Phonology with "goals": Optimality Theory

1. Introduction: Why goal-based phonology?

Phonological rules are a clear, succinct way of summarizing a phonological process in a given language. They state A → B / C__D, or, "Given the configuration CAD, change A to B."

However, the attempt to find cross-linguistic patterns in phonological rules has met with difficulty. It is clear that there are **types** of phonological rules that are common, including assimilation, insertion, and deletion rules. But the actual **statement of a rule** seems to vary quite unpredictably from language to language: that is, which segments are involved, and what external conditions must be imposed on the rule (such as the precise specification of the natural class undergoing the rule or serving as the crucial environment for the rule to apply).

We have also found that pursuing a rule-based approach to phonology has raised questions:

- Children acquiring language pass through stages in which their phonological productions are **simpler** than those of the target adult grammar. In a rule-based model, this implies that the child has more rules—and therefore a **more complex grammar**—than the adults of their language community. Does this seem right?
- Syllabification rules seem to apply continuously throughout the phonological derivation; other kinds of rules don't seem to do this.
- When there are conditions on syllabification rules, such as restrictions on possible coda clusters, these aren't rules themselves; they are more like **goals** that a syllable has to meet.
- Many languages have phonological "conspiracies"—separate, formally unrelated rules that seem to be trying to achieve the same result. This looks like an effect of **goals** again.

In fact, when we look at both segmental rules and syllabification options, there is something that does seem to be quite consistent across languages, and that is the **goals** or targets that many phonological rules are trying to achieve. Likewise, we could say that children in early stages of phonological acquisition have *different* goals than adult speakers have (specifically, children may emphasize goals that lead to simplification of surface forms).

Therefore, a recent trend in phonology has been to develop a phonological model that directly **refers to goals** instead of arriving at them indirectly via phonological rules, or mixing rules together with goals as we have been doing for syllabification. We will pursue a goal-based model of phonology for the rest of the semester.

On the one hand, we will keep many aspects of the model that we have developed intact, especially our understanding of phonological **representations**. For example:

- Phonological processes operate on features
- Syllable structure is an important part of the phonology of languages

However, we will make use of these ideas while using **goals** rather than using rules to model phonological processes and phenomena, such as syllabification or segmental alternations.

2. Formalizing goal-based phonology

The most popular goal-based approach to phonology is called **Optimality Theory (OT)**, and it has been in development since the early 1990s. Here are the basic ideas behind OT.

Basic concepts behind OT

- Goals are universal: they are present in all languages. (OT formalizes goals as **constraints**.)
- However, no language perfectly satisfies all goals. This would be impossible, because many of the goals **conflict** with each other.
- Individual languages respond differently to the conflicting demands because each language sets up its own system of priorities, satisfying the high-priority goals at the expense of the lower-priority goals. (OT formalizes this notion of prioritization as **constraint ranking**.)
- We can determine the priorities of a given language by looking to see what it does when it has to choose between competing goals. (OT formalizes this as an explicit **competition** between a winning output — the actual surface form — and various informative losing competitors.)

We will learn more about the OT framework in upcoming classes.

[Excerpt from Prince & Smolensky (1993), *Optimality Theory: Constraint interaction in generative grammar*. Published 2004, Blackwell.]

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1.2 Optimality

The standard phonological rule aims to encode grammatical generalizations in this format:

(1) $A \rightarrow B / C\text{—}D$

The rule scans potential inputs for structures CAD and performs the change on them that is explicitly spelled out in the rule: the unit denoted by A takes on property B. For this format to be worth pursuing, there must be an interesting theory which defines the class of possible predicates CAD (Structural Descriptions) and another theory which defines the class of possible operations $A \rightarrow B$ (Structural Changes). If these theories are loose and uninformative, as indeed they have proved to be in reality, we must entertain one of two conclusions:

(i) phonology itself simply doesn't have much content, is mostly 'periphery' rather than 'core', is just a technique for data-compression, with aspirations to depth subverted by the inevitable idiosyncrasies of history and lexicon; or

(ii) the locus of explanatory action is elsewhere.

We suspect the latter.