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Are Humans Inherently Killers?

A Critique by Robert Sussman and Joshua Marshack
Followed by a Response by Richard Wrangham

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Are Humans Inherently Killers?

Robert W. Sussman and Joshua L. Marshack
Washington University, St. Louis

Summary *By challenging the authors of the* book Demonic Males*, primatologists Robert Sussman and Joshua Marshack ask us to look at our basic human nature and ask what we can learn about ourselves from other primates. The chapter poses other questions, such as how genetics and learning help explain human behavior, what role aggression plays in chimpanzee and human society, and whether humans and chimpanzees share certain biologically fixed behaviors*.

Are human beings forever doomed to be killers? Is aggression fixed within our genetic code, an inborn action pattern that threatens to destroy us? Or, as asked by Richard Wrangham and Dale Peterson in their well-known book, *Demonic Males: Apes and the Origins of Human Violence*, can we get beyond our genes, beyond our essential "human nature"?

Wrangham and Peterson's belief in the importance of violence in the evolution and nature of humans is based on recent primate research that they assert demonstrates the continuity of aggression from our great ape ancestors. The authors point out that thirty to thirty-five years ago most scholars believed human aggression was unique. Research at that time had shown great apes to be basically nonaggressive, gentle creatures. Furthermore, the separation of humans from our ape ancestors was thought to have occurred 15-20 million years ago (mya). Although Raymond Dart, Sherwood Washburn, Robert Audrey, E.O. Wilson, and others had argued through much of the twentieth century that hunting, killing, and extreme aggressive behaviors were biological

traits inherited from our earliest hominid hunting ancestors, many anthropologists still believed that patterns of aggression were environmentally determined and culturally learned behaviors, not inherited characteristics.

Demonic Males presents evidence that killer instincts are not unique to humans but rather shared with our nearest relative, the common chimpanzee. The authors argue that it is this inherited propensity for killing that allows hominids and chimps to be such good hunters.

According to Wrangham and Peterson, the split between humans and the common chimpanzee was only 6-8 mya. Furthermore, humans may have split from the chimpanzee-bonobo line after gorillas, with bonobos (pygmy chimps) separating from chimps only 2.5 mya. Because today's chimpanzees share a common ancestor with all of these forms, and because the earliest australopithecines were quite chimpanzee-like, Wrangham speculates (in a separate article) that "chimpanzees are a conservative species and an amazingly good model for the ancestor of hominids" (1995, reprinted in Sussman 1997: 106). If modern chimpanzees and modern humans share certain behavioral traits, these traits have "long evolutionary roots" and are likely to be fixed, biologically inherited parts of our basic human nature and not culturally determined.

Demonic Males presents evidence that killer instincts are not unique to humans but rather shared with our nearest relative, the common chimpanzee

Wrangham argues that chimpanzees are almost on the brink of humanness:

> Nut-smashing, root-eating, savannah-using chimpanzees, resembling our ancestors, and capable by the way of extensive bipedalism. Using ant-wands, and sandals, and bowls, meat-sharing, hunting cooperatively. Strange paradox… a species trembling on the verge of hominization, but so conservative that it has stayed on that edge. (Sussman 1997: 107)

Wrangham and Peterson (1996: 24) claim that only two animal species, chimpanzees and humans, live in patrilineal, male-bonded communities with "intense, male-initiated territorial aggression, including lethal raiding into neighboring communities in search of vulnerable enemies to attack and kill." Wrangham asks:

> Does this mean chimpanzees are naturally violent? Ten years ago it wasn't clear … In this cultural species, it may turn out that one of the least variable of all chimpanzee behaviors is the intense competition between males, the violent aggression they use against strangers, and their willingness to maim and kill those that frustrate their goals … As the picture of chimpanzee society settles into focus, it now includes infanticide, rape, and regular battering of females by males. (Sussman 1997: 108)

Since humans and chimpanzees share these violent urges, the implication is that human violence has long evolutionary roots. "We are apes of nature, cursed over six million years or more with a rare inheritance, a Dostoyevskyan demon … The coincidence of demonic aggression in ourselves and our closest kin bespeaks its antiquity" (reprinted in Sussman 1997: 108-9).

Intellectual Antecedents

From the beginning of Western thought, the theme of human depravity runs deep, related to the idea of humankind's fall from grace and the emergence of original sin. This view meshed well with many modern "scientific" interpretations of the evolution of human behavior. Recognition of the close evolutionary relationship between humans and apes, from the time of Darwin's *Descent of Man* (1874) on, has encouraged theories that look to modern apes for evidence of parallel behaviors reflecting this relationship.

From the beginning of Western thought, the theme of human depravity runs deep

By the early 1950s, large numbers of australopithecine fossils and the discovery that the large-brained "fossil" ancestor from Piltdown, in England, was a fraud led to the realization that our earliest ancestors were more like apes than like modern humans. Accordingly, our earliest ancestors must have behaved much like other nonhuman primates. This, in turn, led to a great interest in using primate behavior to understand human evolution and the evolutionary basis of human nature. The subdiscipline of primatology was born.

Raymond Dart, discoverer of the first australopithecine fossil some thirty years earlier, was also developing a different

view of our earliest ancestors. At first Dart believed that australopithecines were scavengers barely eking out an existence in the harsh savannah environment. But from the fragmented and damaged bones found with the australopithecines, together with dents and holes in these early hominid skulls, Dart eventually concluded that this species had used bone, tooth, and antler tools to kill, butcher, and eat their prey, as well as to kill one another. This hunting hypothesis "was linked from the beginning with a bleak, pessimistic view of human beings and their ancestors as instinctively bloodthirsty and savage" (Cartmill 1997: 511). To Dart, the australopithecines were

> confirmed killers: carnivorous creatures that seized living quarries by violence, battered them to death, tore apart their broken bodies, dismembered them limb from limb, slaking their ravenous thirst with the hot blood of victims and greedily devouring living writhing flesh. (1953: 209)

Cartmill, in a 1993 book, shows that this interpretation of early human morality is reminiscent of earlier Greek and Christian views. Dart's own 1953 treatise begins with a seventeenth-century quote from the Calvinist writer R. Baxter: "of all the beasts, the man-beast is the worst/to others and himself the cruelest foe."

This hunting hypothesis "was linked from the beginning with a bleak, pessimistic view of human beings and their ancestors as instinctively bloodthirsty and savage"

Between 1961 and 1976, Dart's view was picked up and extensively popularized by the playwright Robert Ardrey (*The Territorial Imperative, African Genesis*). Ardrey believed it was the human competitive and killer instinct, acted out in warfare, that made humans what they are today: "It is war and the instinct for territory that has led to the great accomplishments of Western Man. Dreams may have inspired our love of freedom, but only war and weapons have made it ours" (1961: 324).

Man the Hunter

In the 1968 volume *Man the Hunter*, Sherwood Washburn and Chet Lancaster presented a theory of the evolution of hunting, emphasizing that it is this behavior that shaped human nature and separated early humans from their primate relatives.

> To assert the biological unity of mankind is to affirm the importance of the hunting way of life … However much conditions and customs may have varied locally, the main selection pressures that forged the species were the same. The biology, psychology and customs that separate us from the apes … we owe to the hunters of time past … for those who would understand the origins and nature of human behavior there is no choice but to try to understand "Man the Hunter." (1968: 303)

Rather than amassing evidence from modern hunters and gatherers to prove their theory, Washburn and Lancaster used the nineteenth-century concept of cultural "survivals": behaviors that persist as evidence of an earlier time but are no longer useful in society.

> Men enjoy hunting and killing, and these activities are continued in sports even when they are no longer economically necessary. If a behavior is important to the survival of a species . . . then it must be both easily learned and pleasurable. (1968: 299)

Man the Dancer

Using similar logic for the survival of ancient "learned and pleasurable" behaviors, perhaps it could as easily have been our propensity for dancing rather than our desire to hunt that explains much of human behavior. After all, men and women love to dance; it is a behavior found in all cultures but has even less obvious function today than hunting. Our love of movement and dance might explain, for example, our propensity for face-to-face sex, and even the evolution of bipedalism and the movement of humans out of trees and onto the ground.

men and women love to dance; it is a behavior found in all cultures

Could the first tool have been a stick to beat a dance drum, and the ancient Laetoli footprints evidence of two individuals going out to dance the "Afarensis shuffle?" Although it takes two to tango, a variety of social interactions and systems might have been encouraged by the complex social dances known in human societies around the globe. We are joking, of course, but the evidence for man the dancer is just as good (or lacking) as it is for man the hunter or man the killer.

Sociobiology and E. O. Wilson

In the mid-1970s, E. O. Wilson and others, described a number of traits as genetically based and therefore human universals, including territoriality, male-female bonds, male dominance over females and extended maternal care leading to matrilineality. Wilson argued that the genetic basis of these traits was indicated by their relative constancy among our primate relatives and by their persistence throughout human evolution and in human societies. Elsewhere I have shown that these characteristics are neither general primate traits nor human universals (Sussman, 1995). Wilson, however, argued that these were a product of our evolutionary hunting past.

