HISTORICAL LINGUISTICS AND GENERATIVE PHONOLOGY

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1. Scope. In this essay I propose to examine some theories of historical
generative phonology. I shall concentrate on certain aspects of formal
and functional explanation. This means that I shall leave aside ques-
tions such as social motivation, and historical changes versus child lan-
guage, which in themselves merit attention. Further, I shall neglect cer-
tain theories of historical change which are rather marginally connected
with the mainstream of research in this area. Finally, I will be con-
cerned with sound changes in relation to the system of rules of a lan-
guage, rather than in relation to acoustic and articulatory facts about
sound change, as illustrated in e.g. Ohala (1974).

2. Formalism

2.1. General Remarks. The hypothesis that the phonological system of
any language consists of a set of ordered rules entails that it is possi-
ble to describe historical changes as changes of sounds, as in earlier
theories, as well as changes in the system. Accepting the latter propos-
al has the advantage of allowing a classification of sound changes into a
small number of types. Besides restructuring of the underlying represen-
tation, to which I will return in section 2.6, there are four kinds of
system changes, following the proposal of Kiparsky (1968):

      (1) a. Rule loss
          b. Rule change
          c. Rule addition
          d. Rule reordering

The remainder of this discussion is based on the assumption that his-
torical sound changes are better studied as changes in the phonological
system than as changes of surface segments or classes of segments. I will
not present arguments for this view here. For a defence of this approach,
cf. Saporta (1965), among others.

In the following four sections I will discuss each of the types of lan-
guage change mentioned above individually.

2.2. Rule Loss. This kind of system change is very frequent. Rule loss
can have two effects. The rule in question may be dropped entirely, and

the surface representation will not retain any traces. On the other hand
it may lead to a change in the underlying form, which will be reflected
on the surface. These two types are by no means clearly differentiated.

An example of rule loss can be observed in Yiddish. At an early stage
Yiddish had a rule of final devoicing, similar to that of German. German
retains this rule, while it has been lost in Yiddish. Thus Yiddish has
lid "song" and tog "day" where German has Lied /li:t/ and Tag /ta:k/.

Rule loss is often caused by a more profound change in the structure of
the language. It seems quite plausible to assume that many rules in Latin
were dropped when the complex inflectional system of the language lost
its original character. Examples of such rules are rhotacism, Lachmann's
law and the rule which drops (or adds) an n in e.g. natio – nationis and
homo – hominis. Rhotacism is quite typical in this respect. It was active
mainly in noun paradigms of the type os – oris, mus – muris. When the in-
flectional system was lost, there was no need to preserve rhotacism as a
special rule.

2.3. Rule Change.   Kiparsky proposed that rule change could be of one of
the following two types:

(2) a. Rule simplification

b. Rule complication

The first type implies either that the environment becomes more general,
or that the class of segments affected is more natural. A typical case,
cited by King (1969) is that of a certain rule in German which applies to
the segment /t/ only, in Darmstadt Hessian, to /p t/ in Alsatian and to
/p t k/ in the Swiss German dialect of Zürich.

The latter type is the inverse of the former one. Here the environment
becomes more specific or the segments affected belong to a smaller, less
natural class.

Dinnsen (1975) wants to constrain the concept of rule change in the
following way:

Rule generalization can be of one of the two following types. A feature
specification may be lost. The rule applying to the three German dialects
is clearly of this kind. On the other hand, the value of the feature,
i.e. + or –, may become a variable,∝.

Rule complication arises in order to avoid opacity, in the sense of Ki-
parsky (1971).

2.4. <u>Rule Addition.</u>   Rule addition can be split up into two types: addi-
tion at the end of grammars, and addition in the middle of grammars. The
latter type has been called rule insertion.

   It is rather clear that the first type exists. The latter type is, how-
ever, much more controversial, and its existence has been questioned by
King (1973). It is also quite difficult to imagine how rule insertion
could have psychological reality. Probably, putative cases of rule inser-
tion are merely misanalyses of data due to our faulty understanding of
rule ordering. In fact most proposed cases of rule insertion have later
been reanalyzed, e.g. as normal rule addition with subsequent rule reor-
dering.

