

ONE FOR ALL

Our ability to cooperate in large societies has deep evolutionary roots in the animal kingdom

By Frans de Waal



TRADITIONAL DISCUSSIONS OF HOW HUMANITY BECAME THE DOMINANT form of life, with a population of more than seven billion and counting, have focused on competition. Our ancestors seized land, so the story goes, wiped out other species—including our brethren the Neandertals—and hunted big predators to extinction. We conquered nature, red in tooth and claw.

Overall, however, this is an unlikely scenario. Our forebears were too small and vulnerable to rule the savanna. They must have lived in constant fear of pack-hunting hyenas, 10 different kinds of big cats and other dangerous animals. We probably owe our success as a species more to our cooperativeness than our capacity for violence.

Our propensity to cooperate has old evolutionary roots. Yet only humans organize into groups capable of achieving colossal feats. Only humans have a complex morality that emphasizes responsibilities to others and is enforced through reputation and punishment. And sometimes we do incredible things that put a lie to the idea of humans as purely self-interested actors.

Consider this scene that unfolded last year in a Metrorail station in Washington, D.C. A passenger's motor-

ized wheelchair malfunctioned, and the man ended up sprawled on the tracks. Within seconds, multiple bystanders jumped down to bring him back up before the next train. An even more dramatic rescue occurred in 2007 in the New York City subway, when Wesley Autrey, a 50-year-old construction worker, saved a man who had fallen in front of an approaching train. Too late to pull him up, Autrey jumped between the tracks and lay on top of the other man while five cars rolled overhead. Afterward, he downplayed his heroism: “I don’t feel like I did something spectacular.”

What he did was spectacular, of course. But what propelled him to put his own life in jeopardy to help a fellow stranger in the subway? For answers to this question and to how we came to cooperate in other ways, we must first look at similar behavior in our evolutionary cousins, particularly our closest living relatives: chimpanzees and bonobos.

PRIMATE COOPERATION

I REGULARLY WATCH less dramatic cases of selfless cooperation in these animals at the Yerkes National Primate Research Center at Emory University. My office overlooks a large, grassy enclosure, in which an aging female, Peony, spends her days in the sun with other chimpanzees. Whenever her arthritis flares up, she has trouble walking and climbing. But while Peony is huffing and puffing to get up into the climbing frame, an unrelated younger female may move behind her, place both hands on her ample behind and push her up. We have also seen others bring water to Peony, for whom the walk to the spigot is strenuous. When she starts out in that direction, others run ahead to pick up a mouthful of water, then stand in front of the old lady, who opens her mouth to let them spit a jet of water into it.

A host of recent studies have carefully documented primate cooperation, reaching three main conclusions. First, cooperation does not require family ties. Even though these animals favor kin, they do not limit their cooperation to family. DNA extracted from chimpanzee feces collected in the African forest has allowed field-workers to examine which animals hunt and travel together. Most close partnerships in the forest involve unrelated individuals. Friends mutually groom one another, warn each other of predators and share food. We know the same is true for bonobos.

Second, cooperation is often based on reciprocity. Experiments indicate that chimpanzees remember received favors. One study measured grooming in a captive colony in the morning before feeding time. On introduction of sharable food, such as watermelons, the few lucky possessors would be surrounded by beggars holding out a hand, whimpering and whining. Researchers found that an individual that earlier in the day had groomed another was more likely to obtain a share from this partner later on.

Third, cooperation may be motivated by empathy, a characteristic of all mammals, from rodents to primates. We identify with others in need, pain or distress. This identification arouses emotions that tend to prompt helping action. Scientists now

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WHALE SHARERS: Lamalera hunters, who work together in life or death situations, possess an acute sense of fairness.

believe that primates, in particular, go further and care about the well-being of others. In a typical experiment, two monkeys are placed side by side, while one of them selects a token based on color. One color rewards only the monkey itself but the other rewards both of them. After a few rounds, the choosing monkey opts most often for the “prosocial” token. This preference is not based on fear of the other monkey, because dominant monkeys (which have the least to fear) are the most generous.

Sometimes caring about others costs primates nothing, such as in the above test, but they also help one another at a substantial cost, such as when they lose half their food in the process. In nature, chimpanzees are known to adopt orphans or defend others against leopards—both extremely costly forms of altruism.

DEEPER ROOTS OF HELPING

THESE CARING TENDENCIES in primates probably evolved from the obligatory maternal care demanded of all mammals. Whether a mouse or an elephant, mothers need to respond to their young’s

IN BRIEF

Human beings have a unique ability to cooperate in large, well-organized groups and employ a complex morality that relies on reputation and punishment.

But much of the foundation for this cooperation—including empathy and altruism—can also be observed in our primate cousins.

Homo sapiens’ unique cooperative abilities are what have allowed the species to become the dominant one on the earth.

signals of hunger, pain or fear—otherwise the infants might perish. This sensitivity (and the neural and hormonal processes that support it) was then co-opted for other relationships, helping to enhance emotional bonding, empathy and cooperation within the larger society.

