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ABSTRACT

This paper discusses the interpretation of data on two types of phonological change: change in language over time in the culture, and change in the development of the individual speaker; and examines the position that these two sorts of change interact in a certain way in relation to phonological structure. If one conceives of phonology as a finite set of ordered rules which relate surface syntactic structure to the phonetic descriptions of a language, there are three obvious potential ways for it to change: a rule can be added or deleted, changed, or reordered. Assumed is that phonological rules present certain stable characteristics of the individual's perceptual-motor operations and provide the natural central units for the processing of language sounds. The changes present in "phonological drift" have been thought to represent the typical contribution of children during initial language acquisition; they are not found in adults, who are less able to reconstruct basic aspects of their phonological system. The typically adult form of sound change, rule addition or deletion, is not found in children, who are built so that they organize rather than add. Adults have much more greater control over the form of the language. The program of psycholinguistic investigation sketched here for phonology needs to be carried out for other parts of the grammar as well. (Author/AMM)

# NATIONAL LABORATORY ON EARLY CHILDHOOD EDUCATION

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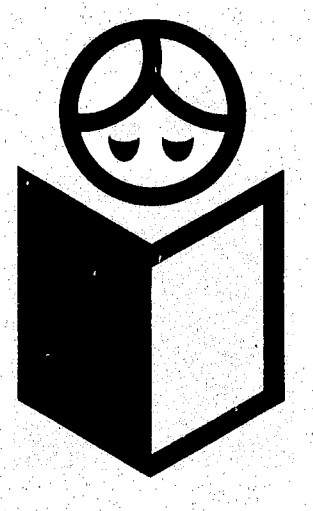
Informal Paper



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# THE PSYCHOLOGICAL REALITY OF DIFFERENT TYPES OF PHONOLOGICAL CHANGE

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The generative-tranformationalist approach has led American linguists to relax certain constraints on the form of synchronic phonological description; it has also opened up these descriptions to new kinds of evidence. This paper discusses the interpretation of data on two types of phonological change: change in language over time in the culture (diachronic change) and change in the development of the individual speaker (ontogenetic change). Although ontogenetic and diachronic change have been considered by Jakobson (1941), I wish to examine the position, reflected in more recent analyses, that these two sorts of change interact in a certain way in relation to phonological structure.

If one conceives of phonology as a finite set of ordered rules which relate surface syntactic structure (or something closely resembling it) to the phonetic descriptions of a language, there are three obvious potential ways for it to change: a rule can be added or deleted; a rule can be changed; or rules can be reordered. Consider the following assertion: actual natural languages have changed either by rule addition on the part of adults, or by rule alteration or reordering on the part of children. Extensive linguistic evidence bearing on this assertion has been presented by Kiparsky (1968). His presentation, together

with his remarks on the importance of "psychological reality" of phonological descriptions, has stimulated me to prepare these remarks on psychological considerations relevant to the topic.

In order to consider the "psychological reality" of any such assertion about phonology, assumptions must be made about how phonological descriptions may be related to the processes carried out by the speaker/hearer of a language. I assume that phonological rules represent certain stable characteristics of the individual's perceptual-motor operations--that, in fact, phonological rules provide (or should provide) the natural central units for the processing of language sounds. The implication here is that the form and the "size" of such rules indeed characterize functional components of the individual's abilities. On the other hand, I do not wish to imply that single rules actually represent specific acts carried out in the production or perception of speech--it is phonological competence, not performance, that is being characterized.[1]

That being the case, how are we to interpret the ordering of rules? If it does not represent order of events in speech processing, what does it represent psychologically? Another possibility would be for ordering to reflect directly the order of acquisition of rules by the individual. This possibility directly contradicts the hypothesis we are examining. If the rules which describe the competence of the adult are a simple cumulation, then he would hardly be able to reflect language change by having, in his

childhood, reordered and reformed those rules. That would be possible only if processes accounting for language change in the culture differed completely from those accounting for language continuity in the individual. Although there may be some relation between ontogenetic priority of rules and their ordinal placement in the most psychologically real grammar, any such relation should be treated as contigent rather than a priori.

The position taken here is that the order of rules in the grammar is related to two psychological features. The first is the importance of the component described by a given rule in the individual's competence--its pervasiveness in the performances which the competence underlies. The higher a rule is in the body of rules, the greater its effect on the phonetic shape of utterances will generally be, other things being equal (Halle, 1962; Postal, 1968); placing a rule toward the initial position is a rough indicator of its "functional load" in the whole sound system. The second psychological correlate of rule order is the interrelatedness of the components of competence described by the given rules--the extent to which different aspects of competence fit together. What is involved here is not the ordinal position of any single rule, but the extent to which prior rules "feed" or "bleed" following rules.[2] Maximization of feeding and minimization of bleeding relationships obviously lead to a system which may be thought of as well-integrated. It seems most reasonable to me in this regard to expect that a condition will tend to

obtain which balances forces toward integration and toward differentiation, both of which typify the functioning of living systems; that is, a set of rules will tend neither to "bleed each other dry" and hence become an atomized group of unrelated rules nor to become "fed up" with each other and hence merge into a single monster-rule.

Through a parallel, more familiar, and equally plausible line of reasoning, a probable psychological correlate of the form of rules can be advanced. Rules whose structural analyses and whose specifications of structural change are statable in fewer features are clearly generally simpler than those requiring more features. This is nothing but a restatement of Halle's (1962) now classical position.

