

THE INTERCONNECTION OF SOUND PRODUCTION, PERCEPTION, AND PHONEMIC TYPOLOGY

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It has never been possible to practise respectable phonemics without taking adequate account of the underlying phonetics. Linguists who hope to avoid the laborious detail of phonetics entirely are deluding themselves. On the other hand, since the growth of phonemic theory there has, however, tended to continue to some degree phonetic study divorced from an adequate regard for the phonemic aspects. The two simply cannot be studied in isolation; that is, they cannot be studied without cross-control. Each of the three aspects which I have mentioned in the title of my paper limits the others, and this applies in both directions. This truth is most easily illustrated in situations of bilingualism and so-called Sprachbund phenomena, and I have chosen my illustrations from materials that I have collected at first hand from the field of Balkan languages, a field which happily illustrates a good many of these things in quantity.

First of all, sound production limits the resources available for typology, i.e. available to set up a given type of phonemic system. We will ignore the extreme limitation, which is founded on abnormalities whereby a given speaking organism is incapable of producing certain sounds, in this fashion subtracting from the total available roster. On the other hand, the characteristic ranges of vocoid production which are very widespread in the Balkans (excepting in northernmost Albanian dialects and certain varieties of Serbian) [i]:[ɛ]:[a]~[ʌ] and [u]:[ɔ]:[a]~[ʌ], with the relatively steady state in which they occur in the natural languages there, place an upward limit generally on the available discrimina for phonemic differentiation. In other words, we are not surprised when in the Balkans we do not find "Danish" vowel systems. This situation has often been assumed as a truism, but, I think, a little too often; things are really not quite as simple as this allusion may seem to imply.

Secondly, sound production limits perception. One example of a very common phenomenon: Greek phonetic [i] occludes for Greek speakers the opposition found in English /i/ [i]~[i̇]:/ɪ/ [ɪ] (regardless of how we agree to phonemicize these). Therefore, a Greek normally, because, of his background, simply does not perceive the difference between English *ship* and *sheep*. It has to be pointed out to him. This situation tends to be less explicitly and accurately assumed than it might be; and it has often been overlooked.

Thirdly, sound perception limits production. For example, Greek speakers

regularly render the Greek Albanian phoneme /ɛ̃/ [ɪ] as [i]; so, in the phrase, /čɛ̃ bɛ̃n/ "how do you do, τὴ κανεῖς", Greeks regularly reproduce [tsi bin]. This is a very familiar experience in second-language learning. It rests largely on two major features: either on the absence of native phonetic ranges, as in the Greek versus Greek Albanian example just cited; or on mis-segmentation, such as in Tolstol's story about the little boy whose name was Хвилипок "Philip", or in Finnish *kahvi* "coffee".

Fourthly, perception limits typology. Again we leave aside the case of physical abnormalities, where the perceiving mechanism is inadequate to accommodate certain typological characteristics. This limitation is a cardinal factor in the result that we see from bilingualism and from the diffusion of systems; unfortunately, our corpus of really good documented studies is still too limited for us to draw the varied and rich conclusion that we will undoubtedly be able to draw eventually. This interaction may limit the allophones systematically, resulting, e.g., in the collapse of a symmetrical set of phonemes or leading to an imbalance that gives an asymmetry. To illustrate, again from the Balkans, the collapse of a symmetrical set: Greeks merge English *ts* and *ch* as /c/ [ts], for Greek has no opposition between the sibilant and hushing spirants and affricates. On the other hand, this interaction may limit relevant allophonic positions, thus expanding or restricting the total phonemic cadre. Again from the Greek area, certain Greek Albanian dialects have become acculturated to the Greek pattern whereby native Albanian nasal plus voiced stop, which occurs freely as a cluster in most forms of Albanian in any position, occurs selectively only in non-initial position. In initial position in these varieties there is no phonetic nasal preceding. In this fashion the total relation of nasal clusters to voiced stops is reordered.

