Deconstructing the nuclear stress algorithm: Evidence from second language speech*

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14.1 Introduction

The relation between focus and prosody has long been recognized (Halliday 1967, 1970; Chomsky 1971; Jackendoff 1972), but it remains an issue of contention as to how this relation is established. On the one hand, focus has an effect on grammatical meaning. On the other hand, phrasal prominence plays an important role in determining which parts of the sentence can be interpreted as focused, i.e. as non-presupposed and under assertion. In some languages, focus affects the overt positioning of constituents in the syntactic structure (e.g. Hungarian), but not in others (e.g. English). Establishing the connection between phrasal prominence and focus-related meaning is particularly challenging in a model of grammar (such as the standard model in generative grammar), in which syntax mediates the relation between phonology and semantics.¹ One view has been to directly define the domain of focus in

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¹ There is a growing literature showing the impact of focus on the semantic interpretation of a sentence. While the effects of focus on truth-conditional meaning is generally observed in cases of contrastive focus and not in cases of informational focus, there is no reason to doubt that the two are one and the same semantic object. Furthermore, there is no reason to doubt that the semantics of focus in questions is any different from the semantics of focus in statements; the two only differ in the force conveyed by the sentence. Semantically, focus introduces a set of disjunctive propositions
terms of predicate-argument structure and pitch-accent distribution therein (the so-called 'Pitch-Accent First' theories put forth by Gussenhoven 1984 and Selkirk 1984). Another (more standard) view has been to introduce a feature \( F(\text{ocus}) \) to annotate the syntactic structure that feeds phonological interpretation (PF) and semantic interpretation (LF) (the so-called 'Stress-First' theories, put forth in Jackendoff 1972 and endorsed by many since then). At PF, it is required that the F-marked constituent of a phrase contain the rhythmically most prominent word in that phrase. At LF, an F-marked constituent is interpreted as the non-presupposed or asserted part of the sentence. Other approaches (also within the 'Stress-First' line of thought) attempt to directly relate main phrasal stress and interpretation (Neeleman and Reinhart 1998; Szendrői 2001, Vergnaud and Zubizarreta 2005; Reinhart 2006):

(1) That part of the sentence that is \textit{interpreted} as focused must contain the rhythmically most prominent word.

In the present work, we endorse the latter view, but will not discuss it further, except note that if (1) is indeed part of the grammar, then it must be the case that the PF and LF outputs are subject to congruency constraints beyond those imposed by narrow syntax.

In what follows we will only be concerned with the prosody of focus. Given space constraints, we cannot engage in a discussion of the different approaches on the focus-prosody connection, but see Truckenbrodt (2006a, 2007) for recent overviews of the literature. In this paper, we have two specific goals. We revisit the crosslinguistic analysis of NS for Germanic and Romance put forth in Zubizarreta 1998 and argue that the difference between the two types of languages can be traced back to a fundamental difference between them (already noted in Zubizarreta op.cit.), namely the fact that:

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

An important cue to the metrical invisibility of functional categories is that functional words (such as copulas, determiners, and prepositions) may be un-stressed, which is indeed the case in Germanic but not in Romance. The metrical (in)visibility of functional categories has the following consequence (Zubizarreta and Vergnaud 2005):

(Hamblin 1973; Higginbotham 1993). Contrastive focus may be analyzed as a case of exclusive disjunctions, while informational focus may be analyzed as a case of inclusive disjunctions (Vergnaud and Zubizarreta 2005).
(3) In Germanic, a subset of the syntactic structure may be metrically interpreted, while in Romance the entire syntactic structure is always metrically interpreted (with the exception of traces which are never part of the metrical structure).

We will argue that (2)/(3) is the reason why we find non-phrase-final NS in wide focus contexts in Germanic in a variety of structural contexts, such as SV intransitives (*the sun is shining*), and reduced relatives (*there are problems to solve*). We will refer to these patterns, along with the transitive OV compounds (*they went egg-hunting*), as the Germanic NS pattern, which are inexisten in Romance in wide focus contexts. Indeed, any such pattern in Romance can only be associated with a narrow focus interpretation. We will provide evidence for an analysis that connects the Germanic NS patterns to the availability of unstressed functional words (in particular unstressed auxiliaries) based on the English speech of native Spanish speakers.

Our second goal is to highlight the modular nature of the algorithms that generate NS placement. In fleshing out our analysis of the distribution of NS in Germanic, we will crucially separate two distinct components: the part that is grammatically encapsulated (i.e. the Nuclear Stress Rule or NSR) and that part that is discourse-related, namely Anaphoric Deaccenting or A-deacc (Ladd 1980, 1996; Selkirk 1984; Gussenhoven 1984). Indeed, crosslinguistic data lends supports to such a view. While Romance languages lack the Germanic NS pattern, some of them (e.g. Italian and Spanish) also lack A-deacc (Ladd 1996; Zubizarreta 1998), yet there are others (e.g. French) that do have A-deacc (Ronat 1982; Zubizarreta op.cit.). We will present experimental data that supports such a modular view, based on the timing of acquisition of A-deacc and Germanic NSR by Spanish native speakers with English as the second language (L2).

14.2 The metrical (in)visibility of functional categories and the NSR

It has been widely recognized that main phrasal prominence tends to fall on the last word of the phrase in wide focus contexts—i.e. as an answer to a

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2 The term stress refers to the relative rhythmical prominence within some particular unit of speech. In stress languages like Germanic and Romance, (pitch) accent refers to one of the perceptual correlates of stress (based on the acoustics of an Fo event), the other correlates being loudness (based on the acoustics of intensity) and length (or duration) of segments. See n. 17 for related discussion.
question such as What happened? (The underlined word indicates the position of main phrasal prominence.)

   b. John worked on his paper.

(5) a. A glass suddenly broke.
   b. A glass broke suddenly.

Yet, there is reason to believe that the NSR that computes main phrasal prominence in the English examples in (5) is sensitive to predicate-argument relations, while the NSR that computes main phrasal prominence in (4) is sensitive to constituent ordering. This is suggested, on the one hand, by the fact that in the counterparts to (4a) and (4b) in V-final Germanic languages, main phrasal prominence falls on the direct object and on the prepositional object respectively, even though these do not occupy the final position in their respective phrases. Cf. (4) and (6).

