On the Description of Phonological Hierarchies

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Comparative studies have established that although the scope of a phonological process may vary considerably in different languages, in different styles and periods of a language, and in different stages of language learning, many of the observable differences fall into implicational hierarchies. For example,

(1) Stops may be devoiced word-finally (as in German), or not (as in Old English), but if stops are devoiced so are fricatives.\(^4\)

These hierarchies have been part of every phonological theory intended to characterize the set of phonetically motivated processes.\(^2\) Indeed they seem to be the sole content of some theories, e.g. the "atomic phonology" of Dinnsen (1976).\(^3\) According to Dinnsen,

where researchers have been attempting (with little success) to formulate putative universal rules of a very general character, the theory of atomic phonology suggests that we should rather be attempting to determine what are the most specific restrictions empirically necessary for a rule's formulation since all variations on that rule are determinable from the distinctions appealed to in the putative atomic rule.\(^143\)

The possible variations are determined in Dinnsen's theory according to a principle of "rule complementation," as follows. If (2) is the most restricted (or "atomic") form of word-final devoicing,

\[
(2) \begin{align*}
& [+ \text{obst}] \\
& [+ \text{cont}] \\
\end{align*} \rightarrow [+ \text{voice}] / \quad \# \\
\]

then by taking the complementary value of a feature (in this case [+ cont]) in the structural description of (2), we obtain a complement rule (3):

\[
(3) \begin{align*}
& [+ \text{obst}] \\
& [- \text{cont}] \\
\end{align*} \rightarrow [- \text{voice}] / \quad \# \\
\]

A complement rule is "dependent," in Dinnsen's terminology: it applies only if its atomic rule also applies.

It is not clear to us how this differs, except formally, from descriptive devices proposed by previous researchers, or why Dinnsen believes that the latter have not been attempting to determine the most specific restrictions on processes. For example, in the "natural process" notation of Donegan (in Miller 1972,1973) and Stampe (1972), rule (2) would be expressed as (4),\(^4\)
where [+ cont] (read "especially [+ cont]") means that (4) may apply to noncontinuant obstruents or not, but that if it does, it must also apply to continuant obstruents. This notation also expresses the same hierarchy in variable applications, much like the variable notation of Labov (1972):

(5) \[
\begin{align*}
\text{[+ obst]} & \rightarrow \text{[-voice]} / \underline{\text{#}} \\
\text{[+ cont]} & \\
\end{align*}
\]

In the "meta-rule" notation of Foley (1972), Chen (1972), Vennemann and Ladefoged (1973), we would have (6),

(6) \[
\begin{align*}
\text{[- obst]} & \rightarrow \text{[-voice]} / \underline{\text{#}} \\
\text{[a cont]} & \\
\end{align*}
\]

with the universal condition \(a > n\), where \(n\) is a language-specific value \(\{0,1\}\) on a scale \([1\ \text{cont}] = \text{fricatives}, [0\ \text{cont}] = \text{stops}\), so the application of (6) to \([0\ \text{cont}]\) (stops) entails its application to \([1\ \text{cont}]\) (fricatives). Obviously, all these notations necessarily refer to the most restricted as well as the most general forms of processes, and we can only conclude that Dinnsen has mistaken a novel formalism for a novel theory.

In fact, the atomic theory, precisely because it fails to express the most general form processes may take, has nothing to distinguish absolute conditions on their application, like [-obst], from relative conditions, like [-cont]. Thus from the atomic rule (2) we could obtain the complement rule (7),

(7) \[
\begin{align*}
\text{[- obst]} & \rightarrow \text{[-voice]} / \underline{\text{#}} \\
\text{[+ cont]} & \\
\end{align*}
\]

which predicts the existence of languages in which sonorants (7) and fricatives (2) devoice finally, but stops do not!

Dinnsen's conclusion that atomic phonology "is the most highly constrained theory of phonology consistent with known facts of natural language" (143) seems, therefore, to be mistaken, and likewise his exclusive concentration on the most restricted forms of processes. In the case of word-final devoicing, the most restricted form is not (2) but (8):

(8) 

This is the form of the process in Modern English, where no sounds are devoiced word-finally. And total non-application is in fact the most restricted form of any phonological process. If we followed Dinnsen's methodology to its logical conclusion, the content of atomic phonology would be invisible to the naked eye.
Notes

1 This is one of Dinnsen's examples. To our knowledge it was first noted by Ralph (1973).
2 For brevity's sake we restrict ourselves to a few recent theories (references in paragraph two) and apologize to the very many researchers—past (e.g. Sievers 1901) and present (e.g. Greenberg 1966)—we have not discussed. We also overlook all differences in the ontological and epistemological status accorded the processes in question in various theories, even our own ordinarily indispensable distinction between processes and rules (Stampe 1973).
3 Further references are given in Dinnsen's 1976 article, but we have seen only this and Dinnsen and Eckman 1975.
4 For clarity and brevity, we continue using devoicing to illustrate notations, rather than the various processes originally discussed in the references that will be cited throughout this paragraph.
5 It should be noted that Dinnsen's implicit assumption that all restrictions are implicational is mistaken. For example, the MHG diphthongization of ü to ou is said to have preceded that of ð to ei, and from this Dinnsen argues that the diphthongization of ð but not ü is impossible (139). But precisely this occurs in the Scots version of the English-Vowel Shift (Wright 1905: 192ff and 196ff), and many analogous examples are discussed by Donegan (e.g. 1976: 151). This is a natural mistake, and bound to occur until we fully understand the causalities involved.
6 Children typically come to restrict the application of any process which distinguishes their pronunciation from adults and finally to suppress it altogether (Stampe 1969, Edwards 1970). For the suppression of word-final devoicing by English-speaking children, see Velten 1943, Smith 1973.

References

Foley, James. 1972. Rule precursors and phonological change by


