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Bees learn football from their buddies

The insects show sophisticated learning for non-bee related tasks, and can even improve on what they are taught.

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One bee demonstrates to another how to use a ball to gain access to a reward.

Ref 1.

Bees quickly master an insect version of football — with a sweet reward at the end — just by watching another bee handle the ball, suggesting that the tiny pollinators are capable of sophisticated learning, says a study in *Science*[1].

Bumblebees watched a fellow bee tugging a ball into a goal, which earned the athlete a gulp of sugar water. The observing bees could soon do the task themselves. They even figured out how to nab the reward with less effort. “They’re not just blindly copying. They’re doing something better,” says study co-author and behavioural ecologist Olli Loukola of Queen Mary University of London.

Previous research has shown that insects are capable of advanced cognitive tasks. But this is the first time that insects have shown they can become adept at actions far removed from the job of being a bee, the study authors say. The fact the creatures learned a complex skill by watching their fellow bees rather than by undergoing long, incremental training was also another first.

Loukola and his colleagues schooled a select group of buff-tailed bumblebees (*Bombus terrestris*) to move a wooden ball to the centre of a platform to earn a sweet treat. These bees then strutted their stuff while observed by test bees. After three observation sessions, a test bee was allowed to control the ball. They achieved their goal almost every time, implying that they had picked up on social cues while watching the trained bees. Bees without the benefit of instruction scored around 30% of the time.

Social learning

To push the bees’ abilities, the researchers presented each instructor bee with three balls. Two had been glued in place and only one — the farthest from the goal — rolled freely. The instructors lugged that one to the goal. Test bees watched these sessions and were then presented with three freely rolling balls. Instead of copying the instructors by moving the farthest ball, test bees took the easy way out: they moved the closest one.

That impresses neuroethologist Ken Cheng of Macquarie University in Sydney, Australia. “It sure looks like what would be called goal

emulation," or actions in pursuit of a goal rather than rote imitation, he says. If so, "that's fairly sophisticated".

Tomer Czaczkes at the University of Regensburg in Germany, is less convinced. He suspects that rather than benefiting from social learning, the test bees might have learned that the ball and target are "interesting, and so end up interacting with the ball closest to the centre of the platform".

Study co-author Clint Perry, a cognitive neuroethologist at Queen Mary, points out that bees tutored by a fellow insect outperformed bees without role models: one group watched as the ball was moved by a magnet, and another group was given no demonstration at all. "Social information helped tremendously," he says.

"It really pushes the idea that small brains aren't necessarily simpler," Perry says. "These miniature brains can accomplish a lot more than we thought."

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References

1. Loukola, O. J., Perry, C. J., Coscos, L. & Chitka, L. *Science* **355**, 833–836 (2017).