

HIERARCHICAL RELATIONS AMONG PHONEMIC UNITS AS PHONOLOGICAL
UNIVERSALS

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After splitting the phoneme into its minimal components - distinctive features - and viewing it as a bundle of such features the question arises as to mutual compatibility of the features within the bundle and their relationship to one another on the axis of simultaneity.

It is the differing capacity of distinctive features for relating with one another into simultaneous combinations or "vertical sequences" that creates bundles of features differing in character and possessing a varying degree of "markedness", i.e., combinations of features characterized by commonness, naturalness, high degree of occurrence in the system ("unmarked") and less common, less natural combinations of features manifesting a lower degree of occurrence ("marked"), cf. Gamkrelidze (1975).

Depending on the varying capacity of distinctive features to combine with one another in a simultaneous bundle, it proves feasible to set up a gradation scale of "markedness" of simultaneous (vertical) combinations of features. Opposite extreme values on such a "scale of markedness" involve: (a) obligatory combination of the distinctive features on the axis of simultaneity, i.e., maximally "unmarked" combinations (as, e.g., combinations of features like [+syllabic, -nonsyllabic], [-syllabic, +nonsyllabic] or [discontinuous, dental], etc.) which are represented in any phonemic system being a constituent part of the phonemes entering the minimal phonemic inventory of language, and (b) noncombina- bility, mutual incompatibility of features potentially forming maximally "marked" combinations (e.g., the features of [glottalization] and [voice] or the features [nasal] and [fricative] that are incapable of combining into simultaneous bundles).

Between such extreme values of "markedness" are arranged all kinds of possible combinations of distinctive features with varying degrees of "markedness" - with a greater or lesser approximation to the extreme values reflecting the varying capacity of distinctive features to combine with one another in forming simultaneous bundles.

Such a "scale of markedness" of combinations of distinctive features must, in principle, be characterized by a fairly high degree of universality, for it reflects the capacity - common to human language - of definite phonetic and acoustic-articulatory properties to combine more or less freely and form simultaneous articulatory complexes. Definite phonetic features, owing to their acoustic-articulatory peculiarities, combine preferably with one another on the axis of simultaneity. "Marked" bundles of features reflect - in contrast to "unmarked" bundles - a limited capacity of definite phonetic features to join in simultaneous combinations, i.e., their lesser tendency to mutual combination. Hence such bundles represent less usual or less natural combinations of features, being placed on the "scale of markedness" closer to the maximal value of "markedness".

It is but natural to expect that such bundles (and correspondingly the phonemes represented by them) will be characterized by a lesser degree of actualization in language than will features which, in view of their acoustic and articulatory properties, combine easily with each other, representing natural or usual combinations of features. The former group of bundles of features (and correspondingly the phonemes represented by them) constitutes functionally weak units in the system, being characterized by a low degree of occurrence (frequency) and distributional limitations or being entirely absent in a number of languages, forming gaps in the paradigmatic system; the latter group of bundles is more common and natural and, in this sense, "unmarked", forming functionally strong units of the system and being characterized by a greater distributional freedom and a higher degree of occurrence (frequency) - some of them with a probability of occurrence equal to one (maximally "unmarked" combinations of features). Thus definite distinctive features combine with one another in simultaneous bundles in preference to other features, the combinations of which on the axis of simultaneity form more complex units in terms of articulation and perception. Being less optimal, such combinations are of a limited occurrence in the system, forming less natural phonemic units characterized by a lower frequency of occurrence and equalling zero in certain systems (yielding phonemic gaps in the paradigmatic pattern).

The phonemic units representing stable and "unmarked" bundles

of features in any linguistic system may be characterized as "dominant" as opposed to the less common and less natural (i.e., "marked") units of the system that may be styled "recessive". Thus, any two phonemic units opposed to each other in the paradigmatic system by the hierarchical relationship of "markedness" may be characterized as "dominant" vs. "recessive", while the relationship of "markedness" itself, implying a dependence between these units, may be restyled as the relation of "paradigmatic dominance". The terms are obviously borrowed from molecular biology, known for its ample use of linguistic vocabulary in application to the genetic code (cf. Jacob, 1977). Such a change of terms and the substitution of "dominant vs. recessive" for "unmarked vs. marked" seems to be expedient in view of the ambiguity of the traditional expression "markedness" and its still widespread use in the original sense of "merkmalhaltig/merkmallos" (as different from that of "common, natural" vs. "less common, less natural").

It is precisely the establishment of such universal patterns of compatibility of distinctive features into simultaneous bundles or into "vertical sequences", with determination of their opposite function of "dominance" in the paradigmatic system that appears to be one of the basic tasks of present-day typological phonology. This will help establish universally relevant hierarchical dependence between the correlative units of a phonological system and to identify the core of phonemic oppositions, a kind of deep phonological structure, that constitute the basis of the phonemic inventory of human language, invariant in relation to particular phonemic systems in synchrony and to possible phonemic transformations in diachrony.

In this respect correlations of stops and fricative phonemes in a phonemic system present a special interest. In particular, in the subsystem of stops the following hierarchical correlations of dominance may be established among the phonemic units of various series (cf. Melikishvili, 1970):

In systems with an opposition among stops differing on the feature "voice", the voiced labial /b/ is functionally stronger (dominant) as compared to the velar stop /g/. Stated otherwise, the feature "labiality" in a simultaneous combination with the feature "voice" yields a dominant bundle of features, making up the labial phoneme /b/, as different from the combination of the

features "voice" and "velarity" that yield a functionally weaker, less common and in this sense "recessive" voiced velar stop /g/. Inversely, in the class of voiceless stops it is precisely the velar /k/ that appears as a more natural, functionally stronger and dominant member of the paradigmatic opposition as compared to the labial /p/ serving as a functionally weaker, recessive unit. Thus "velarity" combined with "voicelessness" and "labiality" combined with "voice" form more natural and common bundles of features representing the dominant phonemes /k/ and /b/, whereas the combinations of "voicelessness" with "labiality" and of "voice" with "velarity" create functionally weak, recessive units /p/ and /g/, this being due to the acoustic-articulatory characteristics of the features involved.

