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What Has Four Legs, a Trunk and a Behavioral Database?

A detailed field guide to African elephants includes thousands of video and audio clips.

JOYCE POOLE WAS 6 YEARS OLD and living in Malawi when her family drove north to see the wild African elephants of what is now Kenya's Amboseli National Park. On spotting an majestic male elephant, Dr. Poole's father, who was a serious photographer, stopped the car and started taking pictures. "What will happen if the elephant charges?" Joyce asked nervously.

"He will squash our car to the size of a pea pod," her father replied, squinting through his camera.

A moment later, the elephant charged. Joyce screamed and dived under the seat. Her father yanked the car out of the way. The engine stalled, and the elephant charged again before finally deciding that the tin-canned tourists weren't worth the stampede. For years afterward, Dr. Poole said, "I was pretty wary of elephants."

Yet in the fine rom-com tradition of "Pride and Prejudice" or "When Harry Met Sally," early leership gave way to abiding love. Today Dr. Poole, 55, is a leading authority on the African savanna elephant, the largest land animal on the planet and one of the most cognitively and behaviorally complex.

She and her collaborators have tallied up major insights into elephant sexuality, family life, foraging styles, the elephant social scene and communication strategies, including the startling discovery that elephants can keep in touch with far-flung peers by generating deep, low-frequency signals that we humans can hardly hear. Dr. Poole has spent tens of thousands of hours in the field, observing, tracking and analyzing wild elephants. Now, in a comprehensive project that fellow animal biologists describe as "an amazing achievement" and "an immense treasure case," she and her husband, Pether Granli, have compiled the fruits of her fieldwork into a vast database called the Elephant Ethogram: A Library of African Elephant Behavior.

Released in May by the nonprofit group ElephantVoices, the ethogram is a detailed compendium of the basic flavors and phenomena of elephant behavior: the flaps, ripples, folds and slaps of the elephant's enormous, expressive ears; the way the trunk curls up, stretches out, swivels, probes, plucks, sucks and joints; the subtle swivings of the tail; the not-so-subtle weaves and bobs of an excited male's phallus, which resembles a second trunk and at times gets in a lumbering male's way; the trumpets, rumbles, greetings, pleats, scolds, teases and threats. About 500 behaviors and 110 behavioral suites are described in a variety of contexts, and the library is still growing. And although ethograms of varying thoroughness have been compiled for other species, what makes the new Elephant Ethogram exceptional — and addictive, even for the nonexpert — is its inclusion of more than 3,000 video and audio clips that illustrate the written descriptions.

"It's an incredible scientific accomplishment and a wonderful addition to our knowledge," said Cynthia Moss, founder of the Amboseli Trust for Elephants and another leader in the field. "To have all the postures, gestures, vocalizations, signals displayed and explained in one place, I don't know of anything else like it."

The encyclopedic ethogram arrives amid an ongoing crisis for Africa's wild elephants. In late March, the International Union for Conservation of Nature formally divided African elephants into two distinct species, the savanna elephants described in the ethogram and the smaller, rarer and more elusive forest elephant. Both are now listed as endangered, the forest elephant critically so. In 1913, there were an estimated 10 million elephants across the African continent. Today, only 400,000 or so remain. Elephants continue to be slaughtered for their magnificent tusks, which are highly



The Elephant Ethogram is based on studies of about 6,000 elephants in three groups in Kenya and Mozambique led by Joyce Poole, a leading authority on the African savanna elephant. The database offers major insights into elephant family life, communication strategies and sexuality. Elephants arrange their trunks into a periscope shape, below, used in different contexts.



modified incisor teeth and of much greater utility to elephants than as carved-ivory status symbols displayed on a chess board. But the more serious threat is loss of habitat, and run-ins with people over access to land and water. Elephant biologists argue that the more we understand the elephant mind-set, the greater the odds of keeping elephants alive.

Michael Pardo, a postdoctoral researcher at Colorado State University who wrote his Ph.D. thesis on woodpeckers, switched to studying vocal communication in African elephants three years ago. "Elephant behavior can be subtle, and it's sometimes hard to know why an elephant is vocalizing," he said. "Joyce has spent a lot of time studying the context of different calls, and the videos give me a sense of what I should be looking for in the field."