(6) a. Hans hat ein Buch gelesen.
   Hans has a book read
   b. Peter hat an einem Papier gearbeitet.
   Peter has on a paper worked

Furthermore, even in English we find prosodic patterns that are not phrase-final, such as in intransitive SV structures, both unaccusatives (7) and unergatives (8) (Schmerling 1976; Selkirk 1984, 1995; Gussenhoven 1984), as well as in compound structures (9). (The examples in (7) and (8) are taken from our experimental protocol; the context questions are given in brackets.)

(7) a. My friend arrived. [Why are you so happy?]
   b. My bag vanished. [What’s the matter?]

(8) a. A student ran. [What did they do to celebrate the new track at school?]
   b. Because a dog is barking. [Why are those children screaming?]

(9) a. Peter is a pasta eater.
   b. Every spring, Mary goes bird-watching.

It is also relevant to note that it is the presence of the adverb in examples such as (5) (either to the right or to the left of the verb) that pulls
main prominence to the right. Cf. (5) with (10) (from our experimental protocol). This contrast, first noted by Gussenhoven (1984), suggests that an argument has a privileged status when it is a metrical sister of its selecting predicate.³

(10) A glass broke. [What was that crashing sound?]

This conclusion is further reinforced by the minimal contrast (noted by Krifka 1984) between (6b), where the PP is an argument and attracts main prominence, and (11), where the PP is an adverb and main prominence falls on the verb.⁴

(11) Peter hat an einem kleinen Tisch gearbeitet.
    `Peter worked on a small table.'

Given the above facts, it is reasonable to conclude that there are two algorithms at play for generating Nuclear Stress: one which is more specific and which is sensitive to the selectional relation that holds between a head and an argument (see n. 6 for definition of what counts as an argument), and another general algorithm that assigns main prominence to the rightmost constituent in the phrase. The latter applies when the former fails to apply. Following Zubizarreta (1998), we will refer to the former as the S-NSR and to the latter as the C-NSR (i.e. the ‘elsewhere’ case).⁵

³ Note that appealing to a trace in object position to transmit main prominence to the subject in examples such as (7) and (10) will not work given that material such as an Adv between the subject and the verb consistently pulls the NS to the right; cf. examples such as (5a). Furthermore, NS on the subject is also found with unergatives.

⁴ Truckenbrodt (2006a) accounts for the contrast between (6b) and (11) by exploiting the structural difference between complements (which are XP’s sisters to a head) and adjuncts (which are XP’s sisters to another XP). He proposes a two-tiered system, which consists of a rule ‘Stress XP’ that applies to the syntactic phrase, followed by a late rule that assigns main prominence to the last phrasal stress in the intonational phrase. Yet his proposed ‘Stress XP’ rule fails to account for stress patterns such as (7) and (8), essentially because it does not discriminate between subjects (of intransitives) and adjuncts. Yet, there are similarities between Truckenbrodt’s two-tiered system and the system assumed here; see n. 6 for further discussion.

⁵ Note that there is some similarity between Truckenbrodt’s two-tiered system mentioned in n. 4 and the two-layered NSR in (12). More specifically, there is some degree of similarity between the S-NSR and ‘Stress-XP’, on the one hand, and between C-NSR and the intonation-level NSR. In both systems, the question arises as to why the former (i.e. S-NSR or Stress XP) does not apply in Romance. Our answer to that question is given in (2)/(3), which could easily be incorporated into Truckenbrodt’s system as well.
Given two metrical sister nodes $C_i$ and $C_j$, if one is a head and the other is its arg(ument), assign NS to the arg (S-NSR).\(^6\) Otherwise, assign NS to the rightmost constituent node in the phrase (C-NSR).\(^7\)

As mentioned earlier, the NSR applies to a metrical structure, which, in the case of Germanic, may be non-isomorphic to the syntactic structure; see (3). As mentioned earlier, traces are not metrically visible. Furthermore, we assume that in the metrical structure a head is defined as a non-branching node and a non-head as a branching node. A final caveat: while we adhere to the view that the NSR generates a metrical grid (as in Halle and Vergnaud 1987), which can be further affected by other rhythmic considerations, we will ignore this in the present work since it will not affect what we have to say here. Instead, we will adopt the more conspicuous notation introduced by Liberman (1975 [1978/97]), which applies directly to the metrical tree: a node that receives NS is labeled Strong (S) and its sister node is labeled Weak (W). The word dominated by an uninterrupted path of S nodes is interpreted as the locus of main phrasal stress.\(^8\)

We illustrate how the NSR works by reviewing some of the core examples discussed above, as well as the much discussed variability of the NS position in intransitive structures (Sasse 1987; Ladd 1996) and in reduced relative clauses in Germanic (Bolinger 1972). Consider the metrical structure of the transitive (4a) and the transitive compound in (9a). In order to keep the syntax simple, we will omit those functional categories whose presence or absence does not ultimately affect the position of NS (such as Determiners). On the other hand, we do include T(ense), whose status as metrically (in)

\(^6\) 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 (in the sense of Hale and Keyser 2002) of the lexical head. 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 a poem well read’; see Kahnemuyipour (2004: 117) on similar cases in Persian.

In English, the relevance of the l-s argument vs adjunct distinction can be appreciated in minimal contrasts such as *tree eater* (someone who eats trees) and *tree eater* (someone who eats while on a tree). Interestingly, manner modifiers within compounds also attract stress, e.g. *slow-roasting, fast-acting, quick-drying* (brought to our attention by Ed Holsinger). Other attributive modifiers do not, e.g. *ever-lasting, long-suffering*.

\(^7\) Building on ideas put forth by Cinque (1993), Zubizarreta (1998) proposed an unification of the S-NSR and the C-NSR based on an abstract notion of ‘most deeply embedded’ constituent in the selectional ordering (S-NSR) and in the constituent ordering (C-NSR). More in-depth, crosslinguistic experimental research still needs to be done before we can evaluate the merits of such a proposal, but see Szendroi (2001) (on Hungarian) and Kahnemuyipour (2004) (on Persian) for relevant discussions.