Gaps in the paradigmatic system are distributed according to the established functional correlation of dominance of the phonemic units. Systems with gaps in the class of stops opposed according to "voice/voicelessness" assume in general the form as in (1-3):

(1) b - d t g k	(2) b p d t - k	(3) b - d t - k
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The degree of recessiveness in the class of voiceless stops increases in accordance with the superposition on the bundle of the additional feature "aspiration" or "glottalization"; incidentally, "glottalization" appears as a feature of a higher degree of "recessiveness" than does "aspiration", so that the hierarchical sequence of increasing dependence in the class of unvoiced stops has the form: voiceless (plain) - aspirated - glottalized. Thus, the glottalized labial /p^h/ appears in relation to the aspirated /p^h/ as a recessive member of the opposition, whereas the aspirated /p^h/ is recessive in relation to the voiceless plain phoneme /p/ (cf. Greenberg, 1970).

Gaps in the paradigmatic systems are represented in accordance with these correlations. The possible systems with gaps in the respective series of voiceless stops are given in (4) and (5):

(4) b p ^h - d t ^h t' g k ^h k'	(5) b - - d t ^h t' g k ^h k'
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There appears to be a further dependence in the paradigmatic system between the subclass of stops and that of the corresponding fricative phonemes which manifest analogous correlations of dominance.

In the labial series the voiced fricative phoneme w/v/β emerges as the dominant member of the correlation, with the recessive voiceless unit /f/, whereas in the velar series the voiceless fricative /x/ functions as the dominant unit as opposed to the recessive voiced fricative /ɣ/, i.e., f → w/v/β, γ → x, and γ → w/v/β, f → x (where the arrow is directed from the recessive member of the opposition to the dominant one). Systems with gaps in the class of non-strident labial and velar fricatives with an opposition of "voice/voicelessness" assume in general the form as in (6-8):

(6) w/v f - x	(7) w/v - γ x	(8) w/v - - x
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The subsystem of fricatives appears in the paradigmatic system as a kind of substitute for the corresponding stops. In particular, the absence in the subsystem of stops of its functionally weak, recessive members (i.e., of the velar phoneme in the voiced series and/or the labial phoneme in the voiceless series) presupposes the presence in the paradigmatic system of the corresponding fricative phonemes (i.e., of the velar fricative in the voiced series, and/or the labial fricative in the voiceless series): $\bar{g} \rightarrow \gamma$, $\bar{p} \rightarrow f$. Thus, the fricative phonemes /f/ and /ɣ/ and the dominant members implied by them, viz. w/v and /x/, respectively, emerge as substitutes for the corresponding stops /p/ and /g/, compensating, as it were, for their absence and thus establishing an equilibrium in the paradigmatic system. It may be asserted that the tendency to such an equilibrium in the system is due to the natural phonetic tendency to a symmetric filling of the three main articulatory zones - labial, dental, and velar - with sounds of consonantal articulation: stops or fricatives. If the system has the recessive stops /p/ and /g/, the presence of their substitutes in the form of the corresponding fricatives /f/ and /ɣ/ is optional. Such phonemes appear in the paradigmatic system as redundant consonantal elements, subject to diachronic changes.

Language systems evince a definite hierarchical order among diverse types of structural, in particular phonological, oppositions indicating the existence of a strict stratification of phonological values. It is in conformity with such universally valid correlations that diachronic phonemic transformations occur in a language. This gives a clue helping us to better understand language change in diachrony and to propose linguistically more realistic and plausible schemes of language reconstruction.

The classical Indo-European comparative grammar deals with a system of Proto-Indo-European stops that appears to be linguistically improbable and unrealistic since it runs counter to the typologically established phonological universals concerning the nature of the system of stops, with different phonemic series and a definite distribution of gaps. This necessitates a total revision of the traditionally postulated three-series-system of Proto-Indo-European stops - I: voiced II: voiced aspirates III: voiceless (with an absent or weakly represented voiced labial /b/) and its reinterpretation as I: glottalized II: voiced aspirates III: voiceless aspirates (with an absent, resp. weakly represented, glottalized labial /p'/), cf. Gamkrelidze-Ivanov (1973); Hopper (1973):

<u>Traditional System</u>				<u>Revised System</u>		
I	II	III		I	II	III
(b)	b ^h	p		(p')	b ^[h]	p ^[h]
d	d ^h	t	⇒	t'	d ^[h]	t ^[h]
g	g ^h	k		k'	g ^[h]	k ^[h]
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Such a reinterpretation of the traditional system of Proto-Indo-European stops brings it in full conformity with typological evidence, both synchronic and diachronic, and allows to envisage a more realistic and linguistically plausible picture of Proto-Indo-European.

The evidence of the modern linguistic typology and the theory of language universals in effect necessitates a revision of the traditional schemes of the classical comparative linguistics by ad-

vancing new comparative-historical reconstruction.

This is one of the more practical aspects (finding its application in diachronic linguistics) of the modern linguistic typology and the theory of language universals.

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