Researchers find neural cells in rat brain that are tuned to posture

November 2 2018, by Bob Yirka

When rats are exploring their environment, they spend time on all fours – a 'neutral' default position – but also raised up on their hind legs. When researchers at the Kavli Institute for Systems Neuroscience recorded the firing of neurons in rats exploring a two-meter by two-meter box they found that many fewer neurons fired when the rat was in its neutral position compared to when it was in a posture less often visited, such as rearing up on its hind legs. Credit:

Goran Radosevic

A team of researchers at the Norwegian University of Science and Technology has isolated a group of neural cells in rat brains that are tuned to posture. In their paper published in the journal *Science*, the group describes experiments they carried out with rats while studying their brains in action, and what they found. Guifen Chen with University College London have written a Perspective piece on the work done by the team in the same journal issue.

The ability of animals to orient their bodies is one of the more remarkable feats carried out by the brain. But the mechanism still mostly remains a mystery. In this new effort, the researchers investigate the role of posture in orientation and which parts of the brain are involved.

To learn more about how the brain processes orientation, the researchers set up six cameras around a test rat to view and record its movements in a confined space, and tracked its posture with six degrees of freedom. They also inserted a silicon probe into a test rat's brain to watch as different brain regions became active. This setup allowed the researchers to compare neural activity in different parts of the rat brain with certain physical postures, such as sitting on hind legs.

The researchers identified neurons in the posterior parietal cortex and the frontal motor cortex that were associated with changes in posture. So close were the associations that the researchers could actually predict which posture a rat was assuming by simply watching neural activity in these two brain regions.

In her Perspective piece, Chen suggests the findings by the research team are groundbreaking—they run contrary to the notion that the active

areas observed by the team are mostly motion centered. But they also give rise to even more questions—some of which might be answered with further research. As just one example, she wonders if neurons associated with posture become active only when a posture is achieved, or if they continue firing as that posture is held in place.

When a tennis player hits a ball, she moves through a series of postures to ensure that her racquet connects with the ball. The ability to hit the ball requires the brain to be aware of your body's position in space, a concept called 'body schema.' A new paper published in *Science* shows that many more neurons in two parts of the brain called the posterior parietal cortex and the frontal motor cortex, fire when the body is in certain postures or positions versus when the body is in a more neutral position. Credit: Goran Radosevic

More information: Bartul Mimica et al. Efficient cortical coding of 3D posture in freely behaving rats, *Science* (2018). DOI: 10.1126/science.aau2013