

Comparisons of intraunit relationships in nonhuman primates living in multilevel social systems

Abstract

Multilevel social systems have evolved in several species of cercopithecoid primates and appear to be an effective means of changing group size amid variation in environmental conditions. Larger groupings of these species fission and fuse, making intraunit relationships essential to maintain the integrity of the smallest social units. We examine these intraunit relationships in four primates with multilevel social systems: proboscis monkeys (*Nasalis larvatus*), snub-nosed monkeys (*Rhinopithecus roxellana*), hamadryas baboons (*Papio hamadryas*), and geladas (*Theropithecus gelada*), using social network analysis. The proboscis monkeys and hamadryas baboons were wild and unprovisioned, whereas the snub-nosed monkeys and geladas were partly provisioned. Comparison of eigenvector centrality coefficients revealed a phylogenetic difference in the key individuals maintaining social networks between the colobines and the cercopithecines: females were more central in proboscis and snub-nosed monkeys, with males generally peripheral to social interaction, whereas males were more central than females in geladas and hamadryas. A comparison of sex differences in clustering coefficients, however, revealed a significant difference only in geladas, suggesting that one-male-multifemale units in this species become more unstable when females, but not males, are removed from social networks. Taken together, our results reveal the strongest differences between geladas, characterized by female philopatry and male dispersal, and the three species with bisexual dispersal. These results demonstrate the potential for social network analysis to reveal the social bonds most important for maintaining cohesion of the smallest units of primate multilevel societies. This, in turn, can serve as a proxy, in the absence of long-term data, for underlying patterns of sex-biased dispersal and philopatry.