

Researchers reveal acoustic complexity of chickadee songs

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Songbirds join humans in the select few animal groups that are "vocal learners"—that is, they must learn from adults of their own species to develop a normal ability to speak (or sing, as the case may be). Because the brain wiring underlying vocal learning in songbirds is analogous to that of humans, songbirds are a useful model system for studying human language development.

Most research on songbird [vocal learning](#) has focused on a widely dispersed species of bird known as the zebra finch, known for its loud, boisterous calls. But because only male zebra finches produce learned songs (females do not sing), postdoctoral scholar Allison Hahn of the University of Wisconsin-Madison and her former advisor Christopher Sturdy, a psychology professor at the University of Alberta, have found an alternative choice for songbird study: a small non-migratory songbird commonly found in North America known as the black-capped chickadee. Female black-capped chickadees do sing, and, Hahn and Sturdy have found, their songs are acoustically distinct from the songs of their male counterparts. What's more, the researchers say, both male and female [birds](#) can tell apart the songs of the two sexes.

Sturdy will describe the new findings in a talk at the fall 2015 meeting of the Acoustical Society of America, to be held from Nov. 2-6 in Jacksonville, Fla.

"We study chickadees because much is known about their natural history in the field and they produce numerous vocalizations with various

functions. This allows us to examine what types of information is contained within their vocalizations—and because their behavior in the field has been well-studied, we can begin to understand how birds may use the information in their vocalizations in their natural habitat," Hahn said.

Sturdy's lab at the University of Alberta has for many years studied a particular vocalization known as a "chick-a-dee" call, which black-capped chickadees produce to recruit other birds to help drive away (or "mob") a predator, Hahn explained. The calls are also produced when a new food source is located and to maintain cohesion among the group. "Because the birds live in wooded areas, they may not always be able to see one another, but they can still hear another bird's vocalizations," she said.

More recently, the lab has begun to investigate "fee-bee" songs, used by male black-capped chickadees to attract mates and defend territories from other males of the species. "I started examining female [song](#) production because we had observed female birds in the lab producing songs, but no one had fully described female song production in this species," Hahn said. "Once we had recordings of females producing songs, the logical next step was to determine the acoustic similarities/differences between male and female songs and whether the birds themselves could perceive these differences."

Male and female black-capped chickadees, the researchers found, produced two-note, tonal fee-bee songs, that, overall, were structurally similar. However, bioacoustic analyses that measured specific acoustic features in songs from both sexes, showed that the frequency decrease in the first, or "fee" note—a feature known as the "fee glissando"—is greater in female songs. Using a behavioral task, Hahn and Sturdy found that birds of both sexes could tell male and female songs apart—but using different acoustic cues. "We found some evidence that male birds

rely more on information in the song's first note, while [female birds](#) rely more on information in the second note," Hahn said.

The authors stress that much remains unknown about chickadee songs, including whether [females](#) learn their songs from other chickadees—and, indeed, what function female songs have in the wild.

More information: Presentation # 4aAB2, "Seemingly simple songs: Black-capped chickadee song revisited" by Christopher Sturdy, will take place on Thursday, Nov. 5, 2015, at 8:55 a.m. in City Terrace 9. The abstract can be found by searching for the presentation number here: <https://asa2015fall.abstractcentral.com/planner.jsp>

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