> For at least a million years—probably more—Man engaged in a hunting way of life, giving up the practice a mere 10,000 years ago … Our innate social responses have been fashioned through this life style. With caution, we can compare the most widespread hunter-gatherer qualities with similar behavior displayed by some of the non-human primates that are closely related to Man. Where the same pattern of traits occurs in … most or all of those primates—we can conclude that is has been subject to little evolution. (Wilson, 1976, in Sussman, 1997: 65-66)

Wilson's theory of sociobiology, the evolution of social behavior, argued that (1) the goal of living organisms is to pass on one's genes at the expense of all others, and that (2) an organism will cooperate with others only if (a) they carry some of his/her own genes (kin selection) or (b) if at some later date the others might offer aid to the organism (reciprocal altruism).

The genetically driven "making nice" is the basis of human ethics and morality

To sociobiologists, evolutionary morality is based on an unconscious need to multiply our own genes, to build group cohesion in order to win wars. We should not look down on our warlike, cruel nature but rather understand its success when coupled with "making nice" with some other individuals or groups. The genetically driven "making nice" is the basis of human ethics and morality.

> Throughout recorded history the conduct of war has been common … some of the noblest traits of mankind, including team play, altruism, patriotism, bravery … and so forth are the genetic product of warfare. (Wilson 1975: 572-3)

The evidence for any of these universals, and for the tenets of sociobiology generally, is as weak as was the evidence for Dart's, Ardrey's, and Washburn and Lancaster's theories of innate aggression. Not only are modern gatherer-hunters and most apes remarkably nonaggressive, but in the 1970s and 1980s studies of fossil bones and artifacts showed that early humans were not hunters and that weapons were a later addition to the human repertoire. In fact, C. K. Brain (1981) showed that the holes and dents in Dart's australopithecine skulls matched perfectly with fangs of leopards or with the impressions of rocks pressing against the buried fossils. Australopithecines apparently were the hunted, not the hunters (Cartmill, 1993; 1997; Hart and Sussman ,2009).

anthropology has been misunderstood at times by well-meaning scientists or misappropriated by those who wish to reinforce the status quo by positing underlying biological causes to complex social problems

It would appear that, as with other fields of study and perhaps even more so than most, anthropology has been misunderstood at times by well-meaning scientists or misappropriated by those who wish to reinforce the status quo by positing underlying biological causes to complex social problems. As a caveat to all who attempt to use the biological sciences to understand humanity's place in the world, primatologist and chimpanzee specialist Frans de Waal aptly suggests:

> When it comes to our relation with nature, there is no escaping the tension between perception and projection. What we discover in nature is often what we put into it in the first place. Consequently, the way naturalists have contributed to humanity's know-thyself mission can be understood only in the context of the stained-glasses through which they stare in nature's mirror (de Waal, 2003: 293).

Beyond Our Genes

Wrangham and Peterson's book *Demonic Males* goes beyond the assertion of human inborn aggression and propensity toward violence. The authors ask a critical question: Are we doomed to be violent forever because this pattern is fixed within our genetic code, or can we go beyond our past—get out of our genes, so to speak? The authors believe that we can look to the bonobo or pygmy chimpanzee as one potential savior, metaphorically speaking.

Bonobos, although even more closely related to the common chimpanzee than humans, demonstrate a peace-loving, lovemaking alternative to chimpanzee-human violence. How did this happen? In chimpanzees and humans, females of the species select partners that are violent: "[W]hile men have evolved to be demonic males, it seems likely that women have evolved to prefer demonic males … as long as demonic males are the most successful reproducers, any female who mates with them is provided with sons who themselves will likely be good reproducers" (Wrangham and Peterson, 1996: 239). However, among pygmy chimpanzees females form alliances and have chosen to mate with less aggressive males. So, after all, it is not violent males that have caused humans and chimpanzees to be their inborn, immoral, dehumanized selves; it is, rather, poor choices by human and chimpanzee females.

Bonobos, although even more closely related to the common chimpanzee than humans, demonstrate a peace-loving, lovemaking alternative to chimpanzee-human violence. How did this happen?

Like Dart, Washburn, Ardrey, and Wilson before them, Wrangham and Peterson believe that tendencies to killing and violence are inherited from our ancient relatives of the past. However, unlike these earlier theorists, Wrangham and Peterson argue this is not a trait unique to hominids, nor is it a by-product of hunting. In fact, unlike the original concept of the "Killer Ape," in this updated manifestation, it is just this violent nature and a natural "blood lust" that makes both humans and chimpanzees such good hunters—hunting follows killing, not vice versa. It is the bonobos that help the authors come to this conclusion. Supposedly, because bonobos have lost the desire to kill, they also have lost the desire to hunt.

> [B]onobos tell us that the suppression of personal violence carried with it the suppression of predatory aggression. The strongest hypothesis at the moment is that bonobos came from a chimpanzee-like ancestor that hunted monkeys and hunted one another. As they evolved into bonobos, males lost their demonism, becoming less aggressive to each other. In so doing they lost their lust for hunting monkeys, too … Murder and hunting may be more closely tied together than we are used to thinking. (Wrangham and Peterson, 1996: 219)

Ironically, new evidence exists that bonobos in fact do hunt (Surbeck and Hohmann, 2008), which further complicates Wrangham's dubious theory. One also has to wonder why at the only site where chimpanzees are seen to make spear-like implements for hunting, high levels of in-group and out-group directed aggression have not been observed and it is the females that do the hunting (Fongoli in Senegal; Jill Pruetz and Bertolani, 2007, and Pruetz personal communication). Additionally, even if one accepts the notion that chimpanzees and humans are obligate aggressors and killers, there is little evidence to support a link between hunting and conspecific killing (Scott, 1971; Zillman, 1979).

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The Selfish Gene Theory

Wrangham's idea of a shared human and chimpanzee lust to kill is based upon the sociobiological tenet of the selfish gene. "The general principle that behavior evolves to serve selfish ends has been widely accepted; and the idea that humans might have been favored by natural selection to hate and to kill their enemies has become entirely, if tragically, reasonable" (Wrangham and Peterson, 1996: 23).

The authors make two arguments that humans and chimpanzees share biologically fixed behaviors: (1) they are more closely related to each other than chimpanzees are to gorillas, and (2) chimpanzees are a good model for our earliest ancestor and retain conservative traits that should be shared by both.

In regard to the first of these statements, the chimp-gorilla-human triage is so close that it is difficult to tell exact divergence times or patterns among the three. The second statement is just not true. Chimpanzees have been evolving for as long as humans and gorillas, and there is no reason to believe ancestral chimps were similar to present-day chimps. The fossil evidence for the last 5-8 million years is extremely sparse, and it is likely that many forms of apes have become extinct, just as have many hominids.

Furthermore, even if the chimpanzee were a good model for the ancestral hominid, this would not mean that humans would necessarily share specific behavioral traits. As even Wrangham and Peterson emphasize, chimps, gorillas, and bonobos all behave very differently in their social behavior and in their willingness to kill conspecifics.

Debunking "Demonic Males," Coalitionary Killing and Related Concepts

The proof of the "demonic male" theory must rest solely on the evidence that violence and killing in chimpanzees and in humans are behaviors that are similar in pattern; have ancient, shared evolutionary roots; and are inherited. By 2004, there had been only 17 suspected and 12 ''observed'' cases of adult chimpanzee-chimpanzee killings reported from four of nine chimpanzee long-term research sites. This spanned a total of 215 years of combined observer time at these sites and yields a maximum rate of one chimpanzee killing every 7.5 years (see Wilson and Wrangham, 2003; Sanz, 2004; Sussman and Hart, 2008). Furthermore, most of the chimpanzee research sites where such data were gathered are highly disturbed by human encroachment, disturbance, and interference (Sanz, 2004). Besides killing conspecifics, Wrangham "includes infanticide, rape, and regular battering of females by males" as a part of this inherited legacy of violent behaviors shared by humans and chimpanzees (Sussman, 1997:108).

The proof of the "demonic male" theory must rest solely on the evidence that violence and killing in chimpanzees and in humans are behaviors that are similar in pattern; have ancient, shared evolutionary roots; and are inherited

Building on arguments from *Demonic Males*, Wrangham has further developed his theoretical argument, in particular

using three major concepts to support his hypothesis that violent behavior is basic to both humans and chimpanzees (Wrangham, 1999). These three concepts are coalitionary killing, the imbalance-of-power hypothesis, and a dominance drive.

Wrangham believes that warfare in humans and violent, deadly attacks in chimpanzees are examples of a phenomenon he labels "coalitionary killing." Adult males in these species collaborate to kill or brutally wound other adults. Coalitionary killing generally is rare among animal species but is found in social insects and some social carnivores, such as lions, wolves, and spotted hyenas, and we would add, a number of other predators. In *Demonic Males* Wrangham and Peterson state: "That chimpanzees and humans kill members of neighboring groups of their own species is . . . a startling exception to the normal rule for animals" (1996: 63). "Fighting adults of almost all species normally stop at winning: They don't go on to kill" (1996: 155). Among primates, coalitionary killing occurs only in chimpanzees and humans. "The ancient origin of warfare is supported by the rarity of coalitionary lethal violence toward adult conspecifics in other primates, and by evidence that … chimpanzees and humans share a common ancestor around 5-6 mya" (Wrangham, 1999: 3).

Coalitionary killing generally is rare among animal species but is found in social insects and some social carnivores

Second, Wrangham believes that the principal adaptive explanation linking coalitionary killing in chimpanzees and humans is what he refers to as the "imbalance-of-power hypothesis." This "states that coalitionary kills occur because of two factors: intergroup hostility, and large power asymmetries between rival parties" (1999: 3). Thus, chimpanzee males will attack other conspecifics if they outnumber them and have a low risk of injury to themselves. "By wounding or killing members of the neighboring community, males from one community increase their relative dominance over the neighbors … this tends to lead to increased fitness of killers" (1999: 11-12). Because of the complexity of modern warfare, these types of lethal raids can be seen more readily in humans in "primitive" warfare among "pre-state" societies (1999: 5). Wrangham believes that the imbalance-of-power hypothesis is also relevant to dominance interactions among members of the same community, and some of the coalitionary kills he cites occurred within chimpanzee communities.