Given this analysis of psychological correlates of phonological structure (as far as it goes)[3], we can return to the problem currently at hand--the relation between the contributions of adults and children to language change. Let us first take up changes whose basis is located in the form and ordering of rules. These changes, present in "phonological drift," have been thought to represent the typical contribution of children during initial language acquisition. Why is this sort of thing not found in adults? I would accept as plausible Halle's suggestion that adults, on the basis of maturation, are less able to reconstruct basic aspects of their phonological system--that "a wholesale restructuring of his grammar is beyond the capabilities of the average

adult." Of course, maturation need not be involved; psychological researches (cf. Underwood, 1957) have demonstrated the general prevalence in human functioning of proactive inhibition, the tendency of learning to do one thing to inferfere with learning to do another different thing later. Since people normally do learn a language when they are young, the question of actual maturational involvement is impossible to solve unless one sets up indirect experimental investigations.

Putting aside adults for the moment, let us examine the actual character of phonological change introduced through alteration in form and ordering of rules. Here we can start off with Kiparsky's perceptive demonstration that in both laws one has a ready notion of a simplicity metric--that there is an inherent directionality in the change to be observed, whether it is described in terms of the form of the rules or in terms of their relative order. As hinted earlier, what one actually expects here is a tendency toward maximal simplicity given empirical adequacy of the grammar. Since children's phonological rules are probably too large, their feature systems too gross, and their rule-ordering too little established, the other half of their activity must consist in a tendency toward a less simple, but more descriptively adequate system. This tendency presumably converges with the simplification tendency at some point of optimum differentiation and integration.

A word is also necessary on the difference between change by rule alteration as opposed to change by rule reordering. Kiparsky's impression seems to be that the latter, but not the former, will lead to phonetic forms at a greater distance from the base representation in the lexicon. If that is so, one may expect that rule-ordering would tend to follow simplification of rule form in developmental progression. I have no idea about the actual evidence on this issue.

This brings up the general methodological point that ordinary synchronic linguistic techniques are inherently unable to ascertain whether the phonological structure of any child is indeed different from that of adults around him in the respects we are discussing. This situation arises because we are by definition talking about cases where the grammars being compared are descriptively adequate (as in the example of Halle, 1962). The phonologies have the same output, but they produce it in different ways. Research of a sort that would usually be called "psychological" is necessary to decide the individual case.

The last point has conceptual as well as methodological implications. If the adult grammar and the simpler grammar arrived at by the child in the course of language acquisition are indeed equivalent in terms of the sets of utterances they generate, then exactly how does the formation of the child's grammar exercise "a profound influence on the further evolution of the language"? The child's newly-formed competence must get

him to act differently in some respect at some time, or else there would in fact be no language change. Exactly how and when the change does come about is unsolvable on the basis of current evidence. Think about, for instance, the following possibility: the formation of the child's competence leads him, as an adult, to be differentially susceptible to language contacts or to sound pattern tendencies in the system he is using. If this were so, then our "adult-style" language change would actually be an indirect result of the simpler system developed some years previously in childhood.

We can now turn to what has been referred to as the typically adult form of sound change: rule addition (or deletion). Again, our first question is why this is not found in the other age group--this time the children. The exact converses of the arguments used before are possible, namely, that children are built so that they organize rather than add or that since children are acquiring the whole system there must be massive transfer of training between each aspect. But another factor is present; this is that it is adults who have much greater control over the form of the language. Even if children do introduce new rules (as I suspect they do), these would not agree with adults' ideas of what is phonologically grammatical, and the adults would win out.

With respect to rule addition, it is equally possible (although this is not mentioned by Kiparsky) to use a psychologically interpretable

notion of simplicity (as he did for the other type of change). In this case one is dealing with the form and placement of the new rule. It follows from what we have said that rules that have simpler structural analyses and that describe a simpler change should be preferred--as they do seem to be (cf. Postal's example that single sounds are seldom the subject of shifts). Likewise, terminal rule placement (or in psychological terms, adoption of less pervasive operations) would cause less strain than earlier placement. As Halle has remarked, language change must follow some constraint imposed by an intelligibility criterion.

It should also be mentioned that I would be most suspicious, on psychological grounds, of rule deletion. People may stop what they have done in the past, but they seldom if ever really forget what they have learned. This would lead me to prefer the addition of exception-making rules, rather than deletion of the rules that are expected (cf. Chomsky & Halle, 1968).

The program of psycholinguistic investigation which has been sketched here for phonology obviously needs to be carried out for other parts of the grammar as well. In particular it will be interesting to observe whether developmental change of an intrinsic sort can ever be demonstrated as a differential factor in types of language change. Are other cases equally susceptible to the alternative interpretation that

any adult-child differences in contribution to language change reflect:

(a) the inability of adults to reorganize their patterns of functioning;

(b) the greater social power of adults;

(c) the fact that children do grow up and are somewhat different adults than their parents were?

If that were so, diachronic linguistics would turn out to resemble some other kinds of social phenomena that have received a lot of attention lately.

## FOOTNOTES

[1]Features of phonological performance are susceptible of insightful characterization of the sort given by Neisser (1967), but that is not the topic of this paper.

[2]"Feeding" and "bleeding" are Kiparsky's (1968) concepts and terms; a rule feeds another if the output of the structural change it describes provides input acceptable to the structural analysis of the latter rule, while a rule bleeds another rule if its output is not a candidate for the latter rule to work on.

[3]There is no characterization here of the psychological difference between "bleeding" minimization as opposed to "feeding" maximization, nor between the parallel contrast in type of rule change between change in structural change as opposed to change in structural analysis.

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