

The formants in the murmur part are relatively stable: in the spectrogram they appear as straight horizontal lines, and the transitions to and from the adjacent phoneme are usually quite abrupt.

The additional poles and zeros, due to nasalization, are a local distortion in the spectrum without any influence on the other resonance features. These fundamental features are determined solely by the original set of non-nasal poles which affect the entire spectrum.\*

2.442 Production. The oral (or more exactly, the non-nasalized) phonemes are formed by the air stream which escapes from the larynx through the mouth cavity only. The nasal (or more exactly, nasalized) phonemes are, on the contrary, produced with a lowering of the soft palate, so that the air stream is bifurcated and the mouth resonator is supplemented by the nasal cavity.

2.443 Occurrence. The opposition oral vs. nasal is nearly universal in consonant patterns, with isolated exceptions such as Wichita (24). But a great number of languages have no distinction of nasal vs. oral vowels. The number of nasal phonemes in the vowel and consonant pattern is never higher, and usually lower, than the number of oral phonemes. Nasality can be combined with other resonance features, and with rare exceptions at least two nasal consonants are distinguished - the diffuse acute /n/ and the diffuse grave /m/. Frequently there is, in addition, one compact nasal; rarely, two: one acute /ɲ/ and the other grave /ŋ/. In respect to the voicing feature the nasal consonants behave like liquids; normally they are voiced and seldom partake of the opposition voiced vs. voiceless: cf. Kuanyama (SW Africa): /na/ "with" - /ɲa/ "quite" (27). Other consonantal source features are also very rare in nasals.

## 2.5 CONCLUSION

The inherent distinctive features which we detect in the languages of the world and which underlie their entire lexical and morphological stock amount to twelve binary oppositions: 1) vocalic/non-vocalic, 2) consonantal/non-consonantal, 3) interrupted/continuant, 4) checked/unchecked, 5) strident/mellow, 6) voiced/unvoiced, 7) compact/diffuse, 8) grave/acute, 9) flat/plain, 10) sharp/plain, 11) tense/lax, 12) nasal/oral.

No language contains all of these features. Their joint occurrence or incompatibility both within the same language and within the same phoneme is to a

\* John Lotz has made the following suggestion: "There are vowels which are not nasal and there are vowels which are nasal and consequently show a consonantal disruption of the vocalic pattern. But the nasal quality is clearly superposed, since it can only function in addition to another quality. In general terms, if a feature is implied - and in the hierarchy secondary - we subtract it from the total wave and thus obtain the basic phenomenon."

considerable extent determined by laws of implication which are universally valid or at least have a high statistical probability: X implies the presence of Y and/or the absence of Z. These laws exhibit the stratification of the phonemic patterns and reduce their apparent variety to a limited set of structural types.

Despite their multiform interdependence within the phoneme and within the entire phonemic pattern, the different distinctive features remain autonomous. Not only may any feature perform its distinctive function (/gip/ ≠ /gib/ ≠ /gid/), but the identification of a single feature regardless of the different phonemes in which it occurs is seen to play a significant part in language.

The autonomy of various distinctive features clearly comes to light in the grammatical process known in certain languages under the name of vowel harmony. In such languages a word-unit is limited in the choice of its vocalic features. Thus in some languages of the Far East the vowels of a word unit must be either all compact or all diffuse, e.g. in Gold (on the Amur) it may contain either only /o a e/ or only /u ə i/: /gepalego/ "liberate" - /gisurəgu/ "re-tell".

In Finnish those acute vowels which ceteris paribus are paired with grave vowels cannot belong to the same simple word-unit as the grave vowels. The Finnish vowel pattern includes:

Flat		Plain	
Grave	Acute	Grave	Acute
		a	æ
o	ø		e
u	y		i

Hence a word unit may contain either / a o u/ or / æ ø y/, while the plain acute vowels / e i/, which have no plain grave correspondents, are combinable with any Finnish vowel.

