One-Relation Representation for a Simpler-Than-Strings Phonology

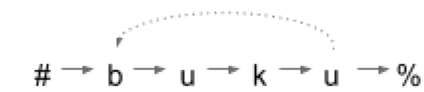
Maxime Papillon - University of Maryland

This presentation aims to argue in favor of a phonological representation derived from that of Raimy (2000) by exploring the additional power conferred by it. In this respect this presentation is in the lines of of Reiss's (2012) bottom-up approach to phonological typology.

One goal is reducing the complexity of the representation by going from strings to directed graphs. Raimy (2000) suggested to replace strings such as (1) with graphs like (2), where # and % are explicit beginning- and end-of-word markers respectively. The difference being that in such a representation single segments can immediately precede or follow multiple others. This allowed him to analyse reduplication as "loops" in the directed graph. Indonesian plural reduplication as in (3) is linearized as (4). This structure then allowed Raimy to tame a number of complicated patterns of over- and under-application of phonological rules interacting with reduplication and infixes

(1) kæt

(3)



(2) # → k → æ → t → %

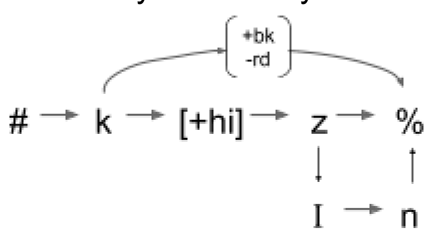
(4) #bukubuku% "books" (Indonesian)

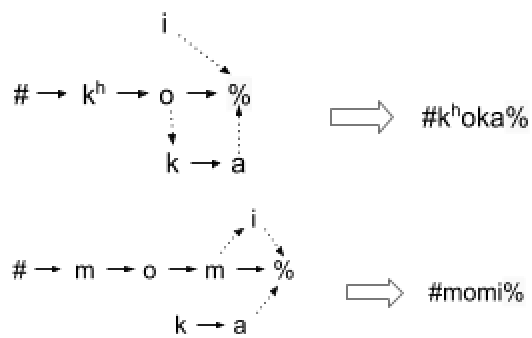
It is important to distinguish a) the fact that directed graphs like (2) are simpler than strings like (1) in the way mentioned above from b) the graphical conventions of our writing system that allows us to easily represent strings as left-to-right sequences of symbols, and c) the richer set of structures allowed in graphs than than in strings. a) is a mathematical fact about the properties of the data structure. Strings are graphs with a total order relation, namely the relation is total, transitive, asymmetric, and irreflexive. A graph without these properties is a simpler mathematical object with fewer assumptions. And with Autosegmental Phonology, feature geometry, and prosodic structures, and correspondence theory almost everyone is already doing phonology on graphs that contain multiple types of relations, obviously a higher amount of complexity than the one-relation graphs I am arguing for here.

It is true that thanks to b) we can represent strings in fewer symbols than graphs as in (1), but that's because our writing system implicitly packages all these assumptions, representing linear order in time as linear left-to-rightness on a the page. Let's not allow this purely pictorial fact of writing influence your impression about mathematical complexity. Strings do require a logical relation of precedence between pairs of elements as well as a notion of start and end, the graph notation is simply actually writing those down. The presence of arrows and special START and END symbols in (Aa) is explicitness, not complexity.

And as said in c) it is true that we can do more with generic graphs than with strings (since all strings are graphs but not vice versa). As seen above graphs can contain branchings, loops, and parallel paths that strings cannot represent. But this is representational power, not complexity. My claim is that talking about generic graphs rather than strings is making fewer assumptions about what phonology is and therefore it is a simpler claim. But one would be correct to think that that it is powerful. Simpler things often offer more possibilities. The point of this paper is to argue that this power matches very well with all the less string-like phenomena of phonology and morphology that are attested. This simpler-than-string phonology is powerful, and it seems to contain just the right power to do morphology.

In addition to reduplication and infixation which were already explored by Raimy (2000), other phenomena that turn out to immediately follow from the additional power of this representation include at least tonal and harmony phenomena (5), allomorphy (6), ineffability and morphological unproductivity, and intonational phenomena.

<table>
<tr>
<td>(5)</td>
<td>Turkish-style Harmony


</td>
<td>(6)</td>
<td>Korean phonologically-conditioned allomorphy


</td>
</tr>
</table>

Reiss (2012) argued that in the realm of segment inventories, the best option is to start from the simplest model -unrestricted feature sets- and crucially to accept it in all its combinatorics power. There can be many reasons for a possible pattern to be unattested, ranging from biases of language change, to the small sample size of studied languages, other than strict limitations of our grammar. Tuning our theories to all and only the attested languages will inevitably lead to overfitting, and phonological theory must therefore care more about the simplicity of the system than about how tightly it predicts all and only what is attested.

A phonological representation based on graphs is simpler than one based on strings, and its space of possibilities is not a cause for concern. To the contrary it will lead to simpler explanation of morphological phenomena.

References

Raimy, E. (2000). *The phonology and morphology of reduplication* (Vol. 52). Walter de Gruyter.

Reiss, C. (2012). Towards a bottom-up approach to phonological typology. *Towards a Biolinguistic Understanding of Grammar: Essays on Interfaces. John Benjamins Publishing Company, Amsterdam*, 169-191.