prosodic spellout that we offered above states that the highest phrase in the spellout domain of a phase is spelled out as a corresponding prosodic constituent in phonological representation, which is equated with the prosodic major phrase (cf. (20), and that in any case a spellout domain containing eligible material will contain a major phrase (cf. (29)). Our hypothesis, therefore, is that default pitch accent distribution in English and German is ultimately a reflex of principles

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<sup>10</sup> Topics that are “dislocated” at the periphery and related to a pronoun in the sentence have an even more dramatic effect on sentence prosody, in that they appear to be parsed in a separate intonational phrase from the body of the sentence, as shown for Greek by Revithiadou and Spyropoulos 2004, who propose a minimalist account of this phrasing.

that relate syntactic constituency to prosodic constituency. The goal of this section is to show that the theory of phase-based syntactic-constituency-sensitive spellout can indeed provide the basis for an insightful account of pitch accent distribution in these languages.

### 4.1 Phonological constraints on prosodic parsing

We have seen that prosodic spellout as defined above produces a prosodic structure in which the verb may fail to be parsed into a major phrase. Function words like the determiner *die* and the complementizer *dass* in German also show an incomplete prosodic parsing. This is illustrated by the transitive sentences below in (54).

(54) Output of universal principles of prosodic spellout (provisional<sup>11</sup>)

- a. ( ) intonational phrase  
( ) ( ) **major phrase**  
( ) ( ) ( ) prosodic word  
Maria studiert die Gesetze
- b. ( ) intonational phrase  
( ) ( ) **major phrase**  
( ) ( ) ( ) prosodic word  
...dass Maria die Gesetze studiert

Intonational phrase and prosodic word, which we assume are produced by independent principles of spellout<sup>12</sup>, are also represented here. The verb, more precisely the prosodic word to which we assume it corresponds, is parsed as part of the intonational phrase, but not as part of a major phrase. From the point of view of phonological theory, such structures would be considered to be marked. An exhaustive parsing of the string dominated by a prosodic constituent into prosodic constituents at the next level down in the prosodic hierarchy is arguably the ideal for phonological representation (as argued in Selkirk 1995 and elsewhere). We might therefore expect outputs of prosodic spellout like (54ab) to be altered in order to conform more closely to prosodic structure ideals. One sort of alteration would simply promote the verb to major phrase status, but this is not observed, perhaps because of the increase in major phrase heads that would result. A different type of alteration to spellout structure would involve adjunction of a 'stray' verb to an adjacent major phrase, creating a nested major phrasing, as seen in (55):

<sup>11</sup> Sections 4.2 and 4.3 argue that the full representation includes the level of minor phrase as well. The minor phrase could be understood as the spellout of any syntactic branching beneath the level of major phrase (cf. Kubozono 1993).

<sup>12</sup> In the perspective of the current paper, in which designated syntactic constituents are *spelled out as* corresponding prosodic constituents, prosodic word could be understood as the spellout of lexical (not functional) heads, while intonational phrase could be the spellout of ‘comma phrase’ (cf. Potts 2005, Selkirk 2005), an instance of which would be the Force Phrase (Rizzi 1997), the highest node of the sentence.

(55) Prosodic markedness-driven alterations to output of prosodic spellout principles

- a. ( ) intonational phrase  
 ( ) ( ) *major phrase*  
 ( ) ( ) ( ) prosodic word  
 Maria studiert die Gesetze
- b. ( ) intonational phrase  
 ( ) (( ) ) *major phrase*  
 ( ) ( ) ( ) prosodic word  
 ...dass Maria die Gesetze studiert