\(^8\) In the grid version, each node labeled S corresponds to a ‘star’. The word with the highest number of stars is interpreted as the locus of main phrasal stress.
visible may affect the position of NS. In (13) and (14), V and N are metrical sisters and the S-NSR assigns NS to N. If T is metrically visible, the S-NSR fails to apply between T and its verbal sister *read a book* in (13) and between T and its nominal sister *pasta eater* in (14). Therefore, C-NSR applies assigning NS to the verbal predicate in (13) and to the nominal predicate in (14). When computing stress between the subject N and and its metrical sister T, again the S-NSR will fail to apply and C-NSR will assign NS to T. Thus, NS will ultimately fall on *book* and *pasta*, respectively. The same holds true if T is analyzed as metrically invisible. In such cases, the subject will be interpreted as the metrical sister of the verbal predicate *read a book* in (13) and of the nominal predicate *pasta eater* in (14), but the subject is not an argument of either; it is an argument of *read* and *eat*, respectively.\(^9\)

The same logic applies to the metrical structures of (5a) and (5b), shown in (15) and (16), respectively. Whether T is metrically invisible or not, the S-NSR will systematically fail to apply, given that the Adv is not an argument of V. The C-NSR applies instead, recursively assigning NS to the rightmost constituent.

\(^9\) Or alternatively, the subject is an argument of the light verb ‘v’ to which the lexical verb is adjoined; see Hale and Keyser (2002) and references cited therein.
Similar analysis applies to intransitive SVPP structures (such as *A vampire appeared in the house; the girls swam in the pool*), where main phrasal prominence falls on the PP.

Where the metrical (in)visibility of Tense makes a difference is in intransitive structures and in reduced relative clauses. These are the cases where we indeed find variability of NS placement in Germanic. We discuss the intransitive structures first. While main phrasal stress on the subject in SV structures is both possible and frequent in wide focus contexts in Germanic (as in (7) and (8)), SV structures with main phrasal prominence on the verb are equally possible and frequent (although more so with unergatives than with unaccusatives; see section 14.4). The examples below are from our experimental protocol; patterns with NS on the subject with these tokens were also attested (see section 14.4 for further discussion.)

(17)  a. The goalie fell. [What happened at the game?]
     b. A boy disappeared. [What happened at the playground?]

(18)  a. An actress was crying. [Why didn’t they finish the play?]
     b. A patient sneezed. [What was that noise?]

The variability of NS on such intransitive structures was extensively discussed by Sasse (1987), who showed that discourse/pragmatic considerations dictate
which stress pattern the speaker chooses to utter. More precisely, Sasse argues
that this distinction corresponds to the thetic vs categorical judgments
described first by the philosophers Brentano and Marty and revived by
Kuroda (1972). In the case where a simple event is asserted (thetic judgement),
the pattern with NS on the subject is chosen. But not so in the case of complex
events, in which the referent denoted by the subject is named and a property
denoted by the predicate is predicatated of that referent (categorical judgment);
in that case NS falls on the verb. Halliday (1970), Gussenhoven (1983b), Ladd
(1996), Kratzer and Selkirk (2007) also discuss this distinction, often referred
to as eventive vs topic-comment structures. Interestingly, in the presence of
a modal the two stress patterns actually give rise to a difference in truth-
conditional meaning (i.e. two distinct LFs), as in Halliday’s often-cited
example of a sign in the London Underground. The intended stress pattern
is the one in (19b): ‘If you are in the underground and have a dog, you must
carry it.’ The stress pattern in (19a) gives rise to the unintended reading: ‘If
you are in the underground, you must have a dog and carry it’.11

(19)  a. Dogs must be carried.
 b. Dogs must be **carried**.

Not all languages allow such variability in NS placement in out-of-the blue
contexts. In particular, the Romance languages do not allow the stress pattern
with NS on the subject. Sasse suggests that different languages use different
strategies to encode the thetic/categorical distinction; e.g. Spanish uses word
order, French uses the *il y a* or *voici* construction. That might very well be the
case, but it still begs the question as to why some languages, but not others,
may use variable stress patterns to encode such distinctions. French is par-
ticularly noteworthy in this respect because it is rather rigid in its word order,
like English; yet, unlike English, it does not exploit variable stress patterns to
mark such distinction. As in Italian and Spanish, French intransitive struc-
tures require phrase-final NS (irrespective of word-order considerations).

Our view is that Germanic languages can encode the thetic vs categorical
distinction via stress because their grammar can generate both stress patterns
in (19), but Romance cannot, and this typological distinction is to be related
to the difference stated in (2)/(3). It is precisely in the case of (N (T V))
structures where we expect variability in Germanic, depending on whether T is analyzed as metrically visible or not. If T is analyzed as metrically invisible, NS will be assigned to the subject by the S-NSR, as in (20). If T is analyzed as metrically visible, then NS will be recursively assigned to the rightmost constituent by the C-NSR, as in (21). Thus, the grammar generates both patterns and which pattern is selected by the speaker will depend on whether (s)he wants to put forth a thetic or a categorical judgment. In the former case, pattern (20) will be selected and in the latter case pattern (21) will be selected.\textsuperscript{12,13}

\begin{itemize}
\item (20)
\item N\textsubscript{S} V\textsubscript{W}
\item (a) dog (is) barking
\end{itemize}

\begin{itemize}
\item (21)
\item N\textsubscript{W} T\textsubscript{S}
\item (a) dog is barking
\end{itemize}

The same kind of analysis can be extended to the cases discussed by Bolinger (1972), such as those below. The (a) patterns arise if the infinitival tense

\textsuperscript{12} J. Legate has brought to our attention the availability of NS on the subject in the case of subject-to-subject raising structures (e.g. A dog seems to be barking), in similar wide focus contexts. Such facts suggest that when seem functions as a raising verb, it has the status of a functional lexical item, rather than that of a main verb, along lines proposed by Cinque (2004) for Romance.

