Nuclear Stress and Information Structure

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Abstract
This paper discusses and evaluates different approaches to the nuclear stress (NS) algorithm in light of the variability in stress pattern observed for certain constructions in German and English in wide focus contexts (“unmarked” stress patterns), in opposition to the rigid (right-most) nature of NS in Spanish/Italian. The paper also briefly discusses the case of nuclear stress in narrow focus contexts (“marked” stress patterns), and points to recent research that suggests that “unmarked” and “marked” stress patterns originate through distinct mechanisms.

Keywords: Nuclear stress, Anaphoric Deaccenting, Metrical structure, Prosodic phrasing.

1. Introduction
It has long been recognized that information structure plays a fundamental role in modeling the prosody of a sentence, in particular prominence relations; e.g. Bolinger 1958, 1972, Halliday 1976, Chomsky 1971, Jackendoff 1972 for early works on English.¹ Yet, it has remained a matter of debate what aspects of information structure and prosody fall under the purview of grammar. Among those early works, Chomsky 1971 and Jackendoff 1972 stand out in acknowledging that the notion of focus (the non-presupposed or asserted part of the sentence) is
grammatically represented, and that the Nuclear Stress (NS) of the sentence plays a fundamental role in its identification. This constraint can be stated as in (1), where the NS is aligned with the intonational nucleus of the sentence, known as the Nuclear Pitch Accent or NPA; see also Zubizarreta 1998, Reinhart 2006.

(1) The focused constituent must contain the rhythmically most prominent word, i.e. the word that bears the Nuclear Stress (NS).

Thus, in a wide focus example like (2a), where the entire sentence is focused, the NS falls on the rightmost constituent (i.e. the PP complement of the object). This is often referred to as the “unmarked” stress pattern. The unmarked NS can identify the entire sentence as the focused constituent (wide focus), as well as varying degrees of narrow focus: the VP, the DP direct object, or the adnominal PP complement, as long as the constituent that bears the unmarked NS is contained within the focused constituent. Thus, (2a) is felicitous as an answer to a question like ‘What happened?’ (wide focus) as well as to an answer to a question like ‘What did the cat do?’ (narrow VP focus) or ‘What did the cat read?’ (narrow DO). When the focus is narrowed down to a subpart of the sentence that does not contain the unmarked NS stress, for example the subject in (2b), the rhythmically most prominent stress must shift to the subject. Such sentence is felicitous only as an answer to a question such as ‘Who read a book about rats?’. This type of stress, which does not allow for “focus projection”, is referred to as “marked” stress. This remains a fundamental fact that any theory of focus identification must account for.
(2) a. The cat read a book about rats.

b. The cat read a book about rats.

In this chapter, we will use the term “unmarked stress pattern” to refer to patterns that are unaffected by discourse factors, such as the focus/presupposition divide and previously-mentioned or given information (or information accommodated as such by the speaker/hearer). While such “distilled” contexts, which are required to define the unmarked patterns, may at times seem elusive because of the “accommodation” factor, we believe that a theoretical understanding of such patterns is important to gain insight into the “marked stress patterns”.

Among scholars who have recognized the role of phrasal stress in the identification of the scope of the focus within a sentence, the domain of computation of phrasal stress itself has been under debate. Some have argued for the direct computation of NS on the syntactic structure (Cinque 1993, Kahnemuyipour 2004/2009, Reinhart 2006). We refer to it as the strictly syntactic approach. Scholars working within prosodic phonology have argued that phrasal stress is computed on prosodic domains, in particular on the so-called phonological or major phrase (the p-phrase), which are themselves defined in relation to syntactic categories, more precisely in relation to lexical syntactic categories (e.g. Selkirk 1995, Kratzer and Selkirk 2007, Féry 2011, among many others). We refer to it as the prosodic-phrasing approach.7 Truckenbrodt 2006 proposes a mixed approach, with phrasal stress computed directly on the syntactic structure, and NS identified as the last phrasal stress in the prosodic intonational domain. Other researchers have argued for the computation of NS on a metrically-interpreted syntactic structure, in which certain elements of the syntactic structure may be metrically invisible (Halle and Vergnaud 1987, Zubizarreta 1998, Zubizarreta and Vergnaud 2005, Nava and Zubizarreta 2010, Zubizarreta and Nava 2011). We refer to it as the metrically-interpreted syntactic approach.
On the empirical side, two important issues have increasingly come to the forefront of discussion. One is the issue of variability of the positioning of NS in Germanic in wide focus contexts (the unmarked stress pattern). The other issue concerns the cross-linguistic variation in NS placement, in particular in Germanic languages, as opposed to the Romance type; e.g. Ladd 1996, Samek-Lodovici 2005, Vallduví 1995, Zubizarreta 1998, Nava and Zubizarreta 2010, Zubizarreta and Nava 2011. In sections 2 and 3, we discuss how some of the above approaches deal with the variability within and across languages in the unmarked stress patterns, namely the proposal put forth by Kratzer and Selkirk 2007 (who build on insights from Kahnemuyipour 2004/2009), by Féry 2011, and by Zubizarreta and Nava 2011 (based on Zubizarreta and Vergnaud 2005).

Another important question under debate is whether distinct algorithms, perhaps of an entirely different nature, are involved in the computation of “marked” and “unmarked” stress patterns. While some works assume such distinctions (e.g. Cinque 1993, Kahnemuyipour 2004/2009, Selkirk and Kratzer 2007), others have explicitly argued in favor of it (e.g. Reinhart 2006, Zubizarreta and Nava 2010). Bolinger 1972 explicitly denies this distinction, as well as Schmerling 1976, Selkirk 1984, 1995, and Gussenhoven 1984. In section 4, we present the view put forth by Reinhart 2006, in which the marked stress patterns are generated as a consequence of a process of anaphoric deaccenting (i.e. A-deaccenting triggers NS-Shift), as well as an alternative view by Féry and Kügler 2008, where it is suggested that discourse notions such as newness, given, and narrow focus directly modulate the pitch range of a sentence (a process referred to as “scaling”). Finally, we briefly review some results that support the view that the prosody of narrow focus is indeed generated by a distinct mechanism that has direct access to information structure and is subject to dialectal/idiolectal preferences, in stark contrast with the
NS in the “unmarked stress pattern”, which is generated by an encapsulated grammatical algorithm. Yet, the debate on the origins of the marked vs. unmarked stress pattern remains an open question and awaits further investigation.  

