Over Our Heads:
The Hidden World of Bird Communication

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At home in South Carolina, I spend a lot of time listening to birds, watching them, and even, I'd like to think, communicating with them. For the past two years, I've been hand-feeding a pair of Carolina wrens in our yard. My relationship with the male is on-again-off-again, but the female is comically brazen. She corners me when I go outside. She lands on me when I'm talking on the phone or standing on our porch. Sometimes she even perches on a windowsill and stares at me until I step outside with a handful of mealworms. Interactions like that leave me with the uncanny impression that she's communicating with me, that she's anticipating and even manipulating my actions.

The female (left) and male Carolina wrens who have been accepting mealworms from my hand for two years. The male has been more skittish from the start (and hasn't hand-fed at all this year), which is one of the ways I can tell them apart. He also has sharper talons, a more prominent white eyebrow, and a few dark feathers on his stomach.

Birdsong is so commonplace that it can seem like background noise. Their songs and calls are easily heard everywhere from forests to beaches to city sidewalks. But if you pay attention, you can witness the rich world of bird communication. On a rainy morning in May, I walked into a dark forest shortly after 6 A.M. and sat down under the drippy canopy. I was eagerly awaiting the dawn chorus, an eruption of birdsong that fills the air every day around first light. One of the first performers to make itself heard was an Acadian flycatcher, a small bird often found near woodland streams. It isn't much of an artist—flycatchers aren't even considered songbirds—but it was offering a special treat that morning: its "dawn song." Some birds, like the Acadian flycatcher, have a specific dawn song that they reserve for the early morning. (Spoiler alert: the Acadian flycatcher's song, even its special rendition at dawn, isn't very musical. It involves a series of sharp, metallic chirps.) Other voices—eastern phoebe, black-throated green warbler, Louisiana waterthrush—intermingled with

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I've wanted to study the natural world for as long as I can remember. For years I assumed research in ecology or a related field would be my dream job, but when I started college, I was starting to question that. I never liked writing lab reports or reading scientific journal articles, though I loved science articles targeted at a more general audience. I wanted the sort of science that had drawn me to science so long ago—flipping over stones to find frogs and worms underneath, talking to people who loved wildlife and hearing their enthusiasm in every syllable, and reading books and articles meant to inspire curiosity, not kill it. I was tired of scientific jargon and dense, formulaic writing that I had to read three times to understand, and I was starting to think scientific research might not be the right path for me. Then I took "Writing 101: Primate Play and Growing Up" with Dr. Ossi-Lupo. We read a lot of scientific journal articles, APA-formatted and all. Yes, a lot of them were tedious and mind-numbing. But some of them were very interesting. Before taking that course, I had taken science classes and English classes, but I'd never taken a class specifically designed to include both writing and science the way this one did. I'd always loved both subjects, but in high school at least, I usually dreaded assignments that incorporated both—lab reports in science classes or research papers in English classes. Writing 101 took the best of both worlds. Our class read everything from peer-reviewed scientific papers to news articles written for the general public. We debated the pros and cons of storytelling and anthropomorphism in science writing and of doing research in the field instead of just in controlled laboratory settings. We also wrote our own research papers—first as a group project written in more traditional scientific language, then as an individual project designed to appeal to a non-scientific audience. That was the assignment I submitted to Deliberations. It gave me a chance to take a subject I cared deeply about and do my best to make it interesting to people who don't spend their free time meandering through the woods at dawn with binoculars in hand. Throughout the semester, I was also writing articles for the Duke Research Blog. Writing for a science blog and taking "Primate Play and Growing Up" introduced me to the world of science writing, particularly science communication targeted at readers who may not have a background in science. At this point, I don't know what I'll be doing in ten years, but I've realized that I don't just want to study nature. I want to do my best to make others care about it, too. Scientific issues don't just affect scientists. Covid-19 is a stark example of that. Climate change is another. Science isn't confined to laboratories and research papers. To solve some of our world's most pressing issues, we need to make scientific knowledge accessible to everyone.

I want to thank everyone who helped me with the writing and editing process. I especially want to thank Dr. Sheryl Emch for all her help with editing and Dr. Kerry Ossi-Lupo, both for her thoughtful feedback during the editing process and for teaching "Writing 101: Primate Play and Growing Up."

the raindrops and the gurgling stream nearby. As the dark woods slowly lightened, the eruption of birdsong reached a crescendo. Even familiar voices became harder to identify as their songs overlapped with countless others, becoming a flood of sound, a cacophony of music.

We may hear birdsong as music - the meaning going over our heads, so to speak - but what do birds hear? What emotions and information do all those squawks and warbles and trills and chirps convey? Researchers are working to decode them. According to Irene Pepperberg, who has studied bird communication and cognition extensively, "In the early 1960s… the term 'avian cognition' was considered an oxymoron." Birds have not generally been associated with intelligence, but as Erich Jarvis, Duke University Medical Center neurobiologist, explains in ScienceDaily, "We have to get rid of the idea that mammals—and humans in particular—are the pinnacle of evolution." In humans, our capacity for language is one trait that demonstrates our intellect as a species. Language allows us to discuss every aspect of our world, invent stories about things that don't even exist, and pass on knowledge to future generations. Birds might not discuss the possibility of alien life or write instruction manuals, but they're smarter and more expressive than many of us realize.