Third and finally, Wrangham believes that the long-term evolutionary explanation of coalitionary killing is attributed to a "dominance drive" that favors unprovoked aggression. Such aggression is brought about by the opportunity to attack at times of low personal risk, thus substantially reducing competition from neighboring communities. The dominance drive is related to increased fitness, allowing the killers to leave more of their dominant-killer genes to the next generation.

Although there are a number of problems with each of these points, we will concentrate only on what we consider to be the most serious flaw of each argument. Other criticisms of Wrangham's approach can be found in Sussman, 1999; 2000; Tang-Martinez, 2000; Marks, 2002.

Regarding coalitionary killing, Wrangham assumes that certain behaviors resulting in conspecific killings among ants, wolves, chimpanzees, and humans (especially those in primitive, pre-state societies) are similar phenomena. Presumably they have the same biological bases and motivations and therefore are driven by the same underlying natural causes. Thus he gives these behaviors a label, "coalitionary killing," and in creating a name, he creates a phenomenon. Yet the extremely vague similarities between the behaviors observed do not necessarily indicate that the behaviors have any biological similarity whatsoever.

When comparisons are made between human and animal behavior and it is assumed that behaviors that are similar in appearance have similar functions and evolutionary histories, a basic principle of biology is violated

When comparisons are made between human and animal behavior and it is assumed that behaviors that are similar in appearance have similar functions and evolutionary histories, a basic principle of biology is violated. Form alone does not provide information about function or shared genetic or evolutionary history. Referring to "rape" in dragonflies, "slavery" in ants, or "coalitionary killing" in chimpanzees and humans may sound like science but is, as Marks states, "a science of metaphorical, not of biological, connections" (2002:104).

With regard to the imbalance-of-power argument, are we to believe that whenever a group of chimpanzees or humans perceives weakness in another individual or group, that group will attack and kill? Does this depend upon a genetic relationship? If not, why not? In what precise circumstances do we

actually see coalitionary killing, and when does it not occur? One would expect that if violence occurred every time there was a potential imbalance of power in chimpanzee group meetings and in within-group dominance interactions, surely coalitionary killing would be much more common than the less than twenty incidents recorded during many years of observation. In fact, killing is exceedingly rare given the potential for these conditions. Furthermore, do all humans or human groups attempt, or at least wish, to kill individuals in weaker, non-related groups? Given the drive for dominance and the imbalance-of-power hypothesis, why not? Do humans normally desire to do so, but are they restrained by laws and regulations and the fear of punishment? Is this why it is easier to compare primitive, pre-state human societies with chimpanzees, since such societies are less constrained by laws and regulations because they are closer to "nature"? As Wrangham states, "[M]ales are expected by this hypothesis to take advantage of power over neighbors, especially when unfettered by social or cultural constraints" (1999: 22).

… do all humans or human groups attempt, or at least wish, to kill individuals in weaker, non-related groups? Given the drive for dominance and the imbalance-of-power hypothesis, why not?

Presumably, neither chimpanzees nor humans attack in all circumstances of imbalance of power, and in fact coalitionary killing is extremely rare in both species. Wrangham agrees that it is the context that is critical for understanding violent behavior, and it is the context that is not explained by (or relevant to) the proposed hypothesis. "Whether or not an individual employs violence is expected to depend on the proximate stimuli, about which we still know little … Such questions are critical for understanding who becomes violent, and when" (Wrangham, 1999: 22). It seems necessary to have a good understanding of the circumstances and proximate causes of behavior before developing evolutionary explanations for that behavior.

Finally, with regard to the dominance drive argument, Robert Hinde, one of the most respected psychologists and behaviorists of our time, has considered the concept of psychological and behavioral "drives" at length. He emphasizes that the word *drive* is problematic because it has been used in so many different ways. The term may refer to hypothesized entities that are believed to exist but that have not yet been

identified, or to stimuli or responses, or to physiological and psychological states, or to neurological or non-neurological states. The term can also refer to biogenic states, in which changes in behavior are related directly to changes in the internal state of the organism, or psychogenic states, in which they are not. Hinde warns:

> Even within one usage, however, there is a tendency to use drive as a blanket variable—drive concepts are used to provide unitary explanations of a variety of characteristics of behavior which may depend, in fact, on diverse mechanisms … A unitary concept of drive can be taken to imply that these diverse characteristics of behavior depend on the same features of the underlying mechanism. There is no a priori reason why this should be so, and some reasons for thinking to the contrary. (1970:199-200)

Where measures of behavior can be directly correlated, such as drinking leading to a cessation of thirst, the proposition of an intervening drive variable may be a valuable tool for research. However, when correlation between behaviors is not perfect, "such a concept is misleading and can be a positive hindrance" (1970: 196). The use of the concept of drive in relation to the extremely complex set of behavioral and contextual phenomena related to dominance seems to us entirely inappropriate.

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Wrangham argues that those who criticize his theory do not appreciate the relevance of biological arguments for understanding warfare or the importance of the comparative method in biology. We disagree. Rather, we believe his critics are simply not convinced that the concepts of "coalitionary killing," the "imbalance-of-power hypothesis," and a "dominance drive" are sufficient to explain violent behavior in chimpanzees or humans.

Further Contrary Evidence

Putting aside these criticisms—that the definition of coalitionary killing conflates all kinds of possibly unrelated behav-

iors, that the imbalance-of-power hypothesis raises more questions than it answers, and that the idea of a dominance drive is rife with epistemological problems, it is useful returning to the question: just how common is coalitionary conspecific killing in chimpanzees? This is where the real controversy may lie. Jane Goodall described the chimpanzee as a peaceful, nonaggressive species during the first twenty-four years of study at Gombe (1950-1974). During one year of concentrated study, Goodall observed 284 agonistic encounters; of these, 66 percent were due to competition for introduced bananas, and only 34 percent "could be regarded as attacks occurring in 'normal' aggressive contexts" (1968: 278). Only 10 percent of the 284 attacks were classified as "violent," and "even attacks that appeared punishing to me often resulted in no discernable injury … Other attacks consisted merely of brief pounding, hitting or rolling of the individual, after which the aggressor often touched or embraced the other immediately" (Goodall, 1968: 277).

Jane Goodall described the chimpanzee as a peaceful, nonaggressive species during the first twenty-four years of study at Gombe

Chimpanzee aggression before 1974 was considered no different from patterns of aggression seen in many other primate species. In fact, Goodall explains in her 1986 monograph *The Chimpanzees of Gombe* that she uses data mainly from after 1975 because the early years present a "very different picture of the Gombe chimpanzees" as being "far more peaceable than humans" (1986: 3). Other early naturalists' descriptions of chimpanzee behavior were consistent with those of Goodall and confirmed her observations. Even different communities were observed to come together with peaceful, ritualized displays of greeting (Reynolds and Reynolds, 1965; Suguyama, 1972; Goodall, 1968).

Then, between 1974 and 1977, five adult males from one subgroup at Gombe were attacked and disappeared from the area, presumably dead. Why after twenty-four years did the patterns of aggression change? Was it because the stronger group saw the weakness of the other and decided to improve their genetic fitness? But surely there were stronger and weaker animals and subgroups before this time. Perhaps we can look to Goodall's own perturbations for an answer. In 1965, Goodall began to provide "restrictive human-controlled" feeding. A few years later she realized that

> the constant feeding was having a marked effect on the behavior of the chimps. They were beginning to move about in large groups more often than they had ever done in the old days. Worst of all, the adult males were becoming increasingly aggressive. When we first offered the chimps bananas the males seldom fought over their food; … now … there was a great deal more fighting than ever be-fore. (1971: 143)

The possibility that human interference, and not just provisioning, was a main cause of the unusual behavior of the Gombe chimps was the subject of an excellent but generally ignored book by Margaret Power (1991). Wrangham and Peterson (1996: 19) cite this book in a footnote, but as with many other controversies, they essentially ignore its findings, stating that chimpanzee violence might have been considered unnatural behavior if it weren't for the evidence of similar behavior occurring since 1977 and "elsewhere in Africa" (Wrangham and Peterson, 1996: 19).

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Scrambling for More Evidence

What is this evidence from elsewhere in Africa? Wrangham and Peterson provide only four brief examples, none of which is very convincing:

1. Between 1979 and 1982, the Gombe group extended its range to the south, and conflict with a southern group, Kalande, was suspected. In 1982 a "raiding" party of males reached Goodall's camp. The author's state: "Some of these raids may have been lethal" (Wrangham and Peterson, 1996: 19). However, Goodall describes this "raid" as follows: One female "was chased by a Kalande male and mildly attacked … Her four-year-old son … encountered a second male—but was only sniffed" (Goodall, 1986: 516). Although Wrangham and Peterson imply that these encounters were similar to those between 1974 and 1977, no violence was actually witnessed. The authors also

refer to the discovery of the dead body of Humphrey; what they do not mention is Humphrey's age, thirty-five, and that wild chimps rarely live past thirty-three years.

