Common fish species has 'human' ability to learn

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Although worlds apart, the way fish learn could be closer to humans' way of thinking than previously believed, suggests a new research study.

A common species of fish which is found across Europe including the UK, called the nine-spined stickleback, could be the first animal shown to exhibit an important human social learning strategy. The sticklebacks can compare the behaviour of other sticklebacks with their own experience and make choices that lead to better food supplies, according to the study by St Andrews and Durham universities.

The researchers suggest these fish might have an unusually sophisticated social learning capability not yet found in other animals, called a 'hill-climbing' strategy.

This ability of picking the best quality food patch by comparing how successful others are at getting food from it against their personal experience has not been shown before in animals, say the scientists.

The team of researchers, which was funded by the Biotechnology and Biological Sciences Research Council, suggests that in the case of the nine-spined stickleback it is likely to be a case of 'needs must' as the anatomy of this particular species of fish does not offer significant protection from predators to forage alone safely. They may have been 'forced' to learn from others about where to feed while hiding from predators as they themselves cannot risk looking for food sites in the open.

The scientists say the findings, published in the academic journal *Behavioral Ecology*, show that the cognitive mechanisms underlying cumulative cultural evolution may be more prevalent in nonhuman animals than currently believed. The findings show that big brains, like those in humans, are not necessarily needed as a pre-requisite for cumulative culture.

The researchers say the findings contribute to the understanding of brain evolution and the types of brain required for certain cognitive functions, both in humans and animals.

Lead author Dr Jeremy Kendal from Durham University's Anthropology Department, and a Research Council UK Fellow, said: "Small fish may have small brains but they still have some surprising cognitive abilities.

"'Hill-climbing' strategies are widely seen in human society whereby advances in technology are down to people choosing the best technique through social learning and improving on it, resulting in cumulative culture.

"But our results suggest brain size isn't everything when it comes to the capacity for social learning."

Around 270 fish were caught using dip nets from Melton Brook in Leicester, and housed in aquariums in a laboratory. The fish were split into three experimental groups and one control group. The fish in the experimental groups were given two different learning experiences and two preference tests in a tank with a feeder at each end.

First, they were free to explore the feeder at each end during a number of training trials, where one feeder supplied more worms than the other, called the rich feeder. They were then tested to see which feeder they preferred. In the second training trial, those fish that had learned a

preference for the rich feeder observed other fish feeding but this time the rich and poor feeders were swapped round with the rich feeder either giving even more worms than the one the fish previously got their food from or giving roughly the same or less. In the second test, the fish were again free to swim around and choose their feeder.

Around 75 per cent of fish were 'clever' enough to know from watching the other fish that the rich feeder, previously experienced first hand themselves as the poor feeder, gave them the better pay off. In comparison, significantly fewer fish preferred the feeder that appeared to be rich from watching others if they themselves had experience that the alternative feeder would give roughly the same or more food.

The team's further studies have found that the likelihood of copying the behaviour of others increased with the rate at which the others fed.

Dr Kendal said: "Lots of animals observe more experienced peers and that way gain foraging skills, develop food preferences, and learn how to evade predators. But it is not always a recipe for success to simply copy someone. Animals are often better off being selective about when and who they copy.

"These fish are obviously not at all closely related to humans, yet they have this human ability to only copy when the pay off is better than their own. You might expect this ability in animals who are closely related to humans. In the case of the nine-spined stickleback, they have most likely adapted to their local ecology."

Co-author Professor Kevin Laland from the School of Biology at St Andrews University added: "Nine-spined sticklebacks may be the geniuses of the fish world. It's remarkable that a form of learning found to be optimal in humans is exactly what these fish do."

Source: Durham University (news : web)