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## A Natural History of Peace

By Robert M. Sapolsky

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Summary: Humans like to think that they are unique, but the study of other primates has called into question the exceptionalism of our species. So what does primatology have to say about war and peace? Contrary to what was believed just a few decades ago, humans are not "killer apes" destined for violent conflict, but can make their own history.

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### THE NAKED APE

The evolutionary biologist Theodosius Dobzhansky once said, "All species are unique, but humans are uniquest." Humans have long taken pride in their specialness. But the study of other primates is rendering the concept of such human exceptionalism increasingly suspect.

Some of the retrenchment has been relatively palatable, such as with the workings of our bodies. Thus we now know that a baboon heart can be transplanted into a human body and work for a few weeks, and human blood types are coded in Rh factors named after the rhesus monkeys that possess similar blood variability.

More discomfiting is the continuum that has been demonstrated in the realm of cognition. We now know, for example, that other species invent tools and use them with dexterity and local cultural variation. Other primates display "semanticity" (the use of symbols to refer to objects and actions) in their communication in ways that would impress any linguist. And experiments have shown other primates to possess a "theory of mind," that is, the ability to recognize that different individuals can have different thoughts and knowledge.

Our purported uniqueness has been challenged most, however, with regard to our social life. Like the occasional human hermit, there are a few primates that are typically asocial (such as the orangutan). Apart from those, however, it turns out that one cannot understand a primate in isolation from its social group. Across the 150 or so species of primates, the larger the average social group, the larger the cortex relative to the rest of the brain. The fanciest part of the primate brain, in other words, seems to have been sculpted by evolution to enable us to gossip and groom, cooperate and cheat, and obsess about who is mating with whom. Humans, in short, are yet another primate with an intense and rich social life -- a fact that raises the question of whether primatology can teach us something about a rather important part of human sociality, war and peace.

It used to be thought that humans were the only savagely violent primate. "We are the only species that kills its own," one might have heard intoned portentously at the end of nature films several decades ago. That view fell by the wayside in the 1960s as it became clear that some other primates kill their fellows aplenty. Males kill; females kill. Some kill one another's infants with cold-blooded stratagems worthy of Richard III. Some use their toolmaking skills to fashion bigger and better cudgels. Some other primates even engage in what can only be called warfare -- organized, proactive group violence directed at other populations.

As field studies of primates expanded, what became most striking was the variation in social practices across species. Yes, some primate species have lives filled with violence, frequent and varied. But life among others is filled with communitarianism, egalitarianism, and cooperative child rearing.

Patterns emerged. In less aggressive species, such as gibbons or marmosets, groups tend to live in lush rain forests where food is plentiful and life is easy. Females and males tend to be the same size, and the males lack secondary sexual markers such as long, sharp canines or garish coloring. Couples mate for life, and males help substantially with child care. In violent species, on the other hand, such

as baboons and rhesus monkeys, the opposite conditions prevail.

The most disquieting fact about the violent species was the apparent inevitability of their behavior. Certain species seemed simply to be the way they were, fixed products of the interplay of evolution and ecology, and that was that. And although human males might not be inflexibly polygamous or come with bright red butts and six-inch canines designed for tooth-to-tooth combat, it was clear that our species had at least as much in common with the violent primates as with the gentle ones. "In their nature" thus became "in our nature." This was the humans-as-killer-apes theory popularized by the writer Robert Ardrey, according to which humans have as much chance of becoming intrinsically peaceful as they have of growing prehensile tails.

That view always had little more scientific rigor than a Planet of the Apes movie, but it took a great deal of field research to figure out just what should supplant it. After decades' more work, the picture has become quite interesting. Some primate species, it turns out, are indeed simply violent or peaceful, with their behavior driven by their social structures and ecological settings. More important, however, some primate species can make peace despite violent traits that seem built into their natures. The challenge now is to figure out under what conditions that can happen, and whether humans can manage the trick themselves.

