

Shoals of sticklebacks differ in their collective personalities

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A pair of stickleback fish. Credit: Jolle Jolles

Research from the University of Cambridge has revealed that, among schooling fish, groups can have different collective personalities, with some shoals sticking closer together, being better coordinated, and showing clearer leadership than others.

For centuries, scientists and non-scientists alike have been fascinated by the beautiful and often complex collective behaviour of animal groups, such as the highly synchronised movements of flocks of birds and schools of fish. Often, those spectacular collective patterns emerge from individual group members using simple rules in their interactions, without requiring global knowledge of their group.

In recent years it has also become apparent that, across the animal kingdom, individual [animals](#) often differ considerably and consistently in their behaviour, with some individuals being bolder, more active, or more social than others.

New research conducted at the University of Cambridge's Department of Zoology suggests that observations of different groups of schooling fish could provide important insights into how the make-up of groups can drive collective behaviour and performance.

In the study, published today in the journal *Proceedings of the Royal Society B*, the researchers created random groups of wild-caught stickleback fish and subjected them repeatedly to a range of environments that included open spaces, plant cover, and patches of food.

Dr Jolle Jolles, lead author of the study, now based at the Max Planck

Institute for Ornithology, said: "By filming the schooling [fish](#) from above and tracking the groups' movements in detail, we found that the randomly composed shoals showed profound differences in their [collective behaviour](#) that persisted across different ecological contexts. Some groups were consistently faster, better coordinated, more cohesive, and showed clearer leadership structure than others.

"That such differences existed among the groups is remarkable as individuals were randomly grouped with others that were of similar age and size and with which they had very limited previous social contact."

This research shows for the first time that, even among animals where group membership changes frequently over time and individuals are not very strongly related to each other, such as [schooling fish](#) or flocking birds, stable differences can emerge in the collective performance of [animal groups](#).

Such behavioural variability among groups may directly affect the survival and reproductive success of the individuals within them and influence how they associate with one another. Ultimately these findings may therefore help understand the selective pressures that have shaped social behaviour.

Dr Andrea Manica, co-author of the paper from the University of Cambridge, added: "Our research reveals that the collective performance of groups is strongly driven by their composition, suggesting that consistent behavioural differences among groups could be a widespread phenomenon in animal societies."

These research findings provide important new insights that may help explain and predict the performance of social groups, which could be beneficial in building human teams or constructing automated robot swarms.

More information: Repeatable group differences in the collective behaviour of stickleback shoals across ecological contexts, *Proceedings of the Royal Society B*, [rspb.royalsocietypublishing.org1098/rspb.2017.2629](https://rspb.royalsocietypublishing.org/doi/10.1098/rspb.2017.2629)

Provided by University of Cambridge

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