Impatient traders or contingent reciprocators?
Evidence for the extended time-course of grooming exchanges in baboons

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Summary

The scarcity of evidence for contingent reciprocity has led to a growing interest in how market forces shape the distribution of exchanges in animal groups. In a biological market, supply and demand determines the value of an exchange, and individuals choose to trade with the partner offering the highest value. Partners maximize their immediate benefits without the need to monitor the balance of their exchange over time. Applied to grooming exchanges in primate groups, a market model predicts that females will primarily balance the amount of grooming they trade within single bouts, particularly when all partners offer similar value. If some partners can offer other benefits, like reduced aggression, females may exchange grooming for those benefits. In such cases, grooming will not be evenly balanced within bouts. Here, we examine the patterning of grooming in a group of free-ranging olive baboons (Papio anubis). In contrast to predictions derived from a biological market model, two-thirds of all grooming bouts in this group were completely one-sided and females did not consistently provide more grooming to higher-ranking partners. Grooming was more evenly balanced across multiple bouts than within single bouts, suggesting that females are not constrained to complete exchanges within single transactions.

Keywords: baboons, biological market model, grooming, rank, reciprocity.

Introduction

Biological market models provide a way to generate cooperation among unrelated individuals without contingent reciprocity. In the biological marketplace, individuals attempt to maximize their benefits in each transaction, and

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select the partner offering the highest value (Nöe & Hammerstein, 1994; Henzi & Barrett, 1999). When the demand for a partner or commodity is greater than the supply, buyers compete for access to the preferred partner by raising the price they are willing to pay (Nöe & Hammerstein, 1994). Simultaneous exchanges, binding offers, or expulsion from the market place make cheating impossible or unprofitable (Connor, 1995; Nöe & Hammerstein, 1995; Henzi & Barrett, 1999). Although most exchanges will occur over short time-scales, when individuals interact repeatedly and commodity values can be measured incrementally, individuals may select partners based on long-term monitoring and balancing of trade (Nöe & Hammerstein, 1994).

Biological market models have been invoked to explain a number of different types of behaviour in several species. For example, large client fish with many cleaner fish partners to choose from receive better service and get bitten by cleaners less often than client fish with limited choice (Bshary, 2001). The balanced exchange of eggs between pairs of hermaphroditic hamlet fish (Hypoplectrus nigricans), once considered to be an example of contingent reciprocity (Fischer, 1988), may actually be stable because individuals have limited opportunities to find additional partners in the widely dispersed population and cannot benefit from defection (Connor, 1992; Nöe, 2001). When a pair of male baboons (Papio anubis) forms a coalition and steals a fertile female from her consort partner, the higher-ranking coalition partner is more likely to subsequently monopolize the female. The higher-ranking partner is ‘paid’ in mating opportunities for the greater value he brings to the coalition (Nöe, 1990, 1992).

Recently, Henzi & Barrett (1999) have used a biological market model to examine cooperative exchanges among female primates. They argue that grooming is a valuable commodity, and predict that females will mainly trade grooming in kind. Individuals will exchange similar amounts of grooming within single bouts, both to avoid being cheated (Henzi & Barrett, 1999) and because they lack the cognitive capacity to monitor exchanges with multiple partners over extended periods of time (Barrett & Henzi, 2002). In some situations, grooming may be exchanged for other commodities, such as access to infants (Henzi & Barrett, 2002) or tolerance from higher-ranking females (Henzi & Barrett, 1999). However, if cognitive limitations restrict their ability to keep track of the balance of trade, exchanges will be limited to goods and services that are provided within a limited time frame.