

Why phonology is flat: the role of concatenation and linearity

Linguistic structure is hierarchical. But how are hierarchical relations expressed? Is there just one way of implementing hierarchy, or are there different formal expressions that are not just notational variants? Trees (or equivalent graphic representations such as brackets) are the regular and intuitive way of expressing hierarchical relations: they are the default in all areas, i.e. syntax, morphology, phonology, semantics etc. The phonological literature knows a different means of encoding hierarchical relations, though: lateral relations (government and licensing). These are the genuine contribution of Government Phonology to the field. Lateral relations are representationally and formally distinct from trees: although they establish a hierarchical relation between two items of which one is the head of the construction (as do trees), the items engaged are not necessarily adjacent, and they are not grouped into higher units in any way. Also, importantly, two items that contract a lateral relation cannot be as a whole engaged in another lateral relation: lateral relations are not recursive.

The purpose of this talk is to show that the absence of trees from phonology and hence the existence of an alternative means of expressing hierarchical relations follow from two things: a design property of syntax, concatenation (which is absent from phonology: phonological computation does not concatenate anything), and an input condition to phonological computation, linearity (which is absent from syntax: in minimalism linearity is introduced post-syntactically).

In (morpho-)syntax, trees are a consequence of concatenation, and of nothing else: this is the essence of the universal hierarchy- and tree-creating mechanism Merge (even though concatenation and labelling/projection may be distinct operations). It thus follows from the fact that phonology does not concatenate anything that there cannot be any tree-building device in this module: no concatenation, no trees. An appreciable side-effect of this perspective is the explanation of a long-standing observation, i.e. the absence of recursion in phonology: no trees, no recursion.

On the phonological side, I argue that linearity produces lateral relations, and by the same token makes trees unworkable. That is, concatenation and hence trees could not exist in an environment where items are arranged along a predetermined linear order.¹ In the absence of the arboreal option, phonology thus needs to find an alternative means of expressing hierarchical relations, one compatible with linearity. Lateral relations serve this purpose: they are a creature of linearity (and hence unworkable in morpho-syntax).

The perspective described is based on two real-world properties that any implementation of human language (the one we know or other logically possible systems) is confronted to and will have to cope with: some mechanism must glue together pieces that are retrieved from long-term memory. In the same way, linguistic structure must somehow be made ready for being produced and perceived by one (or more) of the five senses that humans use in order to exchange with the world around them. This task implies linearity, which is thus a necessary property of phonology.

The idea that design properties and input conditions shape grammatical systems is inoffensive in a formalist perspective because it defines constraints on Saussurian *Langue*, or Chomskian competence, from the outside, rather than from the inside: once syntactic computation does the job of concatenation, and once phonology copes with linearity, there are still many different ways in which this all can be done in complete disregard of grammar-external pressure. Evolution has chosen an arbitrary subset of these alternatives, and this is why grammar is self-contained in the Saussurian sense (lateral relations are certainly not the only way to express hierarchy in a linear environment).

In the recent minimalist landscape, the grammar-external constraints mentioned identify as so-called third factors when they are used to explain grammar-internal properties. Indeed, Chomskian minimalism and biolinguistics (Chomsky, 2005) as much as anti-chomskian "Cognitive" Grammar (e.g. Taylor, 2002) converge in the effort to explain properties of grammar by more general properties of the cognitive system (of the species or beyond). A third factor explanation is one that draws on some property that is not language-specific.

¹ Pace the existence of metathesis in phonology, which modifies a linearity that pre-exists, which is a different situation.

The more general language-unspecific cognitive properties that everybody is after are often called for but less often named. And understandably enough, when they are, people end up with notions that are so general that one wonders in which way they could be considered in scientific terms, let alone be inspected with scientific instruments. Can we hope, for example, one day to understand what "figure/ground relations" or "cognitive salience" are? Fodor (1983: 107) says that "the more global [...] a cognitive process is, the less anybody understands it."

Historically, 18th-19th century physician Franz-Joseph Gall, who first argued that the cognitive system falls into a number of distinct computational systems, identified broad and (as we know today) highly composite cognitive functions in what was called phrenology then. Objects of inquiry in phrenology were things like combativeness, destructiveness, firmness, benevolence, veneration, cautiousness, love, wit and hope. Fodor (1983) calls these horizontal faculties, and shows that cognitive science could only make any progress at all because they were progressively abandoned and replaced by more humble objects of inquiry, which are smaller and more homogeneous (vertical faculties in his terms). These are the fields of scientific inquiry that contemporary cognitive science (and also neuroscience) is after: among others, attention, vision, audition, and also language.

In this context, concatenation and linearity may well count as third factors, but they appear to be a little different in kind from familiar candidates: Fodorian, rather than Gallian. We know what they mean and how to characterize them. On the other hand, they are not really cognitive (though this word has a strong polysemic record these days): linearity is enforced by the "real world" and the properties of the five senses that humans are gifted with by evolution. Concatenation is probably found elsewhere in the cognitive system (of humans or beyond: in vision for example), but in case it is it is out of necessity, i.e. because some pieces need to be concatenated (this is the whole purpose of language, i.e. Martinet's second articulation: concatenation is the property that makes animal and human communication distinct). This is rather not what is currently understood as a "more general cognitive property" in the literature.

References

- Chomsky, Noam 2005. Three factors in language design. *Linguistic Inquiry* 36: 1-22.
- Fodor, Jerry 1983. *The modularity of the mind*. Cambridge, Mass.: MIT-Bradford.
- Lowenstamm, Jean 1996. CV as the only syllable type. *Current trends in Phonology. Models and Methods*, vol. 2, edited by Jacques Durand & Bernard Laks, 419-441. Salford, Manchester: ESRI.
- Scheer, Tobias 2004. *A Lateral Theory of Phonology. Vol.1: What is CVCV, and why should it be?* Berlin: Mouton de Gruyter.
- Scheer, Tobias 2012. *Direct Interface and One-Channel Translation. A Non-Diacritic Theory of the Morphosyntax-Phonology Interface. Vol.2 of A Lateral Theory of phonology*. Berlin: de Gruyter.
- Takahashi, Toyomi 1993. A farewell to constituency. *UCL Working Papers in Linguistics* 5: 375-410.
- Taylor, John 2002. *Cognitive Grammar*. Oxford: Oxford University Press.