2. The domain of computation for phrasal stress

In this section, we present a short overview of some of the more recent approaches to “unmarked” stress in wide focus contexts. We center the discussion on how these approaches handle the variability of NS placement in Germanic.

2.1. The strictly syntactic approach vs. the prosodic approach

The classic Nuclear Stress Rule (NSR) was put forth by Halle and Chomsky 1968. The cyclic application of this rule, along with certain conventions, predicts NS placement on the last constituent of the sentence, thus capturing the fact that in a transitive SVO sentence, the main prominence is on the object, as shown in (2a). One important challenge to the classic NSR, although certainly not the only one, is the fact that in V-final Germanic languages, in sentences like (3a) and (3b), NS does not fall on the last constituent (namely, the verb), but on the DO and PP complement, respectively.

(3)   a. Hans hat [[ein [Buch]] gelesen].

Hans has a book read

‘Hans has read a book.’

b. Peter hat [[an [einem [Papier ]]] gearbeitet].

Peter has on a paper worked
‘Peter has worked on a paper.’

Cinque 1993 put forth a proposal that attempted to abstract away from word order by fully exploiting the structural information provided by the syntactic structure. More specifically, this author proposed an algorithm that identifies the *NS position with the most deeply embedded node in the syntactic structure*. The complement, being the most deeply embedded node in the VP, is identified as carrying main stress, regardless of whether the language is verb-final or verb initial. Cinque’s proposal also provides an account for the complement vs. adjunct distinction noted by Krifka 1984, if it is assumed that the adjunct is adjoined to the verbal projection, unlike the complement, which is a sister to the verb; cf. (3b) and (4). It is proposed that adjuncts and specifiers are not part of the “main path” of the clausal syntactic structure and therefore their internal structure is invisible to the computation of NS.

(4) Peter hat [vP an einem kleinen Tisch [vP gearbeitet]].

Peter has on a small table worked

‘Peter worked on a small table.’

With the introduction of the notion of “phases” as the relevant syntactic domain for the interface components of the grammar (Chomsky 1999/2001, 2005), a new way of thinking about the interaction of syntax and phrasal stress presented itself. Chomsky op.cit. identified two syntactic categories as defining a “phase domain”: the CP and the vP, and their sister nodes, TP and VP, respectively, as the domain of spell-out and interpretation (i.e. the interface domains). Adger 2006 put forth the proposal in (5):
(5) The spell-out domain of a phase is the domain for phrasal stress assignment.

In an attempt to capture the primacy of objects in transitive sentences in both head initial and head final languages, Kahnemuyipour 2004/2009 further refines this proposal as in (6):

(6) Assign phrase stress within the highest constituent within the spell-out domain.

The rule in (6) accounts for the position of NS in (3) if it is assumed that the DP object in (3a) and the PP locative in (3b) are in a position higher than the verb within the spell-out domain at the point where the NS algorithm applies; this is attributed to the fact that V-to v applies, leaving the DO or the PP argument as the highest constituent in the structure. On the other hand, if the PP adjunct in (4) is outside the spell-out domain, it will not receive the NS. Given the V-to v assumption, the spell-out domain (VP) will contain no phonological material. It is assumed that in such cases, the NS goes on the closest non-null element. In the case of (4), the closest non-null element is the verb.

Kratzer and Selkirk 2007 propose a modified, prosodic version of Kahnemuyipour’s phase-based account of phrasal stress assignment. According to their proposal, the domain for phrasal stress is the phonological (or major) phrase, which itself is defined as the highest phrase within the spell-out domain of a phase; see (7). It is furthermore assumed that the prosodic head of the major phrase bears phrasal stress, and the last phrasal stress is identified as the NS.

(7) The highest phrase within the spell-out domain of a phase corresponds to a prosodic major phrase in phonological representation.
The DO in (3a) and the PP in (3b) constitute a major phrase and therefore a domain for phrasal stress, and being the last p-phrase in the intonational phrase (or i-phrase), they are ultimately identified as the bearer of NS. This framework can account for the contrast between (3b) and (4) to the extent that the PP adjunct is assumed to be outside the prosodic VP spell-out domain of vP.

Another version of phrasal stress based on prosodic phrasing is proposed by Féry 2011, which adds to the system the notion of “prosodic domain integration”. Unlike Kratzer and Selkirk’s analysis, Féry’s proposal is embedded within a constraint-ranking Optimality-Theoretic framework. We will abstract away from these theoretical differences to gauge the commonalities and differences between the two approaches. As in Kratzer and Selkirk’s analysis, in Féry’s proposal, XPs are mapped onto prosodic phrases (8), the head of each prosodic domain (p-phrase and i-phrase) is accented, and the prosodic head of an i-phrase is the rightmost one (9) (equivalent to the NS constituent in the classic NSR approach). The innovation proposed by Féry is that an XP argument can be prosodically integrated with its adjacent head into a larger p-phrase (10a), thus giving rise to cases in which a p-phrase is embedded within another p-phrase. Furthermore, a notion of prosodic subordination is introduced for adjuncts (10b), thus paving the way for a different account of the argument-adjunct contrast in (3)-(4). The complement PP in (3b) will be prosodically integrated with its adjacent head, but not the PP adjunct in (4b), which is analyzed as “subordinate” to the argument-predicate prosodic domain.

(8) A syntactic maximal projection including at least a prosodic word is contained in its own prosodic domain.
(9) Align the right boundary of every i-phrase with its head.

(10) a. An XP argument can be prosodically integrated with its adjacent head into a larger p-phrase.
    
    b. The p-phrase of an adjunct is subordinated to the p-phrase of an argument-predicate complex.

In the next section, we discuss in further detail the system put forth by Kratzer and Selkirk 2007 and Féry 2011, and how they deal with variability of NS placement in certain structural contexts.