2. Six adult males from one community in the Japanese study site of Mahale disappeared one by one over the twelve-year period from 1970 to 1982. None of the animals was observed being attacked or killed, and one was sighted later roaming as a solitary male (Nishida, Hiraiwa-Hasegawa, and Takahtat, 1985: 287-89).
3. In another site in West Africa, Wrangham and Peterson report that Boesch and Boesch believe "that violent aggression among the chimpanzees is as important as it is in Gombe" (Wrangham and Peterson, 1986: 20). However, in the paper referred to, the Boesches simply state that encounters by neighboring chimpanzee communities are more common in their site than in Gombe (one per month versus one every four months). There is no mention of violence during these encounters.
4. At a site that Wrangham began studying in 1984, an adult male was found dead in 1991. Wrangham states: "In the second week of August, Ruizoni was killed. No human saw the big fight" (Wrangham and Peterson, 1996: 20). Wrangham gives us no indication of what has occurred at this site since 1991.

in observations totaling over 215 years, there have been very few recorded instances of extreme violent behavior

In fact, this was the total amount of evidence of warfare and male-male killing among chimpanzees after thirty-seven years of research. As stated above, by 2003, Wilson and Wrangham (2004) had compiled additional instances, citing twelve chimpanzee kills recorded on the basis of direct observations or fresh bodies and up to seventeen more suspicious disappearances. These occurred at four different research sites. There also are five other sites where chimpanzees have been studied where lethal violence has not occurred. Thus, in observations totaling over 215 years, there have been very few recorded instances of extreme violent behavior.

The data for infanticide and rape among chimpanzees are even less impressive. In fact, data are so sparse for these behaviors among chimps that Wrangham and Peterson are forced to use examples from the other great apes, gorillas and orangutans.

However, just as for killing among chimpanzees, both the evidence and the interpretations are suspect and controversial.

Can We Escape Our Genes?

What if Wrangham and Peterson are correct and we and our chimp cousins are inherently sinners? Are we doomed to be violent forever because this pattern is fixed within our genetic code? After 5 million years of human evolution and 120,000 or so years of *Homo sapiens* existence, is there a way to rid ourselves of our inborn evils?

> What does it do for us, then, to know the behavior of our closest relatives? Chimpanzees and bonobos are an extraordinary pair. One, I suggest shows us some of the worst aspects of our past and our present; the other shows an escape from it . . . . Denial of our demons won't make them go away. But even if we're driven to accepting the evidence of a grisly past, we're not forced into thinking it condemns us to an unchanging future. (Wrangham, 1995, in Sussman, 1997: 110)

In other words, we can learn how to behave by watching bonobos. But if we can change our inherited behavior so simply, why haven't we been able to do this before *Demonic Males* enlightened us? Surely there are variations in the amounts of violence in different human cultures and individuals. If we have the capacity and plasticity to change by learning from example, then our behavior is determined by socialization practices and by our cultural histories and not by our nature. This is true whether the examples come from benevolent bonobos or conscientious objectors.

Perhaps the greatest problem with the new iterations of the old fallacious theory is that if human problems such as warfare and killing are seen as universal, primordial, adaptive and natural, then even if this runs counter to good science, these views may become virtually immutable in the collective unconscious, diminishing our impetus for positive change.

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Conclusion

The theory presented by Wrangham and Peterson, although it also includes chimpanzees as our murdering cousins, is very similar to "man the hunter" theories proposed in the past. It also does not differ greatly from earlier European and Christian beliefs about human ethics and morality; the locus of human fallibility is merely shifted from the soul to the gene. We are forced to ask: Are these theories generated by good scientific fact, or are they just "good to think" because they reflect, reinforce, and reiterate our traditional cultural beliefs, our morality, and our ethics? Is the theory generated by the data, or are the data manipulated to fit preconceived notions of human morality and ethics?

Are these theories generated by good scientific fact, or are they just "good to think" because they reflect, reinforce, and reiterate our traditional cultural beliefs, our morality, and our ethics?

Since the data in support of these theories have been weak, and yet the stories created have been extremely similar, we are forced to believe that "man the hunter" is a myth, that humans are not necessarily prone to violence and killing, but that this belief will continue to reappear in future writings on human nature. Meanwhile, primatologists must continue their field research, marshaling the actual evidence needed to answer many of the questions raised in Wrangham and Peterson's volume.

References

Ardrey, Robert (1961). *African Genesis: A Personal Investigation into Animal Origins and Nature of Man.* Atheneum.

Ardrey, Robert (1966). *The Territorial Imperative.* Atheneum.

Ardrey, Robert (1976). *The Hunting Hypothesis: A Personal Conclusion Concerning the Evolutionary Nature of Man.* Macmillan Pub Co.

Bock, Kenneth (1980). *The Hunted of the Hunter? An Introduction to African Cave Taphonomy.* University of Chicago Press.

Cartmill, Matt (1993). *A View to a Death in the Morning: Hunting and Nature Through History*. Harvard University Press.

Cartmill, Matt. (1997). "Hunting Hypothesis of Human Origins." In F. Spencer, ed., *History of Physical Anthropology: An Encyclopedia*, pp. 508-12. Garland.

Dart, Raymond (1953). "The Predatory Transition from Ape to Man." *International Anthropological and Linguistic Review*, 1:201-17.

Darwin, Charles (1874). *The Descent of Man and Selection in Relation to Sex.* 2nd ed. Henneberry.

de Waal, F. B. M. (2003). "Silent invasion: Imanishi's primatology and cultural bias in science." *Animal Cognition*, 6: 293-299.

Erhlich, P. (2000). *Human Natures: Genes, Cultures, and the Human Prospect.* Washington, D.C.: Island Press.

Goodall, Jane (1968). "The Behavior of Free-Living Chimpanzees in the Gombe Stream Reserve." *Animal Behavior Monographs* 1:165-311.

Goodall, Jane (1971). *In the Shadow of Man*. Houghton Mifflin.

Goodall, Jane (1986). *The Chimpanzees of Gombe: Patterns of Behavior.* Belknap.

Gould, Stephen J. (1996). *The Mismeasure of Man.* W. W. Norton.

Hart, D.; Sussman, R.W. (2009). *Man the Hunted: Primates, Predators, and Human Evolution, Expanded Edition.* Boulder: Westview Press.

Hinde, R.A. (1970). *Animal Behavior: A Synthesis of Ethology and Comparative Psychology. 2nd Ed.* New York: McGraw Hill.

Marks, J. (2002). *What it Means to be 98% Chimpanzee: Apes People, and Their Genes.* Berkeley: University of California.

Mackinnon, K. C.; Fuentes, A. (2005). "Reassessing male aggression and dominance: The evidence from primatology," In *Complexities: Beyond Nature and Nurture,* ed. K.C. Mackinnon and S. Silverman, Chicago: University of Chicago Press, pp. 83-105.

Nishida, T., M. Hiraiwa-Hasegawa; Y. Takahtat (1985). "Group Extinction and Female Transfer in Wild Chimpanzees in the Mahali Nation Park, Tanzania." *Zeitschrift für Tierpsychologie* 67:281-301.

Power, Margaret (1991). *The Egalitarians, Human and Chimpanzee: An Anthropological View of Social Organization.* Cambridge University Press.

Pruetz, Jill D.; Bertolani, P. (2007). Savanna Chimpanzees, *Pan troglodytes verus*, Hunt with Tools. *Current Biology* 17: 5412-5417.

Reynolds, V.; F. Reynolds (1965). "Chimpanzees of Budongo Forest." In I. DeVore, ed., *Primate Behavior: Field Studies of Monkeys and Apes,* pp. 368-424. Holt, Rinehart, and Winston.

Rose, H.; Rose, S., Eds. (2000). *Alas, Poor Darwin: Arguments against Evolutionary Psychology.* New York: Harmony Books.

Sanz, C. (2004). *Behavioral ecology of chimpanzees in a central African forest: Pantroglodytestroglodytes in the Goualougo Triangle, Republic of Congo*. Ph.D. Thesis, Washington University, St. Louis, Missouri.

Scott, J.P. (1971). Theoretical issues concerning the origin and causes of fighting. In B. E. Eleftheriou and J. P. Scott, eds., *The Physiology of Aggression and Defeat.* pp. 11-41. Plenum Press.

Strohman, R. (1997). "The Coming Kuhnian Revolution in Biology*." Nature Biotechnology* 15:194-200.

Suguyama, Y. (1972). "Social Characteristics and Socialization of Wild Chimpanzees." In F. E. Poirier, ed., *Primate Socialization*, pp. 145-3. Random House.

Surbeck, M. and Hohmann, G. (2008). "Primate hunting by bonobos at LuiKotale, Salonga National Park." *Current Biology* 19:R906-R907.

Sussman, R. W. (1995). "The Nature of Human Universals." *Reviews in Anthropology* 24:1-11.

Sussman, R. W., Ed. (1997). *The Biological Basis of Human Behavior*. Simon and Schuster.

Sussman, R. W., Ed. (1999). *The Biological Basis of Human Behavior: A Critical Reader.* 2nd ed. Upper Saddle River: Prentice Hall.

Sussman, R. W. (2000). "Piltdown Man: The Father of American Field Primatology," In *Primate Encounters: Models of Science, Gender, and Society, eds. S.C. Strum and L. M. Fedigan, pp. 85-103.* Chicago: University of Chicago.

Sussman, R.W. (2002). "What a Tangled Web they also Weave: The New Sociobiology," *Anthropological Theory* 2:155-164.