\textsuperscript{13} Ladd (1996) also recognizes the primacy of arguments in Germanic NSR (as in (20)) and suggests that cases in which NS falls on the Verb (as in (21)) might be due to prosodic phrasing. These are said to involve two intermediate phrases, each with its own phrasal stress, with the last one as most prominent. Our experimental data indicates that this analysis is not correct. Indeed, 59% of the unergative SV tokens were pronounced by the ENC with NS on V (the rest with NS on the subject). Yet, in only 25% of the tokens with NS on V was the verb phrased separately from the subject. In all the other cases, the subject and the verb were phrased together. (Phrasing was determined in terms of perception and in terms of pitch-reset by two independent coders.) Further evidence for the possibility of analyzing SV intransitives with NS on the verb as one p-phrase is the availability of secondary stress retraction, which only occurs if the words with main and secondary phrasal stress are contained within the same p-phrase; e.g. Annemarie bicycled (example from Inkelas and Zec 1993). These comments also apply to the proposal put forth by Kratzer and Selkirk (2007) regarding phrasing and phrasal stress.
marker to is analyzed as metrically invisible; the (b) patterns if it is analyzed as metrically visible.\textsuperscript{14}

(22) a. I can’t go with you; I’ve got too many things to do.
   
   b. . . . too many things to do.

(23) a. It’s too heavy a price to pay.
   
   b. It’s too heavy a price to pay.

(24) a. We’re looking for a neighborhood where there are other boys to play with.
   
   b. . . . where there are other boys to play with.

Note that none of the (a) patterns exist in the Romance languages (as noted by Ladd 1996 and Zubizarreta 1998), despite the fact that no word-order flexibility is available for such structures in any of the Romance languages, including Spanish (e.g. the Spanish counterpart of (23): Es un precio muy alto para pagar vs “Es muy alto para pagar un precio). In other words, in Romance, and in particular in Spanish, only the C-NSR is active; it can’t be otherwise because functional categories in these languages are always metrically visible.

14.3 Nuclear accent and its interaction with discourse and pragmatics

14.3.1 (Un) expectedness and noteworthiness

In a well-known 1972 article, Bolinger argued that there is no such thing as an unmarked phrasal stress pattern defined by the grammar, that phrasal stress in English is governed solely by relative notions of semantic weight and pragmatic predictability, and that ultimately one can predict the location of nuclear stress in English only if one is a mind reader. We have not adhered to that position because we think that if we maximize control of discourse factors as well as factors stemming from world knowledge, clear patterns do emerge (namely the ones outlined in the previous section).\textsuperscript{15} Indeed, in the experiment reported in the next section, which included thirty English native

\textsuperscript{14} Note that the examples in (24) also require analyzing the preposition with as metrically invisible.

\textsuperscript{15} At the same time, we recognize that controlling for sentence grammar external factors 100% is a very difficult task, the main reason being that the question may prime some of the words in the answer to varying degrees and inferable words can trigger anaphoric deaccenting. Furthermore, inferences may vary from subject to subject. This is an issue that deserves further experimental investigation.
speakers (ENC), we found that in fairly neutral wide focus contexts, unaccusative SV sentences with change of location verbs (come, enter, arrive, appear, escape, vanish) were pronounced 97 per cent of the time with main stress on the subject, and unaccusative SV sentences with change of state verbs (break, close, open, die) were pronounced 98 per cent of the time with main stress on the subject. A sample of Q&A pairs is given below; see also (7).

(25) How was the parade?  
Fun. The band came.

(26) What’s all the excitement in the stadium?  
The football team entered.

(27) Why is that child crying?  
A cat died.

While unaccusatives seem to favor the eventive (or thetic) interpretation, which requires the pattern with NS on the subject (as discussed in the previous section), unaccusatives with NS on the verb are not excluded. In our protocol, we found NS on the verb with tokens that involved the change of location verbs fell and disappear; see the examples in (17). Out of twenty-eight tokens of type (17a), seven had NS on the subject and twenty-one on the verb; out of twenty-eight tokens of type (17b), thirteen had NS on the subject and fifteen on the verb. It seems that the unexpectedness (and therefore, noteworthiness) of the reported event favors the categorical interpretation and therefore NS on the verb (as suggested by Sasse op.cit.) This was further confirmed by the fact that the tokens snow is falling/leaves have fallen (tested with five ENCs) favored NS on the subject, in contrast with (17a).

In the case of unergative SV sentences (bark, roar, smile, talk, dance, swim, sing, run, cry, and sneeze), we found a fair amount of variability within tokens and across subjects: 47 per cent of tokens were pronounced with main stress on the subject and 53 per cent with main stress on the verb. Some samples of Q/A pairs are given below.

(28) How was your field trip?  
It was cool. A lion roared.

(29) Why are those children screaming?  
Because a dog is barking.

(30) What did they do to celebrate the new track at school?  
A student ran.
How did the party end?  
A guest sang.

Yet, pragmatic factors may favor one prosodic pattern over the other. Thus, while 67 per cent of the tokens had main stress on the subject in cases of ‘expected’ predicates (e.g. *a dog is barking, a dolphin is swimming*), 81 per cent of the tokens were pronounced with main stress on the verb in cases of ‘unexpected’ predicates (e.g. *a dog is singing, a dolphin is talking*). The ‘unexpected’ nature of the predicate given world knowledge renders the latter highly ‘noteworthy’.

Pragmatic factors such as ‘(un)expectedness’ and ‘noteworthiness’ can also alter the placement of NS in cases where the grammar dictates an unequivocal location. Thus, we have found variability in the case of some transitives. While 100 per cent of the token answers in the case of (32) and (33) were produced with main prominence on the object (as predicted by the NSR), there was variability in the case of (34). Two thirds of the token answers were produced with NS on the object, while the other third was produced with main stress on the verb and deaccented object. This is probably due to the fact that *movies* is a highly predictable object for the verb *watch*.

(32) Does Jason make good grades in school?  
No, he doesn’t buy books.

(33) Do you have a hobby?  
Yes, I collect stamps.

(34) Is Ellen coming out with us tonight?  
No, Ellen doesn’t watch movies. / Ellen doesn’t watch movies.

We also found some variability in the case of ditransitive sentences. While 87 per cent of the token answers in the case of (35) were produced with main stress on the PP object *covers* and 80 per cent of the token answers in (36) were produced with main stress on the PP object *bed* (which is a robust result), 94 per cent of the token answers in (37) were produced with main stress on the direct object *ice* and the PP deaccented. This may be due to the highly noteworthy presence of ‘ice’ on the road, more so than ‘pictures’ on covers, or ‘toys’ under the bed.\(^{16}\)

\(^{16}\) The same explanation can be give to the contrast between the German examples (i) (cited in Zubizarreta 1998) and (ii) (cited in Kahnemuyipour 2004 and attributed to Winkler and Göbel 2002). Indeed, a state of affairs involving a gun on a table is more noteworthy than one involving a book on a table.

