

How prosody restricts the syntax

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1 Introduction

In this paper, I will discuss central structural properties that distinguish German, English and Italian and show that these are largely reducible to differences in the syntax–phonology interface.

English and Italian are VO-languages, while German is an OV-language, as is illustrated in (1). This difference is standardly relegated to a major syntactic parameter, namely the head complement parameter.

- (1) a. *John has met his neighbour*
b. *Gianni ha incontrato il suo vicino*
c. *Hans hat seinen Nachbarn getroffen*

While in all three languages main stress falls on the right-most phonological phrase within the sentence, German and English can freely remove nuclear stress to achieve, for example, focalization of the subject. In Italian, stress remains right-peripheral and instead of moving stress, the focused constituent seems to be moved syntactically into a right-peripheral position, as is illustrated in (2a). One way to account for this difference is to assume that Italian has a specific focus position which is located at the right periphery of vP, while German and English - due to free stress assignment – arguably are not in need of a specific syntactic position for focus.

- (2) a. *JOHN has met his neighbour*
b. *Ha incontrato il suo vicino GIANNI*
c. *HANS hat seinen Nachbarn getroffen*

In section 2, I will argue that the contrast in (1) can be relegated to the choice of whether prosodic phrasing is weight-sensitive or not, while in section 3, I will argue that no special focus position needs to be assumed for Italian to explain the contrast in (2).

Instead, I will show that this difference reduces to the way in which metrical prominence of the focused constituent is achieved in the syntax-prosody interface.

2 Prosodic domain formation and weight sensitivity

In this section, I will outline an account of the derivation of prosodic structure from syntactic structure that is based on a metrical evaluation of the syntactic tree plus relation-based formation rules that build prosodic phrases around lexical heads, as originally proposed by Nespor & Vogel (1986), but operate independently of directionality parameters.

But before, I will argue in the following section that head final effects and head complement / head adjunct orders can be derived from an interface condition in which prosodic weight plays a crucial role.

2.1 Head final effects and the head complement parameter

It is important to note that head final (HF) effects in German and English occur in head initial phrases, while head final phrases do not display them, as is illustrated for the German and English IP in (3). The standard explanation for the contrast in (3ab) is that (3b), contrary to (3a), violates the head final filter (HFF) in (4), which requires that the head of the modifier and the modified head are adjacent (cf. Williams 1982).

- (3) a. *John carefully read a book*
b. **John with care read a book*
c. *Hans hat ein Buch sorgfältig / mit Sorgfalt gelesen*
- (4) Head Final Filter (HFF)
A premodifier must be head-final

Note that the HFF cannot be stated as a syntactic condition in the minimalist framework, since narrow syntax is taken to be insensitive to notions like adjacency and directionality. The HFF is best treated as a condition on the mapping between syntactic structure and prosodic structure.

In Hinterhölzl (2010), I argue that HF-effects should be treated like weight effects in the formation of the metrical structure of words. In weight-sensitive systems, heavy syllables must appear on the dominant branch, that is to say, occupy the head of the foot

in metrical structure. In a similar vein, I argue that a “heavy syntactic” constituent (see below) must occupy a metrically strong branch in syntactic structure, which secures that it is standardly mapped onto a strong branch in prosodic structure (cf. Section 2.2 below).

If we assume that prosodic domain formation starts out with the lexical head within an extended projection, that is to say, with the verb in the CP and with the noun in the DP, this implies that a heavy syntactic constituent must be phrased on the dominant branch with respect to the verb/noun, when a prosodic constituent comprising them is formed. Since I am following Cinque (1999) in assuming that adjuncts are analysed as specifiers of functional heads in the extended projection of the modified head, the HFF can be restated as given in (5).

(5) PROSODIC VERSION OF THE HFF

A Specifier that constitutes a heavy syntactic constituent must appear on the right branch with respect to the selecting / modified head (to occupy a dominant branch in prosodic structure)

Now the question arises of when a syntactic constituent counts as heavy. The comparison with syllable structure suggests that a syntactic constituent should count as heavy if both its head and its complement domain are lexically filled.

