

PERCEPTUAL DIMENSIONS OF SPEECH SOUNDS.

Eli Fischer-Jørgensen

A closer investigation of the perceptual dimensions of speech sounds must be expected to throw some light on the general laws governing the structure of phonemic systems, the general tendencies of sound development, and the facts of sound symbolism. The closer we come to central processes the better will we understand the essential characteristics of speech.

Starting from Roman Jakobson's hypothesis ^{*)} that vowels are perceived in two dimensions (corresponding to the normal $F_2 - F_1$ diagram) and that these dimensions are closely related to the colour dimensions bright-dark and saturated-non-saturated, the author carried out a number of tests in the years 1949-51, 1952-54, and 1964-65 (with generally from 40 to 200 students without previous phonetic training participating in each test) asking the subjects to group the Danish long vowels i: y: u: e: ø: o: ɛ: œ: ɔ: æ: a: in three groups (bright-neutral-dark or saturated-neutral-non-saturated) and (in later tests) according to a seven-point scale. A number of other adjective-pairs were also tried out using the seven-point scale, (1 a) bright-dark, pointed-blunt, hard-soft, light-heavy, thin-thick, (1 b) narrow-broad, small-big, tense-lax, close-open, (2) tight-loose, compact-diffuse, and (3) flat-round, but in most cases only with the vowels i y u ɛ œ ɔ. Moreover, subjects were asked to match each of the vowels with one of a series of nine achromatic colours, and with one shade from a set of colour charts comprising 11 different hues each represented by an Ostwald colour triangle containing ten different shades of brightness and saturation.

The testing conditions were mostly so arranged that an auditory reaction was favoured, but several of the experiments with seven-point scales were made both with conditions favouring an auditory reaction and with conditions favouring a motoric reaction. The results of these two series showed only slight differences.

 *) Roman Jakobson, "Kindersprache, Aphasie und allgemeine Lautgesetze", Språkvetenskapliga Sällskapet i Uppsala Förhandlingar 1940-42 (1941).

The main result was that there seems to be a dominating perceptual dimension which, when compared to the traditional vowel triangle, can be said to run obliquely downward from the upper left corner (i) to the lower right corner (ɒ), corresponding approximately to F2 - F1. This dimension is covered by the adjectives mentioned under (1), but in such a way that the first 4 pairs (1 a) show a somewhat stronger dominance of F2. A second dimension covered by compact-diffuse and tight-loose is found to be more closely correlated with F1 (but in the sense that i y u were considered as tighter and more compact than the group ɛ æ ɔ with i as the most compact vowel). For saturated - non saturated no clear answer could be obtained. Answers to flat-round were only elicited for the six-vowel group giving the order i-ɛ-y-æ-ɔ-u.

An interesting detail of the results is that the two variants included in the vowel list (namely [ɑ:] and [ɒ:] which are variants of [æ:] and [ɔ:] respectively before /r/-a also after /r/), have their separate placings, ɑ being often rather far removed from æ. This seems to indicate that subjects confronted with isolated vowels may be inclined to react to them as sounds, not as phonemes. The results should thus probably be in better agreement with the general symbolic values of sounds than with the distinctive features of the given language.

A somewhat longer summary of the results will appear in the Proceedings of the Seminar on Speech Production and Perception held in Leningrad in August 1966, and in the Festschrift for Roman Jakobson. A detailed account with documentation will be given in a book to be published by the Philological Society in London.

Further tests involving pure similarity judgments according to the methods used by Göte Hanson^{*)} are in preparation.

A much more restricted number of tests have been applied to consonants. A major preliminary result is that a grouping of the consonants according to manner of production seems much more obvious to the subjects than a grouping according to place of articulation. It is also found that the subjective similarity between consonants (e.g. between p, t, and k) varies according to the following vowel.

*) cp. e.g. The Scand. Journal of Psych. 4 (1964) and 6 (1965).