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KU scientist shows potential of technology for autism research and treatment

LAWRENCE — For the first time, researchers have measured precisely the impact of autism on several aspects of how children learn language with a new technology that has enormous potential for researchers, practitioners and parents, according to Steven F. Warren, lead author of study published online in the Nov. 11 Journal of Autism and Developmental Disorders.

Using the LENA (Language Environment Analysis) system, an automatic vocal analysis technology, the study confirmed that young children with autism spectrum disorder vocalize significantly less than their typically developing peers of the same age — 29 percent less — and that these were often in the form of what the researchers called “monologues” rather than being directed to another person.

More importantly, researchers were able to document deficits in conversational turn-taking with adults — the hallmark of how we learn to communicate with others. Children with autism do this 26 percent less frequently than typical children and the exchanges are markedly shorter in duration.

“This is groundbreaking in that this is the first study based on an automatic measure of the vocal behavior of children,” said Warren, vice provost for research and graduate studies at the University of Kansas and child language development scientist.

According to Warren, the cumulative effect of this deficit is sobering. In one day, the children with autism had 146 fewer opportunities on average than typical children to engage in the give and take of learning language and social and emotional development. In a year’s time that would burgeon to 53,290 fewer conversational turn-taking occurrences.

But there is some good news: the LENA system also measured why therapy may be effective. It documented that when children were in treatment, there was a sharp increase in their vocalizations and turn-taking as well as adult vocalizations to them.

“Providing this type of language-rich environment for a large part of the child’s day may be why some studies have shown that intensive intervention over two or more years can have such a large impact on the development of some young children with autism,” Warren said.

Warren predicts that LENA, which allows the inexpensive collection and analysis of large amounts of data unimagined in language research before now, could revolutionize the assessment and treatment of autism and the behavioral sciences in general.

Researchers and practitioners, for example, could assess the fidelity and effectiveness of interventions over many years, Warren said.

“We might have surmised that children with autism have markedly different experiences learning language, but until now, we have been held back by the lack of measurement technology.”

LENA could allow parents to continue and supplement language enrichment therapy at home and assess their own effectiveness for themselves, Warren suggested.

“In this way, LENA could function similar to the way a pedometer measures how much exercise one gets from walking. Autism interventions remain expensive and arduous. This tool may help us to develop cost-effective treatments and better understand how they work and how to keep them working.”

The study compared the 26 young children with autism spectrum disorder aged 16 months to 48 months to 78 typically developing children of the same age though the LENA digital language processor and language analysis software.

The processor fits into the front pocket of specially designed children’s clothing and records everything the child vocalizes as well as its “language learning environment.”

The analysis is not based on words but on sound patterns and theoretically could be used for speakers of any language, Warren said.

“LENA is a measurement breakthrough that lets us look at human behavior in a way that we have not been able to look at it before.”

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