This means that and PPs and non-pronominal DPs count as heavy syntactic phrases.² Since in this approach all heavy phrases should be treated alike, it follows that not only (heavy) modifiers but also DP- and PP-arguments should appear postverbally/postnominally, if the projections of the head are weight-sensitive. This means, for instance, if nominal projections in a language are weight-sensitive, then both PP-adjuncts and DP- and PP-complements should appear postnominally, implying that the HFF alone is sufficient to account for head – complement orders.

Let us now see how the interaction between the HFF and the head complement parameter works out in the verbal domain. In accounts to the distinction between head-initial and head-final clauses which are based on the universal base hypothesis (UBH),³ it is assumed that complements are base-generated to the right of the selecting head and then moved into a Specifier in the extended projection of this head for licensing purposes, as is illustrated in (6). One way to capture the pertinent distinction in the copy

theory of movement is to assume that complements are spelled out in the licensing position in OV-languages, but in their base-position in VO-languages, as is indicated by angled brackets in (6).

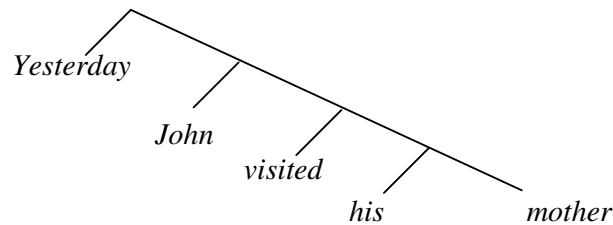
- (6) a. [CP [IP DP [vP v <DP>]]] OV-language (German)
 b. [CP [IP <DP> [vP v DP]]] VO-language (English and Italian)

These spell-out options can now be derived as weight-effects, if we make the following assumptions: if the I-domain in English and Italian is weight-sensitive, then a DP complement must appear postverbally in these languages. Thus, a DP complement should be spelled out in the base position in order to occupy the dominant branch when a prosodic constituent comprising verb and its complement is formed.

2.2 Metrical structure and rules for prosodic domain formation

If a syntactic tree is metrically interpreted as is indicated in (7), the nuclear accent of the clause is correctly determined as the most prominent element in the tree, that is, main stress falls on the noun *mother* within the direct object in (7), simply by treating the right syntactic branch as the strong branch in metrical structure.

(7) *Yesterday John visited his mother*



This metrical interpretation can also be used to determine the heads of prosodic constituents. For instance *mother* will be the head of the prosodic constituent (his mother) and *his mother* will be the head of the prosodic constituent (visited his mother). But the metrical interpretation of a syntactic tree alone will not derive the correct prosodic phrasing of a sentence, since phrasing depends on distinctions that involve the relation between a head and a complement or between a head and an adjunct. For instance, in German a head and a complement form a joint phonological phrase, while a

head and an adjacent adjunct are obligatorily phrased into separate phonological phrases, as is illustrated in (8).

- (8) a. [(*Weil Hans*) (*im ZELT* *blieb*)]
since John in the tent remained
'Since John remained in the tent'
b. [(*Weil Hans*)(*im Zelt*) (*RAUCHTE*)]
since John in the tent smoked
'Since John smoked in the tent'

As is also evident in (8), phrasing also has an influence on where the main accent in the clause is placed. While in (8a) main stress falls on the PP-complement, main stress is placed on the verb in clause final position in (8b). I will come back to this point in the following section. The data in (8) suggests that there are two modes of prosodic composition which I will call subordination and coordination in (9). Assuming that the operation of prosodic composition starts with the lexical head (V,N) within the respective extended projection (CP, DP), we may assume that prosodic phrases are built around the head combining with arguments (9a) and adjuncts (9b) at the point at which the latter are licensed. Let us consider the two cases of prosodic composition starting with a verbal head.

