

Outsmarting the enemy: Tree frogs rely on illusions to find mates without being eaten

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Researchers at Purdue University have discovered that male treefrogs reduce their attractiveness to predators and parasites by overlapping their mating calls with their neighbors. Credit: Purdue University photo/Henry Legett

tree frogs become easy targets for predators and parasites when they send mating calls, but they're finding a way to fool their enemies with a little help from a wingman.

Researchers at Purdue University have discovered that male tree frogs reduce their attractiveness to predators and parasites by overlapping their mating calls with their neighbors. By overlapping their calls at nearly perfect synchrony with neighboring tree frogs, an [auditory illusion](#) takes effect and those enemies are more attracted to the leading call, leaving the other frogs to hopefully find mates without risking their life. The work was recently published in *The American Naturalist*.

"The male frogs are essentially manipulating the eavesdroppers through creating this auditory illusion," said doctoral student Henry Legett, who led the research with Ximena Bernal, associate professor of biological sciences at Purdue University. "Humans experience this illusion too, it's called the "Precedence Effect." When we hear two short sounds in quick succession, we think the sound is only coming from the location of the first sound."

Research at the Bernal lab focuses on the relationship between predation and communication—or what they simply refer to as eavesdropping.

"The illusion created by the male tree frogs calling in synchrony has no effect on [female frogs](#), which was a surprising observation," Bernal says.

"These male frogs have figured out a way to trick these enemies. We thought the females might be more attracted to the leading caller, but it didn't really affect attraction at all. It's a win-win for the frogs because it helps reduce attacks from those enemies who were hoping to prey on the male frogs and females are not tricked by the [illusion](#)."

The study included experiments using playbacks of recorded calls from

speakers and sound traps both in laboratory and field settings at the Smithsonian Tropical Research Institute in Panama, where Bernal is a research associate and frequently visits to work with students.

Researchers discovered that after the initial male tree frog sends a mating call, other frogs follow suit within milliseconds.

"It's so fast, it's almost like a reflex," Legett said. "There's no way their brains have time to process that information. They hear their neighbor and they react immediately."

Bernal and Legett said the research has cultivated even more questions about how frogs communicate.

"You have to wonder why a male frog would call first, given that it increases his chances of being eaten," Legett said. "It's a very strategic game they're playing. The [frog](#) that calls first might not get lucky that time, but maybe he knows he'll get his chance the next time he hears one of his friends make the first call. These are the questions we'll keep asking as we move forward."

More information: Henry D. Legett et al. Prey Exploits the Auditory Illusions of Eavesdropping Predators, *The American Naturalist* (2019). [DOI: 10.1086/707719](https://doi.org/10.1086/707719)

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