Honey bees demonstrate decision making process to avoid difficult choices

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Honey bee (Apis mellifera). Credit: Dr Mario Pahl

(Phys.org) —A new study on the metacognitive ability of honey bees suggests that they, like humans, avoid difficult decisions when they lack sufficient information to solve a problem.

Researchers from Macquarie University tested honey bees with a series

of trials involving visual discrimination between targets inside a two-chamber apparatus. The bees had to learn a rule to match a combination of shapes with nectar. A correct identification was rewarded with sweet nectar, but an incorrect decision resulted in a bitter tasting solution. Bees could also choose not to take the test at all and 'opt out'.

Researcher Dr Andrew Barron says the results showed that the more difficult the challenge, the more likely the bees were to 'opt out'.

"It's a highly debated topic, whether non-humans have the same abilities to gauge their level of certainty about a choice before taking action."

Co-author Dr Clint Perry says, "Similar metacognitive testing has been conducted with dolphins, dogs, and rats. However this study is the first to demonstrates that even insects are capable of making complex and adaptive decisions.

"The honey bees' assessment of the certainty of a predicted outcome was comparable to that of primates in a similar paradigm."

The size, shape, colour and positions of the targets were constantly changed during training so the bees had to learn a geometric rule to solve the task correctly. The bees demonstrated a high level of learning ability to solve the tasks, but when the discrimination of the targets was made harder the bees' behaviour changed.

"As we made it harder for the bees to assess the correct shape combination, the bees' uncertainty about the correct choice grew, and we observed an increase in the decision to exit the chamber and not take the test to avoid the chance of getting it wrong," said Dr Barron.

"This suggests that the bees were only taking the test when they were confident of getting it right."

The full study Honey bees selectively avoid difficult choices they lack the information to solve has been published in full by the National Academy of Sciences.

More information: Clint J Perry, Andrew B Barron Honey bees selectively avoid difficult choices. *PNAS*, www.pnas.org/content/early/201 … /1314571110.abstract

Provided by Macquarie University