Tang-Marinez, Z. (2000). "Paradigms and Primates: Bateman's Principle, Passive Females, and perspectives from other taxa," In *Primate Encounters: Models of Science, Gender, and Society,* eds. S. C. Strum and L. M. Fedigan, pp. 261-274. Chicago: University of Chicago.

Washburn, S. L., and C. K. Lancaster (1968). "The Evolution of Hunting." In R. B. Lee and I. DeVore, eds., *Man the Hunter*, pp. 293-303. Aldine.

Wilson, E. O. (1975). *Sociobiology: The New Synthesis.* Harvard University Press.
Wilson, E. O. (1976). "Sociobiology: A New Approach to Understanding the Basis of Human Nature." *New Scientist* 70:342-45. (Reprinted in Sussman 1997).
Wilson, M. L.; Wrangham, R. W. (2003). Intergroup relations in chimpanzees. *Ann. Rev. Anthropol.* 32:363-392.
Wrangham, R. W. (1995). "Ape, Culture, and Missing Links." *Symbols*, spring: 2-9, 20. (Reprinted in Sussman 1997).
Wrangham, Richard; Dale Peterson (1996). *Demonic Males: Apes and the Origins of Human Violence*. Houghton Mifflin.
Wrangham, R. W. (1999). "Evolution of coalitionary killing," *Yearbook of Physical Anthropology* 42:1-30.
Zillman, D. (1979). *Hostility and Aggression.* Hillsdale, N.J., Lawrence Erlbaum Associates.

Chimpanzee Violence is a Serious Topic:
A response to Sussman and Marshack's critique of *Demonic Males: Apes and the Origins of Human Violence*

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Summary *Sussman and Marshack criticize* Demonic Males *as being wrong in its generalizations about chimpanzee behavior, and flawed in its theoretical interpretations. I show that studies of chimpanzees conducted since* Demonic Males *was published (in 1996) have amply supported the claim that coalitionary killing is an important feature of chimpanzee life. It therefore demands to be explained. The theory developed in* Demonic Males *remains useful, and can help in the development of nonviolent strategies*.

In *The Moral Equivalent of War,* published as tensions were mounting before the First World War, the American psychologist and philosopher William James (1910) brought together two superficially contradictory beliefs. On the one hand, he noted, "History is a bath of blood" (James, 1910: 4). He wrote that among tribal societies "to hunt a neighboring tribe, kill the males, loot the village and possess the females, was the most profitable, as well as the most exciting, way of living" (James, 1910: 3-4). He described Greek and Roman history as a panorama of war for war's sake, and he traced the same tendencies throughout history to the modern day. "Such was the gory nurse that trained soldiers to cohesiveness," James wrote. "Our ancestors have bred pugnacity into our bone and marrow, and thousands of years of peace won't breed it out of us" (James, 1910: 6).

On the other hand, James was a passionate pacifist who regarded war as "a transitory phenomenon in social evolution" (James, 1910: 8). "I devoutly believe in the reign of peace and in the gradual advent of some sort of socialistic equilibrium," he wrote (James, 1910: 14). "The fatalistic view of the war function is to me nonsense …" (James, 1910: 14). Squaring these sentiments with his belief that war is somehow part of our biology, he felt that the great challenge for the future was to find a moral equivalent of war, some activity that would substitute for its dangerous attractions. James' idea that young men need to be challenged with non-war activities has been credited with heralding such institutions as the Peace Corps.

I begin my comment on Sussman and Marshack's critique of *Demonic Males* with William James not because the details of James' ideas were necessarily right, but because I regard him as illustrating and validating the enterprise that Dale Peterson and I undertook. Being concerned that the unpleasantly martial facts of history might induce pessimism, James aimed for constructive thinking without being weakly utopian. So he developed a theory of violence and used it to foreshadow a more peaceful future. His theory was that young men enjoyed war because they liked the excitement of fighting: "The horror makes the thrill," he wrote. Accordingly, institutions were needed that would satisfy young men's need for such feelings without war. Thus he reconciled his understanding that violence comes from biological predispositions with a forward-looking and ultimately optimistic view of the human future. Tolstoy was likewise a pacifist who understood humans to be profoundly drawn to violence. But he had a different theory from James, which was that fear of the Lord was the only motivation for peace. *Demonic Males* has a different theory again. Among other things it proposes that men are inherently more dangerous than women, and that massive imbalances of power among hostile entities tend to induce violence. These various approaches have their differences but they are united in one vital way: they assume that an understanding of violence paves the way for reducing it. I am surprised and disappointed that Sussman & Marshack take a different message

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from *Demonic Males*. Their notion appears to be that if a behavior is argued to have a biological basis, it must therefore be inevitable. Their making this deterministic fallacy is especially strange given that in Chapter 5 of *Demonic Males* Peterson and I explicitly rejected it. There were many who read *Demonic Males* without thinking that it implied any kind of biological determinism, but for those that did, I apologize for not making even clearer our repudiation of it.

My own reasons for interest in the evolution of aggression began with a personal exposure to inter-group hostility among chimpanzees in the early 1970s. Such interactions were then being detected for the first time. The revelation of intense violence and killing in a close relative raised obvious and important questions about the underlying biology for our research team, but it did not promote the sense of fatalism that Sussman and Marshack fear. Strikingly, the three senior scientists who were most closely involved with the discovery of chimpanzee lethal violence at Gombe in the 1970s have all subsequently campaigned particularly strongly against war. Jane Goodall (who was my field advisor for my PhD while I was studying chimpanzees in the early 1970s) was appalled by the discoveries of infanticide, rape and killing of adults among chimpanzees, and wrote eloquently and explicitly about them. Since 2002 Goodall has been a United Nations Messenger of Peace and a tireless advocate for nonviolence and a sustainable world. Robert Hinde (my PhD advisor) has written extensively about the deep prospects for peace among nations, including a book on eliminating inter-state conflict (*War No More*, Hinde and Rotblat 2003), and continues to campaign at the highest levels for reductions in nuclear weaponry through his intense involvement with the Pugwash group. David Hamburg, who like Hinde visited Gombe in the 1970s during the time when patterns of chimpanzee violence were coming into focus, was originally an academic psychiatrist. Hamburg was particularly strongly affected by the revelations. He produced an important analysis of chimpanzee violence with the same essential argument as in *Demonic Males* (Hamburg and Trudeau 1981), and worked for decades with various US administrations and within the UN to help reduce violence around the world. His very important book *Preventing Geno-*

an understanding of violence paves the way for reducing it

cide (Hamburg 2010) is rich in detailed practical solutions for international peace-making and war-preventing mechanisms, yet explicit about the lessons from evolution.

The examples of James, Goodall, Hinde and Hamburg stand as challenges to the idea of Sussman and Marshack (S&M) that "if human problems such as warfare and killing are seen as universal, primordial, adaptive and natural, then … these views may become virtually immutable in the collective unconscious, diminishing our impetus for positive change." James, Goodall, Hinde and Hamburg show that exposure to chimpanzee violence, and in some cases an understanding that it was closely related to human violence, did not propel them into fatalism.

Similarly for my own part, I believe that studies such as *Demonic Males* can help promote the nonkilling philosophy by grappling with such questions as why some species are more violent than others, and what the answers mean for our species' future. Of course whether or not that potential is realized depends on the validity of facts and theory, as S&M note. S&M argue that the evidence for chimpanzee violence in *Demonic Males* was inadequate. Certainly we knew less then than we do now. As it turns out, the evidence for chimpanzees killing each other has mounted steadily since *Demonic Males* was published.

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The Frequency and Distribution of Lethal Violence in Chimpanzees

The "real controversy", S&M suggest, lies in the question "just how common is coalitionary conspecific killing in chimpanzees?". S&M conclude that "in observations totaling over 215 years, there have been very few recorded instances of extreme violent behavior." Accordingly "the evidence and the interpretations are suspect and controversial." S&M imply that observations of coalitional killing by chimpanzees are so rare that they are unimportant and/or untrue.

Coalitionary killings among chimpanzees are certainly rare. Nevertheless current estimates suggest that they occur at a frequency not very different from war deaths among human

pre-state societies (which themselves occur at a substantially higher rate than war deaths in twentieth-century industrial nations, Keeley 1996). In a survey of nine study communities in the five longest-studied populations of chimpanzees with more than one community, Wrangham et al (2006) reported that the median risk of violent death for chimpanzees from inter-community killing (69-287 per 100,000 per year) fell in the same order of magnitude as the median reported values for rates of death from warfare among subsistence-society hunters and farmers (164 and 595 per 100,000 per year, respectively)." Wrangham et al's (2006) rates for humans came from the 32 subsistence societies for which data could most easily be found, from the famously pacific Semai to various war-like groups. Since any particular tabulation of frequency data would be altered by sampling different societies and different periods, the comparison does not justify strong conclusions about the relative rate of war deaths among farmers, hunters and chimpanzees. Still, these estimates show that if violent death has been important among human populations, as few would deny, it is important for chimpanzees.

