

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

Some Limitations of Current Socioecological Models

Current models that purport to explain temporal and spatial variation in association patterns in some higher-FF groups (e.g., chimpanzees, spider monkeys) suffer from at least four significant limitations. First, some of the environmental variables considered to be most important in these models are poorly defined (e.g., what constitutes a “patchy” resource distribution, a “defensible” resource, or a “risky” environment?). Each of these terms implicitly refers to some dimension of environmental heterogeneity and ultimately must be linked to the biology of the species being considered, but this is neither easy nor characteristic. Ecological research in general has acknowledged the difficulties involved in describing environmental heterogeneity (Levin 1992; Sparrow 1999).

Second, these variables (e.g., the “patchiness” of food resources, “predation risk,” and the “risk of infanticide”) have proved difficult to quantify. As a result, they tend to be qualitatively rather than quantitatively incorporated into current models. This makes it difficult to predict under what conditions certain grouping patterns should arise simply as a result of the environment’s natural conditions (Wilson and Richards 2000).

Third, the crudeness of field measures often limits the explanatory power of models. For example, for some higher-FF taxa such as chimpanzees and spider monkeys, average monthly party size has been used to characterize flexibility in social organization over time and has been correlated with the average size of patches visited each month and with monthly estimates of habitat-wide fruit availability (Chapman, Wrangham, and Chapman 1995). However, the rate at which party size or resource availability (or even social or demographic variables such as the number of receptive females in a group or infanticide risk) can change is far more rapid than these crude indexes can capture.

Last, a crucial limitation to current socioecological models is the absence of a method for integrating the different variables in the model or for examining the combined effect of changes in several variables. For example, we are likely to be interested in quantitatively exploring how varying degrees of predation pressure, risk of infanticide, and food distribution together influence some aspect of sociality, but we lack the tools to do this.