

NEWS

Mimed gestures hint at repetitive behaviors in autism

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15 NOVEMBER 2014

Puzzling pattern: A test of tool use reveals unexpected differences in brain activity in local areas of the cerebral cortex among children with autism.

Children with autism show different patterns of brain activity during everyday gestures and movements than controls do, suggest unpublished results presented today at the **2014 Society for Neuroscience annual meeting** in Washington, D.C.

The researchers focused on movements because people with autism are known to have **difficulties with motor skills**. Also, “motor function is easier to manipulate experimentally” than more complex and subtle social behaviors, says study leader **Joshua Ewen**, director of the Clinical Neurophysiology Laboratory at the Kennedy Krieger Institute in Baltimore, Maryland. “It is a great window into the brain.”

Ewen and his colleagues used electroencephalography (EEG) to record the brain activity of 20 children with autism and 28 controls, all aged 9 to 12 years. They scanned the children’s brains as the children viewed a picture of a tool and then pantomimed using that tool — pounding with a hammer, stirring with a spoon, cutting with scissors and so on. These sequences of learned gestures are known as praxis movements.

While they are viewing the picture, the children with autism and the controls both show decreases in frequencies known as alpha and beta waves in areas of the brain's left hemisphere known to be involved in praxis. Alpha and beta waves in these areas are characteristic of rest, and they decrease when these parts of the cortex become activated.

However, the children with autism show smaller decreases than controls do in beta waves from the central area of the left cortex, which is involved in motor function. They also show smaller decreases in alpha waves from the rear area of the left cortex, which is associated with vision and, in this case, the perception of praxis movements.

"This was sort of a surprise finding," Ewen says.

Children with autism are known to **have difficulties with praxis**, but Ewen says he expected them to show differences in **long-range connectivity** between different areas of the brain during these movements, consistent with the **connectivity theory** of autism, rather than in local areas of the cortex.

His team is still analyzing the long-range connectivity data, so those differences may also exist. In the meantime, the results support a competing, but perhaps not contradictory, theory of autism, which holds that the disorder stems from an **excess of excitatory signals** in the brain.

Beta waves are thought to be involved in maintaining the status quo within motor areas of the brain, because they decrease just before and during changes in movement. The results suggest the intriguing possibility that children with autism may perform **repetitive behaviors** because they can't inhibit central beta waves, Ewen says.

In fact, among children with autism, those who have less of a decrease in central beta waves during the praxis task also have more repetitive behaviors, the researchers found.

Children with autism only show brain activity that's different than that of controls when they are looking at pictures of tools, not when they are pantomiming various movements. They may also have differences during this second phase of the task, Ewen says, but a larger sample size may be needed to reveal those differences.

Even if such differences don't exist, Ewen notes, the part of the task where the children look at the tool is what measures motor planning. "That's at the heart of praxis — the ability to coordinate all these things," he says.

For more reports from the 2014 Society for Neuroscience annual meeting, please [click here](#).