## PAX BONOBO

Primatology has long been dominated by studies of the chimpanzee, due in large part to the phenomenally influential research of Jane Goodall, whose findings from her decades of observations in the wild have been widely disseminated. National Geographic specials based on Goodall's work would always include the reminder that chimps are our closest relatives, a notion underlined by the fact that we share an astonishing 98 percent of our DNA with them. And Goodall and other chimp researchers have carefully documented an endless stream of murders, cannibalism, and organized group violence among their subjects. Humans' evolutionary fate thus seemed sealed, smeared by the excesses of these first cousins.

But all along there has been another chimp species, one traditionally ignored because of its small numbers; its habitat in remote, impenetrable rain forests; and the fact that its early chroniclers published in Japanese. These skinny little creatures were originally called "pygmy chimps" and were thought of as uninteresting, some sort of regressed subspecies of the real thing. Now known as bonobos, they are today recognized as a separate and distinct species that taxonomically and genetically is just as closely related to humans as the standard chimp. And boy, is this ever a different ape.

Male bonobos are not particularly aggressive and lack the massive musculature typical of species that engage in a lot of fighting (such as the standard chimp). Moreover, the bonobo social system is female dominated, food is often shared, and there are well-developed means for reconciling social tensions. And then there is the sex.

Bonobo sex is the prurient highlight of primatology conferences, and leads parents to shield their children's eyes when watching nature films. Bonobos have sex in every conceivable position and some seemingly inconceivable ones, in pairs and groups, between genders and within genders, to greet each other and to resolve conflicts, to work off steam after a predator scare, to celebrate finding food or to cajole its sharing, or just because. As the sound bite has it, chimps are from Mars and bonobos are from Venus.

All is not perfect in the bonobo commune, and they still have hierarchies and conflict (why else invent conflict resolution?). Nonetheless, they are currently among the trendiest of species to analyze, a wonderful antidote to their hard-boiled relatives. The trouble is, while we have a pretty good sense of what bonobos are like, we have little insight into how they got that way. Furthermore, this is basically what all bonobos seem to be like -- a classic case of in-their-nature-ness. There is even recent evidence for a genetic component to the phenomenon, in that bonobos (but not chimps) possess a version of a gene that makes affiliative behavior (behavior that promotes group cohesion) more pleasurable to males. So -- a wondrous species (and one, predictably, teetering on the edge of extinction). But besides being useful for taking the wind out of we-be-chimps fatalists, the bonobo has little to say to us. We are not bonobos, and never can be.

## WARRIORS, COME OUT TO PLAY

In contrast to the social life of bonobos, the social life of chimps is not pretty. Nor is that of rhesus monkeys, nor savanna baboons -- a species found in groups of 50 to 100 in the African grasslands and one I have studied for close to 30 years. Hierarchies among baboons are strict, as are their

consequences. Among males, high rank is typically achieved by a series of successful violent challenges. Spoils, such as meat, are unevenly divided. Most males die of the consequences of violence, and roughly half of their aggression is directed at third parties (some high-ranking male in a bad mood takes it out on an innocent bystander, such as a female or a subordinate male).

Male baboons, moreover, can fight amazingly dirty. I saw this happen a few years ago in one of the troops I study: Two males had fought, and one, having been badly trounced, assumed a crouching stance, with his rear end up in the air. This is universally recognized among savanna baboons as an abject gesture of subordination, signaling an end to the conflict, and the conventional response on the part of the victorious male is to subject the other to a ritualized gesture of dominance (such as mounting him). In this instance, however, the winner, approaching the loser as if to mount him, instead abruptly gave him a deep slash with his canines.