- (9) MODES OF PROSODIC COMPOSITION
a. subordination: V + DP = (V (DP))
b. coordination: V + PP = (V) (PP)

The specific mode of prosodic composition depends on the phase status of a constituent. Constituents that belong to "homorganic phases" (see below) undergo subordination, while constituents that belong to non-homorganic phases undergo coordination. The concept of homorganic phases is defined in Hinterhölzl (2009) to account for the fact that arguments and adjuncts cannot be distinguished (phrase-) structurally, since they are both licensed in specifiers of functional heads in the I-domain in an approach which combines the UBH with Cinque's (1999) treatment of modification. The crucial point about this notion is that arguments and its selecting head count as homorganic, while arguments and their selecting heads count as non-homorganic with respect to modifiers of this head.

(9a) is meant to indicate that if a head and an argument are combined, the result is a single phonological phrase that contains the head as prosodic word and the argument as a phonological phrase. Note that the resultant prosodic constituent is recursive. Also note that if another argument is joined with such a prosodic constituent the resultant constituent is recursive as well, as is illustrated in (9c). (9c) also indicates that subordination is taken to work independently of directionality. The only requirement is that the two elements are adjacent in the syntactic tree.

- (9) c. a subcase of subordination: combining two DP arguments with its head
 ((DP) ((DP) V)) or ((V (DP)) (DP))

(9b) is meant to indicate that if a head and an adjacent adjunct are combined the result are two

independent phonological phrases that may be joined at the next prosodic level, namely in the intonational phrase. Prosodic constituents need to be headed. I assume that there are two types of heading procedures, as is illustrated in (10).

- (10) a. INTRINSIC HEADING
 In the combination of a phonological phrase with a prosodic word, the phonological phrase is metrically strong and the prosodic word is metrically weak (this property will also be called strength-sensitivity below)
- b. EXTRINSIC HEADING (DEFAULT VALUE)
 In a prosodic constituent (A B), the right-hand member is metrically strong

Intrinsic heading is only possible if two prosodic constituents are asymmetric, as is the case in subordination. Extrinsic heading is the default procedure and makes use of tree geometry.

Note that the correct metrical evaluation of the English sentence in (7) can be derived by either extrinsic heading alone or by intrinsic and extrinsic heading combined. Examples with main stress on the subject, however, clearly show that also English allows for an intrinsic heading of its phonological phrases, as is illustrated in (11), otherwise a phonological phrase comprising subject and verb should always be right-headed. Furthermore, the role of focus in the determination of the main accent, to be

discussed in the following section, also indicates that English prosody is strength sensitive.

(11) *A TRAIN arrived*⁴

For German, intrinsic heading must be assumed to derive the correct assignment of main stress in the parallel sentence, as is illustrated in (12). (12) shows the prosodic phrasing combined with a metrical evaluation after the syntactic derivation is completed. The phrasing of the complementizer is left unspecified in (12). It will restructure with the adjacent DP in a later stage of the derivation, in phonology proper. In (12), the most deeply embedded phonological phrase is intrinsically headed, all other phrases are extrinsically headed according to their position in the tree.

(12) a. *Weil der Hans der Maria das Buch gab*
 Since John to-Mary the book gave
 b. *weil (^w(*der Hans*) ^s((^w(*der Maria*) ^s(^s(*das Buch*) ^w *gab*))))*

The mapping of syntactic structure onto prosodic structure defined in (9) and (10) above, derives a recursive prosodic pattern in the case of subordination and a rather flat prosodic pattern in the case of coordination. Subordinated phrases are headed, as is indicated by the annotated metrical labels in (12b). Coordinated phrases, being in a symmetrical relationship are not headed and require an extra mechanism that applies in prosody proper.

In conclusion, the result of the mapping between syntax and phonology is a set of phonological phrases part of which, namely the recursive ones, are metrically annotated.

2.3 Further operations in prosody proper

The initial prosodic structure derived by the operations of subordination and coordination in the interface needs to be further worked upon in prosody proper. First, recursive phonological phrases need to be flattened and among the coordinated phonological phrases a head for the containing intonational phrase needs to be determined.