(i) Karl hat ein Buch in Regal gestellt.  
Karl has a book on the shelf put
Are you finished with the coloring books?
No, I'm drawing pictures on the covers.

What did Lucy do before dinner?
She hid her toys under the bed.

Why are all the cars slowing down?
Because there is ice on the road.

14.3.2 Anaphoric deaccenting

As is well known, in English, anaphoric DPs are subject to deaccenting. Two types of anaphora must be distinguished: the case of pronouns and the case of previously mentioned or inferable lexical NPs. English pronouns are intrinsically weak elements (unless emphasized). Indeed, we found that pronouns, such as those in (38) and (39) are unstressed 100 per cent of the time, with NS shifted onto the verb.

Do we have tomatoes?
No, I didn't buy them.

Why is this bag so heavy?
We put sand in it.

We may assume that, because English pronouns are inherently weak, they enter the metrical structure with a label W, thus bleeding the NSR from applying to it and its sister node. In other words, because the pronoun is inherently labeled W, its metrical sister is automatically labeled S.\textsuperscript{17}

On the other hand, lexical NPs in English may be deaccented \textit{iff} they have been previously mentioned implicitly or explicitly. As Ladd (1980) noted, the noun \textit{book} in the answer to the question in (40) may count as previously mentioned, given the presence of \textit{Don Quixote} in the context question (indeed a title of a book may prime the noun \textit{book}).

Did John read \textit{Don Quixote}?
No, John doesn't read books.

\textsuperscript{17} In a metrical grid notation, a pronoun lacks a word-level 'star' (i.e. it is inherently stressless) and therefore cannot support further 'star' assignment by the application of the NSR. This does not preclude pronouns (like other weak prosodic categories) from being assigned emphasis by a discourse-sensitive low-level rule, emphasis being a paradigmatic rather than a syntagmatic notion (Ladd 1996).

(ii) weil er eine \textit{Pistole} auf den Tisch gelegt hat.
because he a \textit{gun} onto the table put has
Therefore, we assume that in English, previously mentioned DPs may trigger A-deacc, a rule which applies to the output of the NSR. We leave the technical details of this rule vague.\footnote{More phonetic research is required on lexical (i.e. non-prominal) anaphora, to see whether its prosody is like that of pronominal anaphora or like that of 'secondary focus', discussed by Beaver et al. 2007. These authors show that there is a remnant of stress in secondary focus and suggest that this perception is due to the acoustic correlates of duration and intensity and not to an F$_0$ event. If the case of lexical anaphora is more like 'secondary focus' than like unstressed pronouns, we should think of it, technically speaking, as a case of 'deaccenting' (rather than as 'destressing'), i.e. as a case of pitch-accent deletion, which then triggers stress-strengthening of the sister constituent (i.e. addition of 'stars' to the sister constituent) in the metrical grid. Under such a view, the NSR is an encapsulated high-level rule that assigns a rhythmic interpretation to a metrical structure, while A-deacc (like Emphasis) is a discourse-sensitive low-level rule which indirectly affects the metrical grid. Because we think that the latter analysis is probably the correct one, we refer to the phenomenon at hand as anaphoric deaccenting (rather than as anaphoric destressing, as proposed by Reinhart 2006).}

(41) **Lexical Anaphora Deaccenting** (A-deacc)
A previously mentioned noun is deaccented, shifting stress onto its metrical sister node.

In a pilot study, we found that, although lexical anaphora deaccenting was indeed attested in the case of implicit mention, it was not very frequent. On the other hand, we found deaccenting of explicitly mentioned lexical nouns to be robust. Some examples from our experimental stimuli with transitives and ditransitives are given below. (See 14.4.3 for results in percentages.)

(42) Did Jason go to the book fair?
   No, he doesn’t buy books.

(43) Why are you buying that old stamp?
   Because I collect stamps.

(44) Why are these notebooks missing their cover?
   Because I’m drawing pictures on the covers.

(45) Why was the racetrack closed down?
   Because there was water on the track.

Spanish, on the other hand, lacks anaphoric deaccenting entirely, both for pronouns, such as (39), and for previously mentioned lexical nouns as in (42)–(45). In all such cases, NS in Spanish falls on the last word of the phrase (cf. Cruttenden 1997; Ladd 1996; Zubizarreta 1998).
14.4 A comparison of English native speech with the English of Spanish speakers

The English speech of Spanish speakers may be particularly revealing in our quest for empirical evidence that there are several sources to English Nuclear Stress (in particular the NSR and A-deacc). This is so because we expect that the speech of second language acquirers will reveal the existence of prosodic transfer:

(46) **Phrasal Prominence Transfer (PTT) Hypothesis.**

Spanish speakers of English, in particular non-high proficiency speakers, transfer the NSR from their native language.

The above hypothesis predicts that:

(47) a. L1 Spanish speakers will place NS on the verb rather than on the subject in intransitive SV structures in English.

   b. L1 Spanish speakers will place NS on the verb rather than on the object in the English compound OV structures.

Furthermore, acquiring the Germanic NSR entails that Spanish native speakers have to restructure their native NSR. On the other hand, since Spanish has no counterpart to the A-deacc rule, acquiring the latter does not require restructuring a native algorithm. Alternatively, within a grammar-competition model (Yang 2002), we may assume that the L2 learner is faced with two competing NSR algorithms: the general C-NSR (active in the L1, as well as in the L2) and the specific S-NSR (active in the L2 grammar only). In contrast, since there is no A-deacc in Spanish, there is no competing L1 algorithm involved in the L2 acquisition of A-deacc. Therefore, we expect a delay in the acquisition of the Germanic NSR as opposed to Germanic A-deacc:

(48) Native speakers of Spanish will acquire A-deacc before they acquire the Germanic NSR (i.e. the S-NSR in (12)).

The hypothesis in (48) makes the following predictions:

(49) a. Speakers that have acquired the Germanic NSR would also have acquired A-deacc.

   b. Speakers that have acquired A-deacc may or may not have acquired the Germanic NSR.
The experiment reported in the following section was set up to test the above predictions, which, as we shall see, were borne out. We will furthermore see that the results of this experiment provides indirect support for the hypothesis that the non-phrase-final Germanic NS pattern is intimately related to the metrical invisibility of functional categories, as stated in (2)/(3).

