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THE ROLE OF SPEECH IN LANGUAGE

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The book under review contains the proceedings of a small conference (22 participants) with the same title, held in October 1973 at the Urban Life Center, Columbia, Maryland. The conference was one in a series called "Communicating by Language", sponsored by the National Institute of Child Health and Human Development (NICHD). There are 19 papers, divided into 3 major sections, viz.

I The development of speech in man and child

II Language without speech (dealing with sign language)

III Phonology and language

Some papers are followed by comments of one of the participants each paper or coherent group of papers is followed by a summary of the open discussion. A separate IVth section of the book contains reflections on the conference by Ira J. Hirsh. Refe-

rences are presented at the end of each paper. The editors have provided a name index and a subject index at the end of the book.

Many linguists and psycholinguists take it for granted that language can be studied without studying speech. Likewise many speech researchers seem to work from the view that the production and perception of speech can be studied without studying language. This situation leads Alvin Liberman to state in his "Introduction to the conference" that "our topic --the role of speech in language--is not an established one; no one has made it the direct and primary object of his research." Although this statement is perhaps too categorical, it certainly is valid for most of the field. (An obvious exception, to my mind, is among others Professor Lindblom of the University of Stockholm, who systematically explorés the explanatory value of quantitative models of speech production and perception in phonology, e.g. Lindblom 1972, 1975). The organizers of the conference, Kavanagh and Liberman, have taken care to select well-known researchers with different backgrounds and different interests to discuss the various problems which may be derived from the central question: "do we increase our understanding of language when we take into account that it is spoken?"

The resulting texts make interesting reading, although one will look in vain for a convincing answer to the initial question. Different investigators have different opinions and the present state of knowledge does not seem to make it

possible to settle the matter. In most papers specialist knowledge is freely intermixed with speculation, and it is not always easy to tell the one from the other. The discussions generally serve more to continue speculation than to criticize in detail each other's thinking. These remarks are not meant as a criticism of the conference and its proceedings. They intend to give an indication, however, of the style of this book, and a warning that one will not find here a thorough discussion of empirical data or explicit, testable theories, that could be of use in more practically oriented work. Instead one finds a number of inspiring expositions of such diverse topics as similarities and dissimilarities between human and animal communication systems, the evolutionary connections between language, speech, and tool-making, the primacy of production or perception in the phylogenesis and the ontogenesis of speech, the primacy of signs or speech in the evolution of language, the articulate structure of signs in those who have sign language as their first language, the origins of phonological change, and the parallels in phonological and other linguistic organization of language.

Below I will make a few remarks on a few selected topics:

a) The evolution of speech and language
b) Spoken language and sign language
c) Innate feature detectors
d) The absence of prosody

I will not attempt to cover in this review all papers in the book.

A. THE EVOLUTION OF SPEECH AND LANGUAGE

In a number of places in this volume attempts are made to relate results of recent empirical studies of several kinds to theoretical ideas on the evolution of speech and language in early man. So Peter Marler gives an interesting description of communication systems in nonhuman primates and birds. His data on monkeys show a difference between discrete signal systems, consisting of a limited number of acoustically well-distinguished sound signals, used by monkeys living in dense forests and having little visual contact, and graded signal systems displaying continuous variation of sound signals, used by terrestrial monkeys. The bird data on the white-crowned sparrow lead him to the concept of an innate auditory template for bird song, modifiable by a suitable external model and serving for the development of vocal behavior. In his speculations on the origin of speech Marler emphasizes the importnace of the evolution of innate but modifiable auditory templates for speech sounds, serving to distinguish between acceptable and nonacceptable models for vocal development, for classifying acceptable sounds into subcategories and for developing speech. He also assumes that, while categorical processing was developed as an aid in identifying sounds from memory, continuous sensory processing of sounds was retained, thus leading to an intermingling of categorical and noncategorical (discrete and graded) processing. He finally suggests that "The substitution of categorical for continuous processing

of speech sounds may have directly facilitated the introduction of syntax as a radical innovation in primate communication".

There appear to be two basic assumptions underlying Marler's reasoning. One is that comparative studies of sensory and vocal behavior in animals and man may lead to interesting theories about specific properties of the human brain underlying man's capacity for speech and language. The other is that such studies may clarify the order in which postulated changes in vocal perception and development might have occurred in the evolution of early man. There is an important difference between these two assumptions. Whereas the former may lead to theories or hypotheses which in principle might become testable, the latter does not, at least not within the limits of this reviewer's imagination. Obviously this lack of testability is common to many speculations about the evolution of human behavior. This has in the past not kept scientists from making reasonable guesses particularly about the evolution of language and speech, and probably will not do so in the future In this volume both Hewes in his comments on Mattingly's paper and Liberman in his own contribution relate the genesis of language to toolmaking. Hewes observes similarities between syntactic structures and the prescribed order of the various steps necessary for the manufacture of flakes from a prepared Levallois core. Liberman, taking the same line of thought, states that the Levallois toolmaking technique cannot reasonably be described by means of a phrase-structure grammar. A

transformational grammar which formally incorporates a memory is necessary. As far as I understand his reasoning this is so because in making a particular chip one has to keep two things in mind, both the last chip that has been made and the final form of the tool. It seems to me, however, that in order to give his argument its force it still has to be shown that there is a fundamental difference in the necessary complexity of underlying mental structures between Levallois toolmaking and many forms of goal-oriented behavior we find in higher animals.

