

Dorothy L. Cheney (1950–2018)

Primatologist who gave voice to animal communication and cognition.

Dorothy Cheney, who died in November 2018, was best known for her long-term studies of vervet monkeys in the Amboseli basin of Kenya and chacma baboons in the Okavango Delta of Botswana. Dorothy collaborated with her husband Robert M. Seyfarth throughout her career, pioneering the use of playback experiments in studies of free-ranging primates. These experiments allowed them to rigorously test hypotheses about the meaning of vocal signals and social knowledge in an ecologically valid context. Their work made primatological research relevant to a much broader array of disciplines, including philosophy, linguistics, cognitive science, comparative psychology and behavioural ecology, and transformed our knowledge of how non-human animals understand their social worlds.

In addition to over 150 articles and book chapters, Dorothy and Robert produced two comprehensive syntheses of work on social cognition, *How Monkeys See the World: Inside the Mind of Another Species* (1990) and *Baboon Metaphysics: The Evolution of a Social Mind* (2007). These books provided authoritative synthetic analyses of the current state of knowledge about communication and social cognition of primates—weaving together empirical evidence and experimental studies from their own research with relevant work from a wide range of disciplines. Dorothy was also one of the five co-editors of the *Primate Societies* (1987), a volume that has had a prominent place on the bookshelf of every working primatologist for three decades.

Dorothy was born in 1950 and earned her undergraduate degree in political science from Wellesley College. She originally intended to attend law school, but a fateful decision to accompany her husband to South Africa, where he was planning to study chacma baboons, altered her career plans. Instead of law school, she earned a PhD at Cambridge University under the supervision of Robert Hinde. Later, Dorothy and Robert moved to Rockefeller University where they worked for several years with the late Peter Marler, a leader in the field of animal communication. Dorothy and Robert joined the faculty at the University of California, Los Angeles in 1981, and in 1985 they moved to the University of Pennsylvania where Dorothy became a professor of biology.



Credit: Robert M. Seyfarth

Inspired by Peter Marler, Dorothy and Robert began a study of vocal communication in vervet monkeys in Amboseli National Park. They recorded vocalizations of individually identified monkeys and then played the vocalizations back to the monkeys under carefully controlled conditions to observe their responses. One of their most important experiments built on Tom Struhsaker's observation that vervet monkeys produce different alarm calls for different predators and respond differently to each. Dorothy and Robert used playback experiments to demonstrate that vervet monkeys responded to the different (recorded) alarm calls for snakes, raptors and leopards in the same way that they would have responded to the sight of these predators. In other words, they showed that listeners are able to extract sophisticated meaning from their group members' calls. This finding had a profound impact on the study of language origins and primate cognition and laid the foundation for the highly active research field of 'referential communication' in animals.

Dorothy and Robert also provided the first insights into what monkeys know about their social world. For example, they played the distress calls of infants to females to find out whether they could recognize the calls of their own infants. As expected, mothers stared in the direction of the hidden speaker when they heard their own infants' calls. However, Dorothy and Robert inadvertently discovered that when other females heard the calls,

they looked at the mother, suggesting that they were aware of relationships between other mothers and their infants. This provided the first evidence of what we now call third-party knowledge and was later extended to knowledge of other individuals' dominance relationships.

Robert and Dorothy were invited to take over the late William J. Hamilton's long-term study of baboons in Moremi and began their work there in 1992. Although initially disappointed by the baboons' relatively small call repertoire, the pair came to appreciate the rich complexity of the baboons' social lives. They learned that baboon calls carry acoustic information about the identity of the caller and that the calls provide reliable information about the callers' intentions and fighting ability. Like vervets, baboons represent other individuals' kinship ties and dominance relationships, categorizing others according to their individual traits and their membership in higher order groups. They also found that the baboons have some capacity for causal reasoning.

Dorothy played an important role in collaborative efforts to extend studies of vocal communication to investigate how monkeys perceive events in their day-to-day lives. Using noninvasive techniques for extracting hormone metabolites from faecal samples, she and her colleagues assessed baboons' responses to potentially stressful events, such as a change in the male dominance hierarchy or the loss of a close relative. For example, male chacma baboons often commit infanticide after

they immigrate into groups and acquire top-ranking positions. Studies of females' stress hormone levels before and after changes in the identity of the top-ranking male showed that lactating females, whose infants were most vulnerable to infanticide, exhibited the most pronounced increases in these hormones—suggesting that these females had some understanding of their own risk. Long-term behavioural and demographic data collected by a series of investigators working under Dorothy and Robert's supervision also documented the positive impact of social bonds on female reproductive success and longevity.

In recognition of her academic accomplishments, Dorothy was elected to the National Academy of Sciences and the American Academy of Arts and Sciences in 2015. She held an honorary PhD from University of Neuchatel, Switzerland (2013) and received the Distinguished Primatologist Award from the American Society of Primatologists (2016) and the

Distinguished Animal Behaviorist Award from the Animal Behavior Society (2016).

Dorothy was also an outstanding mentor to her doctoral students and postdoctoral fellows. She provided direct and sometimes bracing feedback, along with unstinting support and encouragement. Many who worked with Dorothy became part of her academic extended family, sharing a strong connection with each other.

In addition, Dorothy was a valuable role model for a generation of academics trying to balance the (often) conflicting demands of academic life, fieldwork and family. Dorothy and Robert brought their own children, Lucy and Keena, to the field for extended periods, and many families made Baboon Camp their temporary home. We fondly remember warm afternoons fishing from the sandy beaches of the Boro River, convivial dinners under the stars, song sessions around the campfire and endless gossip about the baboons. Dorothy had the uncanny ability to find parallels

between the baboons' social dilemmas and personalities with those of characters in Jane Austen novels. Her sharp mind, dry wit and abiding fondness for the animals she studied endeared her to many. □

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