Cooperation affords substantial benefits, so it is not surprising that it was co-opted in these ways. The most ubiquitous form in the animal kingdom is known as mutualistic cooperation and is presumably so widespread because it produces immediate payoffs, such as providing food or defending against predators. It is marked by working together toward an obvious goal that is advantageous to all—say when hyenas bring down a wildebeest together or when a dozen pelicans in a semicircle drive fish together with their feet in a shallow lake, which allows them to simultaneously scoop up mouthfuls of prey. Such cooperation rests on well-coordinated action and shared payoffs.

This kind of cooperation can spawn more subtle cooperative behaviors such as sharing. If one hyena or one pelican were to monopolize all rewards, the system would collapse. Survival depends on sharing, which explains why both humans and animals are exquisitely sensitive to fair divisions. Experiments show that monkeys, dogs and some social birds reject rewards inferior to those of a companion performing the same task; chimpanzees and humans go even further by moderating their share of joint rewards to prevent frustration in others. We owe our sense of fairness to a long history of mutualistic cooperation.

THE HUMAN DIFFERENCE

HUMANS PROVIDE SHARP EXAMPLES of how sharing is linked with survival. Lamaleran whale hunters in Indonesia roam the open ocean in large canoes, from which a dozen men capture whales almost bare-handed. The hunters row toward the whale, the harpoonist jumps onto its back to thrust his weapon into it, and then the men stay nearby until the leviathan dies of blood loss. With entire families tied together around a life-threatening activity, their men being literally in the same boat, distribution of the food bonanza is very much on their mind. Not surprisingly, the Lamalera people are the champions of fairness, as measured by anthropologists using a tool called the Ultimatum Game, which measures preferences for equitable offers. In societies with greater self-sufficiency, such as those in which every family tends its own plot of land, equity is less important.

One oft-mentioned difference between humans and other primates is that we are the only species to cooperate with outsiders and strangers. Although our willingness to cooperate depends on the circumstances (after all, we may also kill those who do not belong to our group), primates in nature are mostly competitive between groups. The way human communities allow outsiders to travel through their territories, share meals with them, exchange goods and gifts, or band together against common enemies is not a typical primate pattern.

Yet this openness does not need a special evolutionary explanation, as some have argued. Most likely, cooperation among strangers is an extension of tendencies that arose for in-group use. In nature, it is not unusual for existing capacities to be applied outside their original context, a bit the way primates use hands (which evolved for tree climbing) to cling to their mothers. Experiments in which capuchin monkeys and bonobos interact with unfamiliar outsiders have shown them capable of exchange-

ing favors and sharing food. In other words, the potential for cooperating with outsiders is present in other species even if they rarely encounter situations in nature that prompt them to do so.

One way we may be truly unique, though, is in the highly organized nature of our cooperativeness. We have the capacity to create hierarchical collaborations that can execute large-scale projects of a complexity and magnitude not found elsewhere in nature. Consider the terraced rice paddies of the Mekong Delta—or the technology that went into CERN's Large Hadron Collider.

Most animal cooperation is self-organized in that individuals fulfill roles according to their capacities and the “slots” open to them. Sometimes animals divide roles and closely coordinate, such as when synchronized killer whales make a wave that washes a seal off an ice floe or when several chimpanzee males organize as drivers and blockers to chase a group of monkeys through the canopy, as if they agreed on their roles beforehand. We do not know how the shared intentions and goals of this kind of cooperation are established and communicated, but they do not seem to be orchestrated from above by leaders, as is typical of humans.

Humans also have ways of enforcing cooperation that thus far have not been documented in other animals. Through repeated interactions, we build reputations as reliable friends, or poor ones, and may get punished if our efforts fall short. The potential for punishment also discourages individuals from cheating the system. In the laboratory, humans punish freeloaders, even at a cost to themselves, a practice that, in the long run, would tend to promote cooperation in a population. There is much debate about how typical such punishment is in real life, outside the lab, but we do know that our moral systems include expectations about cooperation and that we are hypersensitive to public opinion. In one experiment, people donated more money to a good cause if a picture of two eyes were mounted on the wall to watch them. Feeling observed, we worry about our reputation.

These concerns over reputation could have been the primordial glue that enabled early *Homo sapiens* to stick together in ever larger societies. During much of human prehistory, our ancestors lived nomadic lives much like current hunter-gatherers. These modern peoples demonstrate a robust potential for peace and trade between communities, which suggests that early *H. sapiens* had these traits, too.

Without denying our violent potential, I am convinced that it is these cooperative tendencies that have brought us as far as we have come. Building on tendencies that evolved in nonhuman primates, we have been able to shape our societies into complex networks of individuals who cooperate with one another in all kinds of ways. ■

MORE TO EXPLORE

The Human Potential for Peace. Douglas P. Fry. Oxford University Press, 2005.

The Age of Empathy. Frans de Waal. Harmony Books, 2009.

Prosocial Primates: Selfish and Unselfish Motivations. Frans B. M. de Waal and Malini Suchak in *Philosophical Transactions of the Royal Society B*, Vol. 365, No. 1553, pages 2711–2722; September 12, 2010.

FROM OUR ARCHIVES

Why We Help. Martin A. Nowak; July 2012.

scientificamerican.com/magazine/sa