A baboon group, in short, is an unlikely breeding ground for pacifists. Nevertheless, there are some interesting exceptions. In recent years, for example, it has been recognized that a certain traditional style of chest-thumping evolutionary thinking is wrong. According to the standard logic, males compete with one another aggressively in order to achieve and maintain a high rank, which will in turn enable them to dominate reproduction and thus maximize the number of copies of their genes that are passed on to the next generation. But although aggression among baboons does indeed have something to do with attaining a high rank, it turns out to have virtually nothing to do with maintaining it. Dominant males rarely are particularly aggressive, and those that are typically are on their way out: the ones that need to use it are often about to lose it. Instead, maintaining dominance requires social intelligence and impulse control -- the ability to form prudent coalitions, show some tolerance of subordinates, and ignore most provocations.

Recent work, moreover, has demonstrated that females have something to say about which males get to pass on their genes. The traditional view was based on a "linear access" model of reproduction: if one female is in heat, the alpha male gets to mate with her; if two are in heat, the alpha male and the second-ranking male get their opportunity; and so on. Yet we now know that female baboons are pretty good at getting away from even champions of male-male competition if they want to and can sneak off instead with another male they actually desire. And who would that be? Typically, it is a male that has followed a different strategy of building affiliative relations with the female -- grooming her a lot, helping to take care of her kids, not beating her up. These nice-guy males seem to pass on at least as many copies of their genes as their more aggressive peers, not least because they can go like this for years, without the life-shortening burnout and injuries of the gladiators.

And so the crude picture of combat as the sole path to evolutionary success is wrong. The average male baboon does opt for the combative route, but there are important phases of his life when aggression is less important than social intelligence and restraint, and there are evolutionarily fruitful alternative courses of action.

Even within the bare-knuckle world of male-male aggression, we are now recognizing some surprising outposts of primate civility. For one thing, primates can make up after a fight. Such reconciliation was first described by Frans de Waal, of Emory University, in the early 1980s; it has now been observed in some 27 different species of primates, including male chimps, and it works as it is supposed to, reducing the odds of further aggression between the two ex-combatants. And various primates, including male baboons, will sometimes cooperate, for example by supporting one another in a fight. Coalitions can involve reciprocity and even induce what appears to be a sense of justice or fairness. In a remarkable study by de Waal and one of his students, capuchin monkeys were housed in adjacent cages. A monkey could obtain food on its own (by pulling a tray of food toward its cage) or with help from a neighbor (by pulling a heavier tray together); in the latter case, only one of the monkeys was given access to the food in question. The monkeys that collaborated proved more likely to share it with their neighbor.

Even more striking are lifelong patterns of cooperation among some male chimps, such as those that form bands of brothers. Among certain primate species, all the members of one gender will leave their home troop around puberty, thus avoiding the possibility of genetically deleterious inbreeding. Among chimps, the females leave home, and as a result, male chimps typically spend their lives in the company of close male relatives. Animal behaviorists steeped in game theory spend careers trying to figure out how reciprocal cooperation gets started among nonrelatives, but it is clear that stable reciprocity among relatives emerges readily.

Thus, even the violent primates engage in reconciliation and cooperation -- but only up to a point. For starters, as noted in regard to the bonobo, there would be nothing to reconcile without violence and conflict in the first place. Furthermore, reconciliation is not universal: female savanna baboons are good at it, for example, but males are not. Most important, even among species and genders that do

reconcile, it is not an indiscriminate phenomenon: individuals are more likely to reconcile with those who can be useful to them. This was demonstrated in a brilliant study by Marina Cords, of Columbia University, in which the value of some relationships among a type of macaque monkey was artificially raised. Animals were again caged next to each other under conditions in which they could obtain food by themselves or through cooperation, and those pairs that developed the capacity for cooperation were three times as likely to reconcile after induced aggression as noncooperators. Tension-reducing reconciliation, in other words, is most likely to occur among animals who already are in the habit of cooperating and have an incentive to keep doing so.

Some deflating points emerge from the studies of cooperation as well, such as the fact that coalitions are notoriously unstable. In one troop of baboons I studied in the early 1980s, male-male coalitions lasted less than two days on average before collapsing, and most cases of such collapse involved one partner failing to reciprocate or, even more dramatically, defecting to the other side during a fight. Finally, and most discouraging, is the use to which most coalitions are put. In theory, cooperation could trump individualism in order to, say, improve food gathering or defend against predators. In practice, two baboons that cooperate typically do so in order to make a third miserable.