2.2. Variability in NS placement in Germanic

2.2.1. The case of intransitives

As is well-known, Germanic SV intransitives exhibit variability in the location of NS (Chafe 1974, Schmerling 1976, Selkirk 1984, 1995, Sasse 1987, Zubizarreta 1998, Nava and Zubizarreta 2010, Irwin 2012). Renditions with NS on the subject and with NS on the verb are both attested with SV intransitives in wide-focus contexts. While some authors have correlated the variability with the unergative/unaccusative distinction (e.g. Zubizarreta 1998, Kahnemuyipour 2004/2009, Irwin 2012), it appears that variability in NS placement cuts across the two types of intransitives. Based on data from a Question & Answer production task with 34 native English speakers, Zubizarreta and Nava 2011 report that while variability is systematic with unergatives (e.g. an actress was crying vs an actress was crying; a guest sang vs. a guest sang, where underlines indicate location of NS), it is more skewed with unaccusatives. In particular, while verbs of appearance systematically elicited NS placement on the subject (e.g. the aliens arrive, the police came, a rabbit appeared.), some variability was found in other sub-classes of unaccusatives (the
major fell, the magician disappeared. While alternating intransitives systematically elicited NS on the subject in that study (e.g. a window broke), Chafe 1974 and Sasse 1987 report variability with that verb class as well. Based on a fine-grained analysis of the context associated with variability of NS placement with intransitives, Sasse 1987 argues that the distinction is related to the thetic (eventive) vs. categorical (topic-comment) distinction. Verbs of appearance (arrive, come, appear) are typically associated with eventive predicates, and therefore they systematically give rise to NS on the subject.

Kratzer and Selkirk 2007 recast the thetic vs. categorical distinction in terms of stage-level vs. individual-level predicates, and propose that while the subject of stage-level predicates occupies the Spec of Tense Phrase (TP) (a silent spatio-temporal topic is assumed to be present in such structures), the subject of individual-level predicates occupies the Spec of a higher Topic Phrase (TopP). Some further assumptions are made. In particular, it is assumed that when a verb (or verb cluster) is the only element in a spell-out domain, it moves out to the v projection, thus emptying out the VP. Prosodic spell-out skips spell-out domains that are empty. Thus, the example in (11a), with NS on the subject, has the structure in (11b). The VP being empty, it does not constitute a prosodic spell-out domain. The next spell-out domain will then be TP; rule (7) identifies the subject in Spec of TP as a major phrase, i.e. the last one in the i-domain and therefore the locus of NS.

(11) a. Ich hab’ gehört, dass Metallarbeiter gestreikt habem.
I have heard that metal workers gone-on-strike have

b. [TopP pro [TP Metallarbeiter, [vP e [VP gestreikt ] gestreikt haben ]]]
An example of a subject in Spec of TopP is given in (12a), and its associated structure in (12b). TopP is assumed to constitute a phase, and TP its spell-out domain. Furthermore, an Elsewhere Condition is postulated that states that a spell-out domain with eligible material must contain a major phrase stress. In (12b), the sole eligible element within the TP spell-out domain is the verb, so it will constitute a p-phrase, and ultimately bear the NS (being the last p-phrase within the i-domain).\footnote{16}

(12) a. Ich hab’ irgendwo gelesen, dass der König von Bayern \textit{spinnt}.

I have somewhere read that the king of Bavaria is crazy

b. ...[Top\textsubscript{P} der König von Bayern\textsubscript{i} [TP $e_i$ [vP $e_i$ [VP spinnt] spinnt]]]

It is to be noted that the assumption that the verb moves out of the VP and into the $v$ projection when it is the unique phonological material in the VP (which is a crucial assumption to account for NS on the subject in (11)) is not without consequences. In particular, it undermines a possible explanation of the Krifka’s fact in (4). In effect, by the same logic that applied to (12), being the only element in the VP spell-out domain, the verb (or verb cluster) will move out to the $v$ projection, thus emptying out the VP. Recall that prosodic spell-out skips domains that are empty. Consequently, in (4), the verb and the PP adjunct would no longer belong to distinct prosodic spell out domains; they are both part of the TP spell-out domain. By rule (7), we would then expect that phrasal stress (and hence NS) will fall either on the subject, if the subject is located in Spec of T (see (4’i) below) or possibly on the PP adjunct, if the subject is in Spec of Top and the adjunct counts as part of the TP domain (see (4’ii)), but we would not expect for phrasal stress to fall on the verbal participle which is assumed to be in the
vP domain. Therefore, some further assumption would be needed to block the verb from moving out of the VP in such cases. The logic of the analysis suggests that the locative adjunct (for some reason that remains to be understood) forces the verb to stay in the VP; it would then constitute a major p-phrase and bear phrasal stress by the *Elsewhere Condition* mentioned earlier.

\[(4') \ (i) \ [\text{TopP pro} \ [\text{TP Peter hat} \ [\text{TP pro} \ [\text{an einem kleinen Tisch} \ [\text{VP e} \ [\text{VP gearbeitet} \ [\text{gearbeitet}]}}])

\[\text{ (ii) [TopP Peter] hat [TP e} \ [\text{an einem kleinen Tisch} \ [\text{VP e} \ [\text{VP gearbeitet} \ [\text{gearbeitet}]}}])\]

To account for the variability in NS placement in SV intransitives, Féry also appeals to the topic status of the subject of categorical statements, which occupy a distinct syntactic position from that of subjects of thetic (eventive) statements. It is proposed that prosodic phrasing and prosodic integration are sensitive to that syntactic distinction. Thus, in the case of (11b), the subject XP located in Spec of T is mapped onto a p-phrase and is prosodically integrated within a larger prosodic domain that contains the verb (see rule (10a) and note 13), giving rise to a single i-phrase, as shown in (13a) (small caps indicate pitch-accented word). Since the subject is the sole p-phrase within the i-phrase, it functions as the head of the i-phrase and bears the sole pitch accent in that phrase (which corresponds to the NS). On the other hand, the topic in (12b) constitutes its own i-phrase. Thus, the subject and the verb in (12b) are mapped onto two distinct i-phrases, each with a pitch-accented head (or NS), as shown in (13b).

\[(13) \ (a. \ (\text{ip (p-p \ Metallarbeiter) gestreikt haben}) \]

\[\ b. \ (\text{ip der König von Bayern} \ (\text{ip Spinnt})\]
2.2.2. Locative and directional PPs

Another domain of NS placement variability in Germanic, brought to the forefront of the discussion by Féry, is found in transitive structures with locative PPs (e.g. 14a) and directional PPs (e.g. 14b). Kratzer and Selkirk provide an unambiguous analysis for such cases, in which the DO systematically carries phrasal stress (and ultimately the NS). Recall that in that analysis, only the highest phrase within the spell-out domain (the VP in this case) is parsed as a major phrase and therefore identified as containing phrasal stress. In (15), the DO is assumed to be the highest phrase in the spell out domain; it therefore constitutes a major phrase and carries phrasal stress, while the following PP and verb lack phrasal stress.

