Social communication disorders and the brain

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Through the sea of helmets and jerseys, the quarterback spots his receiver downfield and lets loose with a pass. The receiver didn't run where he was supposed to, but the quarterback's pass landed right in his hands for a touchdown. How does the quarterback know where the receiver is going to be when he throws the ball?

A percussionist in the back row of a symphony orchestra watches her conductor through a forest of bows, bobbing heads, and instruments. She can see the baton and only the conductor's arm, how does she recognize her cue to come in?

At a party, a man sees a woman across a crowded room, and decides that she is also interested in getting to know him better. What social signals does he pick up that will make him go over to her and begin a conversation?

Our brains read the movements of other people's bodies and make judgments from those movements. Those same readings and judgments can be made from seeing just parts of the body as well. How? What parts of the brain are involved? These questions are the focus of research recently done at West Virginia University. The results of this work are featured as the cover story in the September 28, 2005 issue of The Journal of Neuroscience. The article, called Configural Processing of Biological Motion in Human Superior Temporal Sulcus, presents research identifying which areas of the brain are active when human body motion is observed. The authors, from the Robert C. Byrd Health Sciences Center at West Virginia University, are: James C. Thompson, a post-doctoral fellow at the Center for Advanced Imaging; Aina Puce, Ph.D., of the Center for Advanced Imaging; and Michele Clarke and Tennille Stewart, former undergraduate computer science and engineering students who were funded by the National Science Foundation's Research Environments for Undergraduates Program.

The researchers utilized functional magnetic resonance imaging (fMRI) to see how and what parts of the brain responded to watching an animated human figure move on a computer screen. The subjects watched movies of whole and fragmented walking figures and detected changes in the pattern of walking, while the fMRI identified the reactions of their brains.

"We want to understand how people with social communication disorders such as autism and schizophrenia interpret the actions of others," said Dr. Puce. "We have started simply - by studying how the brain detects human motion. We are now beginning to work on how this information is interpreted."

"This research was made possible through some really creative and intelligent work done by our collaborators (Stewart and Clark) from the computer science and engineering program," said Dr. Thompson. "Their skills in computer animation allowed us to create stimuli for our experiment that would have not been possible using traditional methods. This really opens new doors as to what can be done in neuroscience research."

Thompson, lead author of the article, also created the cover illustration, a tribute to 19th century photographer Eadweard Muybridge, who documented human motion in a pioneering series of photographic studies in the late 1800s.