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Apples, oranges and Structural Analogy*

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1. Introduction

This short contribution presents some thoughts on the idea of Structural Analogy (Anderson 1992, 2004) between syntax and phonology, i.e. that those two domains of grammar share a similar architecture. For example, Anderson (2004) likens short/lax vowels in English (as in *put*, *hit*, *cat*), which must be followed by a consonant (**pu*, **hi*, **ca*), to transitive verbs, which must be followed by an object: *John examined *(the patient)*. Likewise, the structure of the syllable has been compared to the structure of a clause—both have even been claimed to be evolutionarily related, cf. Carstairs-McCarthy 1999. One view of the syllable holds that it can be subdivided into onset and rhyme, with the latter further subdivided into nucleus and coda. That structure lends itself to a comparison with clauses with subject, verb and object as the main parts, where again the latter two form a closer union. This idea also seems to fit together with Anderson’s proposal of “transitive” vowels.

Proposals like those have met with interest but also skepticism; both kinds of reactions coming from both phonologists and syntacticians. Some linguists, including myself, are receptive to the idea of parallels (Carstairs-McCarthy 1999, van der Hulst 2006, 2010, etc.). Others reject it (Bromberger & Halle 1989, Carr 2006, Neeleman & van de Koot 2006, etc.) since, so the argument, there are fundamental differences between the two domains making any such analogy unlikely, if not impossible. The example of the syllable from the previous paragraph has been dismissed, amongst other reasons, for lack of semantic relations in phonology (verb and object contract a semantic relation, unlike vowels and following consonants) and the failure to find an equivalent to ditransitive verbs, cf. Tallerman 2006.

Claims for or against a similar architecture across domains cannot stay impressionistic but must be based on explicit formal theories. This is what Neeleman & van de Koot (2006) undertake in great detail, and they conclude that the structural analogy must be rejected.

*I would like to thank my anonymous reviewer for valuable suggestions. This squib is a token of my debt to Martin Prinzhorn, who, despite being a syntactician, was one of my first phonology teachers. The kind of phonology I have been doing over the last couple of years is inspired by syntactic theory, and I suspect I have Martin to thank for that. I hope that the conceptual issue I want to raise in this short contribution will be of interest to him.

In their view (p. 1527), the following three properties, which are said to be fundamental to phonology, make it look very different from syntax: (i) lack of recursion, (ii) lack of projection, (iii) lack of anything resembling syntactic dependencies. Much can be said about those alleged properties, but here I will focus on (part of) the first property, the alleged lack of recursion, and we will only touch upon the others.

A similar sentiment can be found in Jackendoff (2007, 39):

“[Phonological] structures, though hierarchical, are not recursive, in that, unlike syntactic structures, they cannot be embedded indefinitely deeply in other structures of the same type. [. . .] For example, a rhyme cannot be subordinate to a syllable that is in turn subordinate to another rhyme.”

There is much to be said about this quote, but I want to focus on the example of a rhyme embedded in a syllable embedded in a rhyme.¹ The claim that this is an impossible configuration presupposes certain ideas about what syllable/rhymes are; that they are well-defined and justifiable objects, the need for which is a matter of consensus. This is not the case: in Government Phonology (GP), the syllable has no theoretical status and the rhyme, though part of the theory, differs in crucial details from other approaches (Kaye, Lowenstamm, & Vergnaud 1990).

The same can be said about Neeleman & van de Koot (2006): their conclusion, that phonology and syntax are fundamentally different, rests on specific assumptions about phonological structures, for example the Prosodic Hierarchy (Nespor & Vogel 1986) with its accompanying conditions of proper containment and the strict layer condition. I do not deny that those assumptions are mainstream, but wish to point out that trivially, the validity of any comparison will depend on the exact nature of *what* is compared, so similarities between two domains or the lack thereof will depend on the specific model chosen.²

2. Syllables in syllables

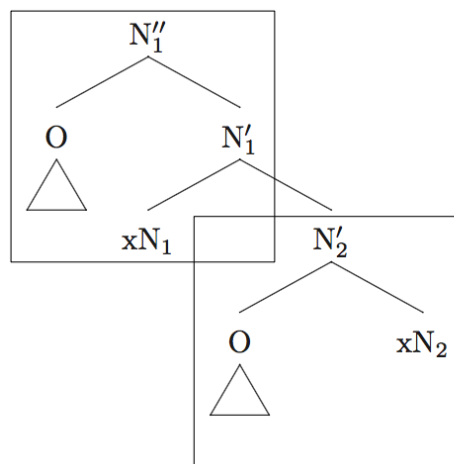
It is ironic that GP 2.0, the particular development of GP that I have been pursuing in the last years (starting with Pöchtrager 2006), employs a structure very similar to the one Jackendoff deems impossible. Not identical, because the concepts of syllable and rhyme as such have no place in it, but at least similar. (2a) gives the structure of the bi-“syllabic” word with initial stress, following Pöchtrager (2006). The structure consists of two onset-nucleus (ON) pairs, where the second pair is embedded in the first.³ (Each onset-nucleus pair is contained in a box for the sake of clarity.) An xN denotes a nuclear head, N^l etc. a projection thereof; onsets are given in abbreviated form. (2b) gives a more mainstream, flat representation, with the internal structure of onsets and nuclei again abbreviated.