(14) a. ...dass ein JUNGE eine GEIGE im Supermarkt kaufte.
   that a boy a violin in.the supermarket bought
   ‘that a boy bought a violin in the supermarket’

   b. ...dass MARIA KINDER in die Schule fuhr.
   that Maria children in the school drove
   ‘that Maria drove children to school’

Féry notes that there is another prosodic pattern available for the sentences in (14), namely one in which both the DO and the PP are pitch-accented, with the PP, being the last one, as the bearer of NS, as shown in (15).17

(15) a. ... dass ein JUNGE eine GEIGE im SUPERMARKT kaufte

   b. ... dass MARIA KINDER in die SCHULE fuhr.
It is worthwhile noting here that by standard assumptions, the directional PP in (15b) is an “argument” since it is entailed by the lexical meaning of the verb *drive*. On the other hand, the locative in (15a) is not an “argument” any more than the locative in Krifka’s example in (4) is. The fact that both (15a) and (15b) pattern alike is therefore intriguing. It suggests perhaps that the Larsonian approach (Larson 1988) to syntactic structuring of the VP adverbs is on the right track. Under that approach the syntax (not the lexical semantics of the verb) guides the structuring of XPs in the verbal domain. Larson’s proposal is that PP locative and temporal adverbs can be incorporated within the VP-shell analysis when there is a DO that can give rise to the binary VP-shell structure, as in (16) below (adapted to German word order):

(16) a. \[vP \ [vP \ [DP \ [vP PP_{Loc} \ V]] \ v]] \]

b. \[vP \ [vP \ [DP \ [vP PP_{Temp} \ V]] \ v]] \]

Accordingly, the PP in (15a) an in (15b) gets integrated automatically into the binary syntactic analysis of a “VP shell” because there is a DO that can function as its specifier, as shown in (17). In other words, syntactically, the PP in (4) functions as an adjunct, but the locative in (15a) functions as part of the verbal predicate, as does the PP in (15b); such PPs could be referred to as “predicative PPs”. Something along these lines would need to be assumed for Féry’s analysis to work.
Within that analysis, the patterns in (15) arise from the canonical analysis in which each XP inside the VP constitute “same level” p-phrases, with the last one identified as the head of the i-phrase and therefore bearer of NS; see (18a). As for the patterns in (14), Féry argues that in this case, the PP is “prosodically subordinated” with respect to the “argument predicate” complex (DO V) by the rule of Adjunct Subordination in (10b) (repeated below), giving rise to the pattern in (18b). This prosodic subordination is indicated by distinguishing different levels of p-phrases, P1, P2, etc, where P2 is subordinated to P1. In (18b), P1 is prosodically subordinated to the argument-predicate complex formed by the object and the verb, an i-phrase in this example. P1 will therefore bear the NPA (= NS) and since P2 is in post-nuclear position, its accent will be deleted. Féry suggests that the preference for (18b) is due to the preference for prosodic integration of the verb with its non-adjacent DO argument.  

\[(18) \quad \text{a. } (i_p (P1 \text{ GEIGE}) (P1 \text{ im SUPERMARKT}) \text{ kaufte}) \]

\[(18) \quad \text{b. } (i_p (P1 \text{ GEIGE}) (P2 \text{ im Supermarkt}) \text{ kaufte}) \]

\[(10b) \quad \text{The p-phrase of an adjunct is subordinated to the p-phrase of an argument-predicate complex. (but see note 13).} \]
may speculate that the “prosodic subordination” of the “predicative PP” with respect to the DO is most likely due to the fact that such PPs in transitive structures break the natural adjacency between DO and V within the VP. On the other hand, in a head initial language like English, with a “V DP PP” word order for transitive structures, the NS is generally on the PP in all-new wide focus structures (e.g. *they bought a violin at the market*), as in the case of PP adjuncts with intransitive verbs (e.g. *he worked at the office*).  

To summarize, in Germanic, there are syntactic structures that allow for variability in the location of NS in wide focus contexts, two prominent cases being the SV intransitive structures and the transitives with a locative or directional PP. An adequate analysis needs to have the flexibility to capture such variability.

3. The metrically-interpreted syntactic approach.

Building on insights in Halle & Vergnaud 1987, Zubizarreta 1998 put forth a system in which NS is computed on (abstract) syntactic structures, but with the option of ignoring certain syntactic elements, in particular functional categories. The *metrical (in)visibility of functional categories* is argued to be the locus of both intra-language variation, of the type examined in section 2, as well as of cross-linguistic variation, as observed between Germanic and Romance languages (in particular of the Spanish variety). Zubizarreta 1998’s original version was further revised in Nava and Zubizarreta 2010, Zubizarreta and Nava 2011. Here we will present the latter version and refer to it as the *metrically-interpreted syntactic (or MI-S) approach*.  

In the Spanish-type of language, NS is always at the right edge of the i-phrase. Thus, in a “DP V” structure in Spanish, NS is always on the verb. This is the case not only in the case of SV intransitives discussed earlier (*a dog’s barking* vs. *un perro está ladrando*), but also in
infinitival relatives; cf. English *there are problems to solve/*there are problems to compute* (Bolinger 1972) and Spanish *Hay problemas que resolver/*Hay problemas que computarizar.* The MI-S approach crucially appeals to two properties to account for the fact that Germanic languages, but not Romance languages, have prosodic patterns with phrase-internal NS in all-new wide focus contexts. The first property, already mentioned above, is recapitulated in (19).

(19) In Germanic, functional categories may be interpreted as metrically invisible, while in Romance, functional categories are always metrically visible.

The second property of the MI-S proposal is that the NSR is made up of two components: one, which is sensitive to the “head-argument” relation, and another one (the “elsewhere” case) that is sensitive to “linearity”. The proposed NSR for the languages under discussion is given in (20), where the NS constituent is uniquely dominated by metrically S(trong) constituents (Liberman 1975). The relevant notion of argument is that of lexico-syntactic (or l-s) argument, in the sense of Hale and Keyser 2002, and not that of lexico-semantic argument.27

(20) Given two metrical sister nodes A and B: (i) If A is a head and B is its argument, assign S to B (specific-NSR). Otherwise, (ii) assign S to the right-most constituent node in the phrase (general-NSR).

To illustrate, consider the metrical structures for SV intransitives in (21). If T is metrically invisible, the first part of the NSR assigns S to the DP subject because it is an argument of its metrical sister V (21a), which is therefore identified as the NS-bearing
constituent. If T is metrically visible, the first part of the NSR fails to apply because DP and V are not metrical sisters; the “otherwise” part of the algorithm applies and ultimately assigns NS to the verbal constituent (21b). The same analysis applies to the German SV intransitives in (13) and extends to the infinitival relative structures in (22). In (22a), the non-finite T is analyzed as metrically invisible and the head of the relative clause gets identified as the locus of NS. In (22b), T is analyzed as metrically visible and the verb within the relative clause gets identified as the locus of NS. In Romance, on the other hand, functional categories are consistently metrically visible; therefore only prosodic patterns with sentence final NS are generated (namely, on the V in the structures under discussion).  

