DO DIFFERENCES IN TEMPORAL PROCESSING DIFFER WITH LANGUAGE ABILITIES IN CHILDREN WITH SLI?
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Abstract
A significant number of children have Specific Language Impairment (SLI), whereby language abilities are delayed compared with typically developing (TD) children, possibly due to temporal processing. Little is known about whether speed of processing delay is generalised to non-language measures. In this study, a robust measure of auditory processing was used. Children’s ability to discriminate between source-echo locations was measured as a function of temporal delay (milliseconds). This ability is known to follow a robust developmental trajectory between birth and 10 years of age in TD children. Results will compare temporal thresholds for children with SLI and TD children. The anticipated outcome is that thresholds will be greater (slower processing) in the SLI group, suggesting the role of generalized temporal auditory processing mechanisms in SLI.

Purpose of Study
The purpose of this study is to determine whether children with SLI (which is thought to be linked with atypical processing of temporal information) show deficit on non-language auditory measures of temporal processing.

Methods
Subjects: Ten Expressive-Receptive SLI children between the ages of 8-12 years and 12-15 years were tested. Each of the children had normal hearing sensitivity.

Stimuli: The present study used two types of stimuli; clicks and speech. The speech stimulus was the word “baseball”, and the click stimulus was a sequence of three rapid clicks.

Testing Environment and Conditions: The stimuli were presented to the listeners through any one of 15 speakers placed between positive and negative 50 degrees on a horizontal arc.

The Minimal Audible Angle thresholds were obtained for single source trials (only one sound presented), and the Precedence Effect conditions (lead-lag pair).

In the PE conditions, where 2 stimuli were presented, delays between presentation of the two sources were 1.5, 10, and 30 ms. For each subject, single source trials were presented first and the PE trials were presented thereafter in a random order.

Procedure: Each trial consisted of a 2 alternative forced-choice task where the stimulus is presented from the left or the right. Depending on the response, the angle of the presented source was either increased or decreased.

Data Analysis
MAA thresholds were determined for each subject at every delay condition. Thresholds were calculated by identifying the reversals, defined as the change in direction of angle during a run, as shown in the graph below (trials marked with circles indicate reversals). Angle values at the reversals were averaged for each run to yield thresholds.

Results:
Average (+/-SD) thresholds are compared for children with SLI ages 9-12 and typically developing children, ranging in age from 3-9.

The three panels show results when the stimuli were either:
A. Single source (one sound)
B. Precedence (paired delayed sounds) with clicks
C. Precedence (paired delayed sounds) with speech

In the PE conditions, the threshold for clicks was 1.5 degrees, and for speech, it was 5 degrees.

Conclusions
Children with SLI show developmental delays on auditory tasks that measure spatial acuity (single source discrimination) and temporal processing (precedence effect with speech). This finding may indicate that children with SLI actually do have some breakdown in the temporal processing of auditory ability. The results with the precedence effect may further indicate that the temporal processing deficit for children with SLI is more severe in tasks that include speech rather than non-speech stimuli. This breakdown in the processing of speech may then correlate with the language problems that children with SLI experience.

References

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