¹Jackendoff’s example is actually one of embedding, a special case of recursion. Also, the notion of recursion is independent of whether the output is (in)finite (Watumull, Hauser, Roberts, & Hornstein 2009).

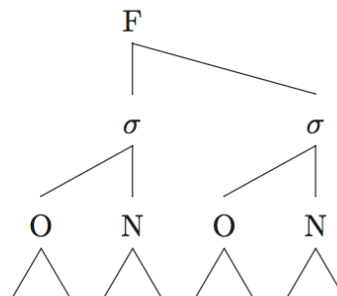
²A rather extreme example of this is the model by Nasukawa (2015), whose representations look very different from mainstream phonology and much more similar to syntactic structures.

³In van der Hulst (2010), a notational variant of that structure is proposed.

(1) a.



b.



As Neeleman & van de Koot (2006) correctly point out, the fact that trees can be used does not imply that trees must be used. It is therefore necessary to look at what kind of predictions are made by tree structures as the one in (2a) which would not find an equivalent in a flatter structure (as in (2b)).

A strong argument for trees in syntax is that they allow the expression of asymmetric relations. A node α can c-command a node β , without the reverse being necessarily true. Asymmetries are central in syntax, and so they are in phonology, I will claim.

In Pöchtrager 2009, 2015 and Živanovič & Pöchtrager 2010 it has been argued on the basis of data from English, Putonghua and Japanese that melodic primes within a phonological structure, in particular the elements **I** and **U**, are distributed in an asymmetric fashion which relies on notions like c-command, only expressible in hierarchical terms. For example, English has the diphthong *oi* (*boy*, *void*), whose head contains **A** and **U** (giving us *o*), while the offglide is simply **I**. Exchanging **U** and **I** yields ungrammatical **eu*. The impossibility of flipping around the two elements has nothing to do with linear order, but follows from a ban on which of the two elements can sit higher (and thus “bind”) the other one. This can be shown by comparison with other languages, where it is never linear order that matters, but always hierarchical structure.

Let us now turn to the structure in (2a), where further asymmetries can be teased out, some better understood than others. Theories of metrical structure employ metrical grids, where the number of grids represents prosodic strength (primary/secondary/no stress), or metrical trees, where the branches are labeled “weak” or “strong”. Neeleman & van de Koot (2006) argue that trees with such labelling violate fundamental principles which trees in syntax must conform to (such as Inclusiveness), since labels like “weak”/“strong” do not follow from inherent properties of the nodes in the tree. Furthermore, so the authors, metrical grids provide an alternative which does not rely on trees and can be integrated with their own proposal of a flat (string-based) organisation of phonology. Notice however that the representation in (2a) also encodes metrical prominence, in that the weaker nucleus

is embedded in the stronger one. What is traditionally achieved by labelling branches is encoded here in the tree itself.

In fact, such a conflation of “syllable” and foot structure only increases the empirical content of the theory, if anything: interaction between the two is expected if they are in fact the same thing. In fact, all phonological phenomena will have to refer to one and the same tree. This is the kind of reasoning that also lay behind Pöchtrager & Kaye 2014, which compared two phenomena: (i) metaphony/umlaut (Germanic, Italian, Korean etc.) which typically goes from unstressed to stressed position and is plagued by lexical and morphological exceptions, disqualifying it as a phonological process, and (ii) vowel harmony, which often goes from stressed to unstressed position, is much more regular and thus more likely to be phonological. If melodic properties are passed on along an asymmetric tree as the one in (2a), then one can stipulate that going downhill (away from stress) is much easier than going uphill (towards stress), hence no umlaut *qua* phonological process.⁴ Similar factors might explain why English tapping happens between stressed and unstressed, but not between unstressed and stressed vowel.

A final word on constituency: (2a) predicts that there is a constituent break between the initial onset and the rest of the word. This defines the complementary environments where English allows [h] (in the initial onset) and [ŋ] (everywhere but in the initial onset, i.e. as part of the initial onset’s sister constituent).

3. Revisiting the Prosodic Hierarchy

The original motivation for the Prosodic Hierarchy (Nespor & Vogel 1986) was the claim that different processes are sensitive to different domains (syllable, foot, prosodic word etc.). The structure in (2a) seems to conflate two notions: (i) onset-nucleus pair (the closest equivalent to the syllable), where a nucleus (as a head) combines with an onset, and (ii) foot, where a nucleus (as a head) combines with another onset-nucleus pair. Both times, the nucleus is the head which projects. Neeleman & van de Koot (2006) express concern that treating feet as projections of a nucleus makes it impossible to refer to specific domains by a unique label (since a projecting nucleus stays a nucleus, no matter how high it projects). Note that while there might not be a specific label, there is a way to define at least the head of a foot (a nucleus that selects another onset-nucleus pair). If word-final consonants are treated as the onsets of empty nuclei, as per Kaye (1990), then that definition also includes the vowel in words like *sit* as head of a foot, because the *i* combines with an onset-nucleus pair (whose nucleus is empty).⁵

The Prosodic Hierarchy is not only interested in heads, but also in domain edges, which

⁴Of course, the facts are *much* more complex than presented here. The reader is referred to Pöchtrager & Kaye 2014. Care needs to be taken when looking at counter-examples. Turkish, for example, is usually claimed to have final stress, so vowel harmony would go *towards* it. However, whether Turkish really has stress (or another kind of prominence system) has been seriously challenged (Kamali 2011, Özçelik 2014).