(1)  
\[ \begin{array}{c}
1. & N_S & V_W \\
2. & (a) & \text{dog} & \text{is} & \text{barking} \\
\end{array} \] 

(22)  
\[ \begin{array}{c}
1. & N_S & V_W \\
2. & \text{problems} & \text{(to)} & \text{solve} \\
\end{array} \]
The above proposal ultimately aims to capture a connection between the basic (low-level) rhythmic property of the language and their phrasal (higher-level) rhythmic patterns, the linchpin of the connection being the prosodic status of their functional categories. In Germanic, all types of functional categories undergo reduction, including, crucially, the tense-carrying auxiliaries. This is not the case in Romance, not even in Catalan, a language with vowel reduction. In Catalan, many determiners and prepositions undergo reduction, but crucially the tense-bearing auxiliaries never reduce (see Solà et al. 2002). The relation between the metrical (in)visibility of functional categories and the prosodic status of functional words is an indirect one; i.e., the metrical invisibility of functional categories depends on the across-the-board reduction of functional categories (D, P, T, C); it is not based on a case by case basis. This makes sense in the MI-S system under discussion to the extent that the NS algorithm applies to abstract metrical structures (based on abstract syntactic structures) and not to phonological words.  

It is worthwhile noting that although theoretically different, the system put forth by Féry and the MI-S proposal summarized above have a certain conceptual similarity. While the former system describes (21a) and (22a) as cases of “prosodic integration”, the latter does so in terms of “metrical constituency”. Note though that Féry’s analysis appeals to a distinct topic position for the DP subject in (21b), obligatorily analyzed as an i-phrase, with the verb forming another i-phrase (each with its own NS). It remains to be seen how Féry’s analysis would extend to (22b). On the other hand, the MI-S analysis assigns one single NS to the structures in (21b) and (22b), namely to V; the DP subject gets secondary stress by other rhythmical rules (see note 5). Note that the MI-S analysis is silent about the relation between NS placement and p-phrasing. Therefore, the option of a single p-phrase for cases like (21b) is not excluded. Interestingly, cases of stress retraction, triggered by two adjacent stresses within the same p-phrase, suggest
that such option does exist; e.g. (ip AnneMarie bicycled) (example from Inkelas and Zec 1993).
Yet, the possibility of insertion of an ip boundary after the subject at a later stage, with its own
NPA, is not excluded; e.g. (ip Anne Marie) (ip bicycled).

We turn next to PPs. The German contrast between (3b) and (4) is dealt with
straightforwardly by the NSR in (20). The PP in (3b) is an l-s argument of V and is therefore
assigned NS by the first part of the NSR (Hans hat (ein Buch gelesen)). On the other hand, the
PP in (4) is an adjunct and, therefore, the first part of the NSR fails to apply to it; the “otherwise”
part of the algorithm applies and assigns NS to the verb: (Hans hat (an einem Papier
gearbeitet)).

As for transitive structures with a locative or directional PP, the NSR will assign NS to
the PP, to the extent that the PP is analyzed as a lexico-syntactic argument of V, or more
precisely, to the extent that the PP is part of the VP-shell of the verb as shown in (16a). Thus,
the structures in (17) gives rise to the patterns in (15). As for the patterns in (14), something
more needs to be said (as in Féry’s system). We may appeal to metrical incorporation of the PP
into the V, contingent on the metrically invisible status of the P (an analysis along these lines
was in fact proposed in Zubizarreta 1998, p. 65). If the PP is “metrically incorporated” into V,
the DP object and the V become metrical sisters and the first part of the NSR assigns NS to the
object. As with Féry’s mechanism of “prosodic subordination”, the question arises as to what
triggers “metrical subordination. As suggested earlier, it might be the case that such mechanism
exists in German (but not in English) because being a head final language, PPs in transitive
structures break the natural adjacency between an unscrambled DO and V within the verbal
phrase. In a way, the prosody, via NS placement on the object (made possible by incorporation
of the intervening XP into the metrical domain of V) makes up for the lack of syntactic
(structural) closeness between DO and V. If this speculation is on the right track, we expect that metrical incorporation (or prosodic subordination) will only occur in structures such as those in (17). We should not expect NS to fall on an object that has scrambled out of the VP; in that case, the lack of NS on the object would itself point to the fact that the DO has moved out of the VP.

To summarize, the variation in NS placement in Germanic, as well as cross-linguistic differences, militate in favor of a flexible approach to NS assignment. The prosodic-phrasing proposal put forth by Féry, as well as the MI-S approach presented in this section, have the inherent flexibility to deal with such variability. Yet, the two systems make fundamentally different claims regarding the theoretical status of NS. In the prosodic-phrasing approach, the NS position is a by-product of prosodic phrasing. In the MI-S approach, NS is computed independently of prosodic phrasing and it crucially determines the position of the NPA in the unmarked cases.

4. Discourse-given information and deaccenting

We turn next to the “marked” NS patterns in Germanic, in which discourse plays a major role in determining the location of NS. Two types of “marked” prosodic patterns have been identified; one in wide-focus and another one in narrow-focus contexts. These are contexts in which the constituent which carries the unmarked NS gets deaccented by virtue of the fact that it is discourse-given (i.e. previously mentioned or inferred from the context). Because NS cannot be associated with deaccented material, it gets shifted to the left (Ladd 1980, 1996, Reinhart 2006, Nava and Zubizarreta 2010, Zubizarreta and Nava 2011, among others). We refer to this phenomenon as $A$-naphoric-deaccenting & NS-Shift.
Examples of “marked” stress pattern, where the focus is “narrow”, are given in (23) (italics mark deaccented material).

(23)  a. *Mary bought that old stamp.* [Who bought that old stamp?]
      b. I am drawing *pictures on the cover.* [What are you drawing on the cover?]

Deaccenting triggers a change in prosodic weight in the metrical structure. To illustrate, consider the metrical tree of the VP in sentence (23b). The NSR generates the metrical tree in (24a).

