Editorial

Processing Efficiency versus Temporal Resolution

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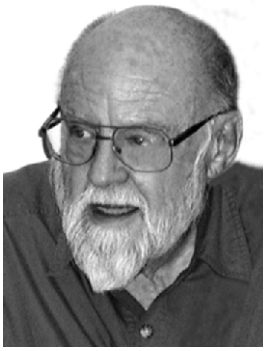

Why do children have more trouble than adults in understanding speech when the background is noisy? Of the many possible explanations that might be advanced, two have been studied at some length: (1) processing efficiency and (2) temporal resolution. The processing efficiency hypothesis suggests that children are unable to marshal the cognitive resources necessary for the efficient processing of speech under difficult listening conditions. The temporal resolution hypothesis, on the other hand, posits that incomplete maturation of rapid temporal resolution of the dynamic speech waveform limits the child's ability to process the speech input efficiently when background noise is present.

In this issue of *JAAA*, Andrew Stuart of East Carolina University reports results of a unique study in which he addressed the question by measuring reception thresholds for sentences in the presence of both continuous and interrupted noise. He reasoned that the difference between the two thresholds was a measure of the extent to which temporal resolution ability permitted the listener to take advantage of the short silent intervals in the interrupted noise. The difference between the two conditions can be thought of as "release from masking" of the continuous noise. Thus a large difference would indicate better temporal resolution than a small difference.

Within this conceptual framework, Stuart compared the performance of five groups of 16 children each between the ages of 6 and 15 years with the performance of 16 young adults on the Hint-C test. Three conditions, quiet, continuous noise, and interrupted noise, were evaluated. In the latter condition, noise bursts and silent intervals varied randomly over the range from 5 to 95 msec. Not unexpectedly, the absolute sentence threshold levels of the children were uniformly poorer than those of the adults, but the important finding was that the difference between sentence thresholds for continuous noise versus interrupted noise did not differ significantly across the age groups. This result is consistent with the processing efficiency hypothesis. The temporal resolution explanation would have been supported only if the children had shown a significantly smaller difference than the adults.

Stuart's testing protocol suggests a straightforward approach to the question of whether faulty temporal resolution ability underlies the listening problems of children with suspected auditory processing disorder. A more ecologically valid approach than measuring gap detection thresholds for noise bursts might be to simply compare sentence thresholds in continuous versus interrupted noise.

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