THE PHONOLOGIST-SYNTACTICIAN INTERFACE

Charles Reiss*

Abstract: This note identifies a parallel between syntactic analyses that rely on remnant movement and phonological analyses that rely on bleeding rule ordering. In each case, combination of simple processes yields merely apparent complexity.

Keywords: bleeding, remnant movement, English plural, rule ordering, natural classes

Phonologists and syntacticians sometimes take not only work home, but each other as well. When these situations stabilize, it sometimes happens that there arise misunderstandings between the phonologist and the syntactician. Naturally, the involved parties might ask themselves "Does my partner not understand what's going on because I am a phonologist/syntactician and we have completely different modes of reasoning from syntacticians/phonologists?" In this note, I suggest that it can be therapeutic to draw non-trivial parallels between at least some examples of phonological and syntactic reasoning.

In particular, I propose that analyses based on bleeding rule ordering in phonology and remnant movement in syntax are very similar in their logical structure. In each case, the analyst has a coherent theory that restricts the range of possible linguistic processes; but in both cases, the surface facts appear to be at odds with such a model. Of course, the sophisticated analysis in each domain solves the apparent puzzle by positing an interaction of simple parts to yield the mere appearance of complexity. Ontologically, the systems are simple, but they can yield phenomenological complexity: "As concepts and principles become simpler, argument and inference tend to become more complex—a consequence that is naturally very much to be welcomed" Chomsky (1981:3).

Remnant movement was posited to explain apparent exceptions to the generalization that only full XPs can move. For example den Besten and Webelhuth (1990) offer the following structure for a German clause with the past participle V *gelesen* topicalized.

(1) [t_i gelesen]$_j$ hat Hans [das Buch]$_i$ nicht t_j
read has Hans the book not

Rather than give up the notion that syntactic computation is simple, the authors maintain the strong hypothesis that only a full XP, such as a VP, can show up in the topicalization position at the beginning of the sentence. The V *gelesen* however, appears to show up without its object *das Buch.* As indicated by the traces and indices, the intended derivation is something like this:

(2)a. hat Hans nicht [$_{VP}$ [$_{NP}$ das Buch]$_j$ gelesen]$_j$
b. hat Hans [$_{DP}$ das Buch]$_j$ nicht [$_{VP}$ t_j gelesen]$_j$ (movement of the DP [*das Buch*]$_i$)
c. [$_{VP}$ t_j gelesen] hat Hans [$_{DP}$ das Buch]$_j$ nicht t_j (movement of the VP [*gelesen* t_i]$_j$)

* Concordia University, Montreal

The sequence in (2a) is the outcome of various applications of Merge. For reasons that need not concern us here, to create (2b) the DP *das Buch* moves to the position before *nicht*, leaving behind the rest of the VP, consisting of just the V *gelesen* (with t_i, the trace of the DP *das Buch*). Finally, what's left of the VP, the remnant after the previous movement, moves to the topicalization position, yielding (2c). Crucially, the constituent that moves is a VP, even though some of the words (*das Buch)* that were initially in the VP are only represented by the trace t_i at this point.

In order to develop our parallel with phonology, it is again necessary to commit to a theory. Let's adopt a theory of phonology that is pretty close to that of Chomsky and Halle's (1968) *The Sound Pattern of English.* We'll assume that segment symbols like /p/, /b/ and /m/ are just abbreviations for sets of valued features. We'll also assume that the targets of rules and the environments of rules must be expressed as natural classes defined by the intersection of their members. For example, let /p/, /b/ and /m/ correspond to these three sets of features (ignoring many other features for convenience):

(3) Features of three consonants
/p/ = {–VOICED, +LABIAL, -NASAL, +CONSONANTAL}
/b/ = {+VOICED, +LABIAL, -NASAL, +CONSONANTAL}
/m/ = {+VOICED, +LABIAL, +NASAL, +CONSONANTAL}

Suppose that there are no other labial consonants in the language in question. The natural class that contains these three segments will be denoted by taking the intersection of the three feature sets and placing the members of the resultant set in square brackets (see Bale and Reiss, 2018 where we use generalized intersection in order to handle natural classes with a single member):

(4)a. Intersection: /p/ ∩ /b/ ∩ /m/ = {+LABIAL, +CONSONANTAL}
b. Natural class of just these three segments: [+LABIAL, +CONSONANTAL]

The natural class in (4b) is the set of all segments that are supersets of the set of features in (4a). Given this formalization of natural classes, we can see that the segments /p/ and /b/ together form the natural class in (5a), to the exclusion of /m/; and the segments /b/ and /m/ define a natural class as in (5b) to the exclusion of /p/:

(5)a. Natural class of /p/ and /b/: [+LABIAL, -NASAL, +CONSONANTAL]
b. Natural class of /b/ and /m/: [+VOICED, -NASAL, +CONSONANTAL]

However, the segments /p/ and /m/ do not form a natural class to the exclusion of /b/, because /p/ ∩ /b/ yields the same natural class as /p/ ∩ /b/ ∩ /m/. There is no class that contains /p/ and /m/ to the exclusion of /b/.

In light of our theory of rules, this means that any rule in this language that applies to /p/ and /m/ necessarily applies to /b/ as well. Of course, a language may have the segments /p/ and /m/ but no /b/, and in this case, a rule can be formulated, intensionally, as all rules are formulated, to apply to the natural class of all labial consonants, [+LABIAL, +CONSONANTAL].