Research on bird cognition and communication has traditionally taken a backseat to studies on supposedly "smarter" animals, but that's starting to change. Scientists are discovering that complex abilities like singing, migrating, and nest-building that might once have been attributed solely to instinct can also involve learning. For instance, the process by which young birds learn to vocalize can vary between species but often involves both instinct and learning.

This doesn't surprise me. On one memorable occasion, when I was sitting on my back steps early in the morning, just a few feet from a recently fledged young wren, he began to sing. It was quieter than the ringing "Tea kettle tea kettle tea kettle!" song that I heard so often from his dad. It seemed almost tentative, and I had the distinct impression that he was practicing.

Behaviors like nest-building, song acquisition, and migration can be influenced by both instinct and active learning. Pictured here is a hummingbird nest.
"Friday's Hummingbird Nest: Feeding Time" by Mike's Birds is licensed under CC BY-SA 2.0

Birds are well known for their songs, but what can that tell us about their minds?

Bird vocalizations can vary widely, even within species. For example, Carolina wrens produce many different vocalizations. Two terms often used to describe bird sounds are "songs" and "calls." Songs are generally more complex, often used to defend territory and attract mates, and may require more active learning by young birds than calls do. In many species, only males sing, though scientists are discovering more and more examples of female songs. Calls, meanwhile, are usually shorter and simpler, but that doesn't mean they aren't used for communication. Birds may use several types of calls for different purposes, such as when begging for food from their parents or to communicate in flight. Alarm calls are another common type of call. Some birds, including Siberian jays, chickens, and black-capped chickadees, alter their alarm calls to convey information about the type of predator and the intensity of the threat. And while birds are closely associated with sound, some birds also use visual cues. Australian magpies, for example, will "point" to a predator to alert other flock-mates to its presence.

Scientists have even found evidence of heterospecific communication, or communication between different species. Some birds, for example, can learn and react to other birds' alarm calls. Magrath et al. describe such behavior as "eavesdropping." It's a tantalizing idea that conjures up images of overheard conversations in our own backyards and in hidden wild places far from human ears.

In my own experience with cross-species communication, it often seems like the wrens are training the humans more than we're training them. When I hear the purring-chittering call I associate so closely with the female's advances, I scan my

surroundings, instantly alert. When my mom hears the begging calls made by young, recently fledged wrens, she promptly goes outside and sits patiently on the steps while the family of wrens gathers around her. At times our interactions almost feel like conversations. *If I tap on the glass, will you come feed me? If I show you the bag of mealworms before I open the door, will you wait there long enough for me to put my shoes on?* Other times, though, our interspecies communication falls short. When a wren lands on my mealworm-less hand and looks at me expectantly, how do I explain that I don't have any with me? When the female wren sneaks inside and takes a tour of my house, how do I get her to leave? And what about the wrens? What's going on behind those stunning amber eyes when those little birds fly toward me instead of away, when they wrap their toes around my fingers and brush their feathers against my skin, when they willingly and literally place their lives in my hands?

In moments like these, I can't help wondering what they're thinking, feeling, saying.

Some scientists would warn me against this sort of thinking. They would argue that anthropomorphism, or ascribing human characteristics to other animals, can make research less objective. However, acknowledging that we are not the only species with minds of our own can also lead to new insights and discoveries. From conveying complex information about predators to using tools, birds engage in many behaviors that suggest they may not be "bird brains" after all.

Australian magpies "point" at predators to alert others to danger. "Australian magpie wb" by Lip Kee is licensed under CC BY-SA 2.0

Studying birds and other animals through the lens of communication and cognition encourages us to reevaluate certain long-standing assumptions. According to Gisela Kaplan, an ethologist (or animal behaviorist) who focuses on birds and primates, "small brains may not mean small cognitive capacity." Kaplan believes the discovery of echolocation was an important step toward the growing awareness of other animals' worlds. As she explains in a detailed review article on animal communication, "the discovery clearly indicated that humans cannot… see, hear, feel, or touch everything other species might be able to perceive." This human-centered view of science and the world at large could be clouding our sight more than we realize. As Robin Kimmerer tells us in "Learning the Grammar of Animacy," a chapter in her book *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge, and the Teachings of Plants,*

> ***We American people are reluctant to learn a foreign language of our own species, let alone another species. But imagine the possibilities. Imagine the access we would have to different perspectives, the things we might see through other eyes, the wisdom that surrounds us. We don't have to figure everything out by ourselves: there are intelligences other than our own, teachers all around us. Imagine how much less lonely the world would be.***

This Carolina wren and her mate have been coming to my hand for food for almost two years. The chittering noise she's making is a type of call (usually shorter and simpler than songs, and typically produced by both sexes). The series of three-syllable notes in the background at 0:14 is a male Carolina wren's song.

Sometimes, new discoveries and ideas can leave us with more questions than answers, but that is the nature of science. While anthropomorphizing animals and trying to read their minds can't always give us the answers, it might help us start to ask the right questions. As for the wrens at my house, I'll always wonder what's going on behind those beautiful, amber eyes. And maybe, when their eyes meet mine, I'm not

the only one left with questions. Maybe instead of just asking, *What are they thinking?,* I should also be wondering, *What do they think I'm thinking?* I might never entirely understand their language, but that doesn't mean I can't listen.

Next time you step outside, I hope you'll open your eyes and ears a little wider. You never know who might be watching or what sorts of conversations they might be having right above our heads.

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