Dr. Pardo cited the "let's go" rumble, a basso profundo call that a female elephant gives to announce her desire to move on. "I knew these calls exist, but when I went out in the field for the first time, it wasn't as easy to identify as it sounded on paper," he said. The ethogram offers 13 clips of the rumbles to help tomorrow's research tyros.

Daniela Hedwig, a research associate with the Elephants Listening Project at Cornell University who studies forest elephants, said, "African elephants can serve as a really cool study system for the evolution of complex communications systems, including our own language."

The ethogram is based on studies of three elephant populations: two in Kenya, at Amboseli National Park and the Maasai Mara reserve, and the third in Mozambique's Gorongosa National Park, for a total of about 6,000 elephants. The different groups display a number of cultural idiosyncrasies. At Maasai Mara, for example, some elephants will spend a dozen minutes at a time standing quietly over a bush.

"They act as if the bush is something other than a bush, as if it were a calf," Dr. Poole said, and all the while making the face of a mother nursing a calf. All but one of the bush straddlers turned out to be adolescent females, suggesting, Dr. Poole said, that behavior was some sort of maternal training technique they learned from watching others. At Gorongosa, female elephants are averse to people, the legacy of Mozambique's 25-year civil war, when elephants were slaughtered en masse. While many of today's Gorongosa elephants were born after the war, Dr. Poole said, "they learned a culture of aggression from their mothers,



Dr. Poole, above left, taking field notes as she records elephant vocalizations in Amboseli National Park in Kenya. She and her husband, Pether Granli, have spent tens of thousands of hours in the field observing wild elephants.

grandmothers and great-grandmothers."

Wherever elephants live, they appear to build up their extensive social vocabulary through a mixing and matching of familiar gestures and sounds. Context is key. Elephants frequently arrange their trunks into a periscope shape, for example. From a calf, it may indicate a desire to suckle. In a young male, a desire to play. Elephants also adopt a periscope trunk when sensing something of unusual interest or danger. Ear-spreading can serve as a warning or a friendly hello, depending on how many times the ears flap wide, whether they are folded or lifted and the angle of the chin.

Through it all, wild elephants love to keep in touch — literally, with their bodies; olfactorily, through odors that dribble down from temporal glands and that other elephants can detect through their trunk-length nasal cavities, which are more sensitive than a bloodhound's; or acoustically, through rumbles, barks, roars and trumpets. The rumbles sound like very deep cat purrs, and they are by far the elephant's most common

and diverse vocalizations.

"Some are quiet, some are loud, some rise and fall in pitch," Dr. Pardo said. He has preliminary evidence that elephants use rumbles to call one another by name.

Which is never Dumbo or Bimbo. Aristotle had a point when he judged elephants "the animal which surpasses all other in wit and mind." Elephants have been shown through the famed mirror-recognition test to have a sense of self-awareness, and females — who form the core of elephant society — keep track of hundreds of individuals through networks of family unit, bond group and clan, out to the whole population.

Elephants are not dumb, but they are kindly. "Elephants display some of the characteristics we would like to think we have," Dr. Moss said. "They're very caring of their families and tolerant of nonrelatives."

An adult male may weigh twice a female's 7,000 pounds, yet he doesn't play the harassing baboon. "Even these big males in musth, when they have surging testosterone, they are so gentle with females and calves," Dr. Poole said. Instead, a bull spends his annual two- or three-month stint of erotic drive searching for willing females in estrus, or fighting with other males.

Otherwise, elephants are relentless gourmands, spending some 16 hours a day pulling down branches, rummaging through bushes and nimbly stripping off foliage. Elephants are considered ecosystem engineers, opening up opportunities for an array of smaller life-forms. At the same time, elephant appetites can lead them to raid orchards and gardens and destroy a subsistence farmer's livelihood overnight.

Elephant biologists and conservationists concede that cohabiting with elephants is not easy but said that the thought of their extinction is unbearable. "It would be a very sad Earth," Dr. Moss said, "if there weren't elephants striding across it."