NEWS

Jittery limb movements may predict autism subgroups

BY **VIRGINIA HUGHES**

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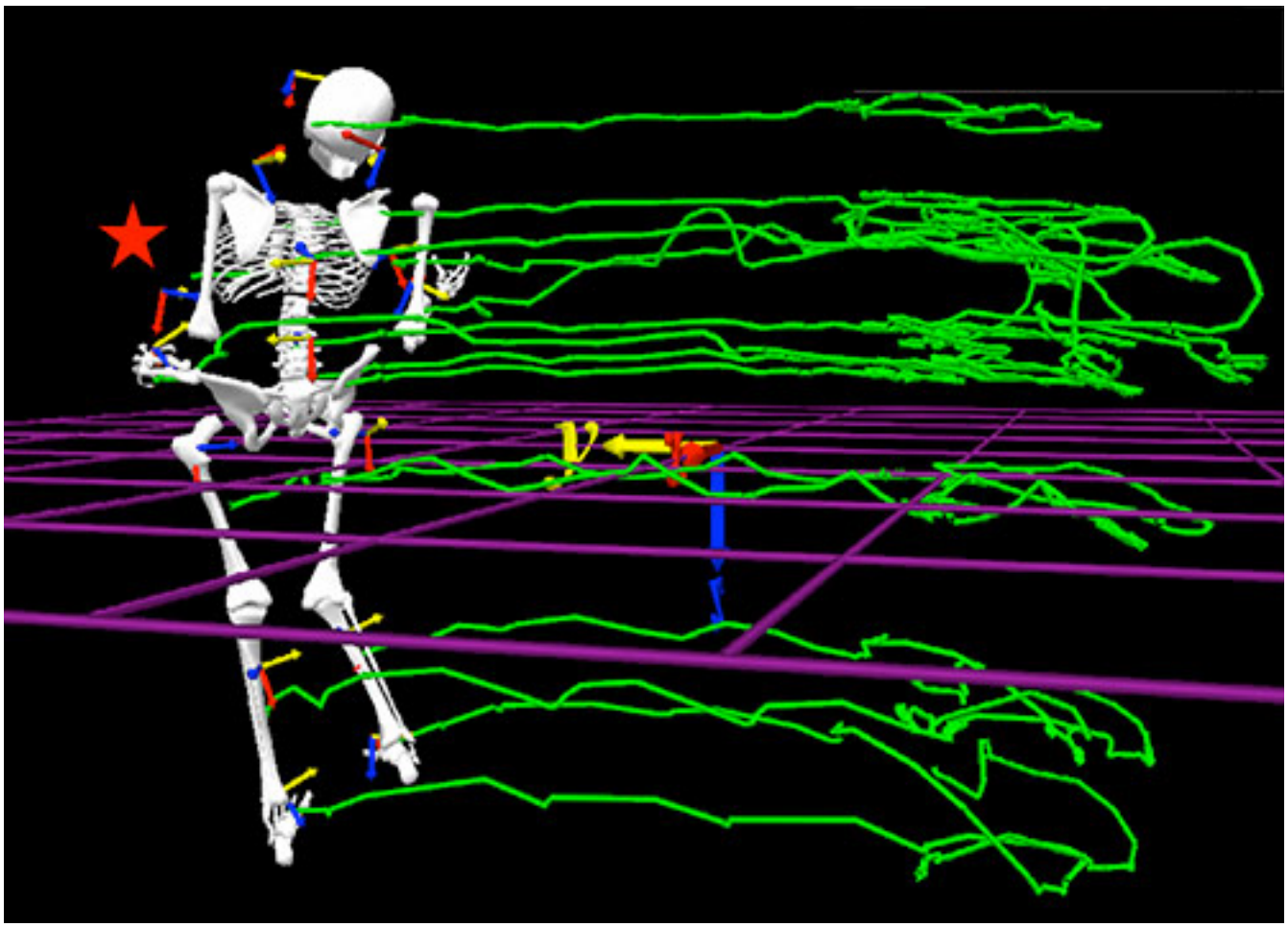

