M any individuals with normal audiograms and normal word-recognition scores nonetheless complain that speech is difficult to understand, especially when there is background competition. In children this complaint is associated with “auditory processing disorder,” or “APD.” In adults it has been variously termed “obscure auditory dysfunction,” “King-Kopetzky Syndrome,” and “APD.” In seniors it is linked to “presbyacusis.” Whatever the name, the common feature over the entire life span is the apparent difficulty in understanding speech when the listening environment is hostile. Although the basis for this disorder remains obscure, many hypotheses have been suggested. One of the most interesting is the possibility that there is a disorder in the ability to structure auditory space appropriately. Thus, a disturbance in the ability to separate auditory “foreground” from background in three-dimensional auditory space may underlie the ability to focus on one speech source while successfully suppressing irrelevant competition.

In this issue of JAAA, authors Ilse Wambacq, Kelly Shea-Miller, Anne Eckert, and Virginia Toth of the New Jersey Neuroscience Institute, Seton Hall University, Montclair State University, and the JFK Johnson Rehabilitation Institute, add an interesting piece to the puzzle. In a study of apparent motion in auditory space (“Perception of Auditory Movement in Children with Poor Listening Skills: An ERP Study”), they show that children who are identified by parents and audiologists as poor listeners show a lack of appropriate hemispheric asymmetry in the obligatory components of the evoked response to leftward auditory motion. Whereas good listeners showed greater evoked activity over the right hemisphere, poor listeners failed to demonstrate this asymmetry.

Wambacq et al studied the P1, N1, and P2 components of the response to apparent auditory motion induced by a gradual shift in the interaural intensity difference between noise bursts presented from the two sides of the head. Principal effects were noted in the N2 component of the evoked waveform. When the apparent source of the noise burst moved from midline to the right, no asymmetries were observed in either group. But when the apparent motion was to the left, good listeners showed a significantly larger N2 amplitude and significantly longer N2 latency at the FC4 electrode (right hemisphere) than at the FC3 electrode (left hemisphere). In poor listeners, however, neither amplitude nor latency showed asymmetry across this electrode array. In addition, good listeners showed an additional negative shift (N2′) at the FC4 electrode compared to the FC3 electrode, but this further asymmetry was not present in the data of poor listeners. On a control task, simple auditory gap detection, in which there was no apparent motion, both groups showed equivalent hemispheric symmetry.

Of particular interest to those concerned with diagnostic evaluation in this arena was the fact that these significant group differences in electrophysiological measures of hemispheric asymmetry in the apparent-motion task were observed in spite of the fact that the two groups did not differ on behavioral performance scores.
The poor listeners were aware of the apparent motion and, behaviorally, responded appropriately. Yet abnormality in hemispheric asymmetry was still demonstrated electrophysiologically.

We will undoubtedly hear much more about hemispheric symmetry and asymmetry as our ability to examine them becomes ever more sophisticated. More than two decades ago, M. P. Bryden of the University of Waterloo, Canada, reviewed a number of studies of lateralization of brain function in children with reading and language deficits. In his summary, he remarked that “Despite unreliable measuring instruments, a plethora of experimental effects that contaminate the results, various methodological absurdities, and frequent instances of contradictory evidence, one theme continues to recur. That is the notion that bilateral representation of function [i.e., lack of appropriate lateralization] is associated with deficit” (Bryden, 1982, pp. 256–257).

Why some children, adults, and seniors have unusual difficulty in understanding speech in noisy backgrounds is certainly a complicated puzzle. Lack of appropriate hemispheric asymmetry may be one important piece.

REFERENCE


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