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Study reveals linguistic deficits behind autistic children's difficulties understanding other people

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One of the defining characteristics of autism is difficulty communicating with others. However, it is unclear whether those struggles arise only from the poor social skills commonly associated with autism, or whether autistic children suffer from more specific linguistic impairments.

"If a kid doesn't interact in the right way because of a social deficit, that could be a communication difficulty, but you wouldn't really say that their linguistic ability in a computational sense was hurt," says Kenneth Wexler, a professor of brain and cognitive sciences at MIT.

Wexler, a psychologist and linguist who has previously developed comprehensive models of how children learn language as part of normal development, has spent the past few years studying autistic children, in hopes of creating a framework to help pinpoint the source of their communication difficulties.

In a study appearing in the April issue of the journal *Language Acquisition*, he reports that some autistic children do have a specific linguistic deficit: They are unable to understand a specific type of grammatical construction involving reflexive pronouns. This finding suggests that there may be a biological basis for the language impairments seen in autism, and paves the way for genetic studies that could reveal new targets for treating the disease, Wexler says.

Lead author of the paper is former MIT postdoc Alexandra Perovic, now at University College London. Former MIT graduate student and postdoc Nadezhda Modyanova is also an author of the paper.

Piece by piece

Wexler's research focuses on how children learn syntax and sentence structure, including grammar. To create a timeline for how children typically acquire language, he investigates when they begin to understand small, specific bits of grammar.

"Some pieces of syntax develop much earlier than other pieces of syntax," he says. "We think there's a biological maturation pace, which is related to the development of different brain areas. This is at least partially under genetic control."

Until recently, there had been very few studies on how language acquisition in autistic children might differ from typical language acquisition.

In the new study, Wexler tested autistic children on their ability to understand a specific grammatical rule known as binding, which is necessary to decipher the meaning of reflexive pronouns. For example, in the sentence "Cinderella's sister was pointing to herself," the word "herself" refers to Cinderella's sister, not Cinderella.

Typically developing children start to correctly make this distinction around age 4. However, Wexler found that autistic teenagers were unable to accurately answer questions requiring them to understand reflexive pronouns. In fact, they performed much worse than children with other developmental disorders, including Williams syndrome and specific language impairment. Children with Williams syndrome typically have low IQs but better verbal abilities; children with specific language impairment have trouble learning language but are developmentally normal in every other way.

Autistic children who do not have communication problems, including children with Asperger syndrome, performed well on the reflexive pronoun test.

"This cross-syndrome comparison calls into question accepted views that poor nonverbal IQ may be responsible for poor language abilities and suggests that language and other cognitive capacities may follow different and intricate paths of development," says Maria Teresa Guasti, a professor of psychology at the University of Milano-Bicocca, Italy, who was not part of the research team.

Genetic signatures

In ongoing studies, Wexler is investigating how autistic children fare in a wider range of linguistic tasks, including identification of who is performing the action in passive verb constructions, such as "John was pushed by Billy," and understanding how the article "the" differs from

"a" or "an."

He also hopes to do studies that could reveal genetic variations associated with different language impairments.

"We don't know yet whether different pieces of grammar have different underlying genetic signatures, but I'm betting that they do, because each piece develops at a different time in normal kids, and we also know that certain areas of the brain develop at different times. It might be that you need certain areas of the brain for different pieces of grammar," Wexler says.

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