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## < How You Move Your Arm Says Something About Who You Are

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Heard on All Things Considered

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July 19, 2012 - AUDIE CORNISH, HOST:

From NPR News, this is ALL THINGS CONSIDERED. I'm Audie Cornish.

ROBERT SIEGEL, HOST:

And I'm Robert Siegel. When the Olympics begin in London later this month, most people will focus on the performance of athletes' bodies. But a few scientists will be more interested in their brains. NPR's Jon Hamilton has this story, on the latest research about how the brain gears up for what the body is about to do.

JON HAMILTON, BYLINE: When Olympic swimmer Michael Phelps steps onto a starting block a few days from now, Krishna Shenoy will be asking himself a question.

KRISHNA SHENOY: What's going on in Michael Phelps' brain, to get ready to swim; so that he can do so accurately and quickly, and the way he wishes, right after the starting gun fires?

HAMILTON: Shenoy is at Stanford. He studies the brain areas involved in movement. And he says there are at least two kinds of movement. One is involuntary, like when you touch a hot stove and pull back. He says that doesn't require much preparation in the brain.

SHENOY: But in so-called voluntary movement - like, in the swimming pool - it's thought that how you get ready to make those movements, how you get ready to move your muscles and your arms in a certain way, matter quite a lot.

HAMILTON: That process is the subject of an experiment described in the journal "Science." Daniel Moran, of Washington University in St. Louis, says the experiment involved two monkeys playing a virtual reality game. The goal was to reach out and touch a virtual target. But in order to earn a reward, the monkeys had to wait for a moment - after they saw the target, but before they started reaching for it.

And during that waiting period, Moran monitored the activity of individual brain cells, in an area that starts working before a movement begins.

DANIEL MORAN: In this case, what we're doing is, we're looking at a planning area; where they're not actually moving, they're just thinking about moving.



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HAMILTON: Much the way Michael Phelps does just before the starting buzzer. You've heard about athletes visualizing a great performance. The monkeys were doing something similar, as their brains prepared for a movement that could be very simple or quite elaborate.

For example, Moran says, sometimes the monkeys had to get past an obstacle.

MORAN: It's sort of like if you're at a dining room table, right? And you want to reach for the bread basket out in front of you, but you have a big water glass in front. You have to reach around the water glass to grab it.

HAMILTON: Or if you're Michael Phelps, it's like wanting to reach the other side of a pool, but realizing you'll have to swim faster than a bunch of competitors. Moran says once the monkeys saw an obstacle, their brain cells began to keep track of much more information. Instead of just remembering which direction to go, the cells got involved in higher-level questions, like what's the ultimate goal here, and what's the best way to achieve it?

MORAN: Only when you had a complicated task did he start to encode more than one or two pieces of information. The more difficult it got, the more information the neurons would encode.

HAMILTON: That was one important finding. But the study also suggested something remarkable - that you may get a glimpse of someone's true nature, just by studying how their brain prepares to move a muscle.

Moran's colleague, Thomas Pearce, says he realized this when he noticed that the two monkeys were using very different strategies to play the video game.

THOMAS PEARCE: It completely matched with the personalities that the monkeys have.

HAMILTON: Pearce says one monkey is impulsive and hyper; the other is more patient and thoughtful.

PEARCE: The patient monkey waited until all the information was known to him, in order to form that plan. The impatient monkey, on the other hand, planned on moving straight to the target as soon as the target showed up on the screen; and only later, would change his plan if the obstacle got in the way.

HAMILTON: It may seem odd to think that the brain cells involved in extending an arm could reveal something about an individual's personality. But Krishna Shenoy, at Stanford, says that's not a crazy idea. He says the brain tends to use the same approach for high-level tasks, as for simple ones.

SHENOY: So is the strategy you might adopt in reaching, somehow reflective of the strategy you might adopt when making an investment or choosing a purchase, or deciding whom to marry?

HAMILTON: Or, if you're Michael Phelps, winning a 15th gold medal. Jon Hamilton, NPR News.

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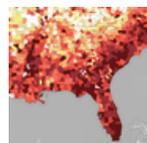
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