Goodall was the first to report the profoundly disquieting fact that bands of related male chimps carry out cooperative "border patrols" -- searching along the geographic boundary separating their group from another and attacking neighboring males they encounter, even to the point of killing other groups off entirely. In-group cooperation can thus usher in not peace and tranquility, but rather more efficient extermination.

So primate species with some of the most aggressive and stratified social systems have been seen to cooperate and resolve conflicts -- but not consistently, not necessarily for benign purposes, and not in a cumulative way that could lead to some fundamentally non-Hobbesian social outcomes. The lesson appears to be not that violent primates can transcend their natures, but merely that the natures of these species are subtler and more multifaceted than previously thought. At least that was the lesson until quite recently.

#### OLD PRIMATES AND NEW TRICKS

To some extent, the age-old "nature versus nurture" debate is silly. The action of genes is completely intertwined with the environment in which they function; in a sense, it is pointless to even discuss what gene X does, and we should consider instead only what gene X does in environment Y. Nonetheless, if one had to predict the behavior of some organism on the basis of only one fact, one might still want to know whether the most useful fact would be about genetics or about the environment.

The first two studies to show that primates were somewhat independent from their "natures" involved a classic technique in behavioral genetics called cross-fostering. Suppose some animal has engaged in a particular behavior for generations -- call it behavior A. We want to know if that behavior is due to shared genes or to a multigenerationally shared environment. Researchers try to answer the question by cross-fostering the animal, that is, switching the animal's mother at birth so that she is raised by one with behavior B, and then watching to see which behavior the animal displays when she grows up. One problem with this approach is that an animal's environment does not begin at birth -- a fetus shares a very intimate environment with its mother, namely the body's circulation, chock-full of hormones and nutrients that can cause lifelong changes in brain function and behavior. Therefore, the approach can be applied only asymmetrically: if a behavior persists in a new environment, one cannot conclude that genes are the cause, but if a behavior changes in a new environment, then one can conclude that genes are not the cause. This is where the two studies come in.

In the early 1970s, a highly respected primatologist named Hans Kummer was working in Ethiopia, in a region containing two species of baboons with markedly different social systems. Savanna baboons live in large troops, with plenty of adult females and males. Hamadryas baboons, in contrast, have a more complex, multilevel society. Because they live in a much harsher, drier region, hamadryas have a distinctive ecological problem. Some resources are singular and scarce -- like a rare watering hole or a good cliff face to sleep on at night in order to evade predators -- and large numbers of animals are likely to want to share them. Other resources, such as the vegetation they eat, are sparse and widely dispersed, requiring animals to function in small, separate groups. As a result, hamadryas have evolved a "harem" structure -- a single adult male surrounded by a handful of adult females and their children -- with large numbers of discrete harems converging, peacefully, for short periods at the occasional desirable watering hole or cliff face.

Kummer conducted a simple experiment, trapping an adult female savanna baboon and releasing her into a hamadryas troop and trapping an adult female hamadryas and releasing her into a savanna

troop. Among hamadryas, if a male threatens a female, it is almost certainly this brute who dominates the harem, and the only way for the female to avoid injury is to approach him -- i.e., return to the fold. But among savanna baboons, if a male threatens a female, the way for her to avoid injury is to run away. In Kummer's experiment, the females who were dropped in among a different species initially carried out their species-typical behavior, a major faux pas in the new neighborhood. But gradually, they assimilated the new rules. How long did this learning take? About an hour. In other words, millennia of genetic differences separating the two species, a lifetime of experience with a crucial social rule for each female, and a miniscule amount of time to reverse course completely.

