

NEWS

Sensors measure social interactions during autism diagnosis

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Social cues: By monitoring movement, researchers have developed a measure that predicts when two people are communicating (left) or not (right).

By outfitting a child and a clinician with four wireless motion sensors, researchers are quantifying some of the nuances of social interaction in ways that may aid autism diagnosis and treatment, they reported yesterday at the **2015 Society for Neuroscience annual meeting** in Chicago.

The multipurpose, lightweight sensors, which are affixed to the child's wrists, head and torso, measure body temperature and pick up movement direction and acceleration. Data from the sensors can provide a readout of how connected two people are in a conversation by, say, detecting synchrony in their movements, says Caroline Whyatt, a research associate in **Elizabeth Torres'** lab at Rutgers University in New Jersey, who presented the findings.

"We're showing that we can use these technologies to understand social situations," she says.

This technology could enhance the accuracy of assessments such as the Autism Diagnostic Observation Schedule (ADOS) — an interview with a clinician designed to ferret out autism behaviors. During the interview, an examiner interacts with the child, asking her to perform certain tasks, such as imitating the examiner playing with a toy frog. A child who shows little connection with the researcher — not naturally turning as she speaks to her or not following her prompts, for example — will have a higher score for social deficits.

Using the sensors during 20 ADOS interviews with children who have autism, and 10 interviews with controls, the researchers could identify the moment a child and the interviewer began to

synchronize their motion.

These measures can provide critical context for a child's behavior, which could aid in interpreting it. For example, a child who is shy or has trouble processing a query may show some connection with the researcher, but possibly only after the examiner has concluded that task and is taking notes, says Whyatt. In this way, sensors may pick up on an indicator of shyness that the examiner may have interpreted as a lack of interest.

"We want to make a road map for clinicians," she says. "We want something that we can use in many different settings to really characterize socialization."

Fitbit plus:

The trick, says Whyatt, is how to make sense of the data from the sensors, which resemble the popular Fitbit activity trackers. An algorithm translates the sensory readings into 'submovements,' discrete actions with a beginning and end. A flip of the hand while talking is one submovement, for example.

The data so far are consistent with the fact that children with autism have problems with motor skills. During an ADOS interview, the researchers found that clinicians use significantly more submovements than the children. This might reflect the fact that they are trying hard to engage the child, says Whyatt. The examiners' movements are also more precise and coordinated than those of the children.

The heat sensors revealed that, compared with the examiners, children with autism have trouble regulating their temperature, suggesting that they have deficits in autonomic function.

The researchers can determine how synchronized the examiner and child are by comparing the timing and location of their movements during the interview. High synchronicity occurs when the pair face each other and talk, for example, whereas the two would be out of synch if a child is playing while the examiner takes notes. The findings suggest that strong prompting by the examiner influences when a child chooses to pay attention.

Each of the children in the study had been seeing the clinician since birth, but the ADOS is usually performed by a stranger, which may skew the interview. Failing to imitate a stranger may reflect shyness rather than social deficits.

Whyatt plans to compare the synchronization patterns in an ADOS interview performed by a 'friend' versus a stranger. This experiment may hint at how much influence a child's familiarity with the examiner has on the outcome of the interview, she says.

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