

# A Galápagos Island warbler population does not recognize call signaling mainland threat

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A female Galápagos yellow warbler falls asleep on her nest during a playback of cowbird calls, which usually provoke aggressive responses in mainland warblers. Credit: Shelby Lawson

Researchers are realizing that animal communication is more complicated than previously thought, and that the information animals share in their vocalizations can be complex. For example, some animals

produce calls that warn of specific dangers in the environment, such as a predator, and these calls can even contain information about the type of predator (e.g., flying vs. ground predator). These calls are known as referential calls.

"Referential calls are a type of symbolic signal that is considered by some to be an evolutionary precursor of more complex communication systems, including [human language](#)," said Mark Hauber (GNDP), a professor of evolution, ecology, and behavior at the University of Illinois Urbana-Champaign.

It is still not completely clear whether and how animals learn referential calls, though evidence suggests animals need experience with the threat being referenced in order to connect the call to it. In a recent study [published](#) in *Behavioral Ecology and Sociobiology*, researchers tested this using a population of birds that have been living apart from a specific threat for over 300,000 years.

In North America, yellow warblers produce referential "seet" calls, which warn of nearby brown-headed cowbirds. Cowbirds are [brood parasites](#), meaning that instead of making a nest and raising their own young, they leave their eggs in other species' nests, forcing those hosts to care for the cowbird. When yellow warblers spot a nearby cowbird during the [breeding season](#), they produce seet calls to warn each other about the threat and increase their vigilance around their nests. Yellow warblers also seet call in response to seet calls from others to pass on the warning.

While this behavior is common in temperate North America, where yellow [warbler](#) and cowbird breeding overlaps, seet calls are more rarely produced by warblers in northern Canada and Alaska, where cowbirds do not breed. This suggests that experience with cowbirds may be necessary for yellow warblers to produce and respond to referential seet

calls.

Researchers at Illinois and collaborators from Western Michigan University and Australia's Flinder's University decided to test this hypothesis using a yellow warbler population in the Galápagos Islands, where the population has been breeding apart from cowbirds for over 300,000 years.

"We were very interested in how experience plays a role in ability to seet call," said Shelby Lawson, a previous graduate student in the Hauber lab, now a postdoctoral science writer fellow at the IGB and first author on the paper.

"We already know that experienced, older yellow warblers produce more seet calls in response to cowbirds, and are more responsive to seets than younger birds. But what about warblers from a population that has never experienced brood parasitism? We wondered if they would be able to recognize the seet call as a warning call for danger."

"The Galápagos population has been isolated from brood-parasitic cowbirds for hundreds of thousands of years," explained Janice Enos, a former postdoctoral researcher in the Hauber lab, now an avian biologist at the Illinois Natural History Survey.

"Because of that, it's the best candidate population to ask about the propensity of warblers to seet call based on the presence of cowbirds, because every other yellow warbler population has had some experience with cowbirds. This is the only one that presumably hasn't."

The researchers first found breeding pairs of yellow warblers on the islands of Santa Cruz and Floreana in the Galápagos. Then they presented playbacks of cowbird calls, seet calls, and controls that had been recorded in North America, along with playbacks of local

Galápagos predators, to the pairs.

The researchers measured and compared the aggression and vocalizations the warblers made in response to the playbacks, predicting that the birds would be most aggressive towards the threats they had experience with, and less towards the sounds that were novel.

They found that the Galápagos yellow warblers were indeed much more aggressive towards playbacks of a local nest predator compared to cowbird and seet call playbacks, of which responses to were comparable to the controls. This response is unlike yellow warblers in North America, which are highly aggressive towards playbacks signaling nearby cowbirds, said Lawson.

Surprisingly, Galápagos yellow warblers never once produced a seet call in response to the cowbird and seet call playbacks. The researchers say this was unexpected, as yellow warblers in northern Canada and Alaska that have been breeding apart from cowbirds for about 6000 years still occasionally produce seet calls when tested.

"Other allopatric (meaning apart) yellow warbler populations still occasionally produce seet calls when shown cowbird models, albeit rarely, so the fact that the Galápagos yellow warbler never produced any seet calls was surprising to see," explained Lawson. "The warblers did not seem to recognize the cowbird threat at all. One female warbler even fell asleep on her nest while a nearby speaker played cowbird calls!"

The team says that this finding only leads to more questions to explore. The Galápagos yellow warbler split off from the mainland lineage so long ago that it begs the question of whether yellow warblers had even evolved the seet call prior to the split. According to the researchers, the Galápagos lineage could have split before the warblers developed the ability to seet call, which could explain why they did not respond to the

call or produce it during the experiment.

The researchers say future directions include testing other yellow warbler populations with varying overlap with cowbirds, in order to tease apart the role experience may play, and to identify when in the warbler's evolution the seet call evolved.

"Projects like these rely on national and international collaborators with different skill sets," said Hauber. "Our team's next step is to study the closest mainland relatives of the Galapagos yellow warblers, in Mexico or the Caribbean, which still coexist with parasitic [cowbirds](#)."

"This study gives us one of the pieces of the puzzle about the evolution of communication, especially complicated communication like referential calls," said Enos. "It also brings up questions about whether the seet call is tied to genetic underpinnings, or if it is learned through social aspects that influence use of the call. We can't tease those two apart in this study, but this begins to fill in a little of that gap."

**More information:** Shelby L. Lawson et al, Absence of Referential Alarm Calls in Long-term Allopatry from the Referent: A Case Study with Galapagos Yellow Warblers, *Behavioral Ecology and Sociobiology* (2023). [DOI: 10.1007/s00265-023-03372-0](https://doi.org/10.1007/s00265-023-03372-0)

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