

# THE PSYCHOLOGY OF RESOLVING GLOBAL CONFLICTS

**From War to Peace**

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CHAPTER 1

## HUMAN NATURE, ETHNIC VIOLENCE, AND WAR

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Is war inherent in human nature? This is not the same as asking whether war is a permanent part of the human condition, but it is similar to asking whether the *risk* of war is permanent, or whether it will be very difficult to prevent future wars. The distinction is that between a natural tendency and an inevitable consequence. Vulnerability to cancer is inherent in the human condition, but we have made great strides against it and we hope that with imagination and effort it will be largely controlled. Yet the vulnerability is in all likelihood permanent because it is inherent in the processes of life.

I will argue that there is in human nature a natural tendency to violence and, additionally, to war, and that the failure to fully recognize this tendency—a common failure in academic circles—increases the risk. I begin with a consideration of the tendency to violence in general, of which war is a special case, sketching the evolutionary causes of violence and its distribution and function in other animals, then considering the evidence for violence during human evolution.

Next I review the range of levels of violence in human groups, considering not only the most but also the least violent cultures. I proceed to outline the machinery or mechanisms of violence in individual biopsychology. This leads inevitably to an emphasis on males, whose propensity for violence, in species like ours, is much greater than that of females.

Recognizing that violence is not the same as war, I proceed to discuss the necessary conditions for producing the latter from the former, allude to the history of war, and review several strong and perhaps universal human tendencies, in addition to the tendency to violence, that add to our predisposition to war. Finally, I present a modest proposal for reducing the risk of war.

## The Evolution of Violence

Beginning in the 1960s, a renaissance of Darwin's theory changed our understanding of evolution. In essence, life consists of strings of nucleic acids that have one or another degree of stability. Whatever the stable strings have or do that makes them last—in the face of entropic forces constantly trying to tear them down—will last along with them. Nucleic acid strings make proteins, and if those proteins add to stability, they too persist. A protective coating, a molecular machine for garnering energy, a structure that senses light—these and countless more consequences of the strings' capacity to make proteins will, if they further stability, persist. These are adaptations. Since they exist only to stabilize the strings, or at least the ordered information in the strings, evolutionary biologists have a favorite saying: "An organism is a gene's way of making another gene."

At any given moment in the history of life, some organisms are better at this than others. They survive and reproduce while the others do not. Thus competition is of the essence of living matter. Since resources are often scarce, this competition will in many species involve adaptations that harm others. Predation is of course an example, but there will also be a need to outcompete, and sometimes harm, other members of the same species. All socially living animal species exhibit violence. Conflicts usually occur over scarce resources such as food, space, or mating opportunity. In most species females invest more in offspring than males do, and this makes them a scarce resource for males, who fight over them. Females, and in many species males as well, guard the young and fight to defend them.

Toward the end of the twentieth century, the natural history of aggression was transformed. The older view was that aggressive behavior functions to space individuals over a territory (Lorenz, 1970). Threats and other aggressive displays were held to reduce actual violence by spacing individuals and arranging them in a stable hierarchy. Animal field studies seemed to support this view (Wynne-Edwards, 1962). Humans were said to be almost unique among animals in that we kill our own kind. Our use of weapons to distance us from our victims was believed to circumvent the natural restraints on violence.

This argument is now unsustainable. Part of the reason it appeared reasonable was the lack of opportunity to observe animal killings. If baboons killed their own kind at the same rate as Americans do, they would have to be watched for hundreds of years before a killing would be seen or even detected (Wilson, 1975, pp. 246–247). As person-years of field observations accumulated, killing was seen in many species and in varied contexts, pointing to the conclusion that "natural" mechanisms restraining violence do not work much better in nonhuman animals than in humans.

One widespread form of killing is competitive infanticide, first systematically observed in the Hanuman langur (Hrdy, 1977, 1979). Langur groups comprise a hierarchy of female relatives with their young. A small number of males may join the group for a year or more, but when new males appear, they may drive out the resident males and take their places. They kill all infants below six months of age in a

matter of days. Females resist without success and mate with the new males as they become fertile again.

