

The Formalism of Phonological Rules

Phonological rules are usually written in the following form:¹

$$A \rightarrow B / C_D$$

where the following conditions are satisfied:

1. A, B, C, D are distinctive feature matrices except that:
 - A or B (but not both) may be the null set \emptyset
 - C or D (or both) may be absent
 - A consists of only one feature column [SN: This is kind of a confusing way to say that A must correspond to only one segment while C or D could in theory each consist of multiple segments (i.e. - more than one feature column). It is unclear to me what to say about B in regards to this formalism. Let's assume that it also must consist of only one feature column.]

If C and D are both absent, the rule is said to be *context-free*. Otherwise, the rule is *context-sensitive*. [SN: These terms are not important for you to memorize, but they should make sense if you think about it!]

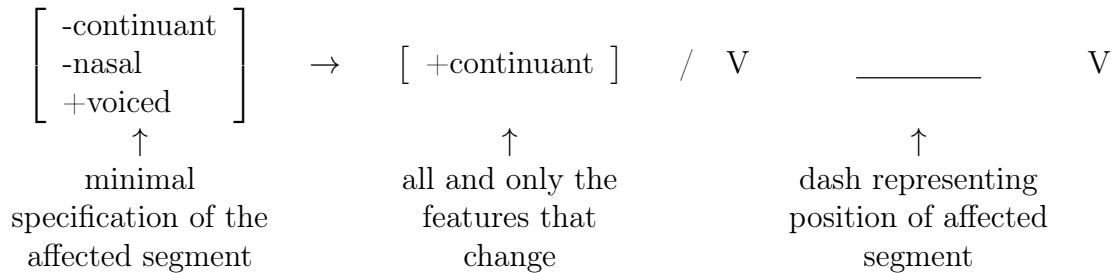
2. C and D may contain (or consist solely of) the boundary symbols # (word boundary) and + (morpheme boundary).

In such rules A is said to be the *affected segment*, B is the *change*, and C and D constitute the *context* or *environment*. [SN: a better/more common term for A is the *target* of a rule. When terms like *context* or *environment* are used on their own they refer to both C and D at the same time. You will often hear more specific terms like *left context/environment* for C and *right context/environment* for D.]

CAD constitutes the *structural description* of the rule and CBD constitutes the *structural change*. [SN: these are useful terms for phonological theorizing, but beyond what we will deal with in this course.]

¹This handout is taken almost word for word from Halle and Clements (1983, p. 93). I will annotate it at certain places to clarify/comment on the importance of the different points being made.

Example. The rule “/b d g/ become the corresponding continuants [β ð ɣ] in intervocalic position” is expressed as follows:

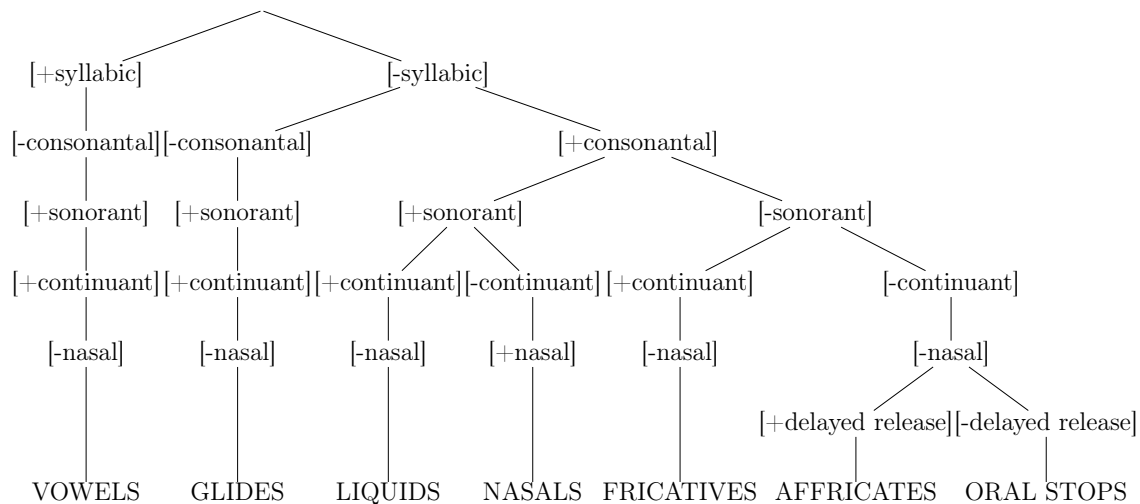


[SN: The important thing here is that the rules should be minimal in how many features are used. For the A position, you want to use only the features necessary to pick out the set of sounds that are the target of a rule. This usually depends on knowing which segments are in a language’s inventory, but if you don’t know the list of segments you can assume general classes of sounds. In other words, don’t just assume a language only has 3-4 sounds. For the B position you want to only specify the features that change. If a feature stays the same in a rule then you should not specify it!]

Some conventional symbols:

- \emptyset the null set
- $\emptyset \rightarrow B / C_D$ “insert B between C and D”
- $A \rightarrow \emptyset / C_D$ “delete A between C and D”
- # word boundary
- + morpheme boundary
- C [-syllabic] segment
- V [+syllabic] segment
- \acute{V} stressed vowel
- C_0 zero or more [-syllabic] segments

The following tree shows the major manner classes and their feature specifications. Five features are used for all classes except for Affricates and Oral Stops which use six. The sixth features is [delayed release].



The following are the *minimally necessary* features to describe each class. Because [delayed release] is a weird feature we're going to ignore the fact that we could just describe stops as [-d.r.] and affricates as [+d.r.].

Vowels: [+syllabic]

[+syllabic] eliminates anything that is not a Vowel.

Glides: [-syllabic], [-consonantal]

[-syllabic] eliminates Vowels.

[-consonantal] eliminates Oral Stops, Affricates, Fricatives, Nasal Stops, and Liquids.

Liquids: [+consonantal], [+sonorant], [+continuant]

[+consonantal] eliminates Vowels and Glides.

[+sonorant] eliminates Oral Stops, Affricates, and Fricatives.

[+continuant] eliminates Nasal Stops ([-nasal] accomplishes the same thing...so choose whichever you prefer).

Nasals: [+nasal]

[+nasal] eliminates all the non-nasal sounds.

Fricatives: [-sonorant], [+continuant]

[-sonorant] eliminates Vowels, Glides, Liquids, and Nasals.

[+continuant] eliminates Oral Stops and Affricates.

Affricates: [-sonorant], [-continuant], [+delayed release]

[-sonorant] eliminates Vowels, Glides, Liquids, and Nasals.

[-continuant] eliminates Fricatives.

[+delayed release] eliminates Oral Stops.

Oral Stops: [-sonorant], [-continuant], [-delayed release]

[-sonorant] eliminates Vowels, Glides, Liquids, and Nasals.

[-continuant] eliminates Fricatives.

[-delayed release] eliminates Affricates.

References

Halle, M. and Clements, G. N. (1983). *Problem book in phonology: a workbook for introductory courses in linguistics and in modern phonology*. MIT Press.