

Smart school of fish expose stupidity of a popular myth

Mark Henderson
Science Editor

Fish are not the brainless dolts they are often assumed to be. Scientists have discovered that they are actually adept learners, with distinct personalities that change as they pick up information about the world.

The popular notion that fish memories are measured in seconds has been exposed as a myth by research which showed that rainbow trout (*Oncorhynchus mykiss*) remember experiences so well that they alter their behaviour in line with what they learn.

The study, led by Lynne Sneddon, of the University of Liverpool, found that individual trout display very different characters — some are bold and inquisitive; others are shy and passive.

These traits, however, can change rapidly in response to particular experiences, as the fish learn how best to cope with their environment — and these changes may influence how likely they are to find themselves on the end of a hook.

Bolder fish are much more

likely to approach and eat unfamiliar forms of prey and tend to eat more to compensate for their higher levels of physical activity, which may make them more vulnerable to anglers.

Shy trout, by contrast, will leave strange-looking food well alone, perhaps protecting themselves from the risk of being caught. The discovery that trout behaviour changes in response to experience shows clearly that the fish are not stupid, but rather that they are good at learning.

"That is a bit of a myth, the idea that fish remember only for seconds," Dr Sneddon said. "Studies have shown that fish can remember for anything up to three years, and current thinking in fish biology is that fish are very diverse in behaviour within any population.

"Rainbow trout certainly have contrasting personalities. Some are bold and some are shy. The bold fish take risks, they are quick to learn, more aggressive and active. Shy fish are cautious and timid, and spend more time under cover.

"They also learn from their experiences: they adjust their

behaviour according to what they pick up from others."

In the study, which is published in the journal *Proceedings of the Royal Society*, Dr Sneddon's team first watched rainbow trout as they were exposed to new and unfamiliar stimuli in the form of shapes made of Lego dropped into their tanks. Fish were then categorised as bold or shy, depending on how quickly they investigated the objects, and how closely they approached them.

The researchers then conducted two experiments on each group. In the first, shy and bold fish were placed in a tank for about 15 minutes a day with another fish that was either much larger or much smaller. As trout are aggressive and territorial, this was designed to provoke a fight in which the size difference between the fish would decide the winner.

When retested with unfamiliar food or objects, shy fish that had repeatedly won such fights grew much bolder, whereas bold fish that had repeatedly lost territorial fights to larger fish became more cautious.

Victorious bold fish re-

mained bold, but shy fish that lost also grew more adventurous. Dr Sneddon said that this was probably the result of a "desperado effect". Submissive fish learn that the only way to feed is to take more risks.

"Subordinate fishes are known to obtain food by waiting until the dominant is engaged in aggression," she said.

In the second experiment, shy and bold fish were given the opportunity to observe a fish of the opposite personality type as unfamiliar food was dropped into a tank divided by a one-way mirror. The "observer" fish could thus see how the "demonstrator" fish reacted, but the latter was unaware of the presence of the former. When bold fish watched shy fish, they became more reserved. The shy fish, however, stayed shy after watching bold ones. Dr Sneddon said that it was possible that the fish thought themselves unable to compete with dominant individuals and thus refused to ape their behaviour.



Trout have distinct personalities and can learn from both direct and observed experiences

Brian Clarke Fishing Correspondent

In the summer of 2003 a group of scientists seemed to suggest that fish were brainboxes on fins. The likes of the gudgeon and the bleak pursued social strategies of manipulation, punishment and reconciliation that would have had Machiavelli taking notes.

Some species could recognise their pals in shoals and had been seen using "tools", or so some

theories went. Now we have bold fish, shy fish and fish with personality traits. It is a wonder that us anglers catch anything.

Most anglers are loath to use words such as "bold" and "shy" because of the anthropomorphic freight these carry, but every angler knows that fish behaviour varies, and that the prime influences on it are weather, food availability and the proximity of threat.

There are two species of trout in Britain: the native brown trout and the alien rainbow. Brown are among the most aggressive of fish and

Most elusive: carp

Richard Walker fished for an average of four days and nights for every fish caught during the year he landed his record catch

Most gullible: trout

Anglers have devised an entire sport from catching it on fake flies

Most suicidal: bleak

Five a minute can be caught
Best home-finder: bitterling
Lays eggs in freshwater mussels, where the young are protected until ready to swim free

some are likely to be more aggressive than others. There is every likelihood that the biggest of these individuals started out as the most aggressive, or "bold", and that they won more food for themselves when young to ensure their own faster growth and survival.

Anglers also know that trout can discriminate: not only between one fly and another, but between different stages of development of the same fly. They also know that trout can learn — to a degree. In a small lake, trout will often stop taking one artificial fly after it has

caught several of their number — and then start taking again if the angler offers them something else. But they are not clever: many a trout is caught twice in a day.

The most intelligent freshwater fish is the carp. Until Richard Walker landed a 44-pounder in 1952, the carp was regarded as virtually uncatchable.

Fish in shoals — especially small fish in large shoals — can often be caught in huge numbers, but that does not indicate stupidity. Among fish, as among all creatures, competition is likely to be the spur.