Competitive infanticide has been seen in chimpanzees, lions, wild dogs, and many other species in varied contexts (Hausfater & Hrdy, 1984). Cooperation too is adaptive, but violence evolved to serve the interests of individuals in obtaining resources, including mates. Dominant males have privileged access to ovulating females in baboons (DeVore, 1965; Hausfater, 1975) and rhesus monkeys (Wallen & Tannenbaum, 1997). Male predominance in physical aggression is mainly due to such competition for fertile females. Another pattern in monkeys and apes is male violence against females, often in the service of sexual coercion (B. Smuts, 1992; B. B. Smuts & Smuts, 1993).

As for violence in human phylogeny, the hypothesis that the emergence of hunting played a key role—the "killer ape" hypothesis (Ardrey, 1963)—is implausible because of the marked physiological and behavioral differences between predatory and within-species violence. Many vegetarian animals exhibit within-species violence, inflicting serious and sometimes deadly wounds with beaks, teeth, hoofs, and antlers. Chimpanzees, for whom meat makes up only a small part of the diet (Stanford, 1999; Teleki, 1973), show severe aggression against other chimpanzees. This includes attacks on females by much larger males, competitive infanticide by females and, most relevant to this chapter, violence between groups at territorial boundaries (J. Goodall, 1977, 1986; J. v. L. Goodall, 1979; Manson & Wrangham, 1991; Wrangham & Peterson, 1996). In the latter pattern, one or two victims temporarily separated from their own group are attacked by several males that beat, stamp, drag, and bite them to death. Victims may be of either sex, but females of reproductive age are often absorbed into the other group instead of being killed. At least twice, whole groups have been shown to be eliminated by systematic, one-at-a-time ambush killings combined with female transfer (J. Goodall, 1986).

In bonobos, however—as close to us genetically as chimpanzees—males fight much less severely and never attack females, perhaps due to female coalitions (Kano, 1992). Although bonobo females change groups at adolescence just as chimpanzees do, they develop close relationships and alliances sealed by food sharing and sex—rubbing their large clitorises together to what looks like orgasm (Kano, 1989; Wrangham, 1993). Female coalitions prevent male abuse (Parish, 1996), although some observers hold that male bonobos would act like chimp males if they were able to (Wrangham & Peterson, 1996). It is worth noting that bonobos are in imminent danger of extinction, but this may have nothing to do with their nonviolent behavior.

By looking at these two species, each of which shares more than 98 percent of its DNA sequences with us, we can make some inferences about the common ancestor of the three, some 6 to 8 million years ago. Certainly aggression was present, but whether the severe aggression of chimpanzees was an original characteristic or derived in their line since, we do not know. Examination of the fossil record provides the next methodological approach to the evolution of human violence.

### Violence among Our Remote Ancestors

Unfortunately, the early part of the fossil record is weak for our purposes. For most of protohuman history there is no evidence of violence, but that is not evidence of the absence of it. There are only a few hundred specimens, mostly small fractions of skeletons, and a significant incidence of violence might be missed because of paucity of data. The first hominids for whom there is a real abundance of specimens are the Neanderthals, now viewed as off the line to modern humans, since their DNA shows little or no genetic mixture with their contemporaries who gave rise to us. Nevertheless, they are our closest hominid relatives, and they share important behavioral characteristics with us.

Neanderthal skeletons show an exceptionally high frequency of injuries, especially at Shanidar in Iraq (Trinkhaus, 1978; Trinkhaus & Howells, 1979), where there are many healed fractures and unhealed broken bones. One adult male at this site has a partially healed scar on the top of his left ninth rib caused by a sharp object thrust into his chest (Trinkhaus, 1995), probably a deliberate spear wound. He may have suffered a collapsed lung and lived no more than a few weeks after the injury. At another Neanderthal site, Skhul, a skeleton shows spear damage in the leg and pelvis (LeBlanc & Register, 2003). These cases date from 40,000 to 50,000 years ago and comprise the clearest evidence of violence in Neanderthals, but along with their high rate of injury they suggest that violence was not uncommon.

Although not evidence of violence, there is clear proof of Neanderthal cannibalism (Culotta, 1999; Defleur, White, Valenzi, Slimak, & Cregut-Bonnoure, 1999). In the cave of Moula-Guercy in France, cut and broken bones dated to 100,000 years were butchered with the same skilled techniques Neanderthals used on deer and goats. Other evidence suggests that cannibalism may be much older, and it has certainly persisted up to recent times (DeGusta, 1999; Sanday, 1986; Villa et al., 1986; Wade, 2000; White, 1992). Scattered evidence of violence also appears in the later fossil record of modern humans prior to the invention of agriculture.