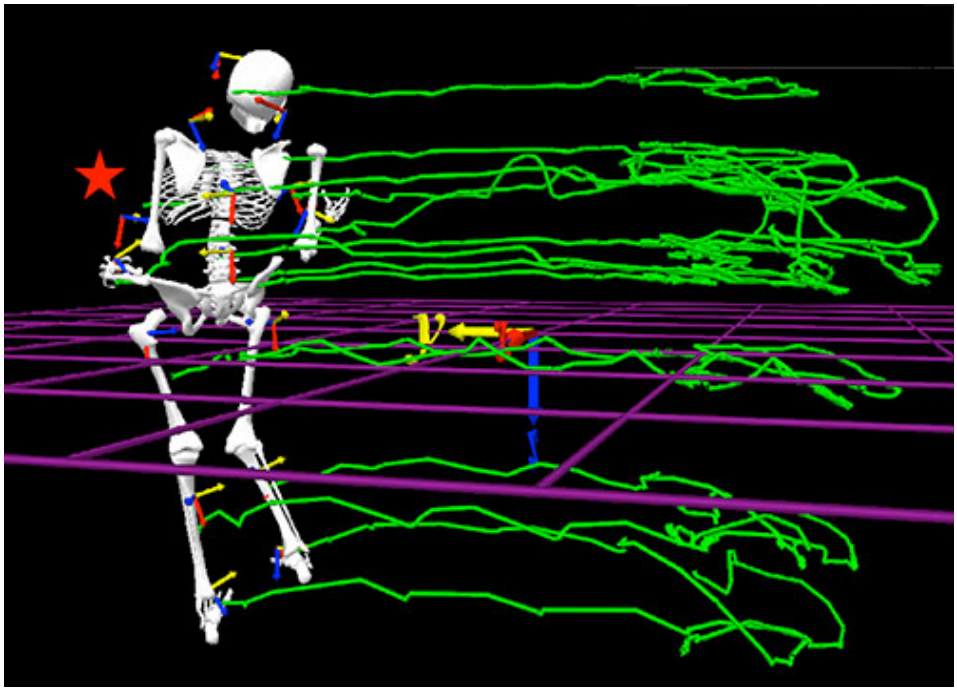

Busy bodies: Children with autism wear motion sensors on 15 joints that record the speed of their limb movements.

Tiny fluctuations in the limb movements of children with autism can predict the severity of their condition and track their response to treatments, according to two unpublished studies presented at the **2013 Society for Neuroscience annual meeting** in San Diego.

Individuals with autism often have motor problems, ranging from clumsiness and imbalance to **wobbly handwriting**. But these symptoms historically have been neglected in scientific research.

“In autism, movement hasn’t been put in the forefront because [people with the disorder] move: They can point, they can reach, they can grasp,” says **Elizabeth Torres**, assistant professor of psychology at Rutgers University in New Jersey, who led the new studies. But zooming in on the tiny changes in those motions reveals distinctive patterns, she says. “It’s actually a very rich signal that we can use to diagnose and treat.”

For the past several years, Torres and her colleagues have been **tracking the precise body movements** of individuals with a range of neurological conditions, such as Parkinson’s disease, stroke and autism.

The researchers place motion sensors on participants' joints that can track subtle changes in their speed and acceleration. Their studies have shown, for example, that people with autism have much **more variable movements than controls**, and that the motor patterns allow researchers to **distinguish between men and women** with the disorder.

Torres is collaborating with physicist **Jorge José** of Indiana University to refine these analyses. At the conference on Monday, the researchers described an experiment in which individuals with autism don motion sensors on their hands and arms and then play a game in which they have to repeatedly touch a circle on a computer screen.

Based on data from 20 individuals with autism and 20 controls, the researchers found that those with autism tend to have more variable pointing behaviors on a millisecond-to-millisecond time scale.

What's more, the movements revealed a continuum in which the most severely affected individuals show the most variability. Those diagnosed with **Asperger syndrome** show the least variability, although still more than controls. "It's a continuous thing, from low to high, but you can pick out the extremes," says Di Wu, a graduate student in José's lab who presented the work.

Variable signals:

This variability makes sense, Torres says, given the frequent **reports of sensory sensitivities** in people with the disorder. Intriguingly, brain imaging studies have also shown that individuals with autism have **more variable signals** in regions that process visual and auditory information.

"These kids live in this uncertain world of noise, and don't have the proper anchors," Torres says.

Movement patterns may also be useful as objective markers of improvement or decline over longer periods of time.

On Tuesday, Torres presented the results from an **ongoing placebo-controlled clinical trial** of a drug called insulin-like growth factor 1 for children with Phelan-McDermid syndrome, an autism-related disorder.

Torres is tracking the participants' movements over more than a year to see whether the drug makes them less variable. So far, she has seen nine of the children five times each. After putting on the sensors, the children walk around naturally and play with their caregivers for about 30 minutes.

The trial is expected to end in 2015, and Torres does not yet know which children received the drug and which received placebo. But because the children's movement differences over time are already striking, she says, "it's very likely that we're going to be able to predict that." Some

children have already become far less variable and others have not changed at all.

“These are huge shifts,” she says. “We don’t see these large changes in typical development.”

*For more reports from the 2013 Society for Neuroscience annual meeting, please **click here**.*