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Deposit and Theft? Two Unusual Interactions over Wild Plant Food between Adult Chimpanzees in Mahale

Takuya Matsumoto[1,2,3] *& Hiroko Sakuragi*[1,4]

1 *Japan Society for the Promotion of Science (JSPS) Research Fellow*
2 *Graduate School of Science, Kyoto University, Japan*
3 *Research Institute for Humanity and Nature, Japan*
4 *Wildlife Research Center, Kyoto University, Japan*
(E-mail: matsumoto@chikyu.ac.jp)

INTRODUCTION

Food sharing is assumed to be one of the most important behaviors in the process of human evolution (*e.g.*, Isaac 1978). Therefore, its occurrence and characteristics have been studied extensively across primates (McGrew 1975; Jaeggi & van Schaik 2011). Among chimpanzees (*Pan troglodytes*), the most genetically closest species to humans (*Homo sapiens*), food sharing is commonly observed, and relevant data on several populations have been well documented and analyzed (Hosaka 2015).

Food sharing among chimpanzees can often be observed between mothers and infants. Studies suggest that infants learn food items through food sharing from their mothers (*e.g.*, Nishida & Turner 1996). Most of the food items shared among non-kin adults include meat and cultivated food (Boesch & Boesch 1989; Hockings *et al.* 2007; Ohashi 2007). Sharing of wild plant food among adults is rare. Boesch & Boesch (1989) defined six types of food transfer interactions (focusing on meat) and suggested that most are characterized by passive sharing (but see Gilby 2006 for active sharing occurring relatively more often among Gombe chimpanzees). A recipient shows begging behavior and takes a part of the food without any facilitation or resistance from the "possessor", who is defined as an individual in physical contact with the food (McGrew 1975; Jaeggi & van Schaik 2011).

The present study reports two cases of wild plant food sharing among chimpanzees. The events are seemingly similar to those reported by Nakamura & Itoh (2001). However, the cases shown here had notable differences from typical food sharing interactions observed in chimpanzees. The subjects were adult chimpanzees (*P. t. schweinfurthii*) of the M group at the Mahale Mountains National Park, Tanzania (see Nakamura *et al.* (2015) for details on the study site and chimpanzee group).

OBSERVATIONS

Case 1, on February 4, 2013 (observed by TM)

At 15:51 h, an adult female, XP, obtained a lemon (*Citrus limon*) fruit and started to feed. XP placed her right hand on the ground behind her to hold herself up as she sat cross-legged with her 3-month-old infant sleeping on her lap. XP peeled the lemon with her left hand and teeth; twenty seconds later, an adult male, CT, approached and sat beside XP on her left, peering at her mouth. When XP finished peeling the lemon, she divided it into halves using her teeth and placed one half in CT's right foot. CT kept holding the half with the same foot, while XP kept the other half in her left hand. CT kept peering at XP's mouth and did not show interest in the fragment handed by XP. After XP finished eating the first half, she took back the half in CT's foot, all the while CT kept peering at her. Then, XP divided the retrieved half into quarters and had CT hold one quarter with his foot again. After finishing her portion, XP took back the quarter from CT's foot and ate it. At 15:55 h, XP put the last piece of fruit in her mouth while CT continued to peer. XP left the site chewing; CT left 30 s later. Forty seconds after CT moved from the site, he obtained a lemon fruit for himself.

Case 2, on July 19, 2015 (observed by TM and HS)

