

Language Comprehension in Language-Learning Impaired Children Improved with Acoustically Modified Speech

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A speech processing algorithm was developed to create more salient versions of the rapidly changing elements in the acoustic waveform of speech that have been shown to be deficiently processed by language-learning impaired (LLI) children. LLI children received extensive daily training, over a 4-week period, with listening exercises in which all speech was translated into this synthetic form.

They also received daily training with computer games designed to adaptively drive improvements in temporal processing thresholds. Significant improvements in speech discrimination and language comprehension abilities were demonstrated in two independent groups of LLI children.

Exposure to specific language alters an infant's phonetic perceptions within the first months of life, leading to the setting of prototypic phonetic representations, the building block on which a child's native language develops. Although this occurs normally without explicit instructions for the majority of children, epidemiological studies estimate that nearly 20% of children fail to develop normal speech and language when exposed to speech in their native environment.

Even after all other primary sensory and cognitive deficits are accounted for, approximately 3 to 6% of children still fail to develop normal speech and language abilities. Longitudinal studies have demonstrated a striking convergence between preschool language delay and subsequent reading disabilities (such as dyslexia). A broad body of research now suggests that phonological processing deficits may be at the heart of these language-learning impairments (LLIs).