Dorothy Cheney (1950–2018)

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Dorothy Cheney died in November 2018 of metastatic breast cancer. Her death ends a remarkable scientific career and partnership with her husband, Robert M. Seyfarth. Together they made major contributions to the study of language origins and social cognition in primates.

Dorothy obtained her PhD at Cambridge University under the supervision of the late Robert A. Hinde, who pioneered the study of social relationships in primates. Hinde considered social relationships to be the emergent outcome of a contingent series of interactions between two individuals. In her PhD thesis, Dorothy documented the social relationships of juvenile chacma baboons, and the nature of social relationships became a continuing theme in Dorothy's research over the course of her career.

After receiving their PhDs, Dorothy and Robert went to work with the late Peter Marler, an expert on animal communication. They began what was to become a long-term study of vocal communication and behavior of vervet monkeys in Amboseli National Park, Kenya. One of their most important findings built on Tom Struhsaker's previous observation that vervet monkeys produce different alarm calls for different predators, and respond differently when they encounter these predators. 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

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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.

Although Dorothy and Robert first used playback experiments to study the function of vocalizations, they soon realized that they could also use playback experiments to probe the extent of monkeys' knowledge about the world. For example, in one of their early studies of vervet monkeys they played the screams of infants to females. As expected, mothers responded more strongly to the screams of their own infants than to the screams of other infants. However, Dorothy and Robert also observed that when other females which heard infant screams, they looked toward the infant's mother. Similarly, when Dorothy and Robert analyzed the pattern of redirected aggression they found that the monkeys selectively targeted the kin of their former opponents. The experimental and observational data suggest that monkeys have some idea of the nature of relationships between other group members.

This body of work has played an important role in discussions of the selective pressures that shape primate cognition. According to the social intelligence hypothesis, the challenges of living in large and complex social groups have favored the expansion and reorganization of the primate brain. While authors of comparative studies debated the relative importance of social and ecological factors in the evolution of primate brains, Dorothy and Robert realized that it was equally important to document what other primates actually know about their social world and how they used this knowledge in their everyday lives.

Social cognition became a primary focus of the long-term project on baboons that Dorothy and Robert began in the early 1990s. They were invited by the late William J. Hamilton III to take over his long-term study of chacma baboons in the Okavango Delta of Botswana. Working with a series of colleagues, Dorothy and Robert showed 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. Baboons also modify their call production in different social contexts and for different audiences. Like vervets, baboons represent other individuals' kinship ties. They also represent others' 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.

One of the most important features of Dorothy and Robert's work was that they linked the selection pressures that shaped the lives of the animals that they studied to their study of vocalizations, cognition, behavior, and physiology. For vervets, predation is a major source of mortality (and anxiety), and natural selection has favored the evolution of alarm calls that provide information about the type of predator. For baboons in Moremi, infanticide is a major source of mortality, as males often kill unweaned infants when they enter new groups and rise to the top-ranking position. That provided the context for a series of playback experiments that showed that males selectively respond to the distress calls of their female "friends," and analyses of fecal cortisol levels that showed that lactating females had the strongest responses to the appearance of new males and social instability in their groups.

In addition to more than 150 articles and book chapters, Dorothy and Robert produced two comprehensive and accessible 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). Dorothy was also one of the five coeditors of *Primate Societies* (1987), a volume that has had a prominent place on the bookshelf of every working primatologist for three decades.

In recognition of her academic accomplishments, Dorothy was elected to the National Academy of Sciences (2015) and the American Academy of Arts and Sciences (1999). She held an honorary PhD from the University of Neuchâtel, 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).