

THE CONVERSATION

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What zebrafish reveal about importance of looks vs personality in choosing a mate

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'D'you come here often?' Mirko Rosenau

When it comes to finding a suitable partner to raise a family, we know that our looks and the way we behave are both crucial to how well we succeed. If there is such a thing as love at first sight, it probably involves a combination of the two. But the relative importance of these factors, and how they interact with one another, provokes endless debate in our society.

We can often learn by looking at other species, since it is well established that looks and personality are just as important in helping other animals to choose partners. There have been **many studies** addressing ways in which various animals' external appearance and colouration patterns **affect** sexual selection – not to mention everything from dominance to individual health.

As for personality, many species besides humans show differences in behaviour that are consistent over time and across different situations. Animal personality studies have thrived during the past two decades: from **initial studies** in the 1990s describing a shy-bold continuum that applied to humans and animals alike, to hundreds of **more recent studies** spanning behavioural ecology and neurobiology in many different animal species. This includes some evidence about personality and selection – animals **tend** to choose mates with similar personalities to their own, for example – **as do humans**.

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Typical Pisces. Lorna Roberts

But how do these choices affect the evolutionary prospects of a species over time? We certainly know that there are **correlations** between “better” colouration patterns and an animal’s health. We also know that certain behaviour traits affect the fitness of a species – more aggressive animals are more successful at reproduction, for instance.

Curiously, however, researchers have traditionally kept their studies into animal behaviour and external appearance separate from one another. So in our new study we posed the question, what happens when both traits are studied together? Do they interact, and if so, which has more impact on the fitness of the offspring?

Fishing for answers

We approached this question using the zebrafish, a small beautifully coloured fish which lives in the tropical streams of the Indian subcontinent. Zebrafish have blue and golden lateral stripes running across their bodies, which bear a resemblance to the vertical stripes on African zebras.

We selected individual fish, screening them for colour phenotypes and at the same time for personality using an established **risk-taking test**. Unlike humans and primates, researchers view fish personalities simply in terms of how “proactive” or “reactive” they are. Proactive animals tend to be bolder and more aggressive, whereas reactive animals are more shy and submissive, among other traits. We therefore split the fish into four different combinations: proactive fish with clear defined colouration; proactive fish with undefined and dulled colouration; reactive fish with clear defined colouration; and reactive fish with undefined and dulled colouration.

To understand the interactions between colouration and personality, we used these four groups to breed specific fish. From the successful crossings we looked at various reproductive parameters,

including the number of eggs, survival of the eggs and embryos, and the growth and survival of the larvae up to juvenile stages. For all these parameters, the proactive fish performed best, regardless of their external colouration. Yet the best performers of all were always the proactive fish with defined colouration patterns – both males and females were in this category

This begged the question, why are the proactive fish more fertile? We came up with one possible reason by monitoring the behaviour of males during mating. This showed that the bolder males were more aggressive and protective of the females. As for why the bolder more colour-defined fish were most fertile of all, this might be explained by the correlations between “better” appearance and healthier animals.



Nightclubbing. Kazakov Maksim

Our conclusion was that an animal’s personality surpasses the effect of external appearance in the reproductive success – and therefore the fitness – of a species. We have to add the caveat that outcomes may be affected in the natural world by predator pressure – there is some evidence they do less well against predators because they tend to take more risks. Having said that, other studies with guppies have showed that bolder, more conspicuous fish, tend to be more successful in the competition to find a mate.

At any rate, the study has given us an important insight into the underlying evolutionary drivers for the success of a particular species. In addition, it raises the possibility of using this approach to enable fish farmers to select specific fish that will be more successful at reproducing.

As for what it tells us about humans and the relative importance of looks and personality to the fitness of our offspring, researchers would have to perform more studies to investigate the link between both

parents' personality traits, external characteristics and fitness. For the moment human studies investigating this interactions are very rare.

 Evolution Reproduction India Zebrafish Personality 

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