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Communication Among Mexican Free-Tailed Bats

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by Barbara French and Amanda Lollar

Apparently surprised to find themselves neatly tucked into tiny paper lunch bags, the bats in our captive colonies protested loudly. We had placed each bat in a separate bag with a name tag enclosed in order to demonstrate our ability to distinguish all of the 135 Mexican free-tailed bats (*Tadarida brasiliensis*) as individuals. We wanted to share with others what we were learning about the language these bats use to communicate with one another, but before we could do so, we needed to document our ability to distinguish individual bats. I made a quick trip to the grocery store to find a large number of inexpensive containers, and then we tucked each little bat into a paper bag. One by one, each was removed from its bag and handed to us for identification. Out of 675 trials, we made 673 successful identifications. (Okay, Natalie looks a little like Mavis in dim light.)

How could we possibly distinguish so many individuals of the same species? You probably could, too, if you had spent thousands of hours caring for them. These colonies require between two and five hours of care each day, seven days a week, 365 days a year. After spending six to eight years with these bats, we know them well. Just as with people, one comes to realize that while Tommy has especially big ears, Christopher has a particularly narrow little nose.

Their injuries also aid in identification. Iris has an injured eye, Chip has a little piece missing from one ear, and Sparky has scars from electrical burns. Even their personalities vary from one bat to another. St. Anthony's sweet nature contrasts sharply with that of Crusty, a somewhat contrary old man. These colonies were started many years ago when, as certified wildlife rehabilitators, we began accumulating bats that had been so severely injured that they could not be returned to the wild. To our surprise, they quickly formed little communities and adapted well to their captive lives.

We both care for many more bats than just those in our captive colonies. Why? We have an insatiable fascination with these animals and have chosen to spend our lives, including most of our free time, learning about and caring for them. Although we work with many species of bats, we both have a special fondness for the gentle-natured Mexican free-tailed bat. Fascinated by the complex social structure that developed in our captive colonies, we came to recognize a small part of the language our free-tails use to communicate with one another. Although we can identify only a fraction of the multitude of distinct squeaks, scolds, buzzes, clicks, and chirps that we have heard, we believe we are now able to recognize and link at least 23 vocalizations with specific behaviors.

Males use buzzes to announce mating territories. They emit a series of dominant scolds and press their muzzles between the shoulders of approaching females before allowing the females to enter their roosting pocket (one of several handmade fabric pouches placed throughout the bats' cages). Within their territories, these same males use another buzz to herd females into a tight cluster before singing a romantic little song, then mating with one or more of the females in the group. It is generally the larger and more robust males that are successful in attracting females.

Males often click loud warnings to ward off potential competitors, and there are frequent disputes over territorial boundaries. These are not generally aggressive confrontations, but rather displays in which the bats face one another, open their mouths wide, bare their teeth, and bob their heads up and down and from side to side. However, there are a few real physical challenges in which two males actually lock jaws and emit annoying screeches until one gives up the fight and scampers off.

Frustrated males, who are unsuccessful in establishing territories or attracting females, sing a more intense and less romantic version of the mating song. These boys hang out on the outer areas of the colony, often hiding behind roosting pouches until an unsuspecting female happens by, at which point the male jumps out and grabs the scruff of her neck with his mouth. He emits a somewhat frantic version of the mating song while attempting to mate with the unwilling female. The girls show a definite preference for the more romantic males with established territories, and often respond to the calls of these males with a series of quiet little clicks.

Dominant males are hesitant to leave their territories to feed from trays of mealworms for fear that another male might move in. These creative males use a food solicitation call when we enter cages for hand feeding. They hang on the edges of their territories, calling persistently, and expressively flapping their wings until handed a mealworm. After eating the mealworm, they repeat the behavior until handed another.