Deaccenting (pitch-accent deletion) of the prepositional object triggers a shift in NS. According to the NS-Shift view, the metrical tree gets relabelled as in (24b). More precisely, the prepositional object that bears the unmarked NS is relabelled $W$(eak). Consequently its sister node (the direct object) is relabeled $S$ and is interpreted as bearing the (marked) NS (recall that the node that is uniquely dominated by $S$ is interpreted as bearing NS). The prepositional object is therefore interpreted as rhythmically subordinate to the direct object. The same logic applies to (23a), where the deaccented VP is relabelled $W$, its sister node (the subject) is relabelled $S$ and is interpreted as bearing the primary (marked) stress, with the object as rhythmically subordinate.

(24)  a.

\[
\text{VPs} \\
| \text{Vw} \\
| \text{drawing} \\
| \text{NPs} \\
| \text{Nw} \\
| \text{pictures (on the) covers} \\
\text{Ns} \\
\]
In the case of narrow focus, as in the examples in (23), the “marked” patterns are the only possible options, given the general NS-Focus correspondence constraint in (1): to the extent that the focused constituent must be prosodically identified as the bearer of NS, \textit{A-deaccenting \& NS-Shift} must apply in such cases. \(^{31}\)

We turn next to “marked” prosodic patterns in “wide focus” contexts, illustrated by the examples in (25) (from Nava and Zubizarreta 2010 and Zubizarreta and Nava 2011, modeled on Ladd’s original examples). The post-nuclear deaccented material is given in italics and the discourse context in brackets. In (25a), the NPA is on the verb and the VP is the focused constituent; in (25b), the NPA is on the DO and the entire sentence is the focused constituent.

\begin{equation}
\begin{align*}
\text{b.} & \quad \text{VPs} \\
& \quad \text{Vw} \\
& \quad \text{drawing} \\
& \quad \text{NPs} \\
& \quad \text{Ns} \\
& \quad \text{pictures (on the) covers} \\
& \quad \text{Nw}
\end{align*}
\end{equation}

(25)  
\begin{enumerate}
\item [a.] Because I collect \textit{stamps}. [Why are you buying that old stamp?]
\item [b.] Because I’m drawing \textit{pictures on the covers}. [Why are these notebooks missing their covers?]
\end{enumerate}

The “marked” patterns in (25) (wide-focus contexts) are different than those in (23) (narrow-focus contexts). As mentioned earlier, in cases of “marked” focus, deaccenting must apply in order for the “marked” focus constituent to be aligned with the NS, as required by (1).
On the other hand, in the case of wide-focus sentences that contain informationally given material, there is a tendency to deaccent these in Standard English. Yet, it is not entirely systematic: of the 35 English native speakers (ENC) tested by Zubizarreta and Nava 2011, 75% deaccented the object in (25a) and 88% deaccented the PP in (25b). Furthermore, Ladd 1996 reports that there are dialects of English (e.g. Hawaiian) that do not deaccent given information in “wide-focus” contexts.

Under the view outlined above, the NSR is a grammatically encapsulated mechanism that determines the position of the NS (the rhythmically most prominent word within the sentence) in neutral contexts. On the other hand, NS-Shift is triggered by discourse factors (namely by deaccenting of given information). Under this view, the operation of NS-Shift triggers a change in the metrical structure. There is an alternative and attractive view, proposed by Féry and Kügler 2008, Féry 2011, whereby discourse notions directly affect the default scaling of pitch accents, rather than the underlying metrical structure. As is by now well-known, in the unmarked intonational patterns (with all new information), there is a scaling of pitch accents due to a phenomenon known as “downstepping”, which applies left-to-right in the intonational domain and lowers a high tone with respect to an immediately preceding high tone; on English downstepping, see Pierrehumbert 1980, Liberman and Pierrehumbert 1984 and on German, see Féry and Kügler 2008, Féry 2011 and references cited therein. According to the latter authors, this default sequences of downstepped tones can be further affected by discourse factors, e.g. narrow focus triggers upstepping of a pitch accent, while givenness lowers it prenuclearly and compresses it postnuclearly.

If we adopt the Féry and Kügler proposal, we arrive at a view in which pitch-accent (more precisely, the NPA) and the NS (as determined by the rhythmical NSR) part ways in the
case of “marked” patterns (see Kahnemuyipour 2004, 2009 for a view along those lines). More specifically, in the discourse-neutral (wide focus) cases, the NS and the NPA would be aligned, but not in the cases where discourse factors triggers pitch deletion of the NS-bearing constituent. This is a radically different view from the standard one, which deserves further investigation.

Whatever the ultimate conclusion as to the specifics of how “marked” patterns are obtained, what is important to retain is that “marked” patterns are generated by a distinct, grammatically encapsulated mechanism, while some other mechanism (sensitive to discourse factors) generates the “unmarked” patterns. Recent research on Spanish dialects and on the English of native Spanish speakers provides further support for this conclusion.

It has often been reported that Romance languages like Spanish and Italian do not deaccent given material and that sentence-internal NS gets interpreted as emphatic in these languages; e.g. Ladd 1996, Cruttenden 1997, Zubizarreta 1998. It has been suggested that in the case of sentence-internal narrow focus, these languages use other strategies, such as word order, to align the focused constituent with NS (e.g. Zubizarreta 1998, Samek-Lodovici 2005). More recent research suggests that sentence-internal narrow focus is not completely excluded in Spanish, and that it is in fact preferred in some cases. Gabriel 2010 reports data on Argentinian dialects, which reveal that a sentence final informationally narrow-focused subject is preferred in the case of intransitive V$S$, as well as in the case of transitives with a cliticized object $cl.VS$ (26a) (i.e. as an answer to “Who bought the book?”). On the other hand, in the case of an informationally narrow-focused subject in transitive structures with a lexical object, a preverbal subject $SVO$ (26b) is preferred to the postverbal $VO_S$ order (26c) (underlines indicate the focus, perceived as most prominent, and italics indicate deaccenting). For such dialects, it is possible that $A$-deaccenting & $NS$-shift (a marked option in Spanish) is preferred to a $V$-$XP$-$S$ order
(possibly due to “weight” considerations). Yet in other dialects, (26c) is preferred in cases of informational narrow-focused subject, with (26b) interpreted as a case of correction or contrastive focus (Zubizarreta 1998) (as in JOHN bought the book, not PETER). The latter author suggests that accent of correction/contrast is generated by an Emphasis stress rule, which can also apply at the sub-word level (unlike the NSR or the NS-Shift rule). This rule would be comparable to Féry and Kügler’s pitch-upstepping rule, but it only serves to identify narrow contrastive focus (and corrections more generally) and not informational focus. On the prosodic distinction between narrow-contrastive and narrow-informational (or new) focus; see also Katz and Selkirk. (2011).

