

# Bees can do basic arithmetic

Date: February 6, 2019

Source: RMIT University (sciencedaily.com)

## Förslag på översättning

researchers – forskare

can do basic mathematics – tillämpa grundläggande

finding – upptäckt

set out to – bestämde sig för

perform – genomföra

revelation – avslöjande, upptäckt

has implications – får följder / konsekvenser för

particularly – särskilt

be taught – läras

recognise colours as – känna igen / uppfatta / förknippa färger med

require – kräver

levels – nivåer

long-term memory – långtidsminne

short-term memory – arbetsminne

on top of this – därtill, dessutom, utöver detta

concepts – begrepp

rather than – snarare än

may be found much more widely – kanske är mycket mer utbredd

than previously suspected – än man tidigare misstänkt / anat

---

Researchers have found bees can do basic mathematics, in a discovery that expands our understanding of the relationship between brain size and brain power.

Building on their finding that honeybees can understand the concept of zero, Australian and French researchers set out to test whether bees could perform arithmetic operations like addition and subtraction.

The revelation that even the miniature brain of a honeybee can grasp basic mathematical operations has implications for the future development of Artificial Intelligence, particularly in improving rapid learning.

Led by researchers from RMIT University in Melbourne, Australia, the new study showed bees can be taught to recognise colours as symbolic representations for addition and subtraction, and that they can use this information to solve arithmetic problems.

RMIT's Associate Professor Adrian Dyer said numerical operations like addition and subtraction are complex because they require two levels of processing.

"You need to be able to hold the rules around adding and subtracting in your long-term memory, while mentally manipulating a set of given numbers in your short-term memory," Dyer said.

"On top of this, our bees also used their short-term memories to solve arithmetic problems, as they learned to recognise plus or minus as abstract concepts rather than being given visual aids.

"Our findings suggest that advanced numerical cognition may be found much more widely in nature among non-human animals than previously suspected.

### ***A school for bees? How the honeybees were trained***

*The experiment, conducted by PhD researcher Scarlett Howard in the Bio Inspired Digital Sensing-Lab (BIDS-Lab) at RMIT, involved training individual honeybees to visit a Y-shaped maze.*

*The bees received a reward of sugar water when they made a correct choice in the maze, and received a bitter-tasting quinine solution if the choice was incorrect.*

*Honeybees will go back to a place if the location provides a good source of food, so the bees returned repeatedly to the experimental set-up to collect nutrition and continue learning.*

*When a bee flew into the entrance of the maze they would see a set of elements, between 1 to 5 shapes.*

*The shapes were either blue, which meant the bee had to add, or yellow, which meant the bee had to subtract.*

*After viewing the initial number, the bee would fly through a hole into a decision chamber where it could choose to fly to the left or right side of the maze.*

*At the beginning of the experiment, bees made random choices until they could work out how to solve the problem. Eventually, over 100 learning trials that took 4 to 7 hours, bees learned that blue meant +1, while yellow meant -1. The bees could then apply the rules to new numbers.*