The second experiment was set up by de Waal and his student Denise Johanowicz in the early 1990s, working with two macaque monkey species. By any human standards, male rhesus macaques are unappealing animals. Their hierarchies are rigid, those at the top seize a disproportionate share of the spoils, they enforce this inequity with ferocious aggression, and they rarely reconcile after fights. Male stump tail macaques, in contrast, which share almost all of their genes with their rhesus macaque cousins, display much less aggression, more affiliative behaviors, looser hierarchies, and more egalitarianism.

Working with captive primates, de Waal and Johanowicz created a mixed-sex social group of juvenile macaques, combining rhesus and stump tails together. Remarkably, instead of the rhesus macaques bullying the stump tails, over the course of a few months, the rhesus males adopted the stump tails' social style, eventually even matching the stump tails' high rates of reconciliatory behavior. It so happens, moreover, that stump tails and rhesus macaques use different gestures when reconciling. The rhesus macaques in the study did not start using the stump tails' reconciliatory gestures, but rather increased the incidence of their own species-typical gestures. In other words, they were not merely imitating the stump tails' behavior; they were incorporating the concept of frequent reconciliation into their own social practices. When the newly warm-and-fuzzy rhesus macaques were returned to a larger, all-rhesus group, finally, their new behavioral style persisted.

This is nothing short of extraordinary. But it brings up one last question: When those rhesus macaques were transferred back into the all-rhesus world, did they spread their insights and behaviors to the others? Alas, they did not. For that, we need to move on to our final case.

#### LEFT BEHIND

In the early 1980s, "Forest Troop," a group of savanna baboons I had been studying -- virtually living with -- for years, was going about its business in a national park in Kenya when a neighboring baboon group had a stroke of luck: its territory encompassed a tourist lodge that expanded its operations and consequently the amount of food tossed into its garbage dump. Baboons are omnivorous, and "Garbage Dump Troop" was delighted to feast on leftover drumsticks, half-eaten hamburgers, remnants of chocolate cake, and anything else that wound up there. Soon they had shifted to sleeping in the trees immediately above the pit, descending each morning just in time for the day's dumping of garbage. (They soon got quite obese from the rich diet and lack of exercise, but that is another story.)

The development produced nearly as dramatic a shift in the social behavior of Forest Troop. Each morning, approximately half of its adult males would infiltrate Garbage Dump Troop's territory, descending on the pit in time for the day's dumping and battling the resident males for access to the garbage. The Forest Troop males that did this shared two traits: they were particularly combative (which was necessary to get the food away from the other baboons), and they were not very interested in socializing (the raids took place early in the morning, during the hours when the bulk of a savanna baboon's daily communal grooming occurs).

Soon afterward, tuberculosis, a disease that moves with devastating speed and severity in nonhuman primates, broke out in Garbage Dump Troop. Over the next year, most of its members died, as did all of the males from Forest Troop who had foraged at the dump.[See Footnote #1] The results were that Forest Troop was left with males who were less aggressive and more social than average and the troop now had double its previous female-to-male ratio.

The social consequences of these changes were dramatic. There remained a hierarchy among the Forest Troop males, but it was far looser than before: compared with other, more typical savanna baboon groups, high-ranking males rarely harassed subordinates and occasionally even relinquished contested resources to them. Aggression was less frequent, particularly against third parties. And rates of affiliative behaviors, such as males and females grooming each other or sitting together, soared. There were even instances, now and then, of adult males grooming each other -- a behavior nearly as unprecedented as baboons sprouting wings.

This unique social milieu did not arise merely as a function of the skewed sex ratio; other

primatologists have occasionally reported on troops with similar ratios but without a comparable social atmosphere. What was key was not just the predominance of females, but the type of male that remained. The demographic disaster -- what evolutionary biologists term a "selective bottleneck" -- had produced a savanna baboon troop quite different from what most experts would have anticipated.