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The five chimpanzee populations that provided data in Wrangham et al.'s (2006) study were Budongo and Kibale (Uganda), Gombe and Mahale (Tanzania) and Taï (Ivory Coast). Data came from up to 2004. At that time coalitionary killing had not been seen in inter-community contexts in Budongo or Taï. Inter-community interactions (and even the location of inter-community boundaries) in Budongo remain poorly understood but seven infant corpses have been found in contexts suggestive of intergroup killing (Reynolds, 2005). Two cases of coalitionary killing have now been recorded in Taï (Boesch et al., 2008). Evidence of coalitionary killing has also come from a six-month study of unhabituated chimpanzees in Gabon (Boesch et al., 2007), from Kalinzu Forest in Uganda (Hashimoto and Furuichi, 2005) and in the Republic of the Congo, where Goossens et al., (2005) described the results of 8 years of monitoring of 37 wild-born captive chimpanzees released into the Conkouati-Douli National Park. Goossens et al. (2005) reported that "encounters with wild chimpanzees

were a major cause of mortality in released males, and 40-50% of released males would have died without veterinary intervention." They concluded that "males should not be released where wild chimpanzees occur, as they are likely to be attacked and killed." Boesch et al. (2007) drew two general conclusions: "1) wild chimpanzees may be very aggressive even in the absence of human observers, which can lead to conspecific killings, in contradiction to the suggestion of Clark (2002) and Power (1991); and 2) wild chimpanzees resort to intercommunity killing through most of their natural range, from groups in rather open habitat to ones in the dense forest, as well as groups that are artificially provisioned, ones under regular human observation, and ones not habituated to human presence." Thus recent data has abundantly affirmed the conclusion drawn in *Demonic Males* that coalitionary killing is a characteristic behavior of chimpanzees.

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S&M draw attention to three kinds of observation that appear to challenge that kind of conclusion. First, they suggest that after Goodall began her studies in Gombe there were so many years without violence that nonviolence should be regarded as the true pattern. But S&M are confused. They claim 24 years without violence, from 1950 to 1974. They should have said 11 years: Goodall's study began in 1960, and the first intergroup infanticide was seen in 1971. Even 11 years is too long a period to provide evidence about inter-community killing, because observers did not start following habituated chimpanzees throughout their territory until the late 1960s (about 1968). Up to that time, either the chimpanzees were poorly habituated to humans (from 1960 to about 1963), or the research team confined their observations to a small provisioning area visited by chimpanzees in search of bananas, close to the center of the study community's territory. After 1968 most observations outside the provisioning area were at first relatively brief (around a half day). In 1971 David Bygott became the first researcher to regularly follow chimpanzees to the borders of their range, and later that year he saw the first recorded inter-community infanticide (Bygott 1972). In 1972 I became the first observer to rely on all-day observations for my research, and like Bygott and subsequent researchers I regularly saw intensely

hostile intergroup interactions. Given the overall rarity of inter-community violence, a latency of about three years from the start of regular observations in the natural environment to the first killing (1968 to 1971) is no surprise.

Second, S&M suggest that some of the reported killings might have been deaths from other causes. The quality of observation certainly varies. At one extreme, several killings in Kibale (Ngogo) have been filmed. At the other are cases of "suspected" killings (such as the death of Humphrey in Gombe, mentioned by S&M), in which a healthy adult male in the prime of life died without any known cause, except that circumstances suggest he had been a victim of an inter-community interaction. Wrangham et al. (2006) distinguished killings by whether they were "observed", "inferred", or "suspected", and gave frequency estimates both including and excluding "suspected" cases. Inclusion of "suspected" cases raised the estimated death rate from inter-community killing from 69 to 287 / 100,000 / year, and from intra-community killings from 271 to 287 / 100,000 / year. Whether or not "suspected" cases are included, the median death rates remain significant.

I look forward particularly to the discovery of peaceful association between members of neighboring communities

Third, S&M note that there are several other sites (they say "five") where chimpanzees have been studied without any records of lethal violence. Certainly there are various sites where scientists have studied chimpanzees without any record of coalitionary killing or other kinds of violence. In some cases there are obvious explanations. The chimpanzees may remain too poorly habituated to be observed closely throughout their territory (e.g. Lopé, Gabon; Mt Nimba, Guinea; Ugalla, Tanzania). The study community may be isolated from other chimpanzees (e.g. Bossou, Guinea; Kyambura, Uganda). Or the population density may be so low that inter-community interactions are very rare (a possible contributor to the lack of reports for Fongoli, Senegal). I agree with S&M that further data will be valuable. I look forward particularly to the discovery of peaceful association between members of neighboring communities, because such novel data would raise fascinating questions about behavioral variation and its causes.

In sum the idea that the evidence for chimpanzee violence is "suspect and controversial" is not tenable. Killing by chimpanzees is rare but it has a wide geographical distribution and is

recorded persistently, even though its occurrence is reduced by chimpanzees tending to avoid the borders with their neighbors (Wilson et al., 2007). Everyone involved with the care of chimpanzees in sanctuaries knows that adult males are so dangerous that they must be managed with great caution in order to avoid severe injury or death to conspecifics and even to humans. It is time to shift the conversation. Although coalitionary killing has been documented in some other primate species (Gros-Louis et al 2003, Campbell 2006, Valero et al 2006), chimpanzees have a predisposition for coalitionary killing far exceeding that in most primates. The question is why.

Explaining Lethal Violence in Chimpanzees

The only developed theory of the evolution of coalitionary killing in chimpanzees with which I am familiar is the imbalance-of-power hypothesis, foreshadowed by various writers (e.g. Goodall, 1986; Manson and Wrangham, 1991; van der Dennen, 1995), described in *Demonic Males* and elaborated by Wrangham (1999). S&M summarize the theory and characterize it as having three main components, each of which has a "serious flaw" that they articulate. For the sake of brevity I restrict my responses to S&M's "serious flaws".

the description of coalitionary killing as occurring in both chimpanzees and humans has no bearing on the motivations that can be ascribed in each case

S&M's first objection concerns the concept of "coalitionary killing." S&M believe this term is illegitimate because in their view, the claim that humans, chimpanzees and ants exhibit "coalitionary killing" is bound to mean that in each species this behavior has "the same biological bases and motivations and therefore … driven by the same underlying natural causes."

I am surprised by this objection, and regret that Peterson and I did not make our position clearer. Contrary to S&M's inference, I used "coalitionary killing" solely as a descriptive term to denote two or more individuals acting jointly to kill a victim. The use of this term does nothing to constrain our understanding of the underlying biology. Specifically the description of coalitionary killing as occurring in both chimpanzees and humans has no bearing on the motivations that can be ascribed in each case. In a similar way I might describe bat, birds and moths as animals that "fly", but by doing so I assume nothing about the aerodynamic

principles followed by the different species.

Whether or not the biology underlying coalitionary killing is in fact the same in chimpanzees and humans is an open question, though of course I hypothesize that there are important continuities. Answers will depend partly on which aspects of biology we are interested in, including adaptive consequences, neural architecture, proximate stimuli, developmental precursors, etc. They will not depend on our system of ethological categorization of behavior.

S&M's second objection is that the imbalance-of-power hypothesis fails to explain why coalitionary killing is so rare. For example they ask: "With regard to the imbalance-of-power argument, are we to believe that whenever a group of chimpanzees or humans perceives weakness in another individual or group, that group will attack and kill?" (Given that the intended victim can sometimes escape, the question would be more appropriate if it ended "will attack and *try to* kill?") S&M's discussion of this question reveals some misunderstanding of chimpanzee grouping dynamics and the imbalance-of-power hypothesis.

In the case of chimpanzees, this state of hostility means that the two groups must be from different communities. In the case of pre-state humans, they can be from different tribes

S&M imply that the imbalance-of-power hypothesis would predict that any meeting between a solitary male and a larger group should lead to an attempted kill. However, encounters between a solitary male and a larger group ordinarily occur within communities, i.e. between individuals who are part of the same social network. In these cases the imbalance-of-power hypothesis does not predict attempts to kill, since (according to the hypothesis) not only must there be a sufficient imbalance of power that the aggressors can attack with impunity, but there must also be a state of hostility between the two meeting groups. In the case of chimpanzees, this state of hostility means that the two groups must be from different communities. In the case of pre-state humans, they can be from different tribes.

S&M's confusion on this point is reflected by their further questions along the same lines. They ask: "Do humans normally desire to do so [i.e. kill the weak], but are they restrained by laws and regulations and the fear of punishment?" It is nonsensical to think that killing has normally to be restrained "by laws and regulations and the fear of punishment". Because the imbalance-

of-power hypothesis invokes intergroup hostility as one of its conditions for attempts to kill, it is an inadequate explanation of cases where both parties are subject to the same laws and therefore necessarily part of the same social network.

S&M continue with a provocative question: "Is this why it is easier to compare primitive, pre-state human societies with chimpanzees, since such societies are less constrained by laws and regulations because they are closer to "nature"?"" The answer is "No." In my view it is indeed easier to establish comparisons about patterns of intergroup killing between chimpanzees and pre-state societies than between chimpanzees and state societies, but this is not because pre-state human societies are closer to "nature", whatever that means. Instead, similarity in a particular pattern of violence between pre-state societies and chimpanzees (namely unprovoked killing of vulnerable members of a neighboring group) is easier to detect partly because the patterns of killing are less variable in each case than those among state societies. In intergroup hostility among state societies, by contrast, the roles of specialized military units, hierarchical leadership, huge groups, diverse weaponry, elaborate alliance systems and other features specific to state organization are significant complicating factors.

