Speech Prosody 2016
31 May - 3 Jun 2106, Boston, USA

The Role of Syntax in the Nuclear Stress Rule

Byron Ahn

Swarthmore College
byron@ucla.edu

Abstract

How directly the operation of phrasal stress placement refers to syntax is theory-dependent: directly in some (e.g., Truckenbrodt 1995, Kahnemuyipour 2009), indirectly in others (e.g., Chomsky & Halle 1968, Halle & Vergnaud 1987). Adequately evaluating this issue requires knowing both the relevant syntactic structure(s) as well as how syntax interacts with phonology – neither is trivial. This paper argues that syntax transparently feeds prosody at regular sub-intervals of structure building (e.g., Uriagereka 1999, Chomsky 2001), and the phrasal stress placement operation refers directly to syntactic hierarchy, without exception. As such, wherever the NSR's predictions are "incorrect", the syntactic representation must be amended (e.g., Steedman 2000, Wagner 2005). The major contribution of this work is not in its specific findings, but rather in its demonstration of a methodology by which phrasal stress data are used to understand syntax and not vice versa.

Index Terms: Nuclear Stress Rule, Phrasal Stress, the Syntax-Prosody Interface, Putative Exceptions

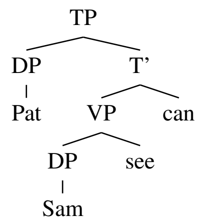
1. Introduction

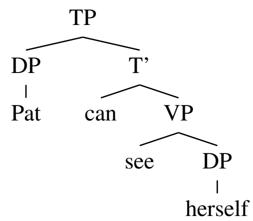
In various works on phrasal stress (henceforth PS), several general operations of PS placement have been formulated (henceforth Nuclear Stress Rules, NSRs). Some relying on the word-order (e.g., [3]), some relying on phonological phrasing (e.g., [9]), some relying on syntactic hierarchy (e.g., [10]), and some relying on syntactic hierarchy, selection, and independent prosodic principles (e.g., [11]). (For a more in-depth literature review, see [2].) What all these major analyses agree upon, however, is that syntax generates a word order / structure, and the relevant syntactic output is the input to the NSR.

One issue with this approach is that specific syntactic analyses/frameworks are presupposed and then used to inform the shape of the NSR. Cinque correctly notes this as problematic: "The responsible way to proceed [...] would be to reach a perfect understanding of the S-Structure constituency of the language, and then consider its stress patterns – a hardly feasible task." ([10]:p.271) This type of approach contributes to a lack of consensus NSR. Specific sentences can be syntactically analyzed in a multitude of plausible frameworks with a multitude of plausible structure, so the same data point can be compatible with any number of NSRs.

As a related second issue, all of these works on the NSR have postulated classes of structures/lexical items that are exceptions to the general pattern of the NSR, in order that the PS data conforms to the NSR. For example, in an out-of-the-blue context, it would seem a reflexive pronoun like *herself* is an exception to the NSR (metrically invisible, in [11]'s terms) in the sentences '*Pat can see Sám*' and '*Pat can sée herself*', since traditional syntactic analyses of English would posit the same syntactic structure for both sentences.[1] The existence of these stipulated (but patterned) exceptions is at best theoretically undesirable, and at worst —as we will see— empirically insufficient.

This work proposes a new way of thinking about PS data to minimize the effects of these two issues. Specifically, I propose that PS should be used as word-order has been used: as observable data that informs the theoretician of what abstract syntactic structures are possible. Just as word order is used to rule out a structure like (1) for '*Pat can see Sám*', so PS patterns can be used to rule out a structure like (2) for '*Pat can sée herself*'.

(1)


(2)


To use word-order to inductively transform a one-dimensional string into a two-dimensional tree structure[2], a specific framework and specific (and sometimes controversial) postulates are necessary (see, e.g., [15], [11], [16]). Similarly, we must establish the a framework and NSR in order to make use of the location of PS to learn about the syntactic structure. While this begs the question of if this is the appropriate framework or NSR, the value of this work is not to expose the correct Syntax/NSR, but rather to demonstrate a methodology which could be applied to any Syntax or NSR.

2. The Present Framework

2.1. Minimalist Grammatical Architecture

For concreteness, this paper assumes a Minimalist architecture (e.g. [17], [18]), which defines (narrow) syntax, semantics, and phonology as largely modular, in the sense that operations in each proceed without consideration of the primitives of the others. That is, phonological operations may proceed without considerations of syntactic objects like islands, or semantic objects like truth conditions.

