

## Fish use logic to size up rivals-study

LONDON (Reuters) - Male fish, like humans, use a sophisticated form of logical reasoning to assess potential rivals, scientists said on Wednesday.

By watching how other males perform in battles over territory, tiny African fish called cichlids decide which opponent they should take on and are likely to defeat to improve their social standing.

The type of reasoning, known as transitive inference, is learnt by young children. It has also been shown in primates and rats but scientists at Stanford University in California are the first to demonstrate it in fish.

"These results show fish do, in fact, use transitive inference to figure out where they rank in the social order," said Russell Fernald, a professor of biological sciences at the university.

"I was amazed that they could do this through vicarious experience, just by watching other males fight."

Male cichlids climb the social ladder by picking fights and defeating their opponents. Fish who are constantly defeated slump in the pecking order.

Fernald and his team, who reported their findings in the journal *Nature*, demonstrated transitive inference in fish by staging a series of experiments in an aquarium in which eight bystander fish watched others in battles.

They used a species of cichlid called *Astatotilapia burtoni* which displays a black stripe, or eyebar, on its face. If a fish is defeated in a battle it is easy to spot the loser because the eyebar disappears temporarily as it swims away from its victorious opponent.

When all the fighting was finished and the fish recovered from their losses, the researchers filmed the bystanders as they chose their potential opponent. They also recorded the amount of time they spent near them, which indicates their preference.

Nearly all the bystander fish selected the weakest fish.

"Our experiment shows that male cichlids can actually figure out their odds of success by observation alone. From an evolutionary standpoint, transitive inference saves them time and energy," Fernald said.

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