It is important to note that the recursive prosodic structures created by subordination violate the Strict Layer Hypothesis (cf. Selkirk 1984, Nespor & Vogel 1986). Note that

Ladd (1986), Selkirk (1995), Peperkamp (1997) and Truckenbrodt (1999) provide arguments for the availability of recursive prosodic structures in certain languages.

Here I propose that syntax derives an initial recursive prosodic phrasing which at phonology proper is flattened by language specific rules that either delete outer or inner boundaries according to global prosodic parameters like rhythm, length and branchingness of constituents and the like. In the normal case, this means that a sentence like (12a) is phrased as given in (13a). This can be achieved by deleting all the outer boundaries but the last and by restructuring of weakly marked elements with an adjacent phonological phrase. The crucial question now becomes what disallows the prosodic phrasing in (13c).

- (13) a. *(weil der Hans) (der Maria) (das Buch gab)*
 b. *(weil der Hans) (der Maria) (das Buch) gab*
 c. * *(weil der Hans) (der Maria) (das Buch) (gab)*

The bracketing of (13c) is derived if all outer boundaries is are deleted, as is indicated in (13b), and the prosodic word comprising the verb is included in a phonological phrase as demanded by the SLH.

In prosody proper, every phonological phrase is assigned an accent tone (which falls on the metrically most prominent syllable in its domain) and is marked with an asterisk. Also the head of the intonational phrase must be determined in phonology proper, if the intonational phrase contains several coordinated phonological phrases. For this purpose, I will propose a metrical version of the rule of final accent reinforcement by Uhmman (1993), which is given in (14). After determination of the head of the intonational phrase, we derive the following accentuation/metrical patterns for the phrasings in (13ac), as given in (15ab), respectively.

(14) STRENGTH-ASSIGNMENT WITHIN iP

If an intonational phrase contains several phonological phrases, the right-most is assigned the metrical value *s*, all others are assigned the value *w*.

- (15) a. $\begin{matrix} * & & * & & * \\ {}^w(\text{weil der Hans}) & {}^w(\text{der Maria}) & {}^s(\text{das Buch gab}) \\ * & & * & & * & & * \end{matrix}$
 b. $\begin{matrix} {}^w(\text{weil der Hans}) & {}^w(\text{der Maria}) & {}^s(\text{das Buch}) & {}^w(\text{gab}) \end{matrix}$

(15a) constitutes the correct accent pattern for a wide focus sentence, while (15b) is only grammatical, if the extra stress on the verb is licensed by a (narrow) focus. Note that in (15a), metrical label correctly determines that main stress falls on the last phonological phrase within the intonational phrase (iP), while in (15b), main stress falls on a constituent that does not occupy the right edge of the iP. Thus, the phrasing in (15b) can be ruled out, since it violates a natural requirement on the headedness of prosodic phrases, given in (16).

(16) HEAD PERIPHERALITY PRINCIPLE (HPC)

Main stress must fall on the right most phonological phrase within iP

I assume that the HPC is subject to parametric variation, since there are languages like Hungarian and Japanese, where main stress is contained in the left-most phonological phrase within iP, but for English, German and Italian only the parametric option directly specified in (16) is relevant.

To summarize, I propose that the mapping between syntax and phonology is a two step process. In the first level, an initial prosodic phrasing is determined on the basis of syntactic information. In the second level (prosody proper), in which syntactic structure is not visible anymore, this phrasing is further refined according to general rhythmical and metrical principles.

3 The role of focus in the interface

In the previous section, we discussed how a default prosodic structure is determined on the basis of a metrical interpretation of the syntactic tree in combination with two modes of prosodic formation. This initial structure is then further manipulated by boundary deletion rules and restructuring operations to determine the correct accentuation patterns in the individual languages.

Focus manipulates this default mapping to secure that the focused element is the most prominent phrase within iP in two manners. While in German and English, the focus feature affects the calculation of metrical prominence relations (leading to a readjustment of prosodic phrasing), in Italian, the focus feature directly manipulates the standard procedure of prosodic phrasing to achieve maximal prominence of the focussed element, as will be discussed in detail in the following two subsections.

