

Fastest pigeons tend to become flock leaders; leaders learn navigation skills more effectively than followers

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Credit: Oxford University

Many birds travel in flocks, sometimes migrating over thousands of miles. But how do the birds decide who will lead the way? Researchers

at Oxford University, reporting in the journal *Current Biology*, can offer new insight based on studies in homing pigeons. For pigeons, it seems, leadership is largely a question of speed.

"This changes our understanding of how the flocks are structured and why flocks of this species have consistent leadership hierarchies," says co-author Dr Dora Biro of the Department of Zoology at Oxford.

In the study, researchers compared pigeons' influence over flock direction to their solo flight characteristics - including speed. They found that faster [birds](#) showed a strong tendency to take the lead in flock flights, regardless of their navigational ability.

However, the researchers also found that leadership experience led to improved homing efficiency in the faster pigeons, with the slower pigeons paying less attention to the landscape below them as they attempted to keep up.

"Some birds are naturally faster and consistently get to the front, where they end up doing more of the navigation, which means on future flights they know the way better," says Dr Biro. "You can compare this to a "passenger-driver" type of effect - drivers in a car have to pay attention, while passengers are often unable to recall the route they were driven along, especially if they remained passive in the navigation process."

In their experiment, which took place in Oxfordshire and involved 40 pigeons tagged with GPS devices, the researchers first released each bird individually and measured its speed and homing efficiency. They then released four flocks of 10 birds each and noted which birds took the lead. Finally, the researchers conducted a further round of solo flights to find out whether leadership experience had improved a bird's efficiency.



Pigeons in flight. Credit: Zsuzsa Ákos

"Our results demonstrate a consequence of group movement that hasn't been documented before - that leaders learn more effectively than followers during collective travel," says lead author Benjamin Pettit, who recently completed his DPhil in the Department of Zoology.

"Furthermore, a pigeon's degree of leadership correlated with the speed rather than the straightness of its preceding solo flight. We therefore demonstrate that both leadership and learning during group flights can be

predicted from inherent, consistent individual differences - in this case, speed."

Previous studies have shown that flock leadership is unrelated to social dominance. Nor does giving followers extra training flights promote them to a position of leadership. The new findings offer a simple explanation for the phenomenon of leadership in birds, with important implications for how spatial knowledge is generated and retained in navigating flocks.

While many birds travel in flocks, homing [pigeons](#) are domestic and more easily studied than most. "We can control the composition of the flocks and the starting points for their homeward journeys," says Pettit. "We also have a good understanding of their individual spatial cognition, in particular how their homing routes develop over repeated flights in the same area."

Recent developments in sensor technology have made it possible to explore with precision how pigeon [flocks](#) are coordinated. The latest GPS loggers allowed the researchers to track not only the birds' overall routes, but also the sub-second time delays with which they react to each other while flying as a flock.

"Our findings broaden the range of species and situations in which we would expect to see leadership and explain how [leadership](#) and competence can naturally come to correlate," says Pettit.

More information: *Current Biology*, Pettit et al: 'Speed Determines Leadership and Leadership Determines Learning during Pigeon Flocking.' [dx.doi.org/10.1016/j.cub.2015.10.044](https://doi.org/10.1016/j.cub.2015.10.044)

Provided by Oxford University

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