



Good case studies reveal something important

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Unexpected encounters bring us excitement and emotion

Let me start with one episode that I happened to witness when I observed a group of gorillas at the San Diego Wild Animal Park (now, San Diego Zoo Safari Park), CA, USA. Unlike in wild gorillas, an 11-year-old female lived with her 21-year-old mother. One year earlier, she had given birth to her first baby, but she failed to look after it correctly, and often left it abandoned on the ground (this baby was eventually removed and hand-reared). On the day she gave birth to her second baby, the young and still relatively inexperienced mother put the baby on the ground just in front of her own mother (i.e., the baby's grandmother). The grandmother immediately grasped the baby's arms, lifted him up, and moved him closer to the mother, who then accepted her baby in her right hand (Fig. 1). Such acts of baby-transfer between the two adult females occurred repeatedly during the first few days after birth, during which the young mother showed improving maternal care (Nakamichi et al. 2004). Even now, 22 years later, I still vividly remember the strong emotion at that moment when I witnessed that scene. Reviewing this episode together with some other rarely observed cases of maternal care of newborns in great apes, Sarah B Hrdy points out in her book *Mothers and Others* that “such admittedly rare incidents nevertheless reveal something important” (Hrdy 2004, p. 237).

Regardless of whether in the wild or in captivity, primatologists often start observations or experiments on targeted individuals or groups with clear aims, hypotheses, and data collection methods decided upon after preliminary observations or experiments. After finishing collecting data, they organize the data, examine the hypotheses using appropriate

statistical methods, and write up their manuscript for submission to a scientific journal. This is a very common way of conducting research. Needless to say, countless articles following this process have revealed many previously unknown aspects of the lives of primates, thus contributing to advances in primatology. At the same time, however, while conducting long-term studies on wild or captive primates, primatologists often happen to encounter unexpected or new events that are rarely observed. If these cases could be recorded “scientifically” and not just anecdotally, and then reported along with some theoretical implications, the accumulation of such cases could also be extremely valuable for our understanding of primates. In other words, we need case studies that include excellent observational data and have theoretical implications. We may also say that these two types of studies—systematic, regular data collection and notable rare or unusual events—should go hand in hand for further advances in primatology. Accounts by many of the leaders in primatology reveal that when they encountered uncommon events such as group fission, takeovers, infanticides, cannibalism, injured individuals and so on, with their keen eyes for observation and attention they promptly realized the importance of such events, and did their best to record and describe them in detail (see papers in the Collection of *Primates*, “Primate tales: memoirs from leaders in primatology,” such as those by Sugiyama, 2022; Struhsakert 2022). One might think that there might be no more such uncommon and important events that are worth reporting, but I do not agree with that view. Let me present the example of one old, but currently thriving research field which needs case studies.

Death-related behaviors in primates

It is almost impossible for researchers to systematically collect data about how animals respond to their dying and dead group members because it is very difficult to predict who will die, when and where, particularly in the wild. Earlier observers often described animal responses to their dying

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Fig. 1 Baby-transfer from a 21-year-old grandmother to an 11-year-old mother. As soon as the mother placed her recently newborn baby on the ground in front of the grandmother (*left* in the photos), the grandmother grasped it by the arms, lifted it up and presented it to the mother, who accepted it with her right hand (from Nakamichi et al. 2004)

and dead conspecifics anecdotally; however, the number of papers documenting such episodes more scientifically is increasing (Goncalves and Biro 2018; Anderson 2020). This is because when researchers have been observing animals for long periods for their own study aims, and when they encounter unexpected situations such as a death, they can record how others respond more accurately. As a result, based on accumulating findings of how other animals respond behaviorally and psychologically to dead or dying conspecifics through noninvasive, observational studies, a new research area has developed: comparative thanatology or evolutionary thanatology (Anderson 2016, 2018). Attempts to organize such data and then to reveal mechanisms and possible adaptive functions are needed (Anderson 2020).

I am one of those fortunate primatologists who has encountered deaths in nonhuman primates and who has been able to record what happens in those situations quantitatively. When I observed wild groups of ring-tailed lemurs (*Lemur catta*) in Madagascar, I recorded responses of six mothers to their dead infants (Nakamichi et al. 1996). Unlike most monkeys and apes, ring-tailed lemur mothers' attempts to grasp their dead infants were so clumsy that they could not carry them (Fig. 2). Instead, they repeatedly moved back and forth between the corpse and the group and vocalized whenever they were far away from the corpse, the group or both on the day of death, suggesting that the mothers were experiencing psychological conflict, between the desire to stay with their dead infant and with the group at the same time. By contrast, mothers of most monkey and ape species do not experience such conflict because they can carry the dead infant.

