PERCEPTION OF LOW-REDUNDANCY SPEECH IN CHILDREN

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Our experiment was performed upon 80 children attending the first four classes of a primary school.

20 subjects were tested in every class. Their age ranged from 7 (lst class) to ten years (4th class).

The children were separately tested with speech messages, which had been recorded on a tape and delivered through ear-phones at a comfortable intensity level (about 50 dB over threshold). Speech material consisted of 9 lists of 10 sentences each: in the first list there was "normal" redundancy speech, whilst in the remaining 8 lists there was low-redundancy speech: 4 lists were composed of distorted sentences and 4 of time-compressed sentences.

Sentences were plain declarative utterances: their length ranged from a minimum of 8 to a maximum of 16 syllables, with a modal length of ten syllables.

The first list of "normal" redundancy sentences was delivered with the purpose of making the children well acquainted with their task. Each subject repeated the sentences of this list without errors.

Then followed the distorted and time-compressed sentences.

The intelligibility of the speech was measured, after the following criteria: the repetitions without errors were judged correct as well as the responses with some minor mistakes (usually represented by the exchange of singular for plural).

Every other kind of response was judged incorrect.

Results are reported in figures. The percentage of sentences correctly repeated is shown on the ordinate; the school grade is pointed out on the abscissa. The dotted area around the curves is the standard deviation.

This first figure refers to distorted sentences. In the higher part of the graph is shown the significance of the comparisons after Student's test. We see that intelligibility increases from the first to the 3rd class with statistically significant differences; on the contrary the scores in the 4th class are quite close to the 3rd one.

Time-compressed speech shows a remarkable increase of intelligibility when passing from the 1st to the 2nd class; then the growths become small and non significant.

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On the whole, it seems that the functions have an asymptotic course: as a matter of fact, we may extrapolate the curves by making use of the scores which have been determined in adults with similar speech material. The percentage of sentences correctly repeated by a group of subjects 20—30 years old with a primary school degree is practically the same as the one of our 4th class children.

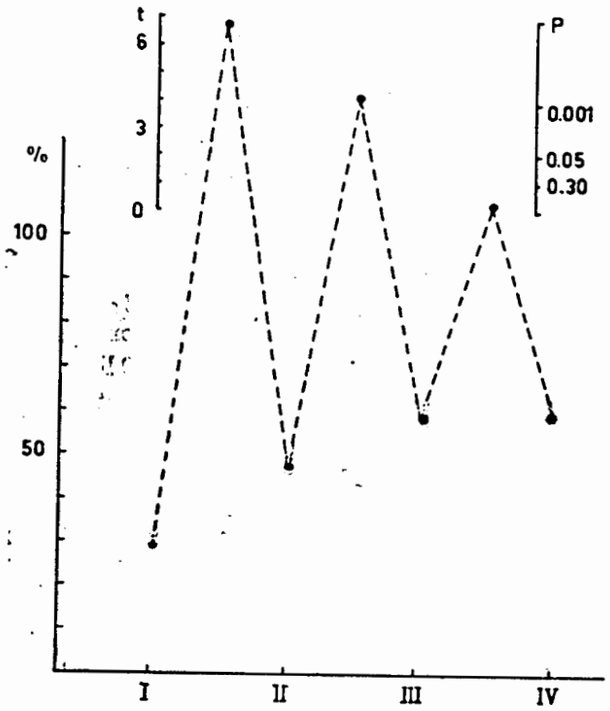

Fig. 1.

The incorrect responses may be divided into three categories:

a) the first group includes repetitions with errors of grammar. They were rather uncommon (only the 8 % of all incorrect responses) and more than $^3/_4$ of them were obtained from children of the first two classes.

b) the second group includes repetitions which were grammatically correct but contained mistakes of semantics. Such a kind of errors occurred in the 36 %; and again more than the half were made by 1° and 2° grade children.

c) in the third group, which numbers 56 % of all incorrect responses, the sentences were not repeated at all. This happened more frequently in the older subjects.

Let us now draw some conclusions from these results.

The operational model of our experience may be concerned as triad of functions: input-transmission, central processes, output-transmissions.

At their turn, the central processes may be shared in three stages: a) discrimination b) integration c) symbolization-comprehension.

When we deal with "normal" redundancy speech, we may get a correct repetition, i.e. a good intelligibility provided that the single phonemes are integrated. An instance of repetition without comprehension is that stage of language development which was defined "echoic", at the beginning of the second year of life.

On the contrary, when we are concerned with low-redundancy speech (as it is the case of our distorted or time-compressed sentences) we may obtain a correct repetition only if the single forms of the utterance are identified and understood: the identification may require the interpolation of those phonemes which have been missed owing to the distortion.

In order to get a correct repetition it is not indispensable that the contextual meaning of the sentence is understood; but if the meaning too is understood, the correction of the mistakes which are due to the distortion is no doubt made easier.

Since the faculties of comprehension and symbolization are functions of language learning, it follows that the intelligibility of low-redundancy speech increases with increasing age; the greatest increments are seen in the first school years and became gradually smaller as the age grows, until they reach an asymptote.

DISCUSSION

Bystrzanowska:

We have made similar observations among older people listenig to the speech in noise. In normal conditions their hearing in noise is the same as among young people. When they are tired their discrimination ability is lowered by the noise more than in young people.