Dominance among female white-faced capuchin monkeys (Cebus capucinus): hierarchical linearity, nepotism, strength and stability

Mackenzie L. Bergstrom & Linda M. Fedigan

(Department of Anthropology, University of Calgary, 2500 University Drive NW, Calgary, AB, Canada T2N 1N4)

(Accepted: 5 March 2010)

Summary

Research on Old World primates provided the foundation for understanding competitive strategies resulting from social and ecological pressures. The neotropical primate, Cebus capucinus shares many social patterns with Old World cercopithecines (e.g., female philopatry, male dispersal), which may contribute to similar expression of competitive strategies. To clarify the nature of dominance patterns among female white-faced capuchins we examined hierarchical linearity, rank acquisition, matrilineal rank inheritance, hierarchical strength and stability. We collected focal data on 22 adult females (2008) and long-term dominance data (1986–2008) on 33 adult females in Sector Santa Rosa, Costa Rica. Females displayed linear hierarchies based on the direction of dyadic submission. At sexual maturity females quickly acquired rank positions beneath their mother and older sisters. Hierarchies were considered strong based on high proportions of food-related agonism, short latency to detection of hierarchies (21 h/female) and low directional inconsistency scores (<5%). Hierarchies were considered stable based on lack of tied submissive interactions (indicative of uncontested rank positions), low rates of rank change (0.510 changes/year), and long-term stability in matrilineal rank order. These findings enhance our understanding of capuchin social systems and how the competitive strategies of white-faced capuchins compare to those of Old World primates.

Keywords: competitive strategies, rank inheritance, females, neotropical primates, social behaviour.
Introduction

Dominance is a fundamental aspect of social organization for many gregarious mammalian species. It is defined by Drews (1993) as “an attribute of the pattern of repeated, agonistic interactions between two individuals, characterized by a consistent outcome in favour of the same dyad member and a default yielding response of its opponent rather than escalation. The status of the consistent winner is dominant and that of the loser is subordinate”. Thus, dominance relationships form through repeated social interactions, stabilizing in such a way that individuals can often predict the outcome of a contest situation based on previous experiences and proximate social and physical cues (Rowell, 1974; Hinde, 1976; Roney & Maestripieri, 2003). Some species rely heavily on physical differences as measures of fighting ability (e.g., size, males vs. females in sexually dimorphic species; weaponry, pushing matches by male red deer, Cervus elaphus: Clutton-Brock et al., 1986) to settle contests and reinforce previously established dominance relationships. Yet dominance interactions often involve the deference of one individual to the other using less physical aggressive and submissive behavioural displays such as supplantations and avoids (e.g., yellow baboons, Papio cynocephalus: Samuels et al., 1987; African elephants, Loxodonta Africana: Archie et al., 2006). Contests resulting in physical injury to one or both participants are very costly so it is in the individual’s best interest to assess physical and behavioural cues to determine the resource holding power (i.e., likelihood of winning) of their opponent prior to engaging in a competitive interaction (Maynard Smith & Price, 1973). The formation of a dominance hierarchy based on repeated interactions with consistent outcomes involving behavioural cues allows the majority of contest situations to be settled without escalation and physical harm to one or more participating individuals (Kaufmann, 1983).

Many species of primate provide good models for the study of dominance as they maintain structured social groups outside of the mating season and form extensive social networks. Competitive strategies for female primates are directly tied to food resources, and resource acquisition may be enhanced by the presence of related females who behave cooperatively (Trivers, 1972; Wrangham, 1980). As a consequence of group living, female primates are faced with the dilemma of needing to cooperatively unite against predators