However, even when a language does have a /b/, it is possible to find evidence that a rule has affected only /p/ and /m/ but not /b/. How is this possible, if we are to maintain the commitment to a theory of phonology that defines rules as applying to natural classes?

Consider the toy language data in (6)

(6) Erewhon noun paradigms

singular	dual	plural	gloss
a. [kapo]	[kapna]	[kap^{j}la]	polar bear
b. [kabo]	[kauna]	[kaula]	penguin
c. [kamo]	[kamna]	[kam^{j}la]	cactus
d. [kauo]	[kauna]	[kaula]	camel

Let's assume that the lexical form for the suffixes for singular, dual and plural are /o/, /na/ and /la/, respectively. Let's further suppose that the lexical form for 'polar bear' is /kap/, for 'penguin' is /kab/, for 'cactus' is /kam/, and for 'camel' is /kau/. With these assumptions it is clear that we need a rule, R1, that turns a /b/ into a [u] before another consonant (or in a syllable coda), so that we get derivations like /kab-na/ surfacing as [kauna] and /kab-la/ surfacing as [kaula].

We also need a second rule, R2, to account for the fact that underlying /p/ and /m/ are palatalized to [p^{j}] and [m^{j}], respectively, before [l]. However, we have already determined that /p/ and /b/ do not form a natural class to the exclusion of /b/—do we need to posit two separate palatalization rules?

Of course the solution is to order the rules so that R1, which changes /b/ to [u] before a consonant, applies before R2, which palatalizes labials before [l]. Once /b/ turns to [u], the underlying /b/ is not palatalized, even if it preceded an /l/, and we say that R2 is bled—a structure in the underlying form that could be affected by R2 is not affected by R2 because R1 has destroyed the relevant structure.

The point is that the surface evidence shows palatalization of /p/ and /m/, but not /b/, but the commitment to a theory that rules are, by definition, formulated in terms of natural classes tells us that this cannot be a rule. The solution is that the prior rule, R1, changed the set of input sequences to the palatalization rule and masked the coherence of the model, just as in the syntactic example, an early application of XP movement (the raising of *das Buch*) obscured the fact that the raising of *gelesen* is actually raising of the whole VP structure. To be explicit, the set of forms to which R2 applies non-vacuously, as the second rule in the phonology, is the *remnant* of the set of underlying forms to which it would have applied, had it been the first ordered rule, minus the set of forms bled by R1. However, the intensional characterization of R1 does not change.

The toy example parallels well-known cases of bleeding ordering. For example, in English, an underlying /z/ is devoiced after /p, t, k, f, θ/ as in *cups, fats, rocks, cliffs* and *myths.* The natural class that contains all these phones also contains (as determined by computation via set intersection) the voiceless coronal stridents /s, ʃ/. Yet these segments do not trigger devoicing of /z/, as in the plurals of *bus* and *bush*, because a prior rule inserts a vowel between consecutive coronal stridents, yielding *bus*[ɨz] and *bush*[ɨz]. Thus, the devoicing rule is bled in the cases where the consonant cluster is broken up by the inserted vowel.

The definition of natural classes based on intersection also provides an explanation for when rules are 'generalized': the voiceless velar fricative /x/ contains all the features found in the intersection of /p, t, k, f, θ/, and this is consistent with the suggestion of Lise Menn and Morris Halle (Halle, 1978) that a speaker of English trained to pronounce the name *Bach* with [x], will apply the devoicing rule to generate *Bach*[s]. Despite having never been exposed to plurals of nouns ending in /x/, the devoicing rule applies as intensionally formulated, because /x/ is a member of the natural class defined by the segments which *were* encountered during acquisition of the English rule, /p, t, k, f, θ/. This is an example of the failure of empiricist accounts of acquisition and it thus constitutes an Argument from the Poverty of the Stimulus (see Volenec and Reiss, 2020 for details).

There are no surprises here. Six decades ago Chomsky pointed out that "relation between a phonemic system and the phonetic record [...] is remote and complex" (Chomsky, 1964, p.38) and the necessity for abstract analyses in syntax is well-established. Katz and Bever's (1976, p.12) observation that "essential properties underlie the surface form" holds as much in phonology as in syntax. So, we have to conclude that the minds of syntacticians and phonologists are not all that different. Our occasional experiences of a reciprocal sense of befuddlement may be more plausibly derived from non-vocational factors.

References

Bale, A., Reiss, C. 2018. *Phonology: A formal introduction*. MIT Press, Cambridge, MA.

Chomsky, N. 1981. *Lectures on government and binding*. Foris Publications, Dordrecht, The Netherlands.

Chomsky, N., Halle, M. 1968. *The Sound Pattern of English*. Harper & Row, New York.

den Besten, H., Webelhuth, G. 1990. Stranding. In G. Grewendorf and W. Sternefeld, editors, *Scrambling and Barriers*, 77–92. John Benjamins Publishing Company, Amsterdam.

Halle, M. 1978. Knowledge unlearned and untaught: What speakers know about the sounds of their language. In M. Halle, J. Bresnan, and G. Miller, (eds.), *Linguistic Theory and Psychological Reality* 294– 303. MIT Press.

Katz, J.J., Bever, T. G. 1976. The fall and rise of empiricism. In T. G. Bever, J. J. Katz, and D. T. Langendoen, (eds.), *An Integrated Theory of Linguistic Ability*, 11–64. Thomas Y. Crowell, New York.

Volenec, V., Reiss, C. 2020. Formal generative phonology. *Radical: A Journal of Phonology* 2:1–148.