14.4.1 The experimental design

The experiment was designed to elicit NS placement at the phrasal level. The participant and the experimenter engaged in a scripted dialogue based on a Question and Answer (Q&A) format. Each participant saw forty-five target stimuli, and an equal number of fillers, with the intention of varying the force and form of the sentences in the dialogue. There were two lists of test items constructed using a Latin square design. Stimuli included a variety of syntactic structures paired with different information-structure contexts, only a subset of which will be discussed here, namely those that are relevant to the present discussion. The relevant structures are listed below, all associated with wide focus contexts:19

(50) 

a. Unergative SV (12 tokens, 3 of which contained pragmatically unexpected predicates).

b. Unacc. SV (12 tokens), Unacc SAdvV (4 tokens), Unacc SVAdv (4 tokens).

c. Transitive OV compounds (4 tokens).

d. Transitive SVO (4 tokens), Ditransitive SVOPP (4 tokens).

e. Transitive SVO, with previously mentioned O (4 tokens); Ditransitive SVOPP, with previously mentioned PP (4 tokens).

f. Transitive SVO, with pronominal O (2 tokens), Ditransitive SVOPP, with pronominal PP (2 tokens).

Participants’ responses were coded and analyzed using PitchWorks software program. The data was coded for the presence vs absence of pitch accent and for location of nuclear accent. Data coding was done by two independent coders, both native speakers of English, in order to ensure inter-rater reliability.

Two participant populations were tested: a control group of 30 adult, native English speakers (ENC), and a test group of 24 adult, L1 Spanish/L2 English

19 We also included contexts with narrow focus (on the subject, on the object, and on the VP) to insure that the L2 speakers had the ability to associate NS with focus. Furthermore, fillers in general allowed us to control for participants’ attention to context.
speakers. All participants were living in Los Angeles, California (where testing took place) at the time of the experiment. The test group completed a Cloze test (Oshita 1997) as an independent measure of proficiency. The test consisted of three passages with every fifth word left blank, giving us a total of seventy-five blanks with a score range from 0 to 75. Of the twenty-four participants in this group, twelve tested at the high proficiency level, and twelve at the intermediate proficiency level; see Table 14.1.

In the following section we present and discuss the results of this experiment.

14.4.2 Results and discussion

14.4.2.1 Germanic non-phrase final NS patterns The results for unaccusative verbs are presented in Table 14.2, with sample examples below. It is in the case of wide focus SV unaccusative structure where we see the greatest difference between the ENC and L2 populations, with the former producing NS on the subject 97 per cent of the time, and the latter group only 13 per cent of the time, a statistically significant difference. (Throughout this section, we annotate the tables with the relevant statistics.) We attribute this significant difference to the application of the S-SNR in the case of the ENC, and to the transfer of the C-NSR from Spanish into English in the case of the L2 speakers. However, we do not observe a significant difference in the case of the SAdvV or the SVAdv contexts. Indeed, for the SAdvV cases both populations place NS sentence-finally at the same rate (91 per cent), and for the SVAdv the majority of NS placement was sentence-final for both groups. This is because the operative algorithm for this construction is the C-NSR, which is present in both English and Spanish.

20 L2 participants were also asked to complete a background questionnaire, which provides information about age of testing, age of exposure to English, length of time in the US (or other English-speaking countries), and other relevant information.
Table 14.2. Unaccusative structures

<table>
<thead>
<tr>
<th>Unaccusative</th>
<th>Prosodic pattern*</th>
<th>Prosodic pattern</th>
<th>Prosodic pattern**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[S v]</td>
<td>[S Adv V]</td>
<td>[S V Adv]</td>
</tr>
<tr>
<td>ENC</td>
<td>97%</td>
<td>93%</td>
<td>80%</td>
</tr>
<tr>
<td>L2</td>
<td>13%</td>
<td>91%</td>
<td>94%</td>
</tr>
</tbody>
</table>

* $\chi^2 = 139.3, \ p < .0001$; ** $\chi^2 = .59, \ p = .443$.

The remaining 20% patterns for the SV Adv structure for English natives were mostly cases of NS on the verb, either with a clear prosodic boundary preceding the Adv or with the Adv deaccented.

(51) **SV unaccusative, wide focus**
Q: What was that crashing sound?
   a. A glass broke. (ENC)
   b. A glass broke. (L2)

(52) **SAdvV**
Q: What happened?
   a. A glass suddenly broke. (ENC)
   b. A glass suddenly broke. (L2)

Another structure where the S-NSR operates in English is the case of transitive compounds. As shown in Table 14.3, the data also reveals a significant difference between the control and L2 groups: ENCs placed NS on the argument 96 per cent of the time, L2ers only 36 per cent of the time. Again, L2 speakers show a strong tendency to transfer sentence-final NS.

(51) **Transitive compound**
Q: Does Jill like to visit parks?
   a. Oh yes. She’s a bird-watcher. (ENC)
   b. Oh yes. She’s a bird-watcher. (L2)

Table 14.3. Transitive compound structures

<table>
<thead>
<tr>
<th>Transitive compound</th>
<th>Prosodic pattern*</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENC</td>
<td>96%</td>
</tr>
<tr>
<td>L2</td>
<td>36%</td>
</tr>
</tbody>
</table>

* $\chi^2 = 45.43, \ p < .0001$. 

Deconstructing the Nuclear Stress Algorithm
The above contrast between the ENC speakers and the L2 group validates the PTT Hypothesis in (46). We turn next to the results obtained for the unergative SV structures, which we think also supports the PTT hypothesis.

As mentioned in section 14.2, there are two possible metrical outputs available for unergatives, depending on whether the functional category T is analyzed as metrically visible or not. The former analysis yields NS on the verb and the latter yields NS on the subject. The general results obtained are given in Table 14.4 above.

When we remove the three tokens with pragmatically unexpected predicates (A dolphin is talking, A dog is singing, A lion smiled), a more balanced result is obtained for the ENC speakers; see Table 14.5. These results confirm that there is indeed a high degree of variability with respect to NS placement in English unergative SV sentences. Furthermore, we see a distinct difference between the ENC and the L2 speakers. The latter group produced a significantly higher number of tokens with NS on the verb than with NS on the subject. Again, this can be attributed to the effects of transfer.