(26) a. El libro, lo compró Juan.

The book ACC CL bought Juan

‘The book, Juan bought it.”

b. Juan compró el libro.

c. Compró el libro Juan.

To summarize, while there is no dialectal variation regarding the location of the NPA in discourse neutral contexts (NPA systematically occupies the final position in the intonational domain), there are dialectal (or perhaps even idiolectal) variation with respect to the position of the NPA in the marked cases, and in some dialects this preference is dependent on the interaction with other weight-related prosodic considerations. This supports the view that “marked” patterns are obtained via some distinct mechanism than the “unmarked” patterns.
The research reported by Nava and Zubizarreta 2010 and Zubizarreta and Nava 2011 on the production of L1 Spanish/L2 English speakers point to the same conclusion. It was shown in that study that it was significantly easier for L2ers to produce sentence-internal “marked” NS (in both narrow-focus cases like (23) and wide-focus cases like (25)) than sentence-internal “unmarked” NS (i.e. NS on the subject in eventive $S^1 V$ structures in wide-focus contexts, discussed in 2.1). The authors conclude that the Spanish grammar is compatible with $A$-deaccenting & NS-Shift and that acquiring the L2 mechanisms of $A$-deaccenting & NS-Shift do not require “out-competing” any algorithm of the L1 grammar; therefore, Spanish speakers can readily incorporate this mechanism into their L2 English grammar. On the other hand, native Spanish speakers have a very hard time acquiring the “unmarked” prosodic patterns with non-sentence final NS generated by the Germanic NSR. In the above-mentioned studies, few L2ers produced the Germanic stress pattern for eventive $S^1 V$ intransitives (and none to a native-extent). We also expect “marked” stress patterns to be more easily affected by language contact.

The same reasoning would apply under the alternative view (Féry and Kügler 2008, Féry 2011), where the “marked” patterns are generated by directly manipulating the scaling of pitch accents. For Spanish native speakers learning German or English as a second language, the latter (discourse-dependent) mechanism would be easier to acquire than the grammatically-encapsulated phrasing rule in (10a).

5. Summary

As mentioned at the beginning of this chapter, it is now well-established that prominence relations within a sentence are intimately connected to information structure. We have presented and compared some of the recent proposals in light of empirical data, in particular data
pertaining to NS variability in Germanic. Whatever the ultimate status of NS in the grammar (whether it is a by-product of prosodic phrasing or has a privileged status in the computation of metrical structure), a successful system needs to account for variable NS placement in certain Germanic structures and for the rigid nature of NS placement in the Romance languages (of the Spanish variety). Recent research on dialectal variability in Spanish and on the speech of L1Spanish/L2 English speakers supports the view that “unmarked” (wide-focus) patterns is generated by a different rule than the one that generates the “marked” (narrow-focus) patterns (e.g. the former by the NSR and the latter via A-deaccenting \& NS-Shift). The further issue of whether narrow informational-focus and narrow contrastive-focus are prosodically distinct (the former identified by the NS and the latter by emphatic accent) is yet another question, touched upon very briefly in this chapter and still a topic of current debate.
References


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Notes

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1 Research in prosodic phonology across different languages (e.g. Jun 2005) has recognized two typological ways of encoding the phonological notion of prominence, *culminatively* (via the Nuclear Pitch Accent, which is aligned with its metrical counterpart – the Nuclear Stressed syllable) and *demarcatively* (via a prosodic juncture aligned with the edge of a syntactic category), e.g. Korean, Japanese, Bengali, and many Bantu languages; see also Féry 2001 on French. In the present paper, we will be concerned only with the *culminative* type of language, and in particular with Germanic (i.e. English, German) and Romance (e.g. Spanish, Italian). See Jun (this volume).

2 Rochemont 1986 defines *focus* in terms of the dichotomy *new* versus *old* (or *given*) information. Yet other research has shown that the discourse-based “focus/presupposition” dichotomy, which has semantic import (Rooth 1985), must be kept apart from the “new/old information” dichotomy, which are discourse notions that may affect the prosody of the sentence but lack semantic import. In fact, the focused constituent can contain old (or given) information; see Ladd 1980, 1996, and section 4 of this chapter.

3 The hypothesis that the focused constituent is *directly* identified by the NS as stated in (1) in languages that use pitch accents to define prominence (see note 1) has not gone unchallenged. An alternative proposal, put forth by Selkirk 1984, 1995, Gussenhoven 1984, have argued that focus identification is directly related to the distribution of pitch accents in a sentence and not to the notion of NPA or its metrical counterpart – the NS of a sentence. More specifically, these authors argue that pitch-accent assignment and predicate-argument structure is mediated by focus projection rules or focus-domain formation rules. The NPA (which corresponds to the
metrical notion of NS) is identified as the last pitch-accented word in the intonational domain (Newman 1946 on the NSR as a late rhythmic rule), but plays no fundamental role in defining the possible scope of the focus within the sentence. See also Nespor and Vogel 1986, who endorse the above “pitch-accent first” view of focus-prominence relation, as well as Féry 2011 (discussed in section 2 of this chapter). We will not discuss Selkirk’s and Gussenhoven’s proposal in this chapter, but see Zubizarreta 1998: 78-85 for a review, as well as Myrberg and Riad (this volume).

The NPA, being the center of the intonational contour, plays a central role in constraining the type of intonational contours that can precede and follow it (see Ladd 1980, 1996 for an overview).

On “focus projection” theories, see Arregi (this volume).

We will be concerned here only with primary stress in wide focus contexts, and not with secondary stress, which typically falls on the subject in a transitive sentence (e.g. the cat in example (2a) in the text). Unlike primary stress, secondary stress in “unmarked stress” patterns is determined, at least in part, by eurhythmicity considerations; see Zubizarreta 1998:38-40, 166 (note 3).

We note that the above mentioned view differs from that of other theories, which propose an algorithm that generates both the primary and secondary stress in wide focus contexts by the same general algorithm; see in particular Chomsky and Halle 1968, Halle and Vergnaud 1987, Cinque 1993, Reinhart 2006, Kahnemuyipour 2004/2009.

On prosodic phrasing, see Jun (this volume).

