

Secrets of flocking revealed

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Credit: Elise esq. via flickr

Watching thousands of birds fly in a highly coordinated, yet leaderless, flock can be utterly baffling to humans. Now, new research is peeling back the layers of mystery to show how exactly they do it -- and why it might be advantageous to fly right.

Mathematical models show that the birds' complicated [collective behavior](#) can be the consequence of a few simple rules of the road -- or sky.

"Initially in [the] 1930s, people thought it might be telepathy that guided flocks of birds. Now we know self-organization is at the heart," said Charlotte Hemelrijk of the University of Groningen in the Netherlands.

Hemelrijk has studied schools of fish and flocks of starlings -- birds that can gather in flocks as large as 30,000 individuals.

"Each day they flap around for 30 minutes in the evening before sleep, and it's just spectacular the way they do this," Hemelrijk said.

And while fish generally only made long skinny shapes as they swam, the shapes that the bird flocks could take -- elongated, bulbous, hourglass, and constantly shifting -- were incredibly diverse. This motivated Hemelrijk to work, collaborating with a computer programmer to create a new model that figured out the underlying logic of the starlings' flight.

She found that even in giant flocks, each bird maintained just about the same speed and only interacted with about seven neighbors as it swooped and dove. As the birds rolled through a turn, the shape of the [flock](#) changed from wide and flat to long and narrow. Additionally, birds that are flying abreast each other end up in a single file line when they turn. The research [was published](#) recently in the journal [PLoS One](#).

The benefits of flocking are still being determined. In one study that measured the [heart rate](#) of [pigeons](#), birds consumed more energy when they were forced to fly closer to each other.

"Clearly for some birds, flying together is costing them energy, so the question remains: why do they do it?" said Geoffrey Spedding, a professor of mechanical and aerospace engineering at University of Southern California. "It could be that flocking is a social phenomenon as well as mechanical one -- something like getting on the treadmill at lunch for exercise."

Spedding said that the study of flocking can be applied to lots of other fields.

"Suppose I want to make a flock of flying machines that can sense an environment and manage coordination among individuals. A good place to start would be some rules of interaction in birds that can equally apply to our artificial devices," Spedding said.

Gathering in flocks could also raise the overall intelligence of the group. According to a [new study](#) in the *Proceedings of the National Academy of Sciences*, larger groups of great and blue tits are better at solving problems than smaller ones.

"For one thing, when there are more birds around, each bird doesn't have to be as vigilant for predators, so they can devote more attention to the task," said Julie Morand-Ferron, a researcher at Oxford University's zoology department.

Social birds can learn quickly from each other, so having one whiz kid present among the group can improve the situation for everyone. In the experiments, the researchers created a lever-pulling device that the birds had to operate to get a food reward. They found that as the size of the groups increased individual birds got more food in return for the time they spent mastering the device.

Morand-Ferron said it's not clear if larger groups work better for all types of [birds](#), but that several species have had the same outcomes.

"Technical innovation is a new benefit to flocking that had not been described in the wild before," Morand-Ferron said.

Source: Inside Science News Service

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