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The study, coordinated by **Professor Andrew Barron from Macquarie University in Sydney and Dr. HaDi MaBouDi** from the university's Department of computer science, has shown the intricate methods honeybees employ to choose which blooms are worthwhile visiting.
Despite this intricacy, research has shown how insects quickly choose where to graze for honey. Despite having a brain the size of a sesame seed, **honeybees are more accurate than humans at making decisions**.

The study, which was **published in the journal eLife**, has improved our knowledge of how the honeybee brain functions and has evolved. According to Sheffield scientists, the study is **inspiring a new generation of robots and autonomous machines** that can think like bees and are capable of making quick, accurate, and effective decisions on their own.

20 bees were taught to recognize five distinct artificial flowers in the study by the researchers. Green flowers always contained tonic water, which has a bitter flavor that bees detest, while the remaining colors occasionally had glucose. Blue blooms always contained sugar syrup.

The scientists then placed the bees in a specially created garden where the flowers only received distilled water to see how well they would perform under various conditions. Each bee was filmed by the researchers as they followed their course and timed how long it took them to decide which bloom to visit.

The findings demonstrated that the bees made their decision to land on a blossom quickly—on average, in **0.6 seconds**—if they were certain that it would contain food. They decided just as swiftly if they were certain that a bloom wouldn't have food.

The researchers then created a computer model to mimic how bees make decisions. Upon closer inspection, they discovered that their computer model's structure closely resembled the physical configuration of a honeybee brain.

The Department of Computer Science at the **University of Sheffield's Dr. HaDi MaBouDi stated:** "When a bee goes out to collect nectar, for instance, it must use minute changes in color or smell to choose which flower it should land on and examine. Each error costs money, uses up energy, and puts the insect at risk. Bees only have a brain the size of a pinhead, with less than a million neurons, to learn how to improve their choices through trial and error. Yet they are swift and precise, making them excellent at this work.

We have revealed the fundamental systems that underlie these amazing decision-making abilities in our work. Since bees are among the most effective navigators in nature, we can now use these to **develop smarter, more resilient, more risk-averse robots and autonomous devices.**

A honeybee has a brain the size of a sesame seed, but it can nevertheless make judgments more quickly and correctly than humans can, according to Professor Andrew Barron of Macquarie

University in Sydney. A supercomputer would be needed as backup for a robot that was trained to perform a bee's task. In parallel research, researchers at the University of Sheffield are **developing autonomous technology by reverse engineering the minds of bees and other insects**.

Professor James Marshall of the university's Department of Computer Science launched Opteran, a spinoff firm, to create lightweight, **inexpensive silicon brains that give robots and autonomous vehicles the ability to see, sense, navigate, and make decisions like insects**. The business is confident that Natural Intelligence, its approach to autonomy, will considerably increase the market for robotics and machine autonomy.

The study's co-author, Professor Marshall, stated: "Our research has shown how bees are capable of making complicated autonomous decisions with very little cerebral circuitry. Bees have extremely low power consumption and incredibly efficient brains because of millions of years of evolution. Future AI systems may be inspired by this biology.

Professor Andrew Barron from Macquarie University in Sydney collaborated with Professors James Marshall, Neville Dearden, and HaDi MaBouDi from the University of Sheffield on the study, "How honey bees make quick and accurate decisions." The article appears in eLife.
Source: **eLife**