After that, the record leaves no doubt. Archeological evidence has demolished "the myth of the peaceful savage" (Keeley, 1996; LeBlanc & Register, 2003). The tenacity of this myth required a substantial degree of blindness to evidence, in accounts that have been called "interpretive pacifications" (Keeley, 1996, p. 20). The archeological record, equivocal for prehuman species, leaves no doubt that homicidal violence was part of life in our own species beginning at least 27,000 years ago (Keeley, 1996, p. 37).

At Grimaldi, a site in Italy, a child's skeleton was found with a projectile point embedded in the spinal column. Czechoslovakian cemeteries from roughly the same period show substantial evidence of violent death, perhaps on a large scale. A 20,000-year-old male burial in the Nile Valley had stone projectile points in the abdominal section and another embedded in the upper arm. Egyptian Nubia shows many more such cases in a time frame of 14,000 to 12,000 years ago. And European sites before the spread of agriculture to Europe show ample evidence of common violence, including the famed "Iceman" of 5,000 years ago, whose well-preserved body has an arrow embedded in the upper back.

These violent injuries and deaths occurred squarely within the hunter-gatherer phase of human prehistory, up to 20,000 years before the advent of agriculture in the respective regions, and ethnography has shown that homicidal violence occurs in a wide range of hunting and gathering societies, including the !Kung, Eskimo, Mbuti, Hadza, and others (Knauff, 1987, p. 477; Lee, 1979a). It has been commonly claimed that hunter-gatherers did not have organized or group-level violence, but this claim has been seriously challenged in a cross-cultural study showing that 64 percent of such societies had combat between communities or larger entities at least once every two years (C. R. Ember, 1978). While the sample in this study is itself open to challenge—it includes, for example, equestrian hunters of North America who cannot serve as a model for our collective past—it is clear that the peacefulness of hunter-gatherers has been exaggerated (Eihl-Eibesfeldt, 1979, pp. 171–173). Other evidence of warlike behavior among hunter-gatherers appears in the form of rock paintings in southern Africa, clubs and shields among Australian aborigines, and frequent spear wounds in 2,000-year-old skeletons in the American Southwest (LeBlanc & Register, 2003, pp. 100–127).

With the Neolithic revolution and the spread of agriculture, archeological evidence of warfare becomes decisive and appears independently in widely separated parts of the ancient world. Many collections of skeletons show embedded projectile points, left-sided skull fractures (reflecting blows with weapons in the opponent's right hand), and parry fractures of the lower arm sustained while warding off such blows. Burials with weapons and armor are seen in many sites and evidence of fortifications becomes ubiquitous (Keeley, 1996; LeBlanc & Register, 2003). Indeed, the whole of human history since the hunting-gathering era can be largely understood as a process of relentless, expansionist tribal warfare (Keegan, 1993; Schmookler, 1983). The Neolithic revolution, with its need to feed expanding populations on fixed tracts of cultivated land, may have intensified group violence and warfare, but the hunter-gatherer baseline included violence both within and between groups.

### Cross-Cultural Evidence: Small-Scale Societies

We could suggest an innate aggressive tendency in humans by describing the most violent societies (Bohannon & American Museum of Natural History, 1967; Otterbein, 1970): the Yanomamo of highland Venezuela, the Dani or Enga of highland New Guinea, the equestrian Plains Indians of the United States, the Aztec, the Mongols, the Zulu of nineteenth-century southern Africa, or the Germans of the Third Reich. Among the traditional Enga 25 percent of adult male deaths were due to violence, and life was largely organized around it (Meggitt, 1977). The Yanomamo, called "the fierce people" by themselves and others, are comparable (Chagnon, 1968; Chagnon, 1992). Forty percent of men have killed at least one other man, and those who have killed have demonstrably higher reproductive success than those who have not (Chagnon, 1988). Such descriptions of the most violent societies can be multiplied and give the impression that humans are a very bloody species composed of dysfunctional cultures (Edgerton, 1992). Many older ethnographic

accounts of warfare in primitive societies, including some thought to be nonviolent by anthropologists, suggest that, as in archeology, violence has often been ignored (Eibl-Eibesfeldt, 1979, pp. 171–187).