⁵In a word like *wallet* we have an onset-nucleus pair (with an empty nucleus) embedded in an onset-nucleus pair that is itself embedded in a nucleus, showing that the next level of embedding is not automatically of a different category. Obviously it remains to be seen what can be said about higher levels or more complex structures.

it allows reference to. If the argument presented here is to go through, this issue will have to be addressed. To do that, the individual empirical facts requiring reference to edges and thus leading (at least in part) to the postulation of the Prosodic Hierarchy would have to be reviewed on a case-by-case basis. This is a daunting task, and so far we have barely scratched the surface of the lower levels of that hierarchy.⁶ Note however that there is a common denominator that will have to be addressed in *each* case: Non-Arbitrariness (Kaye, Lowenstamm, & Vergnaud 1990).

The Non-Arbitrariness Principle (NAP) forms the non-negotiable core of the theory on which everything else rests. It demands that there be a direct connection between what happens and where it happens. Assimilations involve the copying (expressible in various ways) of a certain property from one position to another and, as such, meet the NAP: there is a clear connection between what happens (assimilation) and its context. In the same vein, Harris (1997) has argued that properties can be lost in prosodically unfavourable positions: the reduction of *o* to *a* in unstressed position (say, in Russian) is simply the loss of the element **U**, one of the component parts of an *o* (Harris 1997, Harris & Lindsey 1995).

Consider now final devoicing, a kind of neutralisation.⁷ According to Iverson & Salmons (2011, 1636), it is “widely attested at all levels of the prosodic hierarchy”. In fact, it is seen as a merit of the Prosodic Hierarchy that it provides a rich set of categories to refer to those different levels. A rule-based approach would simply have to include the right kind of boundary in its structural description, to limit devoicing, to, say, word-final position.

Notice that this avenue is *not* open to GP. It would remain unclear what the relation is between the end of a certain domain and the effect we see, i.e. “devoicing”. One has to look for a different interpretation. Gussmann (2007, 289ff.), in a similar vein to Brockhaus (1995) and Harris (1997), argues that Polish obstruents lose their **L**-element (responsible for voicing) at the end of a word because “empty nuclei fail to license **L** on their onsets”. Since word-final consonants are invariably followed by an empty nucleus (Kaye 1990), a link can be established between the empty nucleus, which is assumed to have a weak licensing power (presumably because it is empty), and the loss of **L**.

This move is representative of what would have to be said about each and every level of the prosodic hierarchy. Shifting the burden from the boundary type to a proper phonological object (cf. also the discussion in Scheer 2008) makes the phenomenon in question non-arbitrary, and concomitantly and more generally also weakens the case for those different types of boundaries. To the extent that differentiations need to be made (foot-final, word-final etc.) they can only involve the exact position within the tree that the phonological object finds itself in. This is similar to the idea that in syntax a DP is not subject or object *per se*, but acquires that function as a result of the particular position it is embedded in.

There is yet another possibility: Syntax makes use of functional categories (*C*, *T*, *v*) that fulfill various functions. Maybe phonology does as well. Here is how: The idea that

⁶Similarly, van der Hulst (2006) argues that all domains of grammar need to make a distinction between (roughly) word-level and sentence-level, where different conditions obtain. It is unclear to me at this point whether such a division of labour makes our task harder or easier.

⁷“(De)voicing” is a terrible misnomer as it subsumes various different phenomena, for discussion cf., amongst many others, Brockhaus (1995), Harris (2009), Iverson & Salmons (2011). Here, I will only focus on one single case, but the NAP will have to be observed for all of them.

stress provides extra room has been around in several versions of GP, notably Strict CV (Lowenstamm 1996), for a while, cf. Enguehard 2016 for the most comprehensive attempt. Assume stress is a functional head. The extra space given *is* that head. It can project, take another nucleus as its complement and form what we used to call a foot. (I have nothing to say about potential specifiers.) In that case, the domain of the foot would be reliably identifiable in the same way that a TP in syntax would be identifiable. (Note that this does not free us from finding an account that satisfies the NAP.)

4. Conclusions

I agree with the skeptics of Structural Analogy that the mainstream conception of phonology is often at odds with syntactic organisation. However, GP has shown throughout its history that it is also often at odds with mainstream phonology. In this article I have presented my hope that the two instances of “being at odds” cancel each other out and that looking at phonology through the eyes of syntax can be a fruitful endeavour, if only we are comparing the right things.

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