3.1 The role of focus in prosodic phrasing in German

There is a general consensus in the literature about German prosody that prefocal background elements can receive stress, as is indicated by the alternative phrasings in (17ab), while postfocal background elements must be deaccented in narrow focus sentences (cf. Féry 1992, Uhmman 1993 among others), as is illustrated in (17cde). Furthermore, we must make sure that main stress falls on the focussed constituent.

- (17) a. *(weil der Hans) (der Maria) (das Buch) (GAB)*
b. *(weil der Hans der Maria das Buch GAB)*
c. *(weil der HANS der Maria das Buch gab)*
d. **(weil der HANS) (der Maria) (das Buch gab)*
e. **(weil der HANS) (der Maria das Buch gab)*

Since in our approach accents are assigned to phonological phrases in prosody proper, this means that prefocal constituents may form separate phonological phrases, while separate phonological phrases in the postfocal domain must somehow be excluded. The crucial point is that the phrasings in (17cd) can be ruled out, since they would lead to an accentuation pattern that violates the HPC in (16) above.

To achieve the correct phrasing and stress pattern in (17c), two things need to be taken care of. First, inner brackets need to be deleted in prosody proper, so that the focused constituent (that needs to be assigned main stress) is contained in the final (and only) phonological phrase within iP. Second, the focused constituent needs to be made the head of the large phonological phrase in (17c). Here, the property of free accent placement in German comes into play.

In standard accounts like that of Uhmman (1993), it is assumed that focused constituents receive an accent tone that is metrically enhanced by being assigned an extra beat in prosody proper. In our account, it suffices to assume a) that a focused constituent counts as intrinsically strong and b) that in the prosodic mapping in the first level, this metrical feature is projected such that the focused constituent is determined as the head of the large phonological phrase. While in the default mapping the subject would be assigned the metrical feature w , the focused subject counts as the intrinsic head of the constituent comprising it and the vP and is assigned the metrical value s , as is indicated in (18a). As before, outer brackets are deleted in the next step, yielding the

The contrast in the phrasing in (19a-b) highlights the importance of distinguishing two different levels or steps in the interface between syntax and phonology. While in the initial level two non-homorganic phases must be mapped onto two separate phonological phrases, these constituents can form one prosodic domain in prosody proper since this level is insensitive to the syntactic and phase status of constituents, since restructuring operations applying in phonology proper take into account metrical and prosodic properties only. Restructuring will apply after accent assignment and involves dephrasing of a constituent and deletion of the corresponding phrase accent.

To summarize, the final phonological phrasing in German is determined by principles that govern the relation between metrical structure and focus structure.

3.2 The role of focus in the syntax prosody interface in Italian

As we have noted in Section 2.1, arguments in Italian are subject to the HFF in (5). We have assumed above that the HFF applies to a constituent at the point in the derivation in which it forms a prosodic constituent with the verb. Italian, in contradistinction to English and German, does not allow for free stress assignment. Alternatively, a constituent that is focused seems to move to the right edge of the clause in order to achieve a right-peripheral position within the iP.

As we have seen above, German and English use strength-sensitivity to make the focus the most prominent constituent within the intonational domain of the clause. While German and English manipulate the prominence of a constituent and phrasing is subsequently adjusted such that the focused constituent occupies the right edge within the intonational phrase, Italian manipulates the phrasing itself to achieve maximal prominence for the focused constituent within the intonational phrase.

In the present account, this can be achieved in the following manner. Instead of projecting a metrical feature in prosodic composition, as focused constituents in German and English do, a right intonational phrase boundary is inserted after a constituent that is marked with the focus feature in Italian (cf. Frascarelli 2000 and Büring 2010, who argues that boundary insertion is a major strategy to mark focus in the languages of the world).