At 12:37 h, an adult female, BD, was found holding four fruits of *Tabernaemontana pachysiphon* (two bunches with two fruits each) on a tree. Another adult female, RJ, rushed to BD and tried to pull the fruits toward herself. BD screamed, apparently resisting; however, RJ succeeded in snatching a bunch. BD started to eat a fruit of the other bunch while RJ placed the bunch snatched from BD at her feet. RJ then pulled the fruit that BD was eating using both hands and started to feed on it (for details of the event after then, see Video 1 available online at http://mahale.main.jp/PAN/2018/004.html). Both BD and RJ held the fruit, although only RJ was able to eat it. After a while, BD moved slightly away from RJ and the fruits. After finishing the first fruit, RJ started to eat the second fruit from the bunch. A while later, BD re-approached, then touched and peered at the fruit that RJ was eating. RJ seemed to share a small piece once by mouth-to-mouth transfer. BD tried to pull the fruit toward herself and eat it; however, RJ resisted by biting BD's arm and face (Figure 1). RJ started to eat the third fruit, which allowed BD to have the second's leftover. However, most edible portions of the second fruit had been consumed by RJ. BD peered at the third fruit that RJ was eating, but RJ did not share. At 12:44 h, BD left the site. RJ continued feeding and ate all four fruits. There were no individuals other than BD, RJ and RJ's infant in the vicinity.

DISCUSSION

Although some studies operationally define possession as being in physical contact with the item (McGrew

Figure 1: An adult female, RJ (right), exhibited threatening behavior toward an adult female, BD (left), which tried to take back the *Tabernaemontana pachysiphon* fruit.

1975; Jaeggi & van Schaik 2011), Case 1 in the present study raises a question to this definition. CT kept peering at the piece of lemon that XP was eating while apparently showing no interest in the fragment handed by her. XP took the lemon fruit back from CT's foot as if from her own and ate the entire fruit by herself. Both individuals seemed to share the awareness that the fruit held by CT belonged to XP, even though the individual in physical contact with it was CT, not XP. XP had only one hand available for handling the fruit, for three of her limbs were occupied: legs with her sleeping infant, arm for holding herself up. It seems plausible that XP may have used CT's foot so as not to get dirt on the surface by placing it on the ground. She would have used her own foot to hold a peeled fruit if her feet had not been occupied. This rare behavior of XP may lead to a better understanding of plant food sharing in terms of social significance as follows.

If CT was motivated simply to feed on lemon, he could have easily done so on his own in the same area. However, he chose to stay beside XP and continued to peer at her mouth. Interestingly, he did not recognize the piece of fruit that XP put in his foot as having been shared, or given, by her. Within 1 h before this event, CT had groomed XP for approximately 10 min unilaterally and followed XP intermittently, showing his strong motivation to interact with XP. These observations suggest that it was important for CT to receive from XP what she was eating, not what she put aside when eating. Case 1 supports the suggestion by Slocombe & Newton-Fisher (2005) that plant food sharing between adults may not always be explained by nutritional benefits, but by social significance.

Food sharing in Case 2 can be interpreted as a forceful event because (1) BD resisted by screaming and attempted to reclaim the food and (2) RJ showed a threatening attitude toward BD. This can be assumed as theft, which is one of the 6 types of food transfer interactions defined by Boesch & Boesch (1989). The availability of *T. pachysiphon* fruits is not so high because chimpanzees check and try to select ripe fruits. Thus, these fruits may have been so attractive that RJ took them from BD. Theft accounted for 31.0% (44 out of 142 captures) of contests over prey following capture in chimpanzee predation on mammals during the 1991–1994 period (Hosaka *et al.* 2001). *T. pachysiphon* fruits might have been as attractive to RJ as meat that she snatched it in Case 2.

No data are available on the social rank of BD and RJ. Both immigrated to the M group at the same period in 2010 (Hayakawa *et al.* 2011) and have often traveled in the same nomadic party. Furthermore, BD has taken care (*e.g.*, carrying) of RJ's infant frequently (Sakuragi, unpublished data). It is notable that this forceful food transfer occurred between relatively close individuals.

Previous studies on chimpanzee food sharing have focused on meat sharing and have found that possessors gain fitness benefits from sharing (*e.g.*, Gilby 2006). However, the two cases shown in this study reveal that food-related interactions in chimpanzees are quite diverse. The first case especially calls for reevaluation of the possessor–recipient dichotomy regarding food transfer. It is difficult to reach any general conclusion from these two cases alone; more detailed descriptions and analyses of interactions related to food transfer are required to elucidate the concept of "possession" of food in chimpanzee societies.

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