The fruit fly may know it's bugging you

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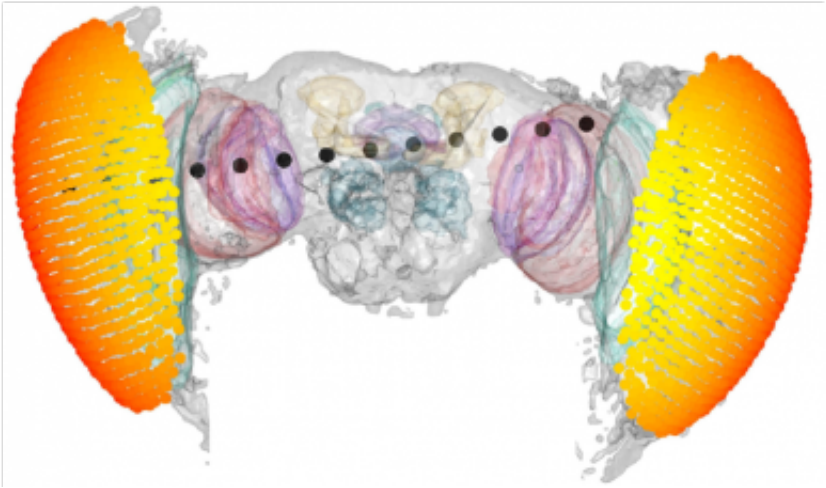

Recordings were taken from sites (black dots) across the fruit fly's brain regions.

University of Queensland researchers have shown, like humans, fruit flies may be self-aware of their actions.

Scientists at UQ's Queensland Brain Institute placed tethered Drosophila melanogaster fruit flies in front of a digital display, on an air-supported ball, while recording multiple parts of their brain simultaneously.

QBI's Associate Professor Bruno van Swinderen said the experiment was a virtual reality scenario where the flies had the ability to control either the position of a visual stimulus (a dark bar), or were shown replayed movies of the stimulus they were not able to control.

"We found that when the fly is in control there is an increase in communication between brain regions, compared to when they are just responding to the very same visual stimuli replayed to them," he said.

Dr van Swinderen said it was known from human research that different parts of the brain needed to work together for attention and perception to occur effectively.

"Looking at only one part of the brain at a time may be less revealing about attention, because the whole brain is likely to be involved," he said.

"It's really interesting that humans and flies share the ability to focus and have attention.

"The difference is that we have around 100 billion neurons, and they only have 100,000 to do pretty much the same – focus on one thing at a time and select the best course of action."

The experiments showed that each fly is an individual with its own strengths, weaknesses and preferences.

"There were actually some star performers that immediately understood whether they were in control or not, and some never seemed to know the difference," Associate Professor van Swinderen said.

"Across our research, there is always individuality between all of the animals. Tthey all behave differently."

One important conclusion from this research is that understanding how attention works in the brain may might require studies of how different brain regions interact, rather than only looking at one brain region at a time.

Ms Leonie Kirszenblat, a PhD student who performed the work with postdoctoral researchers Dr Angelique Paulk and Dr Yanqiong Zhou, said the research had important implications on how to study attention in animal models.

"Traditionally, in animal models such as Drosophila, the tendency among researchers has been to try to find single brain regions responsible for different functions," Ms Kirszenblat said.

"However, we now know that to best understand how animals attend to and respond to their environment, we need to devise methods allowing us to manipulate and observe multiple brain regions simultaneously," she said.

"This is now possible in Drosophila, but still hard to do in many other animals."

The research is published in The Journal of Neuroscience.

More information: "Closed-Loop Behavioral Control Increases Coherence in the Fly Brain." The *Journal of Neuroscience*, 15 July 2015, 35(28): 10304-10315; DOI: 10.1523/JNEUROSCI.0691-15.2015

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