

Inequality not inevitable among mammals, study shows

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Capuchin monkeys are among species showing an innate sense of fairness.
Credit: Joy Ernst/Unsplash

Because literature and film so often depict nature as inherently unfair, people assume that animals live in a "dog-eat-dog world." Inequality

might seem like an inevitable fact of life, but a new analysis of data for 66 species of mammals reveals enormous flexibility of their social systems and many routes toward inequality.

Among mammals, including humans, competition for food and mates tends to increase inequality. But there is also sharing, cooperation, [conflict resolution](#) and aversion to inequity. These factors promote more equal societies.

A [paper](#) published in *Philosophical Transactions of the Royal Society B: Biological Sciences* shows that mammalian societies run the gamut from egalitarian to hierarchical. But while scientists have extensively studied the evolution of hierarchy, the paper's authors say, they have a poor understanding of how fairness evolves. In fact, mammals rely upon a suite of mechanisms to balance the costs and benefits of equality for group living, and evolution does not necessarily favor hierarchy.

"The evolution of fairness has played as big a role in the evolution of [mammal](#) species ... but it has been understudied," said senior author Michael Alfaro, professor of ecology and evolutionary biology at UCLA. "Our study is part of a larger effort to understand peacekeeping and conflict across mammalian societies and perhaps lend insight into human inequality."

Across mammals, hierarchy evolves through intergenerational transfer of resources, skills or tools that enhance individuals' ability to survive and raise more young than others.

"This can take the form of metabolic, nutritional and social advantages passed on to offspring by high-ranking mothers who experience less stress, through direct inheritance of resources, such as hunting territories or [fruit trees](#); from dominant parents; or from coalitions and alliances between related individuals," said the study's co-author Barbara

Natterson-Horowitz, a UCLA professor of ecology and evolutionary biology.

Parents with special skills—such as tool use or an innovative hunting technique—can pass these on to their young to give them an advantage over others.

One or more of these factors are present in most [mammal species](#), and the resulting hierarchies can be shallow and shifting over time, or steep and persisting for generations. Hierarchies among humans' closest relatives, chimpanzees and gorillas, for example, fall somewhere in the middle. These apes have distinct dominance hierarchies that can persist for more than one generation, but other factors work against the resulting inequalities to destabilize and transform the hierarchy.

"Factors that work to promote fairness among mammals include food sharing and adoptions, revolutionary coalitions, conflict resolution, and an aversion to inequality," said former UCLA postdoctoral fellow and first author Jennifer Smith, now at the University of Wisconsin-Eau Claire.

Some mammals share food with relatives who are unable to find their own food, or to strengthen [social ties](#). For example, vampire bats share blood meals with relatives who are weak from hunger, while chimpanzees share meat from a successful hunt with the entire group. Some animals, such as elephants and lions, adopt orphaned young and raise them as their own. These practices mitigate the unequal distribution of resources within a hierarchy and promote [social relationships](#) based on sharing, not dominance.

Lower-ranking individuals in numerous species also form coalitions to challenge dominant individuals, often making [social dynamics](#) operate more fairly, such as when female lions join forces to prevent infanticide

by males. Coalitions can also overthrow the dominant individual altogether. After these and other conflicts, individuals make up with each other and might solve future conflicts more peacefully.

In addition, many species have an innate sense of fairness, or aversion to inequality. They notice when one individual has obtained or been given something of greater value and are willing to hold out for the better item. Capuchin monkeys, for example, will refuse to perform a behavior for a cucumber reward if they see others being given grapes.

In the overall picture painted by the research, evolution favors flexible social dynamics that help individuals from diverse species across the Tree of Life thrive under variable conditions. Dynamics that promote fairness and equality are central to the evolution of social behavior, and hierarchy and inequality are not inevitable.

"Where there is inequality in nature, biological mechanisms countering [inequality](#) will emerge," Natterson-Horowitz said.

More information: Jennifer E. Smith et al, Mechanisms of equality and inequality in mammalian societies, *Philosophical Transactions of the Royal Society B: Biological Sciences* (2023). [DOI: 10.1098/rstb.2022.0307](#)

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