(53) Unergative structure (with pragmatically neutral predicate):
Q: What was the noise in the waiting room?
a. A patient sneezed. A patient sneezed. (ENC)
b. A patient sneezed. (L2)

<table>
<thead>
<tr>
<th>Table 14.4 Unergative structures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unergative</td>
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<tr>
<td></td>
</tr>
<tr>
<td>ENC</td>
</tr>
<tr>
<td>L2</td>
</tr>
</tbody>
</table>

* $\chi^2 = 2.82, p = .093$.

The above contrast between the ENC speakers and the L2 group validates the PTT Hypothesis in (46). We turn next to the results obtained for the unergative SV structures, which we think also supports the PTT hypothesis.

As mentioned in section 14.2, there are two possible metrical outputs available for unergatives, depending on whether the functional category T is analyzed as metrically visible or not. The former analysis yields NS on the verb and the latter yields NS on the subject. The general results obtained are given in Table 14.4 above.

When we remove the three tokens with pragmatically unexpected predicates (A dolphin is talking, A dog is singing, A lion smiled), a more balanced result is obtained for the ENC speakers; see Table 14.5. These results confirm that there is indeed a high degree of variability with respect to NS placement in English unergative SV sentences. Furthermore, we see a distinct difference between the ENC and the L2 speakers. The latter group produced a significantly higher number of tokens with NS on the verb than with NS on the subject. Again, this can be attributed to the effects of transfer.

(53) Unergative structure (with pragmatically neutral predicate):
Q: What was the noise in the waiting room?
a. A patient sneezed. A patient sneezed. (ENC)
b. A patient sneezed. (L2)

<table>
<thead>
<tr>
<th>Table 14.5 Unergative structures (with pragmatically expected/neutral predicates)</th>
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<tbody>
<tr>
<td>Unergative</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>ENC</td>
</tr>
<tr>
<td>L2</td>
</tr>
</tbody>
</table>

* $\chi^2 = 25.39, p < .0001$. 
The results for the three tokens with pragmatically unexpected predicates are given in Table 14.6. In this case, the results for ENC and L2 speakers are similar but possibly for different reasons. In the case of the ENC speakers, the preference for producing NS on the verb is due to pragmatics. In the case of the L2 speakers, it could be due to transfer.

(54) Unergative structure (with pragmatically unexpected predicate):
Q: Why does everybody look so surprised?
a. Because a dog is singing. (ENC)
b. Because a dog is singing. (L2)

We turn next to transitive and ditransitive structures in wide focus contexts, with and without previously mentioned material. The results are given in Table 14.7 below.

The NSR algorithm predicts NS on the direct object in transitives and on the PP in ditransitives for both ENC and L2 speakers. As shown in columns 2 and 4 in Table 14.7, this was indeed what we obtained in the case of L2 speakers to a very high extent. On the other hand, the predicted results were less robust in the case of ENC, especially in the case of ditransitives. In the case of the transitives, the relatively lower percentage of NS production on the final

| Table 14.6 Unergatives structures (with pragmatically unexpected predicates) |
|-----------------------------------|-----------------|-----------------|
| Unergative | Prosodic pattern* | Prosodic pattern |
| | [S v] | [s V] |
| ENC | 19% | 81% |
| L2 | 15% | 85% |

χ² = .87, p = .350.

| Table 14.7 Transitives: Wide focus with and without previously mentioned material (+/−PM) |
|-----------------------------------|-----------------|-----------------|-----------------|-----------------|
| Transitives | Pattern | Pattern* | Pattern | Pattern** |
| | [S [v Q]] | [S [V o]] | [S [V o PP]] | [S [V O pp]] |
| | (−PM) | (+PM) | (−PM) | (+PM) |
| ENC | 80% | 82% | 60% | 80% |
| L2 | 98% | 23% | 93% | 14% |

* χ² = 35.54, p < .0001; ** χ² = 26.57, p < .0001.
constituent by native speakers was due primarily to two test items, one of
which was already commented on in section 14.3.2 and is repeated in (55). A
third of the ENC speakers deaccented the object in this example, shifting NS
to the verb. As mentioned earlier, this is possibly due to the highly predictable
status of movies as object of the verb watch. The other relevant test item is
given in (56), which was pronounced by almost half of the speakers with the
deaccented object and NS on the verb. This is probably due to the particular
verb used. In effect, in a previous pilot study, we also noted that the verb hate
used in the same context produced similar results. It could be that emotion-
ally loaded verbs (like hate, love, like) tend to attract emphasis.

(55) Why don’t you take Ellen to the movie festival?
Because Ellen doesn’t watch movies.

(56) Did Barbara taste your dish?
No, she doesn’t like spinach.

As for the ditransitives in column 4, although we did find some variability in
three out of the four ditransitives in wide focus contexts without previously
mentioned PP, the low percentage of tokens pronounced with NS on the PP is
due to a great extent to one test item, which we commented on in section
14.3.2 and which we repeat in (57) below. Eleven out of thirteen speakers
pronounced this case with deaccented PP and NS on the object. As mentioned
earlier, we may attribute the shifting of NS onto the object in this case to the
highly noteworthy status of the object (or alternatively to the priming of roads
by cars).

(57) Why are all the cars slowing down?
Because there is ice on the road.

The pragmatic factors of predictability vs unexpectedness and the related
notion ‘noteworthiness’ are not easy to control for when these are not due
solely to shared pragmatic knowledge and it undoubtedly deserves further
more careful empirical investigation. Nevertheless, we contend that if we can
manage to peel off the effects of pragmatics, we will find clean core patterns
that emerge from the data.

We turn next to the transitives and ditransitives with previously mentioned
material, i.e. the cases of anaphoric deaccenting. Differences in prosodic
patterns between populations were predicted in such cases, given that English
but not Spanish has the A-deacc rule (see section 14.3.2). These predictions
were borne out, as can be seen by comparing the rows in columns 3 and 5 in
Table 14.7. ENC speakers deaccented the object and placed NS on the verb 82
per cent of the time in transitive structures, a rate significantly higher from that of the L2 population, which was 23 per cent (a test item sample is given in (58)). Likewise significant, A-deacc was observed by ENC 80 per cent of the time in ditransitive structures when the information in the PP was previously mentioned, and only 14 per cent of the time by L2ers (a test item sample is given in (59)).

