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## A part of the brain does more than expected, say U. of C. scientists

*Reveals how primates locate and identify what is seen*

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Monkey experiments aid understanding of the brain. (Sanjay Kanojia, AFP/Getty Images)

**By Jessica Tobacman, Special to the Tribune**

March 20, 2013

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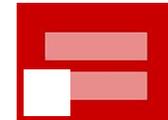
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section of the primate brain is able to categorize visual information at the same time it can locate and identify things that the primate sees.

This finding will help researchers understand how the human brain works, said Chris Rishel, a U. of C. graduate student who worked on the study with David Freedman, an assistant professor of neurobiology at the university.

"This is significant for ... really understanding how the brain learns and processes abstract information," Rishel said. "It has important implications for how human cognition develops and exists. Intelligence makes humans really special, and this is getting at the question of how intelligence works."

In the study, the results of which were published in the March issue of the journal Neuron, the researchers recorded the electrical activity patterns of neurons in the posterior parietal cortex section of the monkeys' brains after the monkeys learned to separate moving visual patterns into two groups.

The results showed that this section of the brain was able to assign sensory information from the outside world into categories. This activity helps the brain understand the importance of information and how to react to it, according to the study.

The results were initially "a surprise to us" because it showed the posterior parietal lobe did more than expected, Freedman said.

"For example, it's known to be involved in deciding where to direct your attention, where to look, or where to reach. But the information we see in this part of the brain in our new study is very different from these spatial functions," he said. "We see that this brain area, even individual brain cells in this area, carry information about the category or meaning of visual stimuli."

They do this in addition to carrying information about the location of objects and other visual stimuli, Freedman said.

"We knew from some earlier experiments of ours that these nonspatial category signals were in this part of the brain. But the surprise was they were about the same strength as the spatial signals," Freedman said. "This points out that this part of the brain is not specialized for one set of functions, related to spatial processing, but are playing multiple roles, including cognitive functions like categorization."

Rishel said scientists still have a long way to go before they know exactly how the brain works.

"We know so little about how the brain works at this point that this is still really far from direct medical or clinical application, but understanding how cognition works is essential to developing treatments for diseases in the future," Rishel said.

One of the areas that Freedman's laboratory is focused on is "understanding how we recognize the category, or meaning, of stimuli and events that we encounter in our daily lives," he said. "One of the main questions we will be looking at in our new work is how categories are learned through experience."

Jon Wallis, an associate professor of psychology at the University of California at Berkeley, called the study "very elegant," and a "very well-designed and controlled experiment."

Earl K. Miller, a professor of neuroscience at the Massachusetts Institute of Technology, said the "experiment skillfully varies spatial and cognitive signals independently and thus unequivocally demonstrate that individual neurons encode both."

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