SPECIFYING SPEECH

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The present paper is concerned with problems arising from the specification of the speech act. It is intended that the production model of which this is a preliminary consideration should reflect the human process of generating meaningful speech from processed linguistic units. The concern therefore is not with suggesting any static correlation between *a sound* and linguistic units but with a dynamic specification for generating the one from the other.

It has been pointed out (Ladefoged 1967) that Jakobson, Fant and Halle in their Distinctive Feature Theory (JHF 1951) did not introduce any combinatory restrictions on their features. This enables both impossible and possible combinations to be generated, including among those possible many that have not been found among the world's languages. No doubt this state of affairs arises from the original descriptive purpose of the theory where the combinatory restrictions are implicit in the sounds being described.

The present production model proceeds in terms of a featural matrix based on those articulatory or neuro-physiological parameters found not to be "significant" or "distinctive" in the languages of the world, but *necessary for modelling the available data about production.* Thus in this case interacting rules for featural combination must be made available on two axes: vertical and horizontal.

The rules for generating vertical combinations of the features may be considered on three major levels: (a) those rules excluding physiologically impossible combinations, (b) rules restricting the possible combinations to those actually found in the world's languages and (c) language specific rules which determine which of the combinations arrived at under (b) can be used in any one language or dialect.

As Ladefoged has underlined (1967) it is necessary at the level of physical phonetics to be able to compare not only sounds as they occur and contrast within one language but also across languages. The best way I can see of doing this is to provide a means of generating an inventory of sounds from a restricted set of features and then limit this by providing a set of language specific rules drawing upon this inventory.

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It has been proposed by several researchers (Holmes et al. 1964; Öhman, 1966, 1967) that one way of approaching the mapping of linguistic units into the continuous event of running speech is to regard the speech act as a series of linked, missed targets. This usually assumes some phonemic programming of the articulators, modified by rules reflecting the physical restrictions imposed upon their linear combination: the so-called coarticulation rules. This approach has the advantage of overcoming the previously outstanding problem of segmentation.

Dr Fromkin's work (1966) in electromyography of the lip muscles tends to indicate that certainly for this parameter it is not simply a question of missed targets and coarticulation phenomena. The action potential resulting from *same* linguistic phonemes is not identical in different contexts (particularly where the same phoneme occurs in initial and final position). Assuming that the EMG signal is directly related to the neural impulses controlling the muscle this would imply that the differences in this case may result from certain positional restrictions imposed at a higher level; this ties in very conveniently with the present proposal. Unfortunately, extensive EMG work at Leeds University Phonetics Laboratory (Tatham and Morton forthcoming), repeating Dr Fromkin's experiments and extending her field, has not produced similar results, at least not for the duration and amplitude of the EMG signal from the lip muscle. Those differences which did show were not decisive enough to support Dr Fromkin's hypothesis completely.

However, it is obviously true that there *are* positional variants of phonemes, although some of these (eg. initial and final (t) in English) are not variants of necessity. Whether these are a direct result of the kind of programming of the articulators that Dr Fromkin suggests or whether they are the result of a cadence-bound rearrangement of priorities among articulatory parameters remains to be seen. It might well be that some simple phonemic programming is overridden at a high level under certain conditions by prosodic features and that syllable or larger units must be accounted for.

The division of the model along two axes: (a) mapping of linguistic phonemic units into extrinsic allophones and then into intrinsic allophones (Ladefoged 1967) and (b) permitting this axis to draw at the central point upon a range of extrinsic allophones derived from restriction on featural combinations produces a more meaningful and powerful model when higher level combinatory restrictions are allowed for on the featural level. Neuro-physiological features should be mapped individually, but in an explicitly related fashion, thus permitting a less clumsy representation of the available data.

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