   There remains however at least one example of rule insertion which has
resisted all attempts of reanalysis: Lachmann's law. This rule is formu-
lated as follows by King (1969):

$$(3) \quad V \longrightarrow [+\text{tense}] \ / \underline{\quad} \begin{bmatrix} -\text{continuant} \\ +\text{voice} \end{bmatrix} \begin{bmatrix} -\text{continuant} \\ -\text{voice} \end{bmatrix}$$

> i.e. a vowel is lengthened before a cluster consisting
> of a voiced obstruent followed by an unvoiced one.

This rule is followed by one of assimilation:

$$(4) \quad [-\text{continuant}] \longrightarrow [\alpha \text{ voice}] \ / \underline{\quad} \begin{bmatrix} -\text{continuant} \\ \text{voice} \end{bmatrix}$$

> i.e. an obstruent assimilates in voice to a following
> obstruent.

The assimilation rule is inherited from Proto-Indo-European. Lachmann's
law, however, is a Latin innovation. Yet rule (3) must be ordered be-
fore rule (4) in order to yield the correct outputs:

(5) a. ag+tum   cf. fac+tum

       āg+tum   Rule (3)   ‑

       āc+tum   Rule (4)   ‑

       āctum   Output   factum

    b. ag+tum

       ac+tum

          ‑

     * āctum

   I will not go into a discussion of Lachmann's law here. Note, however,
that the formulation of this rule is suspect, since it involves an en-

vironment which never occurs in the surface representation, and which ac-
tually is forbidden by the general phonotactic constraints of Latin.

2.5. Rule Reordering.   This form of language change is naturally enough
closely connected with theories of rule ordering. I will here mention two
such theories, which have been more generally accepted than the dozen or
so other proposals.

  The constraint proposed by Kiparsky (1968) states that rules tend to be
reordered in order to permit their fullest utilization. Kiparsky's own
example, from the two Swiss German dialects of Schaffshausen and Kesswil
are typical in this respect.

  The second constraint is that proposed by Kiparsky in 1971. He states
that rules tend to be reordered in order to eliminate opacity. A rule is
said to be opaque if one cannot see from the surface form whether it has
applied.

2.6. Restructuring.   It is clear that modifications of the system of
rules cannot account for all changes. If this were the case the underly-
ing representation would become more and more abstract. Somehow the un-
derlying representation must change,too. For example, at some point in
the history of French, underlying /uˆ/ became /ü/ (cf. Hall, 1976).

  There is at present an almost total lack of interesting hypotheses on
why and how underlying representations change. It seems quite probable
that most such changes actually result from earlier changes in the sys-
tem of rules. Thus, the change from /uˆ/ to /ü/ is probably due to the
addition of a rule converting /uˆ/ to /ü/, optionally, in certain dia-
lects, sociolects or styles.

  The connection between rule loss and restructuring is rather problem-
atic. The very same rule may in some cases remain productive, and in
others lead to restructuring. On the other hand, there are cases where a
rule may be lost entirely in some forms, and lead to restructuring in
others.

  As an example of the former type we have rules such as rhotacism in La-
tin. In paradigms such as os – oris the rule is productive. In forms such
as angor and honor there is no alternation with forms containing s, and
we must conclude that restructuring has taken place.

  As an example of the latter type we have the rule of terminal devoicing
in Yiddish. In forms such as tog it has been lost entirely. In other
forms, such as avek "away" restructuring has taken place.

3. Functionalism

3.1. General Remarks. One of the questions that linguists have tried to answer since the first attempts at investigating historical linguistics is why changes occur. So far, nobody has been able to formulate even one necessary and sufficient condition for language change. In fact, maybe the very nature of historical changes makes it impossible to formulate such conditions.

In modern times this has led some phonologists, e.g. Postal (1968), to reject a priori the possibility of formulating functional statements, and to restrict their attention to the strictly formal aspects of language change.

Nevertheless, it has been observed again and again that changes do not work at random. Historical processes seem to work according to certain patterns, or in order to achieve certain ends. In the following para-graphs I shall discuss some of the functional explanations that have been proposed in recent literature.