Fifthly, typology, i.e. the shape of the total system, limits sound production. This is the case that has often been called *pattern-pressure*. A convenient illustration from the Balkans: Many Tosk Albanian partial consonant systems are of the form

p	t	c	č	k	k	h j	(1)
b	d	ɟ	ž	g	g		
f	θ	s	š				
v	ð	z	ž				

In these systems /h/ is usually realized as a voiceless vocoid phonetically (and in some dialects it then disappears) and /j/ is [j]. In the Albanian of Greece, where /ɣ/ has been borrowed with Greek loans and where inherited /hj/ falls in with /ç/ [ç] borrowed with Greek loans, the cadre is thereby enriched to the following form

p	t	c	č	k	k	(2)
b	d	ɟ	ž	g	g	
f	θ	s	š	ç		
v	ð	z	ž	ɣ		

/ɣ/ and /ç/ move into these positions by their phonetics and by the typology of the system, too.

Then /j/ moves in to oppose /ç/, and takes on an articulation of a more fricative sort than it has in Albanian, and /h/ moves opposite /ɣ/, taking on a velar spirant articulation. Now we have

p	t	c	č	k	k	(3)
b	d	ɟ	ž	g	g	
f	θ	s	š	ç	x	
v	ð	z	ž	j	ɣ	

In other words, we say that /x/ turns out phonetically as it does because typologically it comes to oppose the new /ɣ/.

Sixthly, typology limits perception. One can judge from various aspects of the reactions of Greek speakers that they hear voiced stops and affricates in typical European languages as being nasal, because, for all Greek except acculturated varieties often heard in Athens, a voiced phone occurs either (1) automatically preceded by a nasal segment, or (2) in free variation with nasal plus voiced stop segments, or (3) selectively in complementation with nasal plus voiced segments. (I therefore analyze all forms of modern mainland Greek, with the exception of certain northern dialects where syncopies have occurred to occlude this, with nasal clusters composed of nasal plus stop. Thus Greek has only one series of stops, indifferent to voicing.)

Again, many Albanians and Serbs do not notice that their /č/ is an affricate, i.e. regard it as a stop, because it belongs to their phonemic consonantal rectangle which is to be defined par excellence as the stop rectangle.

p	t	c	č	ć	k	(4)
b	d	ɟ	ž	đ	g	
f	s	š		x		
v	z	ž				

On the other hand, Tosk Albanians hear a phonetic [ç] as a stop, i.e. palatal /k/ (q in the standard Albanian orthography), because it is actually the allophone of that phoneme in certain positions. But Greek Albanians identify the same sound as a spirant, doubtless because it is phonemically defined by their spirant rectangle (see (3) above).

Yet again, we find that different absolute phonetic sounds, such as [t'š] and [k] in Serbian and in Makedonski or in Geg Albanian, and such as [t'š] or [t'] versus [ts] in different Greek dialects are valued in each of these cases respectively as the same sound. This is not because they are phonetically the same but because of their placement in the system.

Analogously, the same sound [u] is a vowel for a Greek, a variant of the vowel /u/, while in a neighbouring village, in certain varieties of Greek Albanian, it is a consonant /w/, a member of the resonant class which includes /l/.

The fifth and sixth types of limitations above form a cardinal lesson of structural linguistics which feeds back into phonetic study on all levels.

Many features of total phonetic-phonemic arrays found in languages in contact

situations reflect a complex of these interplays which have been singled out for isolated discussion above. For example, the Albanian of the Yugoslav NR Makedonija shows a consonantism almost identical in system and in articulation with that of Makedonski. The fusion of more general Albanian (Geg) *č* and *ć* as [tʃ] /č/ probably reflects the third type (above), and certainly (as a later product) the fourth type; while the phonemic realignment of older *tj* as [k]~[kʰ] /k/ probably reflects the second type (on the part of bilinguals), the third (and, as a concomitant, the fourth), and the fifth – each operating in that order. In this transformation series, the system found in Makedonija is typologically returned to the general Albanian shape; we have witnessed a series of moves in a Chinese box.

The problem of the Sprachbund is in large part a complex of just these considerations. Thus, as an end-product, we find the same system extending over different languages, and the same substance treated as systemically different within one single language.

Phonetics cannot operate meaningfully without phonemics. The interplay of the two explains both historical and social-geographic correlations in languages.

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