Furthermore, the interfaces between the modules are only able to pass certain kinds of information in certain directions:

[1] Underlining and acute accents indicate the location of the sentence-final PS. Non-final PS is not considered, but is crucial for teasing apart these analyses, as pointed out by [2]. This is accounted for by making the NSR apply to syntactically-defined substructures (Spell Out Domains), as discussed in [12], [13], and [14], among others, in addition to some principle(s) about relative prominence between these domains.

[2] Or multi-dimensional graph, as in Multidominance theories.

 doi: 10.21437/SpeechProsody.2016-42

syntax can send information about a syntactic object α to phonology and semantics through a mechanism called Spell-Out, but phonology and semantics cannot send information back to the syntax, in order to influence the syntactic properties of α. Moreover, Spell-Out applies multiple times within a single derivation, at fixed cyclic intervals ([5], [6], *et seqq.*), to the phrase that is the complement of certain heads ("phase heads").

Because syntax feeds phonology and semantics separately in this model, and because there is no interface between the two, there is no phonology-semantics interface apart from the narrow syntax ([17]:p.169). Thus any phonological operations that appear to depend on semantic operations/properties are in fact phonological operations that depend on the information syntax passes to both phonology and semantics.[3]

Additionally, not all aspects of the syntactic representation get passed on to the interfaces. In particular, formal syntactic features (a.k.a. uninterpretable features) must not be passed on to the phonological/semantic interfaces ([19]:§3.2). Thus, any phonological effects that appear to be the result of uninterpretable features —such as syntactic label/grammatical category— must not be.

In light of this grammatical architecture, semantic properties such as discourse-givenness or anaphoricity, or the syntactic property of being a function word will never reach phonology. Thus we must revisit any data in which such properties appear to directly influence the placement of PS.

2.2. An Exceptionless NSR

Past works on the NSR have treated anaphoric and function words as exceptions to the NSR (as noted expressly in works including [20] and [11]). However, in this framework, exceptions based on semantic features (identifying anaphors) and uninterpretable features (identifying function words) ought to never reach the NSR, as an operation belonging to phonology. To this end, a NSR must be defined without these exceptions.

Following many recent works, I posit a NSR that assigns PS based on syntactic depth of embedding (in the vein of [10], [11], and [2]) within a Spelled-Out domain ([12], [13]), as below:[4]

(3) The most deeply embedded constituent in a Spell-Out Domain gets phrasal stress.

Applying this algorithm to (2), we incorrectly predict *herself* to be the location for PS. Traditional approaches use this to say we have the NSR wrong (because it is assumed that this syntax is correct); the present paper takes this as evidence that we have the syntax wrong. Since *herself* doesn't bear PS, it must be that *herself* is not the most embedded element in the domain. This is explored further in the next section.

3. Analyzing Some New Data

3.1. Reflexive Anaphors

Consider the data pattern below, found in out-of-the-blue contexts:

(4) a. Wesley locked his bike to Kén.
b. Wesley locked his bíke to himself.
c. Wesley locked his bike to itsélf.

What (4-a) shows is that, under this NSR, the indirect object is the most deeply embedded item in the structure. This is typical of analyses of double object constructions like this (e.g., [22]). (4-b) would traditionally be understood as the anaphor *himself* being metrically invisible to the NSR. However, in this traditional approach, (4-c) is totally unexpected.

In this approach, what conditions the difference between (4-b) and (4-c) must be purely syntactic. The subject-bound anaphor in (4-b) must not be the most deeply embedded, but the object-bound anaphor in (4-c) must be. This syntactic conclusion would seem to be unfounded from traditional views on English, but it is expected if English subject-bound anaphors occupy a syntactically higher position than object-bound ones. Such a syntactic difference is witnessable in an obvious way in many languages (e.g., all Romance languages where the subject-bound *se/si* morpheme occupies a higher position than-object bound anaphors). This PS data suggests that it is witnessable in English as well.

Moreover, in these other languages where the difference between subject-bound and object-bound anaphors is obvious, the subject-bound anaphor cannot occur within a syntactic island. This is true in Romance languages, but also languages like Kannada ([23]). The only way to analyze this is that subject-bound anaphors must undergo syntactic movement (*ibid*). If subject-bound anaphors also undergo movement to this higher position in English, and occupying this position leads to not bearing PS (as just suggested in the previous paragraph), then we expect subject-bound anaphors occuring inside syntactic islands to bear PS. This is witnessed in (4-d-e):

(4) d. Wesley locked his bike to Ken or himsélf.
e. Wesley locked his bike to himself or Kén.

