

## **Supplement H from Aureli et al., ‘Fission-Fusion Dynamics’ (Current Anthropology, vol. 49, no. 4, p. 627)**

### **Demands of Flexibility in the Social Marketplace**

Continuing to focus on taxa that derive from group-living ancestors and in which long-term relationships have important fitness consequences for individuals, we expect higher-FF taxa to vary in the extent to which particular cognitive abilities affect fitness. We suggest that the “peak” in such abilities may occur when the temporal variation in party composition (fig. 1; see supplement C) is highest. This is because the cognitive demands associated with relationship mediation are expected to be greatest in those higher-FF groups with large but variable parties, so that A has to deal with B not just alone or with C but also in parties containing DEF or DGHJ (Johnson 2001).

The demands on cognitive abilities associated with relationship mediation can be especially important when interactions involving multiple individuals are at stake and occur at multiple levels. For example, interactions among different coalitions of dolphins can have an impact on relationships within a particular coalition and vice versa (Connor, Smolker, and Richards 1992; Connor and Krützen 2003). Updating information about third parties after fusion is critical for choosing coalition partners. We might also expect members of higher-FF groups, especially those with long periods of separation between partners, to discount the future less than members of lower-FF groups because the extended time course of interaction may require individuals to forgo short-term gain for long-term advantage, something that may be particularly important in the domain of coalition formation (i.e., in what can be termed the “coalitional marketplace”; Noë, van Schaik, and van Hooff 1991; Noë and Hammerstein 1995).

Additionally, we can expect there to be noncoalitional marketplace phenomena (e.g., exchanges of food for sex) that may be more complicated when individuals are in parties of varying size and composition (Barrett, Henzi, and Dunbar 2003; Johnson 2001). These have not been well studied to date, but we can hypothesize two ways in which costs of exploiting others differ between higher-FF and lower-FF groups. First, in lower-FF groups it is possible to exploit others but still have alternative partners available, whereas in higher-FF groups an individual may find itself in a party with only those it had previously exploited but could still fission to avoid possible retaliation. Alternatively, exploiting others in lower-FF groups may be riskier in terms of sustaining exchange relationships: if such exploitation is witnessed and other animals use “image-scoring” (Nowak and Sigmund 1998) in their calculations of the costs and benefits of interactions, then exploitative individuals may find others reluctant to interact even if they themselves have not been cheated. By the same token, then, individuals in higher-FF groups may have lower costs of exploiting others because there are fewer witnesses to any specific event.