ABSTRACT

As part of a larger study of children with a diagnosis of specific developmental speech and/or language disorder, the burst intensity in repetitive productions of the syllable /ta/ was examined in 24 children between 4:6 and 8:0 years of age with unintelligible speech. Twenty-four children without speech/language deficits matched for age served as controls. The intradividual variability was significantly greater in the children with unintelligible speech than in the controls. This is interpreted as an indication of a deficit in speech motor coordination. The patterns of variability in the unintelligible children differed, however, indicating an inhomogeneous group with different types of underlying motor deficits.

INTRODUCTION

Normal children can be understood by strangers at the age of 4 years. There is a group of children, however, with normal intelligence, normal hearing and otherwise normal development who are unintelligible much longer, sometimes till age 7 or 8. Recently, the phonological aspect of this disorder has been emphasized, following a trend in studies on speech and language disorders to stress cognitive and linguistic aspects and deemphasize or disregard motor functioning. In our previous studies we found that motor coordination problems contribute as much to unintelligibility in children with specific speech and language disorders as do dysgrammatism, paraphasia, and other linguistic abnormalities [1,2]. Since speech requires constant permutations and combinations of gestures in tightly defined temporal sequences, speech motor coordination can

be assessed only during the act of speaking and with methods that do not interfere with this activity. We used acoustic analysis of repetitions of a simple syllable [4] to compare speech motor coordination in unintelligible children and normally developing children of the same age.

Speech can be considered as a skilled act, practiced increasingly during childhood. Two important aspects of skilled acts are speed and low variability in repetitions of the same movement. Besides other parameters, we measured the mean intensity of the release burst of the /t/ in slow and fast repetitions of the syllable /ta/. The intensity of the release burst is dependent on the intraoral pressure build-up during the stop closure and the speed of the release of the stop. Therefore, the subglottal pressure, the opening of the glottis, the closure of the velum and the seal of the stop closure all have to be controlled and related to each other to result in an overall invariant burst intensity [5,6,8]. Measurements of intraoral pressure [3] or peak airflow [7] have shown that adults have very little variation in syllable repetitions.

METHOD

Subjects

The subjects were 24 children between 4:6 and 8:0 years of age from several special schools for speech and language handicapped children. They had been selected for our study because of their unintelligible spontaneous speech. None of the children had a subnormal IQ or any hearing deficit. A detailed language assessment revealed that the children had speech and language deficits of varying types and severity, including language comprehension problems, dysgrammatism and word finding problems. The control subjects were 24 children without speech or language problems matched for age.

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Procedure

The children were tested individually in a quiet room at their school. They were asked to repeat the syllable /ta/ first slowly and then as fast as possible about 20 times each. The speech was tape-recorded with a Sennheiser microphone MKE 803 and a Nagra 4.2 tape recorder. The microphone was placed in front of the child about 50 cm from the mouth. For each child the recording level was adjusted at the beginning of the recording. The tape-recorded speech was digitized at 20 kHz. The intensity level was again adjusted at the beginning of the digitization. The syllables were segmented at the release of the stop under visual and auditory control using a segmentation program developed by M. Dames on an LSI 11/73.

The mean intensity of the 12.5 ms from the beginning of the stop release was 30 kHz. The intensity of the burst intensity in individual children but not of absolute intensity between children. The difference between the burst intensity of two consecutive syllables was calculated in % of the intensity of the preceding syllable.

Statistical analysis

RESULTS

Figure 1 shows the distribution of the children with unintelligible speech and the matched controls over the 5 clusters. In cluster I (indicating the least variability) there are 10 children from the control group and 3 children with unintelligible speech, whereas in cluster V there are only children with speech disorders. The difference between the distributions is significant (p < 0.01). There is no significant correlation between the overall amplitude of the total syllables or the speed of fast syllable repetitions.

DISCUSSION

REFERENCES