This further supports that subject-bound anaphors in English *move* to occupy a higher position, very much like languages where that movement is more obvious, such as Spanish.[5]

Thus, PS patterns inform us that the syntax of English reflexives is different from traditional analyses. At the same time, the location of PS is predicted if English syntax of subject-bound reflexive anaphors is as it is (more obviously) observed to be in languages like Spanish or Kannada. This analysis of English subject-oriented anaphors is corroborated by a range of data, from domains besides the distribution of PS (see [14]).[6] The fact that PS and these other patterns converge on the same analysis further supports an approach in which PS informs the theoretician directly about syntax, because of an exceptionless NSR like (3).

3.2. Verb Particles

Once again, consider a data pattern below, found in out-of-the-blue contexts:

(5) a. I can't zip up my pánts.
b. I can't zip my pánts up.
c. My pants won't zip úp.
d. (*Said to the jammed pants zipper*) Zip úp!

[3]And vice-versa for semantic operations that appear to depend on phonology.

[4]The issues with this formulation raised in [2] are addressed by tying the timing of application to Spell-Out. See [21] for more details on this NSR, including a clear definition of 'depth of embedding'.

[5]Not all movements impact PS location in this way; famously, WH-movement is different ([20]). This has to do with how WH-movement interacts with phases. See [21].

[6]Of course, a question not addressed here is why pronouns and anaphors behave so similarly. In fact, the two are very similar, but also different. See [24] and also §3.3.3 of [14].

Consider first the data in (5-a-b): here the object of the verb bears PS, no matter the word-order between the object and the particle. This is predicted under an analysis in which function words like the particle *up* are metrically invisible. The data in (5-c-d), however, seem to contradict this analysis. The particle bears the PS in the intransitive uses of the verb.

In the analysis promoted here, we have a clear idea of how to use this PS data to make conclusions about the syntax. In cases like (5-a-b), the object is the most embedded element – always more embedded than the particle, no matter the surface word order.[7]

On the other hand, in cases like (5-c-d), the particle *up* is the most embedded element at the time of Spell-Out. This means that, if *my pants* was ever the object in (5-c), its movement must be such that it leaves *up* as the most deeply embedded item in the relevant Spell-Out Domain.[8]

These findings allow us to make decisions between competing analyses of verb-particle syntax – a very controversial topic, with many possible analyses. In particular this rules out common small-clause analyses (e.g., [25], [26], and [27]), and rules in favor of particle-fronting analyses (e.g., [28]). Moreover, it adds to a growing literature that unaccusative predicates don't universally predict PS on the (derived) subject (in line with [29]). Instead, additional factors need to be considered, and the factor implicated by this analysis is structural depth of embedding. Again, by formulating the NSR in this way, we can make strong conclusions about the syntax, which may not be otherwise obvious, and which can be corroborated by independent research.

4. Conclusions

In this paper, I have shown that there is value in flipping the standard paradigm of exploring the relationship between syntax and PS. Instead of using a syntactic analysis to make conclusions about the NSR, we use PS patterns to make conclusions about the syntax. The validity of this approach is supported by the fact that our syntactic conclusions are corroborated by independent (e.g. syntactic/semantic/morphological) evidence found in other works.

While we are using a specific framework and specific NSR, this approach to PS data can apply to other frameworks/NSRs. That said, there seems to be some positive findings by using this framework and NSR, in that it makes connections with independent works in a way that other frameworks/NSRs might not. Further support for this framework and NSR can be found by exploring other past putative exceptions to NSRs – this is the crux of [21], which also explores givenness and indefiniteness (in addition to anaphoricity and function-word-hood), as well as how these features interact with each other.

To conclude, a paradigm like this (particularly alongside an exceptionless NSR like (3)) means that PS patterns are reliable cues in the acoustic signal about the abstract syntactic structure. This is not unlike another cue in the acoustic signal: word-order. Just as word-order is seen as a necessary bootstrap for children and theoreticians to make the correct conclusions about the syntax, so too PS can be treated the same way. This is an especially desirable result, given claims about the power of prosodic bootstrapping in the acquisition of syntax (e.g., [30], [31], [32], among many others).

[7] At least at the time of Spell-Out; see [21] for a detailed discussion, and a possible derivation of the two word orders while preserving the PS on the object.

[8] In particular, its movement must first target a position within the Spell-Out Domain that is higher than the particle *up*.

5. References

[1] H. Truckenbrodt, "Phonological phrases: Their relation to syntax, focus, and prominence," Ph.D. dissertation, MIT, 1995.

[2] A. Kahnemuyipour, *The Syntax of Sentential Stress*. Oxford: Oxford University Press, 2009.

