

# For elephants, deciding to leave watering hole demands conversation

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African Bush Elephant in Mikumi National Park, Tanzania. Taken by Oliver Wright, via Wikipedia.

In the wilds of Africa, when it's time for a family of elephants gathered at a watering hole to leave, the matriarch of the group gives the "let's-go rumble"—as it's referred to in scientific literature—kicking off a coordinated and well-timed conversation, of sorts, between the leaders of the clan.

First, the head honcho moves away from the group, turns her back and gives a long, slightly modulated and—to human ears—soft rumble while steadily flapping her ears. This spurs a series of back and forth vocalizations, or rumbles, within the group before the entire family finally departs.

This curious behavior, measured and documented in a study published in the October issue of *Bioacoustics*, shows how this cognitively advanced species uses well-coordinated "conversations" to initiate cooperation within the group, said lead author Caitlin O'Connell-Rodwell, PhD, a field biologist and instructor in [otolaryngology](#) at the Stanford University School of Medicine. The use of "rumbles" to initiate departure helps explain the group's ability to work together to achieve more complicated tasks, such as [rescue operations](#) to save a calf from drowning.

"These vocalizations facilitate the bonds between the elephants to be able to work together," said O'Connell-Rodwell, who has been studying [African elephants](#) in the wilds for 20 years. "It's the measure of an organized society. It demonstrates how another [social animal](#) grouping organizes itself through vocalizations."

The study also indicates how this behavior uses rumbles in a structured way to transmit signals longer distances both through the air and through ground vibrations that could alert other elephant family groups not to approach the watering hole until they're gone, thus avoiding the mass chaos of too many large, noisy bodies at the same watering hole at the same time.

"I've seen 200 to 300 elephants at the same watering hole at one time before. There's a lot of [vocalization](#) and pushing and shoving and screaming and roaring. You can see why they'd want to avoid that," she said.

O'Connell-Rodwell has studied the elephants of the Mushara area of Etosha National Park in Namibia for 20 years, spending most of her summers hunkered down in a bunker or perched atop a tower cataloging more than 170 identified bulls and more than 15 family groups to understand the importance of long distance communication through both the air and ground. She is the author of the nonfiction science memoir,

The Elephant's Secret Sense, which highlights her earlier work on elephants' ability to communicate by producing and listening to underground vibrations. She has also written one for children called The Elephant Scientist, which won both the Sibert and Horn Book nonfiction honors.

In this study, O'Connell-Rodwell focuses on sounds. She first noticed this apparent watering hole "departure" conversation years ago while observing the elephants in the wilds. The study occurred between July 1994 and July 1995. Researchers set up scientific observation sites at five watering holes in the Etosha National Park using instrumentation to provide acoustic measurements of the vocalizations and charting behaviors.

They counted the number of vocalizations beginning just as the elephant families arrived at the waterhole up until just after their departure. They found that usually only three of the 15-30 members of the group participated in the "conversations," which fit into the power structure of elephant hierarchies.

"They have a matriarch," O'Connell-Rodwell said. "Then there's this sort of secretary-of-state character, and then you have the general who brings up the rear." The families consist of the females and the calves. Males over the ages of 12 to 15 leave the herd and form their own groups.

She describes the sound of a rumble this way: "It's similar to listening to a truck in the distance. It's really striking, low frequency. You can almost imagine the cycling of the sound wave. It's kind of a throbbing in your chest." The deep sounds also travel by vibrations through the ground.

The study confirmed that elephants use vocalization to coordinate action, and that usually three callers are involved in this very coordinated turn-taking conversation.

"It's not just a chorus," O'Connell-Rodwell said. "As soon as one call ends, another call starts, then the next, then the next. It's connected like a string. Effectively they take a three-second call and turn it into a nine-second call."

The rate of coordinated calling significantly increased after the initiation of departure when compared to the pre-departure period. In an analysis of 14 of these back-and-forth episodes, 33 percent occurred pre-departure and 66.7 percent occurred during departure.

"These bouts increased in number as the elephants departed the waterholes," the study states, indicating that, they "appear to be true communicative events."

The study helps explain how these females can work together to achieve other tasks, said O'Connell-Rodwell, who went on to describe a scene she's witnessed several times as the leaders of a family worked together to save a calf from drowning.

"At our site, we occasionally get newborns falling into the trough. Sometimes the younger mothers get scared and traumatized, they swing their trunk around panicking. They don't know what to do. I've seen the matriarch and another high-ranking female kneel down and wrap a trunk around the baby and pull them out. The little calf is so distraught, the older siblings come and calm him down."

The study also suggests that the use of the longer, repeated calls are a method of communicating messages at a distance to other herds by increasing the length of the signal through both the air and ground. The repetition of this longer signal makes the calls more easily detectable at a distance.

"Most likely they're intending to send a message at a distance,"

O'Connell-Rodwell said. "It's a great recipe for getting your sound to transmit much further."

O'Connell-Rodwell is drawing analogies between humans and [elephants](#) in research conducted with hearing aids at Stanford. The hearing-impaired, she said, are much better at feeling vibrations and could benefit from research like this, which shows how longer, repeated vibratory signals are made and could be more easily detectible.

Provided by Stanford University Medical Center

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