3.2. Natural Changes. The concept of natural phonology has been very fashionable these last years. Segments, systems of underlying segments as well as rules have been classified as natural (unmarked) or as un-natural (marked). Natural rules, for example are those which occur in a variety of unrelated languages and are easily acquired by children. They are often easy to identify intuitively, but difficult to formalize.

Of the following pairs of rules, the a rules are more natural than the b rules:

(6) a. $[-\text{continuant}] \longrightarrow [-\text{voice}] / \_\_\_ \#$
    b. $[-\text{continuant}] \longrightarrow [+\text{voice}] / \_\_\_ \#$

(7) a. $k \rightarrow c / \_\_\_ i$
    b. $c \rightarrow k / \_\_\_ a$

(8) a. $V \rightarrow [+\text{nasal}] / \_\_\_ \begin{bmatrix} C \\ +\text{nasal} \end{bmatrix}$

    b. $V \rightarrow [+\text{high}] / \_\_\_ \begin{bmatrix} C \\ +\text{high} \end{bmatrix}$

These rules are formalized in a very similar fashion. A minimum of ac-quaintance with how natural languages work will leave little doubt that the first member in each pair of rules is much more plausible than the second.

One functional approach to language change involves this concept. It has been proposed that less natural rules are changed into more natural ones, that unnatural rules may be dropped, and that rules are reordered in order to stand in the most natural (usually feeding) order. Thus, this functional concept cuts across the formal ones outlined in the preceding sections.

There are however several difficulties with this approach. The first is that, so far, nobody has been able to give any formal criteria for distinguishing natural rules from unnatural ones. A first step in this direction has been taken by Schane (1972), who tries to classify natural rules into classes, which in turn could be defined formally. His three classes are:

(9) a. Assimilative rules.

b. Rules which strive to produce an optimal syllable structure.

c. Rules which strive to produce a natural set of segments, in the sense of Jakobson.

Further Schane classifies features according to a hierarchy. Those features which are high up on the hierarchy will not be subject to assimilation, while those which are further down on the hierarchy will be.

These ideas seem more promising than other proposed criteria of naturalness. However, they are certainly far from universally valid. Further they raise a number of interesting questions. If there really is a hierarchy of features, why are the features subject to this difference in their ability to resist assimilation? If there really are certain types of rules which are natural, what makes just those rules natural?

The second difficulty with the concept of natural processes is that there clearly are cases of highly unnatural changes, as well as cases of loss of natural rules. Examples of the former kind are the "crazy rules" discussed by Bach & Harms (1972) and Beade (1974). A well-known case is the German consonant shift which replaced the common and natural segments p, t and k by the highly marked pf, ts and kx. An example of the latter kind is the loss of the rule of final devoicing in Yiddish.

A plausible extension of the concept of naturalness would be to assume that changes in underlying segments will replace marked ones by less marked ones. One such discussion of restructuring in terms of natural changes is that of Lass (1971).

Unfortunately, however, there are serious problems connected with this

approach. Either this hypothesis is wrong or our concept of naturalness is. There are innumeral examples of quite natural segments developing into highly marked ones. To cite just a few, we have the German consonant shift mentioned above, the development of retroflex consonants in the Indo-Aryan languages and the development of implosives and clicks in certain southern Bantu languages.

Eventually one could consider a kind of "areal naturalness" rather than a universal one. This could account for the two last cases of unnatural developments cited above. However, this still does not explain the phenomena in Old High German.

3.3. Maximal Differentiation. It has been suggested that the surface form of a string influences the phonological system in that the derivations should lead to distinct survace forms where there are grammatical differences. A quite logical extension of this concept is to have derivations preclude semantically distinct forms having the same surface forms, in certain instances at least.

The classical example of this phenomenon is one taken from certain urban dialects of American English, first mentioned by Twaddell (1935), and given a functional interpretation by Kiparsky (1972). In these dialects the past tense morpheme -t is deleted except where this would lead to homonymy between the past and present tense forms. Thus the past tense of keep is pronounced /kep/, while the past tense form of step is pronounced /stept/.

