Contemporary Views on Architecture and Representations in Phonology
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Two Comments on “The Role of Features in Phonological Inventories”

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[–] Abstract and Keywords

This chapter presents two commentaries on the role of features in phonological inventories. It stresses the primacy of distinctive features in phonological theory and the importance of the details of distinctive feature theory. It also agrees with the notion that speech sounds are composite entities made up of features of the kind presented in *The Sound Pattern of English*. Moreover, the chapter discusses voiceless obstruents and high-pitch vowels (sonorants) produced with stiff vocal cords, in contrast to voiced obstruents and low-pitch vowels that are produced with slack vocal cords.

Keywords: features, phonological inventories, phonological theory, speech sounds, vowels, vocal cords, voiceless obstruents, voiced obstruents

I am in complete agreement with Clements’s thesis in chapter 2 of this volume that speech sounds are composite entities made up of features of the kind presented in *The Sound Pattern of English* (*SPE*; Chomsky and Halle 1968). The idea that speech sounds are composite entities (and not the atoms of language) was first advanced by Alexander Melville Bell in his 1867 book *Visible Speech*. This book presented Bell’s phonetic alphabet, where each letter directly expressed the features that composed the sound represented (see figure 3.1). Thus, every consonant was represented by a crescent with the opening pointing in one of four directions: left, up, down, right. An opening to the left represented labial consonants; an opening upward, [+anterior] coronal consonants; an opening downward, [−anterior] coronal consonants; and an opening to the right, dorsal consonants. Other consonantal features were represented by diacritics: a bar across the opening represented stops, a dash opposite the opening [+voiced], and so on.

In commenting on his father’s alphabet, Alexander Graham Bell, the inventor of the telephone, wrote in 1911:

> The true element of articulation, I think, is a constriction or position of the vocal organs rather than a sound. Combinations of positions yield new sounds, just as combinations of chemical elements yield new substances. Water is a substance of very different character from either of the two gases of which it is formed; and the vowel *oo* is a sound of very different character from that of any of its elementary positions. (p. 38)

Prior to publication of *Visible Speech*, Alexander Melville Bell offered the alphabet to the British government for recording personal names and other non-English words in the colonies, among other things. His sole condition was that the government pay for casting the special typefaces needed to print texts in Visible Speech. Unfortunately, Bell’s offer was rejected by the then prime minister, Lord Derby, on the grounds that there were no public funds for this purpose. Lord Derby was an accomplished classicist with a well-received translation of the *Iliad* to his credit, which perhaps made Bell hopeful of a more positive reaction.

(p.70)

As is well known, the prohibitive cost of casting the type was the reason why Bell’s alphabet was replaced with that of the International Phonetic Association (IPA), where sounds are represented by letters of the Roman alphabet and diacritics available in most print shops. In fact, the IPA Principles expressly counsel writers against use of diacritics, wherever possible. The replacement of Bell’s alphabet by that of the IPA had the unfortunate effect of obscuring and ultimately consigning to oblivion Bell’s important discovery that the atoms of language are not sounds, but features.

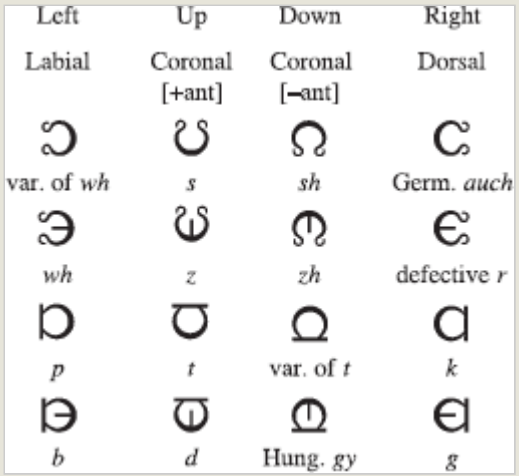

Figure 3.1 Examples of Alexander Melville Bell’s Visible Speech symbols. (After Bell 1911:56, 62. Visible Speech symbols courtesy of Simon Ager, omniglot.com. Originally published in Morris Halle, “Palatalization/Velar Softening: What It Is and What It Tells Us about the Nature of Language,” *Linguistic Inquiry* 36:27.)

It is significant in this regard that Ladefoged and Maddieson’s (1996) summa of twentieth-century phonetic knowledge is titled *The Sounds of the World’s Languages*, taking sounds rather than features as the primitives of language. This important theoretical stance is taken without explicit argument, although the view of the speech sound as a complex of features was reintroduced into linguistics in 1928 by Roman Jakobson, Nikolai S. Trubetzkoy, and Serge Karcevsky and was fundamental to some of the most important phonological studies of the twentieth century, including Trubetzkoy’s (1939) *Grundzüge der Phonologie* and Chomsky and Halle’s (1968) *The Sound Pattern of English (SPE)*.

