

Grouping patterns in nonhuman primates

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Primates exhibit a variety of grouping patterns, also called social organizations. Traditional grouping patterns are classified based on the number of adult males and females traveling together. Grouping patterns are often viewed as being organized from simple to more complex, with an implicit and sometimes explicit view that there was an evolutionary transition from one to the next, starting with the basic ancestral mammalian social organization of the solitary foraging mother and her dependent offspring sharing the same home range. Although alternative descriptive terms exist, grouping patterns or social organizations are traditionally classified into the following seven types:

- Solitary: adults that travel and forage by themselves. More recently, “solitary forager” is preferred to highlight the fact that animals that live alone nonetheless interact with their neighbors.
- Pairs: adults that share the same home range with one other adult of the opposite sex. Individuals within pairs can travel and forage separately or together.
- Extended families: adults that travel together in the same home range with one or more adults of the same or opposite sex but with only one breeding female.
- Single-male/multi-female groups: adult females that travel together in the same home range with other adult females and one adult male. Numbers of adult females in such groups can vary from two to more than 20.
- Multi-male/multi-female groups: adult females that travel together in the same home range with other adult females and

more than one adult male. Primates exhibiting this grouping pattern typically have more adult females than are found in single-male/multi-female groups.

- Multi-level groups: adult females that travel together in the same home range with other adult females and at least one adult male, and that regularly assemble with similar units at common sleeping sites. Depending on the species, the smallest units are called “reproductive units” or “one-male units.” When units interact with each other they form a “band” or “clan,” respectively, and several bands or clans that interact form “herds” or “bands,” respectively.
- Fission–fusion groups: adult females and males that at different times travel alone or with other adults of either sex within the same home range.

A recent evolutionary framework argued that, rather than the stepwise fashion of increasing size and complexity of social organizations described above, the initial solitary forager social organization led to loose aggregations of multiple females and males, and then to cohesive multi-male/multi-female groups. This social organization later spawned both pairs and single-male/multi-female groups (Shultz, Opie, and Atkinson 2011).

Stepwise evolutionary frameworks do not readily account for the fact that different grouping patterns can be expressed in the same species. An alternative framework is demographic, suggesting, for example, that the transition from single-male/multi-female to multi-male/multi-female groups can occur when maturing males remain in the natal group (Eisenberg, Muckenhirn, and Rudran 1972). This approach importantly recognizes that dispersal patterns contribute to grouping patterns (see DISPERSAL). Dispersal patterns are directly responsible for the kinship structure underlying observed

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grouping patterns, and reveal another weakness of the evolutionary framework. For example, both vervet monkeys and red colobus monkeys live in multi-male/multi-female groups and thus, according to the evolutionary stepwise framework, would have evolved from the same precursor. However, female vervets are philopatric and remain in their natal groups throughout their lives, whereas female red colobus disperse to other groups at sexual maturity, suggesting that their social organizations evolved independently.

While unrelated genera such as vervet monkeys and red colobus monkeys can have similar grouping patterns, more often congeners have similar grouping patterns. This suggests that there are indeed evolutionary forces operating on social organizations, if not in the transitions between grouping patterns, then at least to some degree in phylogenetic constraints. For example, all species in the genus *Cercopithecus*, commonly known as guenons, form single-male/multi-female groups. However, it is important to recognize that consistency may at times be a human construct. In this case, vervets, which typically live in multi-male/multi-female groups, were until recently included in the genus *Cercopithecus*.

Similar social organizations in unrelated species have been interpreted as convergent evolution driven by similar ecological conditions. Habitat preference, diet, and diel activity have long been thought to influence grouping patterns (Clutton-Brock and Harvey 1977) (see FORAGING STRATEGIES). For example, almost all nocturnal insectivores are solitary foragers regardless of phylogenetic relatedness, and nearly all terrestrial primates live in multi-level or multi-male/multi-female groups. Predation and food abundance/distribution have also been viewed as major ecological determinants of grouping patterns. For instance, it has long been assumed that group living is a function of predation pressure, and that adding more

group members reduces predation pressure, an assumption derived from primates living in open habitats where predation is assumed to be greater than in forested habitats. These assumptions have yet to be adequately tested. More evidence exists that group size is a function of energetic constraints on daily travel. Animals in larger groups typically move farther per day than animals in smaller groups, and maximum group size may be reached when food intake cannot provide enough energy for more travel. Understanding the underlying causes of diverse grouping patterns is a major focus of the field of socioecology (see SOCIOECOLOGICAL MODEL).

SEE ALSO: Mating systems (primates)

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FURTHER READING

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