We will see below that adjoined major phrase structures like these, which contain a single major phrase head for nested major phrases, provide the basis for assigning the sort of phrase stress patterns that are needed to explain the distribution of default pitch accents in English and German<sup>13</sup>. And so we think it is worthwhile to entertain a theory of prosodic phrasing which includes universal interface principles of prosodic spellout as sketched above, and, as part of the phonology, an optimality-theoretic ranking of prosodic markedness constraints which operate to produce surface prosodic structures that are more nearly phonologically ideal. With such a theory, language-particular variation in prosodic phrasing would be the consequence of the phonology: different language-particular rankings of prosodic markedness constraints could give rise to different alterations to the prosodic structure produced by the universal prosodic spellout principles. For example, it is conceivable that in some other language, a verb that is in configuration (54a) might adjoin to the major phrase that precedes it, rather than to the major phrase that follows. Indeed Prieto 2005 argues that in Catalan a verb does prosodically adjoin to what precedes, just when a following direct object is sufficiently long and the preceding subject short enough. And Revithiadou and Spyropoulos 2004 report on work showing this is true in Greek. As for where the verb is adjoined in the general case, one might wonder whether there's a tendency for languages with major phrase-final stress placement like German to favor the "proclitization" of the verb, while major-phrase-stress-initial languages might favor the "encliticization" of the verb. All this needs to be explored.

This paper is not the place to develop a sustained argument in favor of the new claim that cross-linguistic variation in default prosodic phrasing is a function of language-particular differences in the phonological component of the grammar, not of differences in the syntax-phonology interface, namely spellout. Rather we must content ourselves in the last two sections with merely showing that major phrase structures like those in (55) are needed in an account of default pitch accenting in German and the phrase stress on which

<sup>13</sup> Clearly, it would be desirable to have independent evidence for this nested structure from other phonological or phonetic phenomena, including the possible presence of boundary tones, or the blocking of assimilatory phenomena that the presence of the internal major phrase edge would imply.

it is based, and with the observation made above that phonological pressures could plausibly give rise to the structures in (55) on the basis of the phrasings in (54), which we have hypothesized are the output of universal prosodic spellout principles.

## **4.2 Default pitch accent as tonal enhancement of prosodic headedness/stress**

Standard phonological theory distinguishes the representation of tone from the representation of prosodic structure prominence (headedness) and is charged with providing an account of the interdependence between the two (see Yip 2002). The descriptive term ‘pitch accent’, in the sense which we have been using it, refers to a tonal entity which is confined to a ‘culminating’ position within some prosodic domain, often characterized as a position of stress. In so-called ‘intonational languages’ like English, Dutch and German, unlike in lexical tone languages, the tonal elements of the pitch accents are not part of the underlying representations of morphemes with additional segmental content. Rather, in an intonational language it is only in surface representation that a pitch accent comes to be associated with a prosodically prominent syllable in a word of the sentence. There appear to be two distinct sources of pitch accents in intonational languages — default pitch accents, which are non-meaning-bearing tones epenthesized in the phonology, and pitch accents that are tonal morphemes. In both cases, these tonal elements end up located on a syllable with local prosodic prominence.

In English, Dutch and German, a variety of pitch accent types have been isolated (Grice, Baumann and Benz Müller 2005 for German; Gussenhoven 1983, 2003 for Dutch; Beckman and Ayers-Elam 1997 for English), some of which are claimed to make distinctive meaning contributions to the sentence (see for example Pierrehumbert and Hirschberg 1990 on English). It’s been proposed by Büring 1997, for example, that the contrastive topic in German is marked by a L\*+H pitch accent. Conceivably, that L\*+H pitch accent is the realization of contrastive topic morphology, produced as part of the spellout of the contrastive topic phrase, and then located on the main stressed syllable within it. But there are other pitch accents-- in English, Dutch, German, and other languages--- which have no particular meaning contribution. These pitch accents appear to be epenthetic tonal elements whose function, if any, is to enhance the head of a prosodic constituent. This class of default pitch accents includes those that are introduced on the main stress of every word in Cairene Arabic (Hellmuth 2006)<sup>14</sup>, on the initial (head) syllable of every accentual/minor phrase in Korean (Jun 1995), and on the main stress of what has been referred to as phonological phrase in Bengali (Hayes and Lahiri 1991). Quite conceivably, tonal elements may in principle be introduced by default on a head/main stress prominence at any level of the prosodic hierarchy, and languages will differ depending on whether and at what level of prosodic headedness such a tonal epenthesis is defined. So where do the default epenthetic pitch accents of English and German fit in?

