

# For stressed bees, the glass is half empty

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When people are depressed or anxious, they are much more likely to see their glass as half empty than half full. In tough times, evidence of that same pessimistic outlook can be seen in dogs, rats, and birds. Now, researchers reporting online on June 2 in *Current Biology*, a Cell Press publication, show that bees, too, share those very same hallmarks of negative emotion.

"We have shown that the [emotional responses](#) of [bees](#) to an aversive event are more similar to those of humans than previously thought," said Geraldine Wright of Newcastle University. "Bees stressed by a simulated [predator](#) attack exhibit pessimism mirroring that seen in depressed and anxious people."

"In other words," added study first author Melissa Bateson, "the stressed bee's glass is half empty."

But, they say, that isn't the same as saying that bees consciously experience emotions in the way that we do. On that point, the jury is still out.

To find out how bees view the world, the researchers set them up to make a decision about whether an unfamiliar scent portended good or bad things. First, the bees were trained to connect one odor with a sweet reward and another with the bitter taste of quinine. The bees learned the difference between the odors and became more likely to extend their mouthparts to the odor predicting sugar than the one predicting quinine.

Next, the researchers divided the bees into two groups. One group was shaken violently for one minute to simulate an assault on the hive by a predator such as a honey badger. The other group was left undisturbed. Those bees were then presented with the familiar odors and some new ones created from mixes of the two.

Agitated bees were less likely than the controls to extend their mouthparts to the odor predicting quinine and similar novel odors, the researchers found. In other words, the agitated bees behaved as if they had an increased expectation of a [bitter taste](#), the researchers said, demonstrating a type of pessimistic judgment of the world known as a "cognitive bias."

"What we have shown is that when a honeybee is subjected to a manipulation of its state that in humans would induce a feeling of anxiety, the bees show a similar suite of changes in physiology, cognition, and behavior to those we would measure in an anxious human," Wright said. "In terms of what we are able to measure, a shaken honeybees is no less 'anxious' than a lonely dog or a rat in a barren cage."

The researchers say they don't expect the findings will be unique to honeybees among invertebrates. They would in fact expect to see the same thing in any animal that needs to change its behavior in the face of potential dangers.

The findings suggest that it may be possible to study bees as a model for emotion in invertebrates. "If some scientific research on emotion could be conducted in insects, this would lead to a reduction in the numbers of sentient vertebrate animals used in research," Bateson said. "Thus our research potentially has important implications for animal welfare."

Provided by Cell Press

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