

Bees: Smart Like Us?

The honeybee hive mind is one of the most sophisticated thinking machines on the planet, and even compares favorably with the thinking machine between our ears.

Hives store 50 pounds of honey in a season. To do this, hive workers complete about 4 million foraging trips, flying a total of 12 million miles. They systematically find dozens or hundreds of food patches, exploit them, and move on.

This is sophisticated stuff, requiring coordination at a level of complexity approaching that of a human corporation. In fact, bee intelligence is even capable of solving a mathematical series; in one experiment, entomologists placed a bowl of sugar water outside a hive. Bees quickly found it. The next day, the bowl was moved twice as far away. Again, the bowl was found. This went on for several days, with the bowl being moved away from the hive in a geometric, not arithmetic progression. The experiment was supposed to study search efficiency, but after several days something unexpected occurred; when the experimenters went to place the bowl, the bees had *anticipated them* and were already on the spot!

This is astonishing. There are, frankly, plenty of humans who have trouble with geometric progressions. How is it even possible for a *hive* to make this sort of calculation?

It is known that bees can communicate by means of the 'waggle dance', an abstract language that is eons older than any human language. Essentially, bees return to the hive and do the hokey-pokey; their jigs and jogs convey the precise location of food that may be miles away. In other words, they give each other good directions which, again, is not so common among humans. The dance's vocabulary is known

- there is even a dictionary; what is *not* known is how bees began to use such a sophisticated language.

Barbara Shipman, a mathematician at the University of Rochester, discovered that the shapes created during the waggle dance are the same as the shapes created when the possible curves of a 6 dimensional flag manifold are projected onto a 2 dimensional surface. Don't worry if you don't understand that - there are not many humans who do. The point is, there is a surprising, but real, correlation between an obscure branch of higher mathematics and the abstract language used by bees. Shipman even sees this as evidence that bees are able to sense quantum fields directly, a trick that human physicists believe to be impossible.

Be that as it may, bees certainly use abstract language to communicate, they are excellent navigators and planners, they can solve mathematical problems, and they manage food resources. What criteria for higher intelligence does this not meet?

Sadly, due to pesticide misuse, habitat reduction and mite infestations, honeybees are declining in the United States and could disappear entirely. The consequences are unknown - one possibility is agricultural collapse.

It may be, in fact, that the fate of the honeybee is bound up with the fate of our civilization, and that failure to appreciate their alien intelligence might lead to our own demise.