Other special calls are those shared between a mother and her pup. Hungry babies call their mothers with a series of loud clicks when their stomachs are empty, and the mothers respond with "I'm coming" clicks of their own. Females that experience problems during birth emit a distress call, and those whose babies die will continue to call for their infant for up to four days after its death. Some mothers who lose their young will help another mother raise her baby. At the age of three to five weeks (just prior to the time they begin flying), the young in our colonies give a special practice flight buzz as they stretch their entire bodies and rapidly flap their tiny wings.

Our resident free-tailed bats squabble loudly as they jostle for favored roosting spots, but chatter quietly and nuzzle one another in an apparent sign of affection as they rest during the day. Another chattering-like call is emitted as bats hop toward one another in a kind of play. Young males less than one year of age appear to take great pleasure in sneaking up and jumping on the backs of other bats, either males or females, and emit characteristic calls reminiscent of those emitted by reproductively active males during dominance displays over females.

The bats in our colonies buzz in irritation when disturbed by an outside force and click with panicked intensity when they feel threatened. They sometimes squeal in protest when we treat an injury, and occasionally, when they have been bothered beyond their endurance, they abandon their roosting pouches, emitting escape cries as they flee in a blur of fluttering wings.

Other calls include anticipation clicks, which the bats emit in the evening just prior to leaving their roosting pouches to feed, and questioning "What do you want?" sounds as our bats approach us (familiar intruders). Later, while the colony rests after feeding, the predictable call of the town crier floats through the air, perhaps as an assurance that all is well.

Our experiences with these colonies have allowed us to document mating in wild colonies in the United States. In 1996, drawn by the familiar singing ritual, we observed springtime mating taking place in roosts where summer maternity colonies formed. After listening to our recordings, BCI biologist Brian Keeley and BCI/Texas Parks and Wildlife biologist Annika Keeley subsequently documented mating in the crevices under Texas bridges.

The behaviors in captive colonies hint at a complex social order—a community with its own special language by which bats locate, greet, argue, and play with one another, and by which they display irritation, anticipation, and affection. And yet, we have defined only a small number of those calls that are audible within the limited range of our human ears—only a tiny fraction of the bats' extensive "vocabulary."

With a range of hearing that far exceeds our own, we can only imagine how many more "words and phrases" bats

use in their daily (and nocturnal) communications in the wild. Do they share information about good foraging sites, potential dangers, or changes in weather conditions? We cannot say for certain, but we do know that we have barely scratched the surface in our attempts to decipher the language, and hence the social complexity, of the world of the Mexican free-tailed bat.

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The authors' assertions that they can identify every bat in their colonies of 50 or more are frequently met with skepticism. These three Mexican free-tailed bats illustrate the types of observable differences—color, age, size, and injuries—that help French and Lollar distinguish individuals. Snowball (center) is an unusual color for this species.



These soundwave graphics show bat calls recorded with the help of BCI member Chris Rodriguez. According to the authors, there are identifiable types of calls for a broad range of interactions from “Momma, I’m hungry,” to “I’m a courting male and this is my territory,” to “Get out of my place!”



Barbara French's free-tailed bats scramble from their fabric-pouch roosts for a dinner of mealworms, of which they consume thousands a week. Males that are unsuccessful in defending territories take advantage of mealtime to sneak up on females.



Barbara French checks on a bat in the early evening, when her free-tail colony first becomes active. After coming out to feed, the bats fly around the large cage, then gather in one large cluster in a smaller wooden roosting cage to night-roost and digest their food. Later, in the early morning, they have a second bout of activity. After chittering and chattering throughout the morning, the bats retreat to the crevices of their fabric pouches and go into torpor for the rest of the day.

All articles in this issue:

- [On the Cover](#)
- [Communication Among Mexican Free-Tailed Bats](#)
- [Australia's Flying Foxes at a Crossroad. Richards](#)
- [Bats of the Cayman Islands](#)
- [Dr. John Bowles: BCI's Behind-the-Scenes Scholar](#)
- [Letters](#)
- [Wish List](#)
- [Found: Six Shares of AOL Stock. 2000](#)
- [BCI Highlights](#)
- [Matching Gifts and Payroll Deductions](#)