It is easy to imagine that this functional constraint is psychologically real. However, there are many attested cases of grammatically distinct, but related, forms which are not differentiated on the surface. To remedy this, Kiparsky (1972) proposes a hierarchy of grammatical functions. Those which are weak are easily dropped, while strong distinctions tend to be maintained. If this hierarchy is correct, several interesting questions arise. Is the list universal or language-specific? Is there any deeper reason for certain grammatical distinctions being weaker than others? How would such a hierarchy look for languages which have different grammatical functions than those found in the languages cited by Kiparsky?

Cases of semantic rather than morphological differentiation can be found too. Typical cases are where a word fails to undergo a regular historical change because it would become homonymous with a tabu word. All

these cases have, however been rather marginal, and it is difficult to draw any general conclusions from them.

3.4. <u>Analogy.</u>   One of the oldest principles of functional explanation is that of analogy. Due to the rather unconstrained application of this principle, it fell into discredit after the development of generative grammar. In recent years, however, it has become respectable again, both in synchronic (Harris 1973) and in historical phonology (Kiparsky 1971, 1972, 1974; King 1972; Beade 1974; Vincent 1974).

Two similar, though not identical principles are involved. On one hand there is analogy proper, the extension of a certain pattern from one part of the lexicon to another. On the other hand there is paradigmatic regularity, which eliminates irregular forms within a given paradigm. In recent literature attention has focused mainly on the latter, and it is this concept with which I will be concerned here.

Also this functional principle cuts across formal classes. Harris (1973) shows that paradigms can be made regular by changing the order of certain of the rules involved. Other means of achieving this regularity can be to drop rules which make the paradigm irregular, to generalize a rule so that it applies to all forms of a given paradigm and not only some of them, and finally, by restructuring.

Analogy probably has psychological reality. However, the term is vague and needs constraining if it is to have any theoretical validity. Kiparsky (1974) discusses such constraints in general terms, but does not arrive at any definite conclusions.

Another interesting question involving analogy is how this concept interacts with other constraints on language change. King (1972) discusses the connection between analogy and opacity. Since his discussion is based on one single example one can question its validity.

3.5. <u>Optimal Phonotactic Structure.</u>   Kiparsky (1972) proposes that phenomena such as derivational constraints and phonological conspiracies actually are attempts to arrive at the optimal phonotactic structure. Examples are the realization of the CV syllable and the elimination of complex consonant clusters. For a case of the latter type, cf. Kisseberth (1970).

A possible example involves the rule of e-epenthesis in Spanish. The general phonotactic structure of Spanish prohibits initial clusters of the general type <u>s+consonant</u>. All words which would ordinarily begin with

a cluster of that kind receive an epenthetic e. This applies to inherited
words such as escuela and estrella, "school" and "star" respectively, as
to loan-words such as estación "station" and esquí "ski".

Another example is cited by Schane (1972). He suggests, for French,
that the rules for deleting a word-final consonant before a following
word-initial one are due the constraints on syllable-structure which make
CV syllables less marked than other types. Thus:

(10) a.   /pətit ami/   /pəti garsɔ̧/
          C V   CV CV

Studies on language universals show that there is a set of universal or
near-universal constraints on phonotactic structures. There are several
interesting questions which arise from this approach to historical
changes. Which are these universal optimal structures? Is there a univer-
sal set of ways at arriving at these structures?

4. Conclusion

The treatment of historical changes in terms of changes in the system of
rules seems quite superior to a description of changes of segments. How-
ever, the formal constraints proposed at first were not strong enough to
provide a really interesting theory of language change. Further, all for-
mal constraints seem to reach a merely descriptive level, while function-
al theories seem to come closer to explanatory adequacy. On the other
hand, functional explanations are expressed too vaguely to be adequate in
their present shape. Many other questions were raised in connection with
the specific proposals that were discussed in the previous sections. Two
questions, are more general and have to do with the relation between the
different constraints.

First, is there a hierarchy of constraints? This involves, among other
things the interaction between formal and functional theories.

Second, how does one change in a system affect the rest of that system?
Since the set of rules of the phonological component is so complex, it
seems natural that a disturbance caused at one point will set off a kind
of "domino reaction".

Given the rather primitive state of historical generative phonology,
answering these questions would contribute vastly to our understanding of
language change.

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