Fish's thoughts filmed for first time

The thought process of a fish as it tracks its prey has been filmed by scientists, revealing the precise pattern of brain activity which governs hunting behaviour.

By Nick Collins, Science Correspondent

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The study by Japanese scientists is the first to produce a real-time recording of the exact brain processes at work in an animal carrying out its natural behaviour.

Previous studies have estimated patterns of brain activity using MRI scans to identify when different regions of the brain switch on or off, but the new study used a different technique to record which individual cells were engaged at any moment.

The technology could be used to gain greater understanding of the thought process of animals and humans, and to learn more about abnormalities which give rise to diseases of the brain, researchers said.

Prof Junichi Nakai of Saitama University, one of the study's authors, explained: "In this study we demonstrated a map in the brain [of a zebra fish]. A similar map is also present in the human brain ... knowing the model animal's brain is related to knowing the human brain."

Koichi Kawakami of Japan's National Institute of Genetics added: "In the future, we can interpret an animal's behaviour, including learning and memory, fear, joy, or anger, based on the activity of particular combinations of neurons (brain cells).

"This has the potential to shorten the long processes for the development of new psychiatric medications."

The researchers genetically modified zebra fish larvae so that neurons in their optic tectum, a part of the brain related to vision, gave off fluorescent green light when they were being used.

Zebra fish larvae have transparent bodies, meaning the activity of their brain cells could be filmed in real time using a microscope and a high-resolution camera.

The juvenile fish were filmed first as they looked at a moving dot on a screen, and then as they watched a paramecium – a tiny organism they would normally eat – swim past them while they were

immobilised.

Finally, the scientists recorded the fish while they swam freely in the presence of a paramecium, to record their brain as they exhibited natural hunting behaviour.

The study, published in the Current Biology journal, revealed which networks of brain cells were involved as the fish spied its prey, moved towards it and decided to capture it.

Prof Nakai said: "By analysing the movies we took, we could clearly see where in the brain the image of the prey on the retina is sent.

"There is a clear map in the brain. For example, the left-eye's image goes to the right-side brain in the zebrafish. We could see dynamic change in brain activity."

Prof Koichi Kawakami, another of the researchers, added: "Our work will lead to understanding of fundamental neuronal circuits that control fundamental brain functions that the fish and human brains have in common."