But it is more instructive to look at the least violent societies. Differences in the degree of violence among cultures span three orders of magnitude, and understanding those differences should help us reduce violence. But are there truly nonviolent societies? The !Kung San of Botswana are often cited as among the least violent (Marshall, 1976; Thomas, 1959). They were not observed to have organized group conflicts in recent times. Nevertheless, their homicide rate matches or exceeds that for American cities (Lee, 1979b, chap. 13), and there are many nonlethal acts of violence as well (Shostak, 1981; Shostak, 2000). Moreover, their explicit contempt for other ethnic groups and even for !Kung in other villages who are not their relatives suggests that if they had the technological opportunity and the ecological motivation to make war, they would have the psychological capacity. And historical data indicate that they conducted wars or at least intervillage raids in the past (Eibl-Eibesfeldt, 1979, p. 171).

A different kind of test case is presented by the Semai, slash-and-burn gardeners of Malaysia, a small-scale society like that of the !Kung but more sedentary. Violence was said to be abhorrent to them and virtually nonexistent. "Since a census of the Semai was first taken in 1956, not one instance of murder, attempted murder, or maiming has come to the attention of either government or hospital authorities" (Dentan, 1968, p. 58). This low rate of violence was attributed to upbringing and cultural ideology:

A person should never hit a child because, people say, "How would you feel if it died?" ... Similarly, one adult should never hit another because, they say, "Suppose he hit you back?" ... [T]he Semai are not great warriors. As long as they have been known to the outside world, they have consistently fled rather than fight, or even than run the risk of fighting. They had never participated in a war or raid until the Communist insurgency of the early 1950's, when the British raised troops among the Semai, mainly in the west. ... Many did not realize that soldiers kill people. When I suggested to one Semai recruit that killing was a soldier's job, he laughed at my ignorance and explained, "No, we don't kill people, brother, we just tend weeds and cut grass." (p. 58)

But when the British engaged the Semai in counterinsurgency against Communist rebels in the mid-1950s, they became extremely violent:

Many people who knew the Semai insisted that such an unwarlike people could never make good soldiers ... they were wrong. Communist terrorists had killed the kinsmen of some of the Semai counterinsurgency troops. Taken out of their nonviolent society and ordered to kill, they seem to have been swept up in a sort of insanity which they call "blood drunkenness." ... "We killed, killed, killed. The Malays would stop and go through people's pockets and take their watches and money. We did not think of watches or money. We only thought of killing. Wah, truly we were drunk with blood." One man even told how he had drunk the blood of a man he had killed. (pp. 58–59)

This episode was followed by a return to normalcy:

Talking about these experiences, the Semai seem, not displeased that they were such good soldiers, but unable to account for their behavior. It is almost as if they had shut the experience in a separate compartment. ... Back in Semai society they seem as gentle and afraid of violence as anyone else. To them their one burst of violence appears to be as remote as something that happened to someone else, in another country. The nonviolent image remains intact. (p. 59)

It is perhaps not surprising that such a reversal could occur when a group of men are taken completely out of their normal cultural context, and it may be the lack of prior experience with violence that made the reversal so extreme. Still, this case undermines the belief that violence stems solely from childhood experience or that the individual tendency to participate in war can be prevented by nonviolent experience during development.

It is also quite different from the !Kung case, in which violence was found to have occurred at substantial levels in the traditional cultural context. Culture *can* reduce violence, as indeed the Semai culture did in its normal context. In a cross-cultural study using the Human Relations Area Files and designed to sample representatively the ethnographic universe, it was found that after a society has been pacified by external powers, it becomes less interested in training boys to be aggressive (M. Ember & Ember, 1994). Matrilocal societies, where women live with their female relatives, have less warfare than patrilocal ones where men live with their male relatives (Divale, 1974; M. Ember & Ember, 1971).

Another study using a wide cross-cultural sample found that when husband-wife intimacy is high, organized group conflicts are less common (J. W. M. Whiting & B. B. Whiting, 1975). Cultures where husbands and wives eat together, sleep together, and share the child care are among the least violent, while those that have organized themselves around constant or at least intermittent warfare tend to segregate men away from women and children, with separate men's houses for eating and sleeping, and men's societies in which even young boys are severely stressed and actively trained for warfare. This study indirectly supported the hypothesis that the social dynamic of male aggregations fosters violence (Tiger, 1969). It is not well understood, but it is cross-culturally very widespread and has a dramatic parallel in chimpanzees.