Liberman also suggests that the final crucial stage in the evolution of human language would appear to be the development of the bent two-tube supralaryngeal vocal tract of modern man, which allows its possessors to generate acoustic signals that (1) have very distinct acoustic properties and (2) are easy to produce, being acoustically stable. Reconstructions from fossils tell him that the Neanderthal hominids had to do without this asset, and therefore probably retained a communication system with a mixed phonetic level that relied on both gestural and vocal components. At this point the reader particularly feels the need for an expert criticism of the validity of such reconstructions.

B. SPOKEN LANGUAGE AND SIGN LANGUAGE

The question whether speech or gestural communication has been more important in the evolution of human language came up several times during the conference. In reaction to Mattingly's

idea that "speech exemplifies a thoroughly and peculiarly human kind of knowing" Hewes commented that the depigmentation of the volar skin would indicate the antiquity of nonvocal communication. Indirect support for this supposed antiquity of gestural communication comes from some fascinating studies of American Sign Language (ASL), according to Bellugi and Klima a full-fledged language of its own, and not a derivative or degenerate form of written or spoken English. Stokoe argues for the antiquity of sign language from a possible parallel between ontogeny and phylogeny. It appears to be the case that the infant with deaf parents, learning ASL as its first language, begins putting wordlike signs into sentencelike structures at an earlier age than the child making two-word or three-word sentences in speech.

Bellugi and Klima have studied sign language from historical changes in the form of signs, in short term memory experiments, by analyzing a collection of "slips of the hand", and by comparing American Sign Language with Chinese Signs, in all cases with profoundly deaf people who use sign language as their primary form of communication. They show that signs in ASL are not simply signals which differ uniquely and holistically from one another but are, rather, highly coded units. They also provide evidence that grammatical processes bear the marks of the particular transmission system in which the language developed. This seems to be confirmed in Huttenlocher's

contribution, comparing the encoding of spatial relations in ASL and natural language (= spoken American English)

It is too early to draw any definite conclusions from these studies of sign language on the interdependence of natural language and speech, as the structure of sign language is only beginning to be understood. But it is certainly of much interest to students of language behavior that the human perceptual and cognitive systems appear to be so flexible that profoundly deaf people may develop visual communication systems among themselves which, if not equal in expressive power and speed of communication to natural spoken languages, at least come close to them. Further comparisons between the syntax of natural spoken languages and sign languages may lead to more caution in interpreting current ideas about what is and what is not innate in our linguistic abilities. Similarly comparisons between the efficiency of speech perception and the efficiency of visual sign perception might well make us wonder whether speech perception is as special as some theorists like to make us believe.

C. INNATE FEATURE DETECTORS

The idea that speech perception is mediated by, possibly innate, speech specific feature detectors was given considerable attention in the conference. This idea supported Marler's extrapolation from innate auditory templates in birds to innate auditory templates in humans. Studdert-Kennedy provides a

careful survey of the current empirical evidence concerning the perceptual processing of consonants and vowels, from which he concludes that the "human cortex is supplied with sets of acoustic detectors tuned to speech, each inhibited from output to the phonetic system in the absence of collateral response in other detectors".

Cutting and Eimas present evidence that such feature detectors are innate. Eimas has shown that very young infants, one month and four months of age, can discriminate much better between different speech sounds that belong to different phonemic categories than between different speech sounds belonging to the same phonemic category in adult speech. One may concur, however, with the doubt expressed by Hirsh in his reflections on the conference whether Eimas's data are about speech or about general auditory perception. One may feel similar doubts about the interpretation Eimas and Cutting give to the data stemming from the selective adaptation paradigm, introduced in speech perception studies by Eimas and Corbit in 1973 and since then used by an increasing number of investigators. In selective adaptation studies it is shown that repeated stimulation with a particular acoustic configuration, for instance a syllable ba, may change the response distribution in a phoneme identification task, for instance the binary forced choice between ba and pa measured with stimuli taken from the acoustic continuum between ba and pa. In this case the number of pa-responses would increase at the cost of the ba-responses. The

interpretation is that there are feature detectors which can be fatigued by repeated stimulation. By carefully studying which acoustic configurations lead to shifts in particular response distributions, it would be possible to find out what information is extracted by particular feature detectors. Cutting and Eimas argue for the existence of phonetic, speech specific, feature detectors. More recent studies show that categorical perception and selective adaptation are not unique to speech perception (Cutting, Rosner and Foard 1976). Furthermore, to my knowledge, nobody has yet seriously discussed the difficulties for a theory of "wired-in" feature detectors stemming from perceptual normalization experiments in which it is shown that response distributions in phoneme identification tasks may shift systematically due to the immediate environment of the test segment (e.g. Fourcin 1972).

D. THE ABSENCE OF PROSODY

The volume under review is not only remarkable for the many interesting and stimulating papers it contains but also for what it does not contain. In a collection of papers with the title "The role of speech in language" one would have expected to find at least one contribution seriously discussing the relation between speech prosody and linguistic structure. It is ironical that the only paper in which intonational contrast is given moré attention than obligatory lip service is Stokoe's contribution "The shape of soundless language", dealing with

sign language Stokoe's treatment of intonation and its kinesic correlate in sign language seems to make explicit why so many speech researchers do not pay attention to speech prosody. He suggests that intonational contrasts "are not necessarily linguistic and have more affinity with other systems that signal affect than with phonemic contrasts. There remain then only phonemic contrasts between consonant and consonant, vowel and vowel, and tone and tone (when so used) as the indisputably linguistic, basic features of language". One may fear that this undue overemphasis on phonemic contrast in speech perception research will persist until speech scientists turn away from the study of isolated CV-syllables and start wondering about the perception of normal spontaneous connected speech.

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