[3] N. Chomsky and M. Halle, *The Sound Pattern of English*. New York, NY: Harper and Row, 1968.

[4] M. Halle and J. R. Vergnaud, "Stress and the cycle," *Linguistic Inquiry*, vol. 18, no. 1, pp. 45–84, 1987.

[5] J. Uriagereka, "Multiple spell-out," in *Working minimalism*, S. Epstein and N. Hornstein, Eds. Cambridge, MA: MIT Press, 1999, pp. 251–282.

[6] N. Chomsky, "Derivation by phase," in *Ken Hale: A Life in Language*, M. Kenstowicz, Ed. Cambridge, MA: MIT Press, 2001, pp. 1–52.

[7] M. Steedman, "Information structure and syntax-phonology interface," *Linguistic Inquiry*, vol. 31, no. 4, pp. 649–689, 2000.

[8] M. Wagner, "Prosody and recursion," Ph.D. dissertation, MIT, 2005.

[9] A. Kahnemuyipour, "Syntactic cateogies and Persian stress," *Natural Language & Linguistic Theory*, vol. 12, no. 2, pp. 333–379, 2003.

[10] G. Cinque, "A null theory of phrase and compound stress," *Linguistic Inquiry*, vol. 24, no. 2, pp. 239–297, 1993.

[11] M. L. Zubizarreta, *Prosody, Focus, and Word Order*. Cambridge, MA: The MIT Press, 1998.

[12] J. A. Legate, "Some interface properties of the phase," *Linguistic Inquiry*, vol. 34, no. 3, pp. 506–515, 2003.

[13] D. Adger, "Stress and phasal syntax," *Linguistic Analysis*, vol. 33, no. 3-4, 2007.

[14] B. Ahn, "Giving reflexivity a voice: Twin reflexives in English," Ph.D. dissertation, UCLA, 2015.

[15] J. Nunes, "The copy theory of movement and linearization of chains in the Minimalist Program," Ph.D. dissertation, University of Maryland, 1995.

[16] M. Barrie, "Antisymmetry and dynamic antisymmetry," *Language and Linguistics Compass*, vol. 6, no. 1, pp. 21–35, 2012.

[17] N. Chomsky, *The Minimalist Program*. Cambridge, MA: MIT Press, 1995.

[18] C. Collins and E. Stabler, "A formalization of minimalist syntax," To Appear.

[19] N. Chomsky, "Minimalist inquiries: The framework," in *Step by Step: Essays on Minimalist Syntax in Honor of Howard Lasnik*, R. Martin, D. Michaels, and J. Uriagereka, Eds. Cambridge, MA: MIT Press, 2000.

[20] J. Bresnan, "Sentence stress and syntactic transformations," *Language*, vol. 47, pp. 257–281, 1971.

[21] B. Ahn, "There's nothing exceptional about the phrasal stress rule," 2015, lingBuzz/002458.

[22] D. Pesetsky, *Zero Syntax*. Cambridge, MA: MIT Press, 1995.

[23] B. Ahn, "Reflexes of reflexivity: Locality and the interfaces," *Proceedings from the 50th Annual Meeting of the Chicago Linguistic Society*, Forthcoming.

[24] M. Wagner, "Givenness and locality," in *Proceedings of SALT XVI*, M. Gibson and J. Howell, Eds. CLC Publications, 2006, pp. 295–312.

[25] T. Hoekstra, "Small clause results," *Lingua*, vol. 74, pp. 101–139, 1988.

[26] R. Kayne, *Parameters and Universals*. Oxford: Oxford University Press, 2000.

[27] G. Ramchand and P. Svenonius, "The lexical syntax and lexical semantics of the verb-particle construction," in *WCCFL 21 Proceedings*, L. Mikkelsen and C. Potts, Eds. Somerville, MA: Cascadilla Press, 2002.

[28] H. Koopman and A. Szabolcsi, *Verbal Complexes*, ser. Current Studies in Linguistics. Cambridge, MA: MIT Press, 2000, vol. 34.

[29] A. Hirsch and M. Wagner, "Patterns of prosodic prominence in English intransitive sentences," Presented at GLOW 34, 2011.

[30] S. Pinker, *Language learnability and language development*. Cambridge, MA: Harvard University Press, 1984.

[31] J. Morgan and K. Demuth, Eds., *The prosodic structure of function words*. Mahwah, NJ: Lawrence Erlbaum Associates, 1996.

[32] A. Christophe, M. Nespor, M. T. Guasti, and B. V. Ooyen, "Prosodic structure and syntactic acquisition: The case of the head-direction parameter," *Developmental Science*, vol. 6, no. 2, pp. 211–220, 2003.