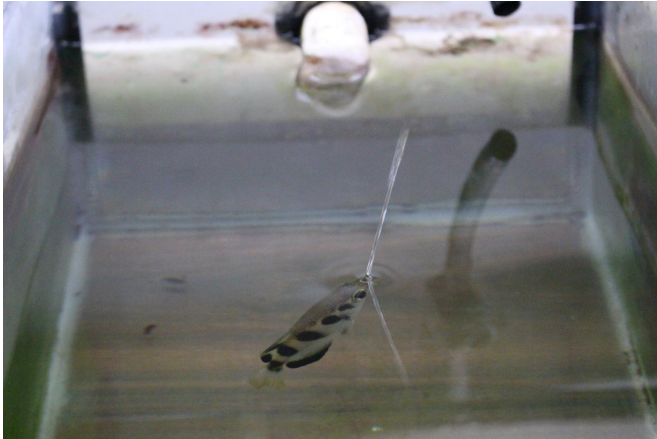


Fish can recognize human faces, new study shows

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Credit: University of Oxford

A species of tropical fish has been shown to be able to distinguish between human faces. It is the first time fish have demonstrated this ability.

The research, carried out by a team of scientists from the University of Oxford (UK) and the University of Queensland (Australia), found that archerfish were able to learn and recognize faces with a high degree of accuracy—an impressive feat, given this task requires sophisticated visual recognition capabilities.

The study is published in the journal *Scientific Reports*.

First author Dr Cait Newport, Marie Curie Research Fellow in the Department of Zoology at Oxford University, said: 'Being able to distinguish between a large number of human faces is a surprisingly difficult task, mainly due to the fact that all human faces share the same basic features. All faces have two eyes above a nose and mouth, therefore to tell people apart we must be able to identify subtle differences in their features. If you consider the similarities in appearance between

some [family members](#), this task can be very difficult indeed.

'It has been hypothesized that this task is so difficult that it can only be accomplished by primates, which have a large and complex brain. The fact that the human brain has a specialized region used for recognizing human faces suggests that there may be something special about faces themselves. To test this idea, we wanted to determine if another animal with a smaller and simpler brain, and with no evolutionary need to recognize human faces, was still able to do so.'

The researchers found that fish, which lack the sophisticated visual cortex of primates, are nevertheless capable of discriminating one face from up to 44 new faces. The research provides evidence that fish (vertebrates lacking a major part of the brain called the neocortex) have impressive visual discrimination abilities.

In the study, archerfish—a species of [tropical fish](#) well known for its ability to spit jets of water to knock down aerial prey - were presented with two images of human faces and trained to choose one of them using their jets. The fish were then presented with the learned face and a series of new faces and were able to correctly choose the face they had initially learned to recognize. They were able to do this task even when more obvious features, such as head shape and colour, were removed from the images.

The fish were highly accurate when selecting the correct face, reaching an average peak performance of 81% in the first experiment (picking the previously learned face from 44 new faces) and 86% in second experiment (in which facial features such as brightness and colour were standardized).

Dr Newport said: 'Fish have a simpler brain than humans and entirely lack the section of the brain that humans use for recognizing faces. Despite

this, many fish demonstrate impressive visual behaviours and therefore make the perfect subjects to test whether simple brains can complete complicated tasks.

'Archerfish are a species of tropical freshwater fish that spit a jet of water from their mouth to knock down insects in branches above the water. We positioned a computer monitor that showed images of human faces above the aquariums and trained them to spit at a particular face. Once the fish had learned to recognize a face, we then showed them the same face, as well as a series of new ones.

'In all cases, the fish continued to spit at the face they had been trained to recognize, proving that they were capable of telling the two apart. Even when we did this with faces that were potentially more difficult because they were in black and white and the head shape was standardized, the fish were still capable of finding the face they were trained to recognize.

'The fact that archerfish can learn this task suggests that complicated brains are not necessarily needed to recognize human faces. Humans may have special facial recognition brain structures so that they can process a large number of faces very quickly or under a wide range of viewing conditions.'

Human facial recognition has previously been demonstrated in birds. However, unlike fish, they are now known to possess neocortex-like structures. Additionally, [fish](#) are unlikely to have evolved the ability to distinguish between human faces.

More information: Discrimination of human faces by archerfish (*Toxotes chatareus*), *Scientific Reports*, [DOI: 10.1038/srep27523](https://doi.org/10.1038/srep27523)

Provided by University of Oxford

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