

A novel screening method makes it easier to diagnose and treat children with autism

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A child with autism discovers how to evoke the onscreen video he likes best.
Credit: Rutgers Sensory-Motor Integration Lab

Researchers have developed a new screening method to diagnose autism, which unlike current methods does not rely on subjective criteria. These results are published in a series of studies in the open-access journal *Frontiers in Neuroscience*.

The studies, funded by a US\$ 650,000 grant from the National Science Foundation, were led by Elizabeth Torres, a computational neuroscientist, and Dimitri Metaxas, a computer scientist, both at Rutgers University, in collaboration with Jorge V. Jose, a theoretical physicist and computational neuroscientist from Indiana University.

Diagnosis

The new technique provides an earlier, more objective and accurate diagnosis of autism, factoring in the importance of sensory and motor impairments. It measures tiny fluctuations in movement and uses a digital real-time map of the subject moving through space and can determine the exact degree to which these patterns of motion differ from more typically developing individuals.

Even in nonverbal [children](#) and adults with autism, the method can diagnose autism subtypes, identify gender differences and track individual progress in development and treatment. The method may also be applied to infants.

"This research may open doors for the autistic community by offering the option of a diagnosis at a much earlier age and possibly enabling the start of therapy sooner in the child's development," says José, vice president for research at Indiana University and a professor of cellular and integrative physiology at the university's School of Medicine.

Treatment

In a second paper, the new method is applied for intervention. The researchers say that it could change the way autistic children learn and communicate by helping them develop self-motivation, rather than relying on [external cues](#) and commands, which are the basis of behavioral therapy for children with autism.

Torres and her team created a digital set-up that works much like a Wii. Autistic children were exposed to onscreen media – such as videos of themselves, cartoons, a music video or a favorite TV show – and learned to communicate what they like with a simple motion.

"Every time the children cross a certain region in space, the media they like best goes on. They start out randomly exploring their surroundings. They seek where in space that interesting spot is which causes the media to play, and then they do so more systematically. Once they see a cause and effect connection, they move deliberately. The action becomes an intentional behavior," explains Torres.

Researchers found that all 25 children in the study, most of whom were nonverbal, spontaneously learned how to choose their favorite media. They also retained this knowledge over time.

The children independently learned that they could control their bodies to convey and procure what they want. "Children had to search for the magic spot themselves," Torres says. "We didn't instruct them."

Torres believes that traditional forms of therapy, which place more emphasis on socially acceptable behavior, can actually hinder children with autism by discouraging mechanisms they have developed to cope with their sensory and motor differences, which vary greatly from individual to individual.

"A powerful framework"

Prof. Anne M. Donnellan, the director of the USD Autism Institute at the University of San Diego, and editor of the papers, says:

"Based on my in my 40+ year experience in autism, I see this research as truly groundbreaking and bound to have a broad impact across multiple disciplines of brain science."

"It provides a powerful, radical new framework for the assessment and categorization of autism that does not require subjective human assessment, and invites a transformation of current behavioral therapies,

from emphasis on instruction driven therapies, to exploratory self-discovery techniques."

It is too early to tell whether the research will translate into publicly available methods for therapy and diagnosis, says Torres. But she is confident that parents of children with [autism](#) would find it easy to adopt her computer-aided technique to help their children.

The studies are published as part of a special collection of papers in a Frontiers Research Topic titled Autism: The Movement Perspective.

The co-principle investigators in the study on the clinical side are Dr. John Nurnberger and Dr. Kimberly Stigler from the department of Psychiatry at the Indiana University School of Medicine

More information: www.frontiersin.org/

Provided by Frontiers

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