But the largest surprise did not come until some years later. Female savanna baboons spend their lives in the troop into which they are born, whereas males leave their birth troop around puberty; a troop's adult males have thus all grown up elsewhere and immigrated as adolescents. By the early 1990s, none of the original low aggression/high affiliation males of Forest Troop's tuberculosis period was still alive; all of the group's adult males had joined after the epidemic. Despite this, the troop's unique social milieu persisted -- as it does to this day, some 20 years after the selective bottleneck. In other words, adolescent males that enter Forest Troop after having grown up elsewhere wind up adopting the unique behavioral style of the resident males. As defined by both anthropologists and animal behaviorists, "culture" consists of local behavioral variations, occurring for nongenetic and nonecological reasons, that last beyond the time of their originators. Forest Troop's low aggression/high affiliation society constitutes nothing less than a multigenerational benign culture.

Continuous study of the troop has yielded some insights into how its culture is transmitted to newcomers. Genetics obviously plays no role, nor apparently does self-selection: adolescent males that transfer into the troop are no different from those that transfer into other troops, displaying on arrival similarly high rates of aggression and low rates of affiliation. Nor is there evidence that new males are taught to act in benign ways by the residents. One cannot rule out the possibility that some observational learning is occurring, but it is difficult to detect given that the distinctive feature of this culture is not the performance of a unique behavior but the performance of typical behaviors at atypically extreme rates.

To date, the most interesting hint about the mechanism of transmission is the way recently transferred males are treated by Forest Troop's resident females. In a typical savanna baboon troop, newly transferred adolescent males spend years slowly working their way into the social fabric; they are extremely low ranking -- ignored by females and noted by adult males only as convenient targets for aggression. In Forest Troop, by contrast, new male transfers are inundated with female attention soon after their arrival. Resident females first present themselves sexually to new males an average of 18 days after the males arrive, and they first groom the new males an average of 20 days after they arrive (normal savanna baboons introduce such behaviors after 63 and 78 days, respectively). Furthermore, these welcoming gestures occur more frequently in Forest Troop during the early post-transfer period, and there is four times as much grooming of males by females in Forest Troop as elsewhere. From almost the moment they arrive, in other words, new males find out that in Forest Troop, things are done differently.

At present, I think the most plausible explanation is that this troop's special culture is not passed on actively but simply emerges, facilitated by the actions of the resident members. Living in a group with half the typical number of males, and with the males being nice guys to boot, Forest Troop's females become more relaxed and less wary. As a result, they are more willing to take a chance and reach out socially to new arrivals, even if the new guys are typical jerky adolescents at first. The new males, in turn, finding themselves treated so well, eventually relax and adopt the behaviors of the troop's distinctive social milieu.

#### NATURAL BORN KILLERS?

Are there any lessons to be learned here that can be applied to human-on-human violence -- apart, that is, from the possible desirability of giving fatal cases of tuberculosis to aggressive people?

Any biological anthropologist opining about human behavior is required by long-established tradition to note that for 99 percent of human history, humans lived in small, stable bands of related hunter-gatherers. Game theorists have shown that a small, cohesive group is the perfect setting for the emergence of cooperation: the identities of the other participants are known, there are opportunities for multiple iterations of games (and thus the ability to punish cheaters), and there is open-book play (players can acquire reputations). And so, those hunter-gatherer bands were highly egalitarian. Empirical and experimental data have also shown the cooperative advantages of small groups at the opposite human extreme, namely in the corporate world.

But the lack of violence within small groups can come at a heavy price. Small homogenous groups with shared values can be a nightmare of conformity. They can also be dangerous for outsiders. Unconsciously emulating the murderous border patrols of closely related male chimps, militaries throughout history have sought to form small, stable units; inculcate them with rituals of

pseudokinship; and thereby produce efficient, cooperative killing machines.

Is it possible to achieve the cooperative advantages of a small group without having the group reflexively view outsiders as the Other? One way is through trade. Voluntary economic exchanges not only produce profits; they can also reduce social friction -- as the macaques demonstrated by being more likely to reconcile with a valued partner in food acquisition.