In most of the Turkic languages, grave and acute vowels are incompatible within a word unit; and to a greater or lesser extent the same device is applied to the flat and plain vowels. E.g., in Turkish:

Root-vowels	Suffix "our"
flat grave	/-muz/
plain "	/-miz/
flat acute	/-myz/
plain "	/-miz/

Ibo (S. Nigeria) has eight vowel phonemes displaying three oppositions: compact vs. diffuse, grave vs. acute, and tense vs. lax. A root contains either only tense /o ɛ ɪ i/ or only lax vowels /o e u i/.

A "consonant harmony" has been developed by the language of the NW Karaites (in Lithuania): the consonants of a word unit are either all sharp or all plain; e.g. /kūn̄l̄ar̄d̄aŋ/ "from days" - /kunlardan/ "from servants".

An extraction of the consonantal compactness and gravity features achieved by an extinction of all other consonantal features is documented by the conventional consonant mutilations in the diction of the Pima songs (SW America) recorded and analyzed by George Herzog.

Voicing is the only consonantal feature relevant for the Slavic assonances (22). For example, Polish oral and written poetry, when using assonances, takes as equivalent all voiced (doba - droga - woda - koza - sowa) and similarly all unvoiced consonants (kopa - sroka - rota - rosa - sofa), while the pairing of voiced and unvoiced consonants is inadmissible. The fact that the words /rota/ "company" and /rosa/ "dew" are semantically distinguished by one feature (interrupted vs. continuant) and at the same time equated in assonance by another feature of the same phoneme (voicelessness) is striking testimony for the operational autonomy of the distinctive features.

## APPENDIX

### Analytic Transcription

The phonemes may be broken down into the inherent distinctive features which are the ultimate discrete signals. Were this operation reduced to yes-or-no situations, the phoneme pattern of English (Received Pronunciation) could be presented as follows:

	o	a	e	u	ə	i	l	ŋ	ɹ	ʃ	k	ʒ	ʒ	g	m	f	p	v	b	n	s	θ	t	z	ð	d	h	#
1. Vocalic/Non-vocalic	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2. Consonantal/Non-consonantal	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-
3. Compact/Diffuse	+	+	+	-	-	-	-	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4. Grave/Acute	+	+	-	+	+	-	-	-	-	-	-	-	-	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-
5. Flat/Plain	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6. Nasal/Oral	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-
7. Tense/Lax	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	+	+	-	-	-	-	+	+	+	-	-	-	+
8. Continuant/Interrupted	-	-	-	-	-	-	-	+	-	-	+	-	-	-	+	-	+	-	-	-	-	+	+	-	+	+	-	-
9. Strident/Mellow	-	-	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-	+	-	+	-	-	-	-

Key to phonemic transcription: /o/ - pot, /a/ - pat; /e/ - pet, /u/ - put, /ə/ - putt, /i/ - pit, /l/ - lull, /ŋ/ - lung, /ʃ/ - ship, /ʃ/ - chip, /k/ - kip, /z/ - azure, /ʒ/ - juice, /g/ - goose, /m/ - mill, /f/ - fill, /p/ - pill, /v/ - vim, /b/ - bill, /n/ - nil, /s/ - sill, /θ/ - thill, /t/ - till, /z/ - zip, /ð/ - this, /d/ - dill, /h/ - hill, /#/ - ill. The prosodic opposition stressed vs. unstressed, splits each of the vowel phonemes into two.

The superposition of the distinctive features in the given language - in this instance English - determines their order in our analytic transcription.

I) The identification of the fundamental source features (1,2) divides the components of the message into vowels, consonants, glides and a liquid, whereby the latter does not demand further analysis.

II) The superposition of resonance features in vowels and consonants presents the following order: A) the compactness feature (3) encompasses all vowels and consonants; B) the gravity feature (4) concerns all vowels and compact consonants whereby the analysis of the acute vowels is exhausted; C) the flattening feature (5) is confined to grave vowels and terminates their analysis, while D) the nasality feature (6) affects uniquely the consonants and concludes the identification of the nasals; finally the tenseness feature (7) concerns all phonemes without a vocalic and nasal feature, i.e. the oral consonants and the glides.