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Cerebral lateralization in a deaf child as related to earlier auditory experiences

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INTRODUCTION AND METHODS. Several experimental studies have shown that in congenitally deaf persons the pattern of hemispheric asymmetry differs from that found in hearing individuals (1). The results of our earlier investigations support this opinion and suggest deafness to be a possible cause of a right - shift in cerebral speech laterality (2,3). The purpose of this study was to examine the pattern of hemispheric asymmetry in a boy who had normal hearing in childhood and, at the age of five, as a result of *meningitis cerebrospinalis epidemica*, suffered a complete hearing loss. As such total hearing loss occurs very rarely in ontogenesis only a case study results are presented. They are compared with those obtained in two control groups consisting of 18 normal hearing children and of 18 congenitally deaf ones (bilateral hearing loss of 80 dB or more). The children were aged 13-14 years, right handed and with normal vision. They were asked to recognize words or neutral faces presented laterally in the left or right visual field for 20 ms. The subjects responded by pointing to the exposed stimulus (word or face) on response cards which contained three different faces or four different words. Recognition errors committed in the left and right field presentations were analyzed.

RESULTS AND DISCUSSION. In the word recognition test, the right hemisphere dominated both in the case study patient and in congenitally deaf children while in those with normal hearing the dominance of the left hemisphere was observed (Fig.1). In the face recognition test, the advantage of the left hemisphere in the investigated patient, no hemispheric differences in congenitally deaf and the right hemisphere dominance in normal hearing individuals were found (Fig.1). To summarize, the pattern of hemispheric differences observed in the case study patient was similar to that observed in the congenitally deaf subjects but differed significantly from that found in normal hearing persons. The results of our study indicate marked differences in functional hemispheric lateralization between deaf and hearing children. These data are compatible with the hypothesis postulating the hemispheric asymmetry to be a product of complex interplay of a number of genetic and environmental factors (4) and point to the functional plasticity of the nervous system.

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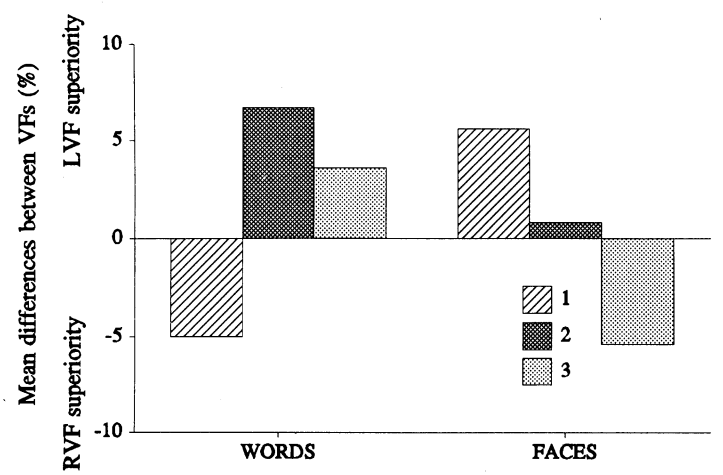

Fig. 1. Differences betwee the mean percentage of errors in the left and right visual fields in normal hearing children (1), congenitally deaf ones (2) and in the case study patient (3).

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