Many case studies on how American and Afro-Eurasian monkey mothers respond to dead infants are now available. We now know that not all mothers carry them. In Japanese macaques, around 30% of infants who died within 30 days after birth were carried by the mother (Sugiyama et al. 2009). In other words, we do not know how the

remaining 70% of mothers responded to their dead infants. We are very likely to report responses to corpses, but we may be less likely to pay attention to mothers who do not carry their dead infants. Moreover, few papers describe responses of other group members to mothers who carry dead infants. Relatively few reports have documented the process up to the moment a mother abandons her infant's corpse; both decomposition and the foul smell from the infant's corpse may cause abandonment (Sugiyama et al. 2009; Fashing et al. 2011). I witnessed a Japanese macaque mother moving around, climbing onto large boulders and up into trees, looking around and vocalizing. She was no longer carrying the mummified corpse of her infant which she had carried for the 30 previous days; her behaviors suggested that she was now looking for it, but had not abandoned it (Nakamichi 2019, Fig. 3). Moreover, far fewer papers on responses of group members to deaths of adult individuals have been published. More data on more species, from both wild and captive studies, are needed to advance our understanding of death-related behavior



Fig. 2 A multiparous ring-tailed lemur mother (7 years old or more) holding her dead infant in a clumsy manner. She was not able to carry it, but she moved back and forth between the dead infant and her group five times on that day (photo by M. Nakamichi)



Fig. 3 An 18-year-old multiparous female Japanese macaque had been carrying the now-mummified corpse of her infant for 30 days after its death (*left*). Several hours after the photo on the left was taken, she was seen moving around without the corpse, visually scan-

ning the environment and emitting vocals such as *gya* (*right*), suggesting that she had lost the corpse and was looking for it (photos by M. Nakamichi)

and emotional states of animals. As good case studies are needed in comparative thanatology, they are also needed to deepen our understanding of many other aspects of primate behaviors.

What are “good” case studies?

In the editorial of the July 2021 issue of *Primates*, Naofumi Nakagawa, Associate Editor of *Primates*, presented a summary of the volume of case studies published in primate journals. He stressed the importance of case studies including infrequently observed behaviors and those which are seen in some groups but not in others, and then called for *Primates* to continue to be a platform for accounts of infrequently observed behaviors in primate species (Nakagawa 2021). In response to his editorial, albeit belatedly, I would like to agree with him. For more than 60 years since the start of its publication in 1958, *Primates* has published case studies not only in News and Perspectives (formerly referred to as Short Communications) but also as Original Articles, and these have contributed to our understanding of the complicated lives of primates. This is also true for more recently published case studies: many examples published as News and Perspectives in the past 6 years have attracted wide attention (i.e., have been read or cited frequently; e.g., Botting and Waal 2020; Campbell 2019; Corredor-Ospina et al. 2021; Hirata et al. 2017; Lu et al. 2021; Makur et al. 2022; Manguette et al. 2020; McLester et al. 2019; Mendonça et al. 2020; Takeshita et al. 2020; Tokuyama et al. 2017; Torralvo et al. 2017; Trapanese et al. 2020). These papers cover a range of topics including responses to dead and injured animals, cannibalism, tool use, predation, mixed-species associations, and dispersal by pregnant gorillas. As in the past, I hope the journal *Primates* will continue publishing good case studies on various topics.

But what are good case studies? It is not easy to clarify the requirements. If we examine both what the above-mentioned case studies describe, and how the contents are described, we may understand what makes these papers attractive. Clearly, they all describe the importance of the observed events and the reports include some theoretical implications that contribute new knowledge in the field. They also include clear and concise descriptions of each case and, where possible, quantitative data (more detailed information is sometimes offered as supplementary material), and some present multiple cases (Botting and Waal 2020). Comparisons between a targeted individual and others such as a sick one or healthy, similar-aged peer can also enhance the value of the case study (Matsumoto et al. 2016). Moreover, most of them offer good color photos or videos as supplementary information; these are tangible proof of observations and very helpful for readers to envisage the events. Good case studies such as these can throw light on animals’ flexible behavioral characteristics as well as their limitations, which might be impossible for us to understand through observations restricted to “usual” situations.

There is one more thing which I would like to add here: it concerns “no response”. Just as monkey mothers who do not carry their dead infants are rarely reported, few studies describe either the lack of vocalizations by monkey mothers during labor or by their newborn babies immediately after birth. When I surveyed the literature on primate births to confirm that, unlike human females, nonhuman primate females give birth silently, I noticed that authors appear much less likely to describe an animal not showing a certain action than they are to describe an animal displaying one. Depending on the situation, it can be important to report not only rarely observed behaviors but also some behaviors not displayed by animals.

I hope that the events that primatologists encounter unexpectedly and record with enthusiasm and accuracy

will continue to be published as good case studies not only in *Primates* but also in other scientific journals. Such case studies can be highly attractive and can unveil unknown aspects of primate behaviors and societies.

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