Milk bottle-raiding birds pass on thieving ways to their flock

December 4 2014, by Neeltje Boogert

He’s gotta lotta bottle. Credit: David Darrell-Lambert, Author provided

Great tits are opportunistic copycats. Entire populations can be found performing the same arbitrary behaviour simply because birds copy one another, following a fashion. And it's this behaviour, reported in a paper published in Nature, that explains the great milk bottle raids that baffled milk drinkers in Britain almost a century ago.

Back in 1921 residents of the small town of Swaythling in Hampshire found their milk bottles vandalised on their doorsteps, the foil caps pierced. The culprits turned out to be birds of the tit family, and this milk thievery spread quickly, with people all over Europe noticing tits pecking through the foil caps of the milk bottles on their doorsteps to reach the cream underneath.

How could this novel behaviour spread so quickly? It's unlikely so many different populations of different species of tits figured it out all by themselves at once. A faster way to solve a complex puzzle is to copy someone else's solution – it was assumed that tits learned by copying each other.

Canadian researchers putting this assumption to the test in the 1980s using chickadees (the North American cousins of tits) unexpectedly found that chickadees quickly learned to pierce foil by themselves. Even more surprising was that chickadees watching a role model weren't able to learn more quickly, which rather killed off the theory of social learning in milk bottle-opening birds.

Instead researchers looked to our closest relatives, the great apes. Chimpanzees learn different ways of cracking nuts or fishing for termites, reminiscent of humans learning new skills. However, without experimental evidence, it's virtually impossible to prove that chimps learn from each other, and not that other factors are responsible, such as genetic or habitat differences between different chimp populations.

Birds, on the other hand, are excellent experimental subjects, with tits in particular being both opportunistic and feeding in large social groups. The *Nature* paper published by Lucy Aplin and her collaborators provides the first experimental evidence of persistent cultural variation in new feeding behaviours in great tits in the wild.

The smart great tit catches the worm. Damien Farine, Author provided

Watching tits behaving wisely

The authors' study of eight populations of tits in Wytham Woods involved using a unique bird feeder to establish whether the tits would copy each others' habits in the wild – a puzzle box with a sliding door that could be opened using two distinct, but equivalent, ways. The bird's reward: a yummy mealworm.

Using two birds from each of the study populations, the authors used some pairs as controls which received no training, while other pairs were trained to use the device in one of two ways – either to push the blue side of the door rightward, or the red side leftward. These birds were then returned to their original flocks, where it was hoped they would demonstrate their trained puzzle-solving skills to others.

Training, as any pet owner or parent knows, does not necessarily lead to performance. But here the experiment worked beautifully: when a trained bird was present to demonstrate, around 75% of their flock-mates solved the puzzle at least once – and the overwhelming majority of them copied the solution that the demonstrator bird had been trained to perform. By contrast, birds in the control populations (where the demonstrators received no training) took a long time to solve the puzzle and ended up with different solutions.

The great tits were keen to fit in: the number of birds learning and repeating the puzzle solution that matched the demonstrator bird's increased by an average of 14% per day. Further evidence comes from 14 birds that migrated from an untrained control population to a population where birds had been trained on one solution. Of these, 10 switched to solving the puzzle using the method demonstrated by the trained bird.

Passing it on

Amazingly, the knowledge of how to solve the puzzle re-emerged as a learned "tradition" even more strongly when the puzzles were taken away for nine months and then returned. Although less than half the original birds who had learned the technique remained, they and the new naïve birds demonstrated an extremely pronounced preference toward using the original solution that had spread previously, rather than finding alternative solutions.

This study raises various new questions – the two alternative puzzle solutions gave exactly the same reward and were equally difficult to solve, so why are most tits so keen to fit in? And when are the few birds that do not comply, referred to by the authors as "mavericks", at an advantage?

It seems symbolic that, just as a major British dairy company announced it would close down its last glass milk bottle factory, great tits turn out after all to be the pervasive copycats they were thought to be almost a century ago. Having provided the first experimental evidence of persistent cultural variation in new feeding techniques – once thought only to exist among primates – these common or garden birds are still full of surprises.

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