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<sup>14</sup> Default pitch accent in Nubi (Gussenhoven 2006) is also conceivably a case like this.

The paradigm of pitch accent distribution which we gave for all-new transitive sentences at the beginning of this paper was as follows:

- (56) a. Maria studiert die Gesetze  
           T\*      (T\*)      T\*
- b. dass Maria die Gesetze studiert  
           T\*      T\*      ---

(The schematic T\* stands for the tone(s) comprising the default pitch accents, which may vary in quality from one dialect of German to another.) In sentences like these, a pitch accent necessarily falls on the subject and object arguments; the verb necessarily lacks accent when it is sentence-final, but shows optional accent if it precedes an the object. Which level of phrase stress is it that calls for the presence pitch accent in German? The necessary presence of pitch accent on the DPs suggests it might be major phrase stress, but the vagaries in the pitch accenting of verbs rules against this. For a medial verb to receive optional pitch accent, it would have to be optionally promoted to major phrase status and thereby receive major phrase stress and an epenthetic pitch accent. And we would then have to stipulatively block the promotion of final verbs to major phrase stress status, since the option for pitch accenting is not available finally. Another argument against the promotion of nonfinal verbs to major phrase status comes from English, where it has been shown that pitch accented verbs in all-new, neutral sentences fail to be followed by the L- peripheral tone that should be found if the verb itself constituted a major phrase (Selkirk 2002, Katz and Selkirk 2006).

A more promising solution is to (i) assume the existence of the lower-level minor phrase in English and German, as in Japanese and Korean, (ii) assume that a level of minor phrase headedness is defined and (iii) to restrict the epenthesis of default pitch accent in English and German to the head (main stress) of minor phrase.

(57) The Pitch Accent Constraint (English, German)

The head of a minor phrase requires a tonal pitch accent.

Because a major phrase stress will always also be a minor phrase stress, given the nature of the phonological representation of stress, (57) immediately predicts the necessary presence of pitch accent on elements that bear major phrase stress. As for the categorical absence of pitch accents, or their optional presence, section 4.3 is devoted to examining the grammatical system that would govern the distribution of those minor phrase stresses (and pitch accents) which do not coincide with major phrase stress in the sentence.



### 4.3 Distribution of minor phrase stress in English and German

Let's consider first the prosodic structure representation of the verb-final sentence amplified with the level of minor phrasing as in (58). The verb would not be parsed as a minor phrase, would lack minor phrase stress, and hence bear no pitch accent.

(58) Grammatical minor phrasing/pitch accenting with final transitive verb

(	x	)	((	x	)	)	major phrase
(	x	)	(	x	)		minor phrase
	(	x	)	(	x	)	prosodic word
OK	...dass	María	die	Gesetze	studiert		
		T*		T*			

Prosodic phonology has a ready explanation for why minor phrase stress/pitch accent should be lacking on the final verb. In German and English a prosodic constraint, call it  $\text{Head-Edge}_{\text{MaP-R}}$ , calls for major phrase stress to be rightmost within the major phrase (cf. (13))<sup>15</sup>. We can understand this constraint as requiring that major phrase stress fall on the rightmost minor phrase within major phrase (cf. McCarthy 2003 on edgemostrness in locating prosodic heads). We also assume that this constraint holds of both major phrases in a nested structure such as (58), which are headed by the same major phrase stress. (58) satisfies the  $\text{Head-Edge}_{\text{MaP-R}}$  constraint on the larger major phrase containing the verb because there is no minor phrase lying between the major phrase stress on *Gesetze* and the right edge of the major phrase. (59) illustrates the fact that that if there were a minor phrase stress (and accompanying pitch accent) on the verb,  $\text{Head-Edge}_{\text{MaP-R}}$  would be violated.

(59) Ungrammatical minor phrasing/pitch accenting with final transitive verb

Head-Edge <sub>MaP-R</sub> rules this out										
(	x	)	((	x	)	↓	)	major phrase		
(	x	)	(	x	)	(	x	)	minor phrase	
	(	x	)	(	x	)	(	x	)	prosodic word
*	Weil	María	die	Gesetze	studiert					
		T*		T*	T*					

So it seems we have a simple standard sort of phonological explanation for the categorical lack of pitch accent on a final transitive verb in an all-new sentence.  $\text{Head-Edge}_{\text{MaP-R}}$  must simply outrank any other grammatical constraint which would seek to introduce a minor phrase in that position.