The insertion of a prosodic boundary has the following effect: the focused constituent and the verb cannot form a joint prosodic constituent at the relevant point of the derivation, barring the application of the HFF with respect to this constituent. Thus,

- (21) *Quanti panini vuoi per cena?*
Mangerò TRE [p:]anini per cena
 eat-FUT three breads for dinner
 ‘I will eat three breads for dinner’

Normally one would identify the focus domain with the numeral *tre* in (21), but the phonological evidence discussed by Frascarelli (2000) indicates that there is no intonational phrase break between the numeral and the head noun (there is one between *panini* and *per cena*). All the more, the numeral and the head noun form a joint phonological phrase, as is evidenced by the application of raddoppiamento sintattico in (21). These phonological data can be taken as evidence that the entire DP *tre panini* must be interpreted as representing the focus domain, with the nominal head constituting given information, in a similar vein as in the case of (22) where the relevant alternatives are entire propositions rather than the individuals *John*, *Peter* and *Mary*.

- (22) a. *Bill only said that he visited JOHN*
 b. set of alternatives = {Bill said that he visited Peter, Bill said that he visited Mary, etc.}

If this analysis is correct and if we assume that background material is inherently weak in metrical terms, then the data in (21) shows that Italian allows for the projection of a weak prominence feature, yielding the metrical representation in (23) which guarantees that the main accent is assigned to the numeral in (21). In (23), G and F stand for given and focused material, respectively (cf. Frascarelli & Ramaglia 2010).

- (23) (^s *tre* ^w *panini*)_GF

To conclude, though Italian is not strength-sensitive in that it allows for the projection of metrical feature strong, cases like (21) can be analysed in a way that suggests that Italian allows for the projection of the metrical feature weak which is inherently triggered by discourse-given material. I will leave the exact treatment of these cases for future research.

Summing up, there are two types of prosodic conditions that have a crucial impact on word order in German, English and Italian. Since the prosodic mapping in English and Italian is weight-sensitive, complements are spelled-out in their base positions in the postverbal domain in these languages, while the weight-insensitivity of the German I-domain allows arguments to be spelled out in their licensing positions. Since the prosodic mapping in German and English on the other hand is strength-sensitive, focused constituents can be made metrically prominent in any position of the tree, while Italian must resort to changing the default phrasing of the clause to make a focussed constituent the most prominent element in the iP.

Both parameters depend on the metrical interpretation of a binary branching syntactic tree, in which a constituent on the right branch is treated as metrically strong by default irrespective of its own metrical properties or those of the sister node. Strength-sensitivity and weight-sensitivity are two modes of altering the default mapping in case of an inherent metrical asymmetry between two sister nodes. While strength-sensitivity allows the left-hand member to project its inherent metrical prominence directly onto the next level, weight-sensitivity makes use of tree-geometrical prominence to achieve relative prominence with respect to its prosodic sister.

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¹ In Italian, it would be more natural to express the direct object solely with a clitic or to the right-dislocate it, as in (i) below. For the sake of parallelism, I will ignore these issues which point to another difference in the expression of discourse given elements in English and German versus Italian.

(i) a. *Lo ha incontrato GIANNI*
 b. *Ha incontrato GIANNI, il suo vicino*

² In Hinterhölzl (2009) the placement of light, that is, pronominal DPs in this approach is discussed in detail. It is argued that they are unproblematic since special syntactic licensing conditions obtain which determine their placement properties. A more problematic case is constituted by DPs headed by a proper name only. These DPs count as light in the present approach and thus may be realized either pre- or post-verbally. I will have to leave this issue for further research.

³ The UB hypothesis assumes that phrase structure is uniformly right-branching, implying that the head of a phrase always precedes its complement in the base structure, that is, before movement (cf. Kayne 1994).

⁴ I assume that subjects in English are licensed within the T-domain. Elements within the T-domain (like elements in the C-domain) are not subject to the HFF (see Hinterhölzl 2009 for evidence in German that the application of HFF is phase dependent, applying in the V-domain in German but failing to apply in its I-domain).

⁵ Spell-out of the subject in its vP-internal base position (preceding the verb) would fail to make the subject the most prominent constituent within an intonational phrase also containing the verb (cf. Frascarelli 2000).