There is a second and equally important reason why comparisons among pre-state societies are particularly apposite for comparisons with chimpanzees: relationships among pre-state societies were often "anarchic", meaning that each society was so independent politically that its success depended solely on its own military resources. Among the tribes of hunter-gatherers in the Andaman Islands, for example, there were no alliances and a permanent state of war. Kelly (2000: 118-119) states that "peace was unattainable in external war (between cultural groups that speak mutually unintelligible languages)." Under these conditions the imbalance-of-power hypothesis does predict consistent efforts to attack and kill vulnerable members of neighboring groups. Such a pattern (attacking members of neighboring tribes whenever they were encountered and vulnerable) was indeed reported by Kelly (2000).

Under these conditions the imbalance-of-power hypothesis does predict consistent efforts to attack and kill vulnerable members of neighboring groups

S&M's questions, asking under what conditions the imbalance-of-power hypothesis accounts for attempts to kill, are

useful in opening up an important topic, which is why there is enormous variation in the rates of inter-group killing among human societies, including hunter-gatherers. There is not sufficient room here to explore in detail the problems raised by surveys of intergroup violence and war among hunter-gatherers, but two points are crucial. First, the majority of surveys of war among hunter-gatherers do not distinguish cases of people living surrounded by other hunter-gatherers, from cases where they are part of a socio-political system involving dominant groups of farmers. The imbalance-of-power hypothesis predicts consistent attempts to kill only in the former systems, where political relationships are anarchic. Second, the difference between internal and external war is vital. In the extreme form of this distinction, external war is war between tribes speaking mutually unintelligible languages, whereas internal war is between villages or other groups within a tribe (Kelly, 2000). The imbalance-of-power hypothesis predicts consistent attempts to kill only in external war. In internal war, by contrast, opponents are socially linked to each other via a variety of allies and affines. Under these conditions the imbalance-of-power hypothesis is only one part of the explanation: other ideas are needed to account for the complex effects of witnesses, reputations, alliance dynamics etc.

males give many spontaneous aggressive displays to each other when rising in rank, followed by a cessation of displays when the target gives formal signals of submission

The third of S&M's "serious flaws" was that my concept of a "dominance drive" was "entirely inappropriate." I used "dominance drive" to refer to the striving of male chimpanzees to dominate members of neighboring communities. S&M's objection was primarily that the "the word *drive* is problematic because it has been used in so many different ways." I agree that the word "drive" had a confusing history in ethology in the 1960s. But I do not think my use of the term "drive" created much confusion, since it should have been obvious that I was merely trying to express the notion that chimpanzees spontaneously show much behavior directed towards eagerly dominating others. Evidence for this phenomenon in chimpanzees is seen within communities. Thus males give many spontaneous aggressive displays to each other when rising in rank, followed by a cessation of displays when the target gives formal signals of submission. De Waal

(1986: 474) calls this behavior "status-striving", defined as an "intentional striving caused by an appetence for dominance". ("Appetence" is a "strong craving or desire".) S&M may find the concept of status-striving or a dominance drive inappropriate, but they offer no alternative account. Whatever we call it, I believe that all observers of chimpanzees would agree that males exhibit an intense competition for status, which we may call "status-striving", "victory appetite" or a "dominance drive" depending on our preference.

S&M summarize their objections to the imbalance-of-power hypothesis by saying that the hypothesis is not "sufficient to explain violent behavior in chimpanzees or humans." I agree wholeheartedly: there are vast complexities in the nature and patterning of violence, and of course the imbalance-of-power hypothesis does not capture all of them. But in its favor the imbalance-of-power hypothesis represents a start at solving the extraordinary, important and chilling problem of explaining why chimpanzees make deliberate attacks on victims from neighboring communities who are outnumbered and over-powered, in a manner evocative of various human practices and contexts.

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Competing hypotheses have been examined but receive little support (Williams et al., 2004; Wilson et al., 2004). First, chimpanzees could in theory have a generalized tendency to attack unfamiliar individuals. However, the likelihood of an attack clearly depends on the relative balance of power (Crofoot and Wrangham, 2009). Second, specific individuals might be particularly prone to violence. However although individual variation has been shown for predatory aggression by chimpanzees (Gilby et al., 2008) and for rank-related frequencies of intra-community aggression (Muller and Wrangham, 2004), Wilson et al. (2001) found equally strong responses to playbacks of strangers among all seven adult males in their study. Third, attacks could be provoked by immediate competition over resources. Relevant stimuli could include the presence of sexually active females, the presence of preferred food patches, a season of ecological stress or a long-term shortage of land or females. None of these has yet been demonstrated to be important, however (Wilson et al., 2004). Only the imbalance-of-power hypothesis has been strongly supported,

since much evidence shows that chimpanzees are sensitive to power imbalances, tend to reduce the number of males in neighboring communities, and gain fitness advantages by doing so (Crofoot and Wrangham, 2009).

Finally S&M complain that *Demonic Males* pays too little attention to an idea presented by Power (2001), who argued that human interference in Gombe may have exacerbated a natural tendency to violence. "It seems possible," she concluded, "that quite unintentionally the Gombe feeding methods brought about the stressful emotive atmosphere of rare, acute food crisis such as might be brought about through either overpopulation or prolonged natural disaster, which may have made adaptive, under the special circumstances, a change to the mode of resource defense Krebs and Davies (1981) refer to as 'despotism': exclusion of others from resources." (Power, 2001: 243). This quote shows that whether or not the Gombe killings were promoted by the provision of some bananas, Power thought that chimpanzees also exhibit such behavior in relation to natural events. She did not, however, present a theory for why they should do so.

Demonic Males suggests that inter-group killings could have occurred in the ancestral lineages of both chimpanzees and humans, all the way back to their common ancestor

Power (2001) speculated that the provision of large numbers of bananas in a small area (particularly in 1966-68) could have contributed to the killing of adults several valleys away in 1974-77. It is difficult to test her idea, but it clearly involves a large number of assumptions. Power (2001) also suggested that Ngogo (Kibale) would be a more informative site, on the basis that it was undisturbed. The Ngogo chimpanzees have indeed never been provisioned, but now that they have been habituated they prove to have had a rate of death from coalitionary killing that exceeded even that reported from Gombe (Table 2 in Wrangham et al 2006).

The Relevance of Coalitionary Killing in Chimpanzees to Warfare in Humans

Demonic Males suggests that inter-group killings could have occurred in the ancestral lineages of both chimpanzees and humans, all the way back to their common ancestor. S&M make two main objections to this idea.

First they are skeptical that chimpanzees (strictly, the genus *Pan*) and humans are each other's closest ancestor. As a result, they view behavioral reconstruction on the basis of similarities in behavior between *Pan* and humans as a misguided enterprise. The data on ape phylogeny are strong however. The trichotomy among chimpanzees, humans and gorillas has been resolved in favor of chimpanzees and humans as sister clades (with gorillas as an outgroup) on the basis of the following types of evidence: total single-copy DNA hybridization (Caccone and Powell, 1989), mitochondrial genes (Ruvolo et al. 1991), the entire mitochondrial genome (Horai et al., 2005), multiple independent DNA data-sets (Ruvolo, 1997; Chen and Li, 2001), non-coding DNA (Xq13.3) (Kaessmann et al., 2001), *Alu* elements (Salem et al., 2003), and most notably, ~ 10 million aligned base pairs (Patterson et al. 2006). No large data-sets contradict these results. Data suggesting alternative gene trees can occasionally be found, and is ascribed to lineage sorting of ancestral polymorphisms (Ruvolo, 1997; Chen and Li, 2001). The evidence for *Pan* and humans being each other's closest relatives is now so overwhelming that the scientific community and NIH decided to spend millions of dollars sequencing the chimpanzee genome before that of any other primate.

The fact that chimpanzees and humans share a rare behavior (coalitionary killing of male neighbors) raises the possibility that the behavior has occurred continuously in both lineages since their common ancestry, but it does not prove it

Second, S&M say that "even if the chimpanzee were a good model for the ancestral hominid, this would not mean that humans would necessarily share specific behavioral traits." I agree, and I have made the same point myself several times. The fact that chimpanzees and humans share a rare behavior (coalitionary killing of male neighbors) raises the possibility that the behavior has occurred continuously in both lineages since their common ancestry, but it does not prove it. The hypothesis of common ancestry for such behaviors will be testable with genetic and neurobiological data.

Concluding Comments

Demonic Males represents an early effort at understanding

the taxonomic distribution and functional significance of coalitionary killing, and its essential evidence and arguments have been well supported by subsequent observations and ideas (e.g. Wilson et al., 2004, Williams et al., 2004, Watts et al., 2006, Boesch et al., 2007, Sherrow and Amsler, 2007, Boesch et al., 2008). I agree with S&M that there are many questions left unanswered, and I believe that continuing research offers the prospect of ever more important insights about the biological, environmental, social and cultural influences on violence. As we probe such topics, I hope that various distractions can be avoided.

First, a theory about a particular set of behaviors (whether it is about killing, or any other behavior, such as feeding, or dancing) should not be criticized for failing to explain "much of human behavior." Contrary to S&M's implications with their dancing parody, *Demonic Males* is focused on violence as a specific problem, not as a prime mover underlying human behavior in general. The fact that *Demonic Males* does not review affiliation, trust, sexual behavior, foraging and so on does not mean that Peterson or I think these topics unimportant. We both consider them very important. It simply means that *Demonic Males* had a particular focus. *Demonic Males* is completely compatible with the obvious fact that men are often caring, loving, cooperative and moral in the best sense. I regret that anyone should have thought otherwise.