A reviewer brings up another important issue which we will cannot make full justice in this chapter, namely the question of whether the position of NS identifies the possible focus domains
in wide and narrow focus contexts alike (the view assumed in this chapter), or whether syntactic structures associated with narrow focus should be annotated with a feature “focus” that is then interpreted prosodically. A theoretical related question is: how “minimalist” is core syntax? In the minimalist framework put forth in Chomsky 1995, 1999/2001, it is assumed that the syntactic properties of phrases are uniquely determined by the properties of the lexical items that compose them. A syntactic feature “focus” is an odd feature within such conception of grammar.

Note that further assumptions need to be made concerning the ultimate placement of NS within a complex DP. Kahnemuyipour 2004/2009 argues, based on Persian, that the algorithm for phrasal stress assignment within the DP is independent of the algorithm for determining NS within the sentence.


To account for the fact that in English, the NS goes on the final constituent irrespective of whether it is a complement or an adjunct (e.g. John worked on the paper, John worked at the office), Kahnemuyipour adopts Cinque’s analysis of adverbials, whereby adverbials are universally generated as specifiers of functional projections above VP, and the English word order is obtained by moving the verbal phrase above the functional projection that contains the adverb. As mentioned earlier in the text, it is furthermore assumed that when the spell-out domain is empty (the lowest VP in this case), the NS goes on the closest non-null element. In the case of English intransitives with a PP locative adjunct, the closest non-null constituent would be the locative PP adverb. See Kahnemuyipour 2004, section 4.5.2 for further details.
12 On the interaction of prosody and information structure in a constraint-based optimality framework, see Samek-Lodovici (this volume).

13 As we will see later, the rules in (10a) should say “....integrate with its adjacent head into a larger p-phrase or i-phrase” and (10b) should say “... subordinated to the p-phrase or i-phrase of an argument-predicate complex”.

14 It is assumed that TopP (like CP) constitute a phase, and TP its spell-out domain.

15 Note that the assumption that the lexical verb has moved out of the VP in (11) is crucial in order to account for the fact that phrasal stress ends up on the subject. If the verb were to remain inside the VP, then it should carry phrasal stress, VP being a spell-out domain when it contains phonological material.

16 A reviewer notes that in Kaynemuyipour’s system, the individual vs. stage level distinction would be modelled in terms of presence vs. absence of a lower phasal domain.

17 Féry also discusses a less frequent option, in which the verb also carries a pitch-accent. We will ignore this option here.

18 *Drive* (like *go*) has a directed motion meaning, i.e. it entails a goal.

19 Larson furthermore assumes that a general thematic hierarchy determines the mapping of a verb’s thematic role onto the syntactic structure.

20 Note that the term “adjunct” with regards to the PP in (18) is technically a misnomer. As suggested earlier, a better term would be “predicative PP”.

21 Further research on ditransitives are needed to investigate whether the degree of pragmatic predictability of the choice of DO with respect to the verb might play a role with respect to the
preference between the stress patterns with NS on the DO (e.g. (18b) vs. nuclear stress on the PP (e.g. (18a)). Similar research also needs to be conducted for English.

22 See Zubizarreta and Nava 2011 for production data on such English ditransitives, but the issue of predictability mentioned in note 21 remains to be investigated.

23 Extra-grammatical factors, such as “predictability” and “note-worthiness” might influence the use of one prosodic pattern versus the other, giving rise to the illusion that “accent placement is predictable if you are a mind reader” (Bolinger 1972).

24 An important difference between the two versions lies in the notion of metrical invisibility. In Zubizarreta 1998, all deaccented material is considered metrically invisible. In subsequent versions, deaccenting does not directly inform the metrical status of a syntactic category: only functional heads may be defined as metrically invisible for the purpose of computing the NSR.

25 Following Kayne 1994, Zubizarreta 1998 suggested that “rightmost” is equivalent to “most deeply embedded” (as in Cinque 1993). Szendrői 2001 have argued that this cannot be the case because there are languages, such as Hungarian, where the “elsewhere” algorithm assigns NS to the left-most constituent.

26 A rhythmic (or metrical) grid is then derived from the metrical tree, where NS is the highest beat in the grid (Liberman and Prince 1977, Selkirk 1984, Halle and Vegnaud 1987). On the metrical grid, see also Myrberg and Riad (this volume). In Zubizarreta’s view, the sentence-level metrical tree only partially informs the sentence’s rhythmic grid. Other rules, based on phrasing and eurhythmicity, determine the shape of the rest of the rhythmic grid, with the NS serving as the central anchoring point of the grid. See note 6.
In fact, the relevant relation is not exactly between a head and its semantic argument, but between a head and its lexico-syntactic (l-s) argument, where a constituent is defined as an l-s argument of a head iff it is contained within the lexico-syntactic structure of the lexical head. (in the sense of Hale and Keyser 2002). This revision is important because it allows us to capture the fact that low manner adverbs, contained within the verbal projection of the head, seem to attract NS. E.g. *Hans hat ein Gedicht gut gelesen* ‘Hans has read the book well’; see Kahnemuyipour 2004:117 on similar cases in Persian.

Functional words in English may be stressed in certain cases. Auxiliaries, which is the functional category of immediate relevance for our present purposes, have been identified as acquiring stress in three environments: in sentence final position, stressed by a postlexical rule (see Inkelas and Zec 1993), in emphatic contexts, stressed via the Emphatic Stress Rule (see Zubizarreta 1998), and when the NS-bearing constituent to its right is informationally given and deaccented, triggering a shift of the NS onto the Auxiliary (on the A-deaccenting & NS-Shift, see section 4). Within the MI-S approach, such cases show that functional categories in English may function as metrically visible.

In the version put forth in Nava and Zubizarreta 2010 and Zubizarreta and Nava 2011, the NSR in (20) is not parametrized. The fact that in Romance only part (ii) of the rule applies follows automatically from the fact that the functional categories in this language type are metrically visible and therefore part of the computation of the metrical tree.

On givenness, see Rochemont (*this volume*). See also Baumann 2006 for a fine-grained study of the pitch-accents associated with different kinds of givenness in German.
31 Reinhart 2006 proposes a competition between focus sets to meet prosodic interface requirements; the stress pattern obtained without NS-Shifting is preferred to the one obtained with NS-shifting.

32 The study reported in Zubizarreta and Nava 2011 had a larger number of participants than the study reported in Nava and Zubizarreta 2010.

33 A question that could decide between the two approaches is whether metrical sisterhood is relevant in determining the position of “shifted NS”; see Ladd 1996 for discussion, as well as Green et al. 2006 for some relevant experimental data.