Another way is through a fission-fusion social structure, in which the boundaries between groups are not absolute and impermeable. The model here is not the multilevel society of the hamadryas baboons, both because their basic social unit of the harem is despotic and because their fusion consists of nothing more than lots of animals occasionally coming together to utilize a resource peacefully. Human hunter-gatherers are a better example to follow, in that their small bands often merge, split, or exchange members for a while, with such fluidity helping to solve not only environmental resource problems but social problems as well. The result is that instead of the all-or-nothing world of male chimps, in which there is only one's own group and the enemy, hunter-gatherers can enjoy gradations of familiarity and cooperation stretching over large areas.

The interactions among hunter-gatherers resemble those of other networks, where there are individual nodes (in this case, small groups) and where the majority of interactions between the nodes are local ones, with the frequency of interactions dropping off as a function of distance. Mathematicians have shown that when the ratios among short-, middle-, and long-distance interactions are optimal, networks are robust: they are dominated by highly cooperative clusters of local interactions, but they also retain the potential for less frequent, long-distance communication and coordination.

Optimizing the fission-fusion interactions of hunter-gatherer networks is easy: cooperate within the band; schedule frequent joint hunts with the next band over; have occasional hunts with bands somewhat farther out; have a legend of a single shared hunt with a mythic band at the end of the earth. Optimizing the fission-fusion interactions in contemporary human networks is vastly harder, but the principles are the same.

In exploring these subjects, one often encounters a pessimism built around the notion that humans, as primates, are hard-wired for xenophobia. Some brain-imaging studies have appeared to support this view in a particularly discouraging way. There is a structure deep inside the brain called the amygdala, which plays a key role in fear and aggression, and experiments have shown that when subjects are presented with a face of someone from a different race, the amygdala gets metabolically active -- aroused, alert, ready for action. This happens even when the face is presented "subliminally," which is to say, so rapidly that the subject does not consciously see it.

More recent studies, however, should mitigate this pessimism. Test a person who has a lot of experience with people of different races, and the amygdala does not activate. Or, as in a wonderful experiment by Susan Fiske, of Princeton University, subtly bias the subject beforehand to think of people as individuals rather than as members of a group, and the amygdala does not budge. Humans may be hard-wired to get edgy around the Other, but our views on who falls into that category are decidedly malleable.

In the early 1960s, a rising star of primatology, Irven DeVore, of Harvard University, published the first general overview of the subject. Discussing his own specialty, savanna baboons, he wrote that they "have acquired an aggressive temperament as a defense against predators, and aggressiveness cannot be turned on and off like a faucet. It is an integral part of the monkeys' personalities, so deeply rooted that it makes them potential aggressors in every situation." Thus the savanna baboon became, literally, a textbook example of life in an aggressive, highly stratified, male-dominated society. Yet within a few years, members of the species demonstrated enough behavioral plasticity to transform a society of theirs into a baboon utopia.

The first half of the twentieth century was drenched in the blood spilled by German and Japanese aggression, yet only a few decades later it is hard to think of two countries more pacific. Sweden spent the seventeenth century rampaging through Europe, yet it is now an icon of nurturing tranquility. Humans have invented the small nomadic band and the continental megastate, and have demonstrated a flexibility whereby uprooted descendants of the former can function effectively in the latter. We lack the type of physiology or anatomy that in other mammals determine their mating system, and have come up with societies based on monogamy, polygyny, and polyandry. And we have fashioned some religions in which violent acts are the entrée to paradise and other religions in which the same acts consign one to hell. Is a world of peacefully coexisting human Forest Troops possible? Anyone who says, "No, it is beyond our nature," knows too little about primates, including ourselves.

[Footnote #1] Considerable sleuthing ultimately revealed that the disease had come from tainted meat in the garbage dump, which had been sold to the tourist lodge thanks to a corrupt meat inspector. The studies were the first of this kind of outbreak in a wild primate population and showed that, in contrast to what happens with humans and captive primates, there was little animal-to-animal transmission of the tuberculosis, and so the disease did not spread in Forest Troop beyond the garbage eaters.

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