This same account predicts the asymmetry observed in the distribution of pitch accents: words that appear to the left of major phrase stress within the major phrase will not be

<sup>15</sup> See Féry and Ishihara 2005 for a similar account of post stress deaccenting in German.

prevented by Head-Edge<sub>MaP</sub>-R from having status as heads of minor phrase, and so should be able to show pitch accents. These include the cases of medial transitive verbs, for example, if we adopt the assumption, illustrated in (60a), that they are adjoined to the major phrase on their right. If these medial verbs were, by contrast, adjoined to the major phrase on the left, they would be incapable of bearing minor phrase stress, just like the verbs in sentence-final position. The representations in (60ab) show the two options in minor phrase organization that we propose for the cases of presence and absence of pitch accent on medial verbs:

(60) Options in minor phrasing and pitch accenting of medial verbs

- a.
- |       |          |             |               |
|-------|----------|-------------|---------------|
| ( x ) | (        | ( x )       | major phrase  |
| ( x ) | ( x )    | ( x )       | minor phrase  |
| ( x ) | ( x )    | ( x )       | prosodic word |
| Maria | studiert | die Gesetze |               |
| T*    | T*       | T*          |               |
- b.
- |       |          |             |               |
|-------|----------|-------------|---------------|
| ( x ) | (        | ( x )       | major phrase  |
| ( x ) |          | ( x )       | minor phrase  |
| ( x ) | ( x )    | ( x )       | prosodic word |
| Maria | studiert | die Gesetze |               |
| T*    |          | T*          |               |

With this, we hope to have provided some initial plausibility for our hypothesis that constraints governing the presence/absence of minor phrasing and minor phrase stress are the source of an explanation for the distribution of default pitch accents in German and English. The minor phrase has been most thoroughly motivated and examined in Japanese and Korean. Further argumentation for positing the minor phrase and its role in pitch accenting in German and English is of course necessary; it must include an investigation of the prosodic spellout principle(s) that would introduce minor phrasing, as well as purely phonological principles that might govern minor phrase organization as well<sup>16</sup>. This remains a project for future research.

#### 4.4 Where is sentence phonology?

In construing constraints on the syntax-phonology interface as part of phase-based spellout, as we have in this paper, the question naturally arises how much of phonology (and phonetics) is done during spellout. The prosodic adjunction of the stray verb, the determination of optional minor phrasing, and the epenthesis of default pitch accents discussed above could in fact all ‘wait’ till the syntactic derivation and its multiple spellout was complete. Conceivably, during spellout only a partial phonological representation would be defined, precisely that which allows satisfaction of the interface constraints on prosodic phrasing and stress-- namely the Highest Phrase and Elsewhere

<sup>16</sup> Selkirk 2006a includes a more detailed discussion of optional pre-major phrase pitch accenting in English.

Conditions on major phrasing; constraints on intonational phrasing, minor phrasing and prosodic words; and the G-marking- and F-marking-sensitive constraints Destress Given and Contrastive Focus Prominence Rule. The incomplete prosodic structure representation that is the cumulative result of potentially multiple spellout(s) on the whole sentence could be the input to the actual phonological component-- say an optimality theoretic constraint ranking-- which would define a full surface phonological representation, and provide the input to the phonetics.

A grammar with a post-syntactic phonological component would give a restricted role to the syntactic derivation in determining sentence phonology, seeing the effect of syntax on phonology (and phonetics) as mediated by its effect on prosodic constituency and stress, as in earlier models of the syntax-phonology interface (e.g. Selkirk 1986, Nespor and Vogel 1986, Truckenbrodt 1995). Further research needs to investigate whether the phonological component should be fully integrated into phase-based spellout, where it could produce opaque ‘cyclic’ effects not capturable by a post-syntactic phonological interpretation.

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