Bird Calls and Songs

By Dr. Mary E. Morrison

We've all noticed the spring symphony of morning bird sounds, but why and how do birds make sounds? Bird *calls* are short and simple, often signaling flight or danger, are made throughout the year, and may be made by any species. The Northern Cardinal's "chip chip" and the Blue Jay's "jay JAY" warning are both calls. Bird *songs* are longer and more complex, tend to be made more during breeding season, and occur in species belonging to the songbird group. Most songbirds, like the white-crowned sparrow, have one stereotypical song (https://www.allaboutbirds.org/guide/White-crowned_Sparrow/). 20% of songbirds have 5 or more different songs. The brown thrasher stands out, with more than 2000 different songs that they model on sounds they hear around them all year around (https://www.allaboutbirds.org/guide/Brown_Thrasher/sounds#). They even learn songs from birds in the tropics where they overwinter, and bring them back north to impress mates each spring. Gray catbirds and mockingbirds also have large song repertoires, with females preferring males with the largest repertoires.

How do birds sing? When humans sing, we vibrate a flexible pair of vocal cords located at the back of our throats in our larynx, controlling their shape to produce different frequency sounds. Birds have a similar structure called the syrinx, located closer to their lungs, that has two branches and two separate pairs of labia, the birds' equivalent of vocal cords. This means that birds can produce two different notes at the same time (see https://www.youtube.com/watch?app=desktop&v=6pVl36zNuy4 for a video animation). The Wood Thrush's song (https://www.allaboutbirds.org/guide/Wood_Thrush/sounds) highlights this ability, called biphonation. The left side of their syrinx makes high pitched sounds, while the right side of their syrinx makes simultaneous runs of lovely trills.

When do birds learn to sing? Hatchlings in the nest go through an auditory phase, listening to the parents and forming memories of their calls and songs. Later on they have a motor phase, when they try to sing the songs themselves. This triggers a sensory phase, when they listen to their own sounds and compare them to the memory or template from their parents. They practice and refine their own songs until they reach sexual maturity. Some species have a combined sensorimotor phase. Then comes the crystallization phase, when the bird permanently eliminates some songs and keeps others. Small-repertoire species like the zebra finch and white-crowned sparrow only get one cycle through these phases, and cannot learn new songs later in life. Large-repertoire species like canaries and brown thrashers can re-enter the sensorimotor and crystallization phases repeatedly throughout life, broadening their song repertoires each season.

What triggers the crystallization phase of song learning? Our current understanding is that in the spring during breeding season, male songbirds experience a surge of testosterone that corresponds to the crystallization phase. This surge causes a structure in their brains called the high vocal center to increase its size, due to the formation of many new connections between nerve cells. This change usually doesn't happen in the brains of female birds.

What's the best way for humans to learn bird songs? The Cornell Lab of Ornithology has some excellent resources

(https://academy.allaboutbirds.org/product/bird-song-basics-getting-started-with-birding-by-ear/). The Merlin app also can use your cell phone microphone to record bird songs and provide suggestions for identification, or you can select a bird species and it will play examples of that species' calls or songs (https://merlin.allaboutbirds.org/). Although Merlin does make mistakes, it can lessen some of the frustration of trying to learn songs for new birders. But I believe the best way to learn bird songs is to get out into the world and observe birds as they sing, season after season, with other experienced birdwatchers. I've learned a lot from the members of the Lycoming County Audubon Society (http://www.lycomingaudubon.org/).

Bird songs are made up of several different phrases or motifs, and these each may have several syllables—groups of notes or elements they may repeat. Some bird songs have structures that lend themselves to mnemonics. For example, the Red-eyed Vireo song sounds like repeats of "Here I am…where are you?" The Eastern Towhee's song resembles "Drink your tea," with variable repetitions of the "drink" syllable. The Common Yellowthroat's song may be remembered as "Witchety witchety witch." The Field Sparrow makes clear notes to the tempo of a dropped pingpong ball, bouncing slowly at first and then faster. I hope you get outside and make up your own mnemonics to help you enjoy birdwatching by ear.

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With thanks to The Cornell Lab of Ornithology's All About Bird Biology.org

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