(58) Previously mentioned object
  Q: Why are you buying that old stamp?
  a. Because I collect stamps. (ENC)
  b. Because I collect stamps. (L2)

(59) Previously mentioned PP
  Q: Why are these notebooks missing their covers?
  a. Because I’m drawing pictures on the covers. (ENC)
  b. Because I’m drawing pictures on the covers. (L2)

We turn next to the data that speaks to the timing of acquisition of the specific Germanic NSR; see (48) and its related predictions in (49). The relevant individual results are presented in Table 14.8.

This table shows the distribution of the acquisition of prominence patterns, cross-tabulated with Cloze test proficiency. There were six high proficiency and ten intermediate proficiency L2 speakers that have not acquired the Germanic NSR nor A-deacc. Two high proficiency and two intermediate proficiency L2 speakers have acquired A-deacc but have not acquired the

---

21 We considered that a given L2 speaker has acquired the NSR or A-deacc if 75% of his/her relevant token items were target-like. While any cut-off point is arbitrary, 75% as cut-off point is a reasonable one, often used in studies on second language acquisition.
Germanic NSR. Finally, four high-proficiency speakers have acquired both the Germanic NSR and A-deacc. Crucially, the opposite order is not found, i.e. we do not find speakers who have acquired the Germanic NSR without having acquired A-deacc. Thus, the predictions made by hypothesis (48) are confirmed by the data in the present study.

As for pronouns, the results show that the L2 speakers were generally much more target-like than in the case of anaphoric lexical DPs. Compare columns 3 and 5 in Table 14.7 with the results in Table 14.9.

When we segregate the data according to proficiency level, we can clearly see that unstressed pronouns are indeed produced before deaccented lexical anaphora:

We attribute the above difference to the fact that English pronouns are inherently unstressed, while deaccenting of anaphoric lexical DPs is context-dependent. Indeed, the latter requires paying attention to detailed aspects of the linguistic material in the discourse, which we assume adds an extra level of processing complexity.

Finally, we turn to some indirect evidence that this experiment provides for the contention that the non-phrase-final NS patterns in Germanic is intimately connected to the possibility of analyzing its functional categories as metrically invisible. Recall that the cue to this property of Germanic functional categories is the fact that functional words are generally unstressed. This makes the following predictions regarding production of unstressed

<table>
<thead>
<tr>
<th>Table 14.9 Unstressed pronouns</th>
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<tbody>
<tr>
<td>Transitives</td>
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<tr>
<td></td>
</tr>
<tr>
<td>ENC</td>
</tr>
<tr>
<td>L2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 14.10 Deaccented lexical anaphora and unstressed pronouns</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS A-deacc Pro</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Interm.</td>
</tr>
<tr>
<td>High</td>
</tr>
</tbody>
</table>
copula and acquisition of the Germanic NSR by L1 Spanish/L2 English learners:

(60)  
a. L2 learners that have acquired the Germanic NSR use unstressed copula at comparable level as native speakers.

b. L2 learners that have not acquired the Germanic NSR use unstressed copula at significantly lower level than native speakers.

We counted the number of unstressed copulas for native speakers and the three groups of L2 speakers previously identified, and we obtained the following results. ENC is the native control group, L2 G1 is constituted of L2 speakers with target-like NS and target-like A-deacc, L2 G2 of L2 speakers with non-target-like NS but target-like A-deacc, and L2 G3 of L2 speakers with neither target-like NS nor target-like A-deacc.

The above results show that the predictions in (60) were borne out. Only the L2 speakers that had acquired the Germanic NSR produced unstressed copulas at the same rate as native speakers, namely in the 90 percentile range, while the other speakers that had not acquired the Germanic NSR produced unstressed copulas in the 60 percentile range. It is particularly noteworthy that G2 (with target-like A-deacc) and G3 (with non-target-like A-deacc) patterned together. In other words, only target-like production of Germanic NS patterns correlate with a native-like level of copula deacc. These preliminary results, if on the right track, provide evidence for (2)/(3) and they furthermore show that the explanation for the late acquisition of Germanic NS patterns cannot be explained solely in terms of difficulties with using NS stress to encode the thetic vs categorical distinction. Note furthermore that such results provide us with an explanation for why all high-proficiency L2 learners have acquired A-deacc but not the S-NSR. Indeed, the acquisition of the Germanic NSR (but not the acquisition of A-deacc) has a pre-requisite: it requires certain aspects of the phonotactics of English to

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Table 14.11: Copula reduction

<table>
<thead>
<tr>
<th>Group</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENC</td>
<td>98%</td>
</tr>
<tr>
<td>L2 G1</td>
<td>94%</td>
</tr>
<tr>
<td>L2 G2</td>
<td>62%</td>
</tr>
<tr>
<td>L2 G3</td>
<td>68%</td>
</tr>
</tbody>
</table>

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22 The analysis was based on 22 test items that contained copulas.
have been acquired, namely the vowel reduction characteristic of English unstressed syllables.

14.5 Conclusion

Based on the L2 data presented here, we can safely conclude that L2 learners start out computing NS on the basis of the general NSR (i.e. the C-NSR). In addition, we presented experimental evidence showing that learners acquire A-deacc before they acquire the Germanic NSR (i.e. the S-NSR). Thus, the L2 data discussed here and the resulting generalizations contribute to linguistic theory in that they provide independent evidence for a modular approach to Nuclear Stress: parts of NS are generated by the NSR (i.e. the S-NSR and the C-NSR) and parts of it are generated by A-deacc.

Furthermore, we have provided preliminary evidence based on L2 speech that the metrical invisibility of functional categories (cued by the stressless nature of the corresponding functional words) is what makes the Germanic NS patterns possible. We think that the latter is ultimately connected to the difference in rhythm between the two sets of languages: Spanish is classified as a syllable-timed language and English as a stress-timed language. This difference in rhythm arises from differences in language-specific phonotactics (Dauer 1983). On the connection between NS placement and rhythm, see Nava and Zubizarreta 2008.
Author Queries

[AQ1] Please provide text citations for Table 14.10 and 14.11.