

Behavioral Study of Sociality in Captive Elephants

Saki Yasui

Kyoto City Zoo

Background

Understanding the sociality of various animal species is important. Elephants form complex fission–fusion societies centered on matrilineal groups. Although it is important to identify the social relationships between females to gain a better understanding of their society, relevant information on this is limited. As such, the first goal of this thesis was to contribute to our understanding of the sociality of elephants in captivity by making detailed observations of their social behaviors and conducting formalized personality assessments. For elephants in captivity, the human–elephant relationship is one of the most important factors contributing to their well-being. However, it has not yet been well studied. The second goal of this thesis was to investigate the caretaker–elephant relationship. This was achieved by conducting direct observation of a mahout, which are the people who take care of and work with elephants in some Asian countries, and their elephants, as well as examining personality-related factors. In Chapter 2 of the thesis, I assessed different elephant personalities and investigated whether sex, age, captive conditions, and genotype influence elephant personalities. In Chapter 3, I investigated the functions of the elephant behavior of touching with the tip of their trunk, which was a prominent behavior between elephants. In Chapter 4, I used the results from Chapter 3 to analyze the social relationship among elephants using social network analysis. Lastly, in Chapter 5, I investigated whether the proximity between elephants and mahouts influences the frequency of social behaviors among the elephants.

Methods

I sent elephant personality questionnaires to the keepers of 75 captive Asian and African savannah elephants to investigate the personality structure of elephants using factor analysis. I also used 196 elephant DNA samples to search for genetic polymorphisms in the genes expressed in the brain that have been suggested to be related to personality traits. Thereafter, I examined the associations between personality scores and genotype, age, sex, housing style, and management procedure for 17 Asian and 28 African savannah elephants.

For the research conducted in Chapters 3 to 5, the subjects were 17 captive Asian elephants at the Elephant study center in Surin Province, Thailand. I directly observed and recorded all the social

behaviors of the elephants using focal animal sampling. I also recorded the distances between the focal animal and its mahout every minute. I analyzed the correlations between the data on the frequency of the trunk touching behavior and the proximity index and the contexts before and after trunk touching to reveal the functions of the behavior. The social relationships between subjects were investigated using social network analysis of affiliative and aggressive behaviors. To examine the mahout–elephant relationships, I investigated the correlation between the proximity frequencies of the mahout–elephant pairs and the frequencies of the social behaviors involving the elephants.

Results

The elephant personality was composed of five dimensions according to the factor analysis: dominance, agreeableness, neuroticism, curiosity, and impulsiveness. Three of the examined genes contained polymorphic regions, and the acheate-scute homolog 1 (*ASH1*) genotype was associated with neuroticism in Asian elephants. In addition, subjects with short alleles of *ASH1* had lower scores of neuroticism than those with long alleles.

The study elephants usually touched each other with their trunks positioned in a U shape (U-type) and sometimes in an S shape (S-type). The frequency of the U-type touch was positively correlated with the proximity index in elephant pairs and it was more frequently observed when the elephants were disturbed. However, the S-type touch was occasionally observed in agonistic contexts, particularly among adults. The individuals that had been in the group for a long time tended to play a central role in affiliative relationships. Both in the affiliative and aggressive networks, I found some subgroups with a few individuals in the subject group. The elephants that maintained proximity to their mahouts for longer periods showed fewer interactions with other elephants.

Discussion

“Impulsiveness,” which is one of the dimensions that I found in the elephant personalities, is similar to “conscientiousness,” which has only previously been found in humans and chimpanzees. This might suggest that elephants are socially complex. The differences found in the *ASH1* genotype may generate differences in the efficiency of dopamine transmission and lead to differences in neuroticism in elephants.

The S-type touch appeared to be a threat or dominance behavior, whereas the U-type touch appeared to be an affiliative behavior that was used for reassurance. Therefore, I suggest that despite the S-type touch having a tactile component, it is likely to play a similar role to visual threat display in other mammals. However, the U-type touch plays a similar role to social grooming in primates or flipper rubbing in dolphins, and it can be used as an indicator of affiliative relationships. The results in Chapter 4 suggest that the individuals that knew the other group members well and were familiar with the relationships between the group members might play an important role in affiliative relationships. The

results also suggest that Asian elephants might not form close relationships with many individuals, regardless of the relatedness between individuals. The result in Chapter 5 suggest that very close relationships between mahouts and elephants could weaken the relationships between individual elephants.

Conclusions

From the aspect of personality, this study demonstrates a strong sociocognitive ability in elephants that may be comparable with that in primates. Further study is required on the links between personality and genotypes in elephants to apply this knowledge for improving the practical management of captive elephants. Importantly, I identified the characteristics of social relationships between female Asian elephants implying that Asian elephants might only develop close relationships with fewer individuals and place more value on these relationships than African savannah elephants. The finding regarding relationships between mahouts and their elephants suggests that the manner in which caretakers build their relationships with the elephants is significant for the successful management of captive elephants.