In view of Clements’s important contributions to feature theory, beginning with his 1985 paper on feature geometry, I was disappointed that in his remarks here **(p.71)** about various phonetic

problems, Clements adopts very traditional views and has little to say about alternatives to them. I focus here on two such “blemishes.”

First, like Ladefoged and Maddieson, Clements refers to the phonetic feature [±palatalized]. This feature, which figured in Jakobson, Fant, and Halle 1952 under the label [sharp], was eliminated in *SPE* for reasons that are worth recalling. In the IPA system, vowels and consonants are characterized with different sets of features, as they were also in Bell’s Visible Speech. One of Jakobson’s important innovations was to eliminate that bifurcation as artificial, because, as Jakobson often remarked, humans have only one vocal tract and its actions produce both vowels and consonants; both types of sounds should therefore share features.

This insight lay behind Jakobson’s introduction of the acoustic features compact-diffuse and grave-acute. (See Jakobson 1938 and Jakobson, Fant, and Halle 1952.) From an articulatory point of view, these two features were not especially intuitive, because they equated distinctions in tongue body positions in the vowels with distinctions of the main active articulator (the designated articulator) in the consonants.

These Jakobsonian features had another undesirable consequence: they required that the feature system include the feature [±palatalized] (or [±sharp]) in order to characterize the so-called soft consonants of Russian and other Slavic languages. In particular, the process palatalizing consonants before front vowels, which is central to Slavic phonology, had to be formulated as in (1).

(1) [−pal] → [+pal] in env _____ [−grave]

(1) fails utterly to capture the fact that from an articulatory point of view palatalization is a natural process, whereby the front tongue position of the vowel spreads to the preceding consonant. The process can be expressed as one of feature spreading once the two acoustic features [±grave] and [±palatalized] are replaced by the single articulatory feature [±back], as was done in *SPE*.

My second comment about Clements’s chapter is this. In various places, Clements refers to the feature [±voiced], overlooking, as it were, the conclusion reached in Halle and Stevens 1971 that the universal feature set does not include such a feature. In that paper, Stevens and I argued that the voicelessness of obstruents and the high pitches of vowels both manifest the single articulatory gesture (feature) vocal cord stiffness. We noted that voicing and pitch are in complementary distribution: voicing contrasts are found in obstruents, whereas pitch contrasts are never found in obstruents, but only in sonorants. Both voicing and pitch are, of course, produced by actions of the vocal cords, but the two classes of sound differ fundamentally with respect to the pressure drop across the cords: the pressure drop is relatively large in sonorants, but significantly smaller in obstruents, and this difference has important consequences for the behavior of the cords. When slack, the cords vibrate in both **(p.72)** obstruents and sonorants. On the other hand, when the cords are stiffened, vocal cord vibration depends on the pressure drop across them. In sonorants, with their large pressure drop, the cords vibrate as before; in fact, the increase in stiffness causes the rate of vibration to increase. By contrast, in obstruents, where the pressure drop across the cords is small, increased stiffness prevents the cords from being set into motion, and as a result the sound is voiceless.

In sum, voiceless obstruents and high-pitch vowels (sonorants) are produced with stiff vocal cords, whereas voiced obstruents and low-pitch vowels are produced with slack vocal cords. This fact accounts also for the well-documented phenomenon that in an obstruent-vowel sequence, the pitch of the initial portion of the vowel is higher when the obstruent is voiceless and lower when the obstruent is voiced (House and Fairbanks 1953). These are simple examples of inertia in the speech production process, rather than parts of the speech-planning process, as suggested by Kingston and Diehl (1994).

Replacing the two acoustic features [±low pitch] and [±voiced] with the single articulatory feature [±slack vocal cords] has further desirable consequences. Simple feature spreading can now account for the tonogenesis facts in the East Asian languages where the tones of vowels are raised after voiceless obstruents and lowered after voiced obstruents (see, e.g., Bao 1990). There are also cases where the slackness feature spreads from a vowel to the adjacent obstruent, the most famous being the Indo-European case described by Verner’s Law. Verner (1876) explained the unexpected appearance of voiced obstruents in Germanic by noting that it occurred always and exclusively after unstressed syllables. In light of the preceding discussion, we can characterize the fact that unstressed syllables have lower pitch than their stressed cognates by assigning to unstressed syllables the feature [+slack vocal cords]. Verner’s Law is then the result of a rule that spreads this feature to the following vowel. Verner’s Law differs from East Asian tonogenesis in that in Verner’s Law the feature spreads from vowel to obstruent, whereas in tonogenesis the feature spreads in the opposite direction, from obstruent to vowel.

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