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Second, superficial similarities with past ideas are no basis for dismissing contemporary theories. To my mind S&M exaggerate the similarities between the imbalance-of-power hypothesis and early Christian beliefs about human ethics. But even a strong resemblance would merely justify caution in evaluation, rather than rejection.

Third, we should strive to avoid false dichotomies. To S&M human behavior is determined by socialization and culture, and not by nature. But behavior is always the product of both nurture and nature. To S&M, male violence stems either from male competition or female choice. But the behavior of both males and females affects the course of evolution. To S&M, australopithecines were the hunted, not the hunters. But chimpanzees are both hunted and hunters, and australopithecines were

probably the same. As we seek to explain complex behaviors we must be open to an interacting set of influences.

Finally, I hope that those of us involved in the search for a helpful theory of violence can avoid trivializing each other's efforts. I would be the first to admit that the imbalance-of-power hypothesis does not give us a working prescription for nonviolence. But by stressing the particular dangers of male coalitionary behavior *Demonic Males* contributes to an ongoing debate about the prospects for promoting nonviolence through the education of women and their increased representation in legislative bodies. Since *Demonic Males* was published I have participated regularly in seminars with such programs as *Women Waging Peace*, in which participants represent conflict zones from around the world. I have repeatedly found that they cherish the optimism represented in *Demonic Males* by its identification of some sources of violence that we can do something about—namely, the appalling ease with which men are induced to violence under some circumstances.

Peterson and I ended our book with this challenge: "If we are cursed with a demonic male temperament and a Machiavellian capacity to express it, we are also blessed with an intelligence that can, through the acquisition of wisdom, draw us away from the 5-million-year stain of our ape past." I agree that whether the stain is 5 million years old remains an open question, but however old it is, we can all agree about the urgency of leaving it behind. William James, Jane Goodall, Robert Hinde and David Hamburg have spoken constructively about a brighter future. The aim of the nascent theory represented in *Demonic Males* is to follow in that important tradition.

"If we are cursed with a demonic male temperament and a Machiavellian capacity to express it, we are also blessed with an intelligence that can, through the acquisition of wisdom, draw us away from the 5-million-year stain of our ape past."

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References

Boesch, C., Head, J., Tagg, N., Arandjelovic, M., Vigilant, L. & Robbins, M. M. (2007). Fatal chimpanzee attack in Loango National Park, Gabon. *International Journal of Primatology*, 28, 1025-1034.

Boesch, C., Crockford, C., Herbinger, I., Wittig, R., Moebius, Y. & Normand, E. (2008). Intergroup conflicts among chimpanzees in Tai National Park: lethal violence and the female perspective. *American Journal of Primatology*, 70, 519-532.

Bygott, J. D. (1972). Cannibalism among wild chimpanzees. *Nature*, 238, 410-411.

Caccone, A. & Powell, J. R. (1989). DNA divergence among hominoids. *Evolution*, 43, 925-942.

Campbell, C. J. (2006). Lethal intragroup aggression by adult male spider monkeys (*Ateles geoffroyi*). *American Journal of Primatology*, 68, 1197-1201.

Chen, F. C. & Li, W. H. (2001). Genomic divergences between humans and other hominoids and the effective population size of the common ancestor of humans and chimpanzees. *American Journal of Human Genetics*, 68, 444–456.

Clark, M. E. (2002). *In Search of Human Nature*. London: Routledge.

Crofoot, M. C. & Wrangham, R. W. (2009). Intergroup aggression in primates and humans: the case for a unified theory. In: *Mind the Gap* (Ed. by Kappeler, P. M. & Silk, J.), pp. 171-197. Berlin: Springer-Verlag.

de Waal, F. B. M. (1986). The integration of dominance and social bonding in primates. *Quarterly Review of Biology*, 61, 459-479.

Gilby, I. C., Eberly, L. E. & Wrangham, R. W. (2008). Economic profitability of social predation among wild chimpanzees: individual variation promotes cooperation. *Animal Behaviour*, 75, 351-360.

Goodall, J. (1986). *The Chimpanzees of Gombe: Patterns of Behavior*. Cambridge MA: Harvard University Press.

Goossens, B., Setchell, J. M., Tchidongo, E., Dilambaka, E., Vidal, C., Ancrenaz, M. & Jamart, A. (2005). Survival, interactions with conspecifics and reproduction in 37 chimpanzees released into the wild. *Biological Conservation*, 123, 461-475.

Hamburg, D. A. (2010). *Preventing Genocide: Practical Steps Towards Early Detection and Effective Action.* Boulder, CO: Paradigm.

Hamburg, D. A. & Trudeau, M. B. (1981). *Biobehavioral Aspects of Aggression*. New York: Alan R. Liss.

Hashimoto, C. & Furuichi, T. (2005). Possible intergroup killing in chimpanzees in the Kalinzu Forest, Uganda. *Pan Africa News*, 10, 31-32.

Hinde, R. & Rotblat, J. (2003). *War No More: Eliminating Conflict in the Nuclear Age*. London: Pluto Press.

Horai, S., Hayasaka, K., Kondo, R., Tsugane, K. & Takahata, N. (1995). Recent African origin of modern humans revealed by complete sequences of hominoid mitochondrial DNAs. *Proc Natl Acad Sci USA*, 92, 532–536.

James, W. (1910). The moral equivalent of war. *International Conciliation*, 27, 3-20.

Kaessmann, H., Wiebe, V., Weiss, G. & Pääbo, S. (2001). Great ape DNA sequences reveal a reduced diversity and an expansion in humans. *Nature Genetics*, 27, 155-156.

Keeley, L. H. (1996). *War Before Civilization.* New York: Oxford University Press.

Kelly, R. C. (2000). *Warless Societies and the Origins of War.* Ann Arbor, MI: University of Michigan Press.

Krebs, J. R. & Davies, N. B. (1981). *An Introduction to Behavioural Ecology.* Oxford: Blackwell.

Manson, J. H. & Wrangham, R. W. (1991). Intergroup aggression in chimpanzees and humans. *Current Anthropology*, 32, 369-390.

Muller, M. N. & Wrangham, R. W. (2004). Dominance, aggression and testosterone in wild chimpanzees: A test of the 'challenge hypothesis'. *Animal Behaviour*, 67, 113-123.

Patterson, N., Richter, D. J., Gnerre, S., Lander, E. S. & Reich, D. (2006). Genetic evidence for complex speciation of humans and chimpanzees. *Nature*, 441, 1103-1108.

Power, M. (1991). *The Egalitarians - Human and Chimpanzee: An Anthropological View of Social Organization.* Cambridge: Cambridge University Press.

Reynolds, V. (2005). *The Chimpanzees of the Budongo Forest: Ecology, Behaviour and Conservation.* Oxford: Oxford University Press.

Ruvolo, M. (1997). Molecular phylogeny of the hominoids: inferences from multiple independent DNA sequence data sets. *Molecular Biology and Evolution*, 14, 248-265.

Ruvolo, M., Disotell, T. R., Allward, M. W., Brown, W. M. &

Honeycutt, R. L. (1991). Resolution of the African hominoid trichotomy by use of a mitochondrial gene sequence. *Proc. Natl. Acad. Sci. U.S.A.*, 88, 1570-1574.

Salem, A. H., Ray, D. A., Xing, J., Callinan, P. A., Myers, J. S., Hedges, D. J., Garber, R. K., Witherspoon, D. J., Jorde, L. B. & Batzer, M. A. (2003). *Alu* elements and hominid phylogenetics. *Proc Natl Acad Sci USA*, 100, 12787-12791.

Sherrow, H. M. & Amsler, S. J. (2007). New intercommunity infanticides by the chimpanzees of Ngogo, Kibale National Park, Uganda. *International Journal of Primatology*, 28, 9-22.

Valero, A., Schaffner, C. M., Vick, L. G., Aureli, F. & Ramos-Fernandez, G. (2006). Intragroup lethal aggression in wild spider monkeys. *American Journal of Primatology*, 68, 732-737.

van der Dennen, J. M. G. (1995). *The Origin of War: the Evolution of a Male-Coalitional Reproductive Strategy.* Groningen, Netherlands: Origin Press.

Watts, D. P., Muller, M. N., Amsler, S. A., Mbabazi, G. & Mitani, J. C. (2006). Lethal inter-group aggression by chimpanzees in Kibale National Park, Uganda. *American Journal of Primatology*, 68, 161-180.

Williams, J., Oehlert, G., Carlis, J. & Pusey, A. (2004). Why do male chimpanzees defend a group range? *Animal Behaviour*, 68, 523-532.

Wilson, M. L., Hauser, M. D. & Wrangham, R. W. (2001). Does participation in intergroup conflict depend on numerical assessment, range location, or rank for wild chimpanzees? *Animal Behaviour*, 61, 1203-1216.

Wilson, M. L., Hauser, M. D. & Wrangham, R. W. (2007). Chimpanzees (*Pan troglodytes*) modify grouping and vocal behaviour in response to location-specific risk. *Behaviour*, 144, 1621-1653.

Wilson, M. L., Wallauer, W. R. & Pusey, A. E. (2004). New cases of intergroup violence among chimpanzees in Gombe National Park, Tanzania. *International Journal of Primatology*, 25, 523-549.

Wrangham, R. W. (1999). Evolution of coalitionary killing. *Yearbook of Physical Anthropology*, 42, 1-39.

Wrangham, R. W., Wilson, M. L. & Muller, M. N. (2006). Comparative rates of aggression in chimpanzees and humans. *Primates*, 47, 14-26.

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