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Speaking of Science

These wily bats learn by spying on other species

By Sarah Kaplan March 21

The fringe-lipped bat is a furry-bodied, wart-faced, giant-eared animal lighter than a golf ball and smaller than the palm of your hand. Its snout sports a fleshy, unicorn-like protrusion called a “nose leaf,” which it uses to direct its echolocating calls. University of Toronto Mississauga biologist Krista Patriquin thinks it's “cute,” though that's probably not the adjective most people would use to describe the animal.

One thing is for sure: It's a wily little critter.

This bat, found in tropical forests from Mexico to Brazil, can discover new food sources by studying the behavior of other species. It is the first example of cross-species learning in bats, researchers say, and it may illuminate how these tiny animals manage to survive as their environment rapidly changes.

The new find, published Wednesday in the journal Science Advances, is based on six months of experiments at the Smithsonian Tropical Research Institute in Gamboa, Panama. Working through the night in a giant metal cage protected from the rain, Patriquin and her colleagues tested whether fringe-lipped bats could learn to associate a new sound with food by observing a bat from a different species.

To ensure that the experiment's sound really was new to the bats, the researchers worked to come up with something so hideous and unnatural that the animals wouldn't tolerate it unless they knew they'd be rewarded.

“Each pulse was a high-pitched 'Eeee, eeee,' " Patriquin said, squeaking into the phone. She hated it, and the bats did, too. “You could visibly see they were not happy, because they would shake their heads in response to the sound.”

Nevertheless, the researchers were able to train members of a similar species, the white-throated round-eared bat, to fly toward the sound in exchange for a tasty meal. By first playing the familiar sound of a katydid's chirp, then gradually switching it out for the piercing “novel cue,” the scientists taught the white-throated round-eared bats to associate the cue with dinner.

Then the experiment began: If a “naive” fringe-lipped bat was placed in the flight cage with a trained white-throated round-eared bat, how quickly would it pick up on the trained animal's food-finding trick?

Very quickly, it turns out. After an average of about 20 exposures, the fringe-lipped bats learned to follow the new sound cue, even when a white-throated round-eared bat wasn't around. They were able to pass the knowledge on to their buddies just as fast; the number of exposures required for fringe-lipped bats to learn the meaning of the sound from trained members of their own species was about the same. Only a single “naive” bat failed to learn from observing another animal.

By contrast, fringe-lipped bats that had to figure out the relationship between the squeaking sound and food on their own were rarely successful. Most of the time, Patriquin and her colleagues had to end the experiment before the bats got the hang of things.

The fringe-lipped bat “is a consummate learner,” Patriquin and her colleagues write in their report, “capable of acquiring new information about novel, potential prey from conspecifics [members of their own species] and heterospecifics [members of other species].”

Past research has revealed other animals capable of heterospecific learning. Wild birds have been shown to eavesdrop on other species' communication. Baby vervet monkeys learn to recognize the alarm calls of starlings flying above — most often when the birds are warning about a predator that also threatens monkeys. Dik diks — miniature antelope found in eastern and southern Africa — will stop grazing, look around and run for cover when they hear the alarm call of a white-bellied go-away bird. (Perhaps the lesson here is that we should all be paying more attention to birds.)

And, of course, humans learn by observing the behavior of other species all the time. Our hunter-gatherer ancestors found new food sources by watching what other animals ate. Today, you might start to recognize the mail carrier's approach from your dog's insistent barking.

“From a purely scientific perspective it's interesting to understand how animals learn about the world around them,” Patriquin said. “But it also tells us how bats might learn to adapt to changes in the landscape.”

Fringe-lipped bats aren't considered a threatened species, but the rain forests in which they live and the frogs on which they feed are imperiled by climate change, habitat destruction and disease. These bats may have to shift their dietary habits or their home ranges as a consequence. If they can speed up the process of adapting by learning from their neighbors, Patriquin said, they may increase their chances of survival in this changing world.

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Sarah Kaplan reports on the weird and wonderful world of science, with a focus on new discoveries in paleontology and astronomy. She previously worked overnights on The Washington Post's Morning Mix team, covering breaking news and other stories from the nation and the world. Follow @sarahkaplan48