Group ambushes and killings in chimpanzees have now been studied in Uganda as well as in the Gombe Stream Reserve of Tanzania, and it has been shown that the best predictor of such an attack is the aggregation of a critical number of adult males. Research by David Watts and John Mitani followed a group of 150 chimpanzees in the Kibale National Park over a five-year period (Gibbons, 2004a). When a critical mass of about 18 males get together, excitement builds until they go out into the forest in a single file, unusually quiet, passing up hunting opportunities along the way until they cross the boundary of their own territory. If they came upon a single male from the adjacent group they ganged up on this victim and, on five separate occasions, killed him.

This pattern contrasts with the dynamic in bonobos, in which the influence of females and their strong alliances helps suppress most male violence. As for the other

great apes, gorillas, more distantly related to us, exhibit two different patterns (Bradley, Doran-Sheehy, Lukas, Boesch, & Vigilant, 2004). Western lowland gorillas show no aggression between males of neighboring groups because (as DNA analyses show) they are relatives who have migrated a short distance from their home groups. Mountain gorillas, on the other hand, tend to stay in their home groups and do show aggression against males in neighboring groups. Orangutans, still more distant from us generically, are mainly solitary animals, but males frequently mate by forcing themselves on females (Rodman & Mitani, 1987).

### The Male Factor in Violence and War

Males predominate very disproportionately in both intragroup and intergroup violence. The past half-century has seen a salutary correction of naive notions of biologically based gender differences in behavior, but we should not replace them with the equally naive notion that there are no such differences. Compared to the received biases of the past, they are few in number, but violence is among them. Margaret Mead played a major role in dispelling the naive notions. By 1949, when her book *Male and Female* was published, she had done ethnographic research in seven traditional, mostly remote, societies and could amply demonstrate the variety of gender roles. Yet at the same time she inadvertently found one behavioral domain in which there is little variation. Sex roles in one group seemed reversed from our expectations:

The Tchambuli people ... have built their houses along the edge of one of the loveliest of New Guinea lakes, which gleams like polished ebony, with a back-drop of the distant hills behind which the Arapesh live. ... Here the Tchambuli women, brisk, unadorned, managing and industrious, fish and go to market: the men, decorative and adorned, carve and paint and practice dance-steps, their headhunting tradition replaced by the simpler practice of buying victims to validate their manhood. (p. 54)

Among the Mundugumor, river-dwelling cannibals of New Guinea, men and women seemed equally masculine:

These robust, restive people live on the banks of a swiftly flowing river. ... They trade with and prey upon the miserable, underfed bush-peoples who live on poorer land, devote their time to quarreling and headhunting, and have developed a form of social organization in which every man's hand is against every other man. The women are as assertive and vigorous as the men; they detest bearing and rearing children, and provide most of the food, leaving the men free to plot and fight. (pp. 53-54)

The variety of gender roles was indeed remarkable and surprised many midcentury social scientists. Mead's work undermined many biologically based notions of gender psychology. Yet in all her cultures there was homicidal violence and, in all, that violence was overwhelmingly male. Tchambuli men may have been effeminate by certain Western conventions, but they killed victims and hunted heads. Mundugumor men were unthreatened by having women provide for them, *because* it freed them to plot and fight.

This sex difference can be traced through thousands of cultures. In every culture there is at least some homicide, in the context of war or ritual or in the context of daily life, and in every culture it is mainly men who do it. Among the !Kung, noted for equality between the sexes as well as pacifism, the perpetrators in 22 documented homicides were all men (Lee, 1979b, chap. 13). Fights over adultery or presumed adultery were involved in several cases, and a majority of the others were retaliations for previous homicides. These two themes of jealousy and vendetta pervade the cross-cultural homicide literature (Ghiglieri, 1999; Knauff, 1987).

In fact, every measure devised to reflect physical aggression favors males at every age in every culture studied. In a sample of 122 societies in the ethnographic spectrum, weapons were made by men in all of them (D'Andrade, 1966, p. 178). Psychological measures support the distinction: In 75 tribal societies on all continents, men were more likely to dream of coitus, wife, weapon, animal, death, red, vehicle, hit, ineffectual attempt, and grass, while women were more likely to dream of husband, clothes, mother, father, child, home, female figure, cry, and male figure (D'Andrade, 1966, p. 198). There are many exceptions at the individual level and in rare cases—such as modern Israel and Eritrea or nineteenth century Dahomey in West Africa—partial exceptions at the group level. Indeed, the United States now places some women in combat. It may strictly speaking be a difference in degree, but it is very large.

Recent research has revisited the relationship between gender and early warfare, and has strongly confirmed the distinction (Low, 2000). Men account for the overwhelming majority of warriors in nonindustrial societies (Ghiglieri, 1999; Manson & Wrangham, 1991), and the capture of women is both a cause and a consequence of war in as many as half of such societies (Divale, 1973; White, 1988; White & Burron, 1988). Literary sources including Homer and the Bible confirm the central role of young women as a goal or perquisite of ancient wars (Hartung, 1992), and despotic empires carry this to an extreme in which large numbers of young women end up in the beds of powerful men (Berzig, 1986, 1992, 1997). Men have always made wars, often over women (Tiger, 1984).

In psychological research, the strongest case for gender difference is also in physical aggression (Hyde, 1986; Maccoby & Jacklin, 1974). Of 94 comparisons in 67 different studies, 57 showed statistically significant sex differences, and in only 5 were females more aggressive. The subjects ranged from age two to adulthood and the measures ranged from hitting, kicking, and throwing rocks to scores on a hostility scale, and included fantasy, dream material, verbal aggression, and aggression against dolls. Of 6 different studies in which actual *physical* aggression was measured, five found that boys exceeded girls, the last showing no difference. A study of more than 500 17-month-olds showed that both aggression and a sex difference in aggression have already emerged by that age (Tremblay et al., 1999).

In the Six Cultures study, Beatrice Whiting and others studied children's behavior through direct, detailed observation in naturalistic settings in a New England town and in five farming and herding villages (B. Whiting & Edwards, 1988; B. Whiting & Whiting, 1975; B. B. Whiting & Edwards, 1973). In Mexico (Juxtahuaca),

Kenya (Nyansongo), India (Khalapur), Japan (Taira), and the Philippines (Tarong), as well as in New England, hundreds of hours of observations were made on children from age 3 to 11, using uniform methods. Children were scored on 12 small units of behavior, such as "seeks help," "offers support," "touches," "reprimands," and "assaults." Multidimensional scaling revealed two main dimensions: "egoism versus altruism" and "aggressiveness versus nurturance" (B. B. Whiting & J. W. M. Whiting, 1975). In all six cultures, boys showed greater egoism, greater aggressiveness, or (usually) both. The analysis was later extended to five other quantitatively studied cultures—Kien-taa in Liberia, Kokwet, Ngeca, and Kisa-Kariobangi in Kenya, and Bhubaneswar in India—with similar conclusions (B. B. Whiting & Edwards, 1988). Yet another group used similar methods to study children in four more cultures, in Belize, Kenya, Nepal, and American Samoa (Munroe, Hulefeld, Rodgers, Tomeo, & Yamazaki, 2000). Comparing 96 boys to 96 girls, ages 3, 5, 7, and 9, in all four cultures boys' aggression exceeded that of girls, with boys being aggressive in about 10 percent of their interactions, and girls in 6 percent. Boys' aggression occurred especially in predominantly male groups.

In another cross-cultural study 3-to-5-year-old children were observed in social interaction in London and among the !Kung (Blurton Jones & Konner, 1973). Two observers using different techniques—one recording facial expressions, the other physical acts—both found boys to be more aggressive in both cultures. The excess of physical aggression in males is a highly consistent finding (Edwards, 1993).

### General Biological Mechanisms

While aggression is predominantly male, females have the basic aggressive equipment and actions, which they show in maternal aggression, competition, dominance interactions, and other situations (Hrdy, 1981; Preuschoft, Paul, & Kuester, 1998), including self-defense against males (Hrdy, 1977, 1999; B. Smuts, 1992; B. B. Smuts & Smuts, 1993). Both the shared physiological substrates and those that differentiate males from females are increasingly well understood.

In the late 1930s Heinrich Klüver and Paul Bucy did experiments on monkeys in which they removed the end of each temporal lobe (Klüver & Bucy, 1939). This damaged several structures, including the amygdala and hippocampus, and resulted in tameness, rare in rhesus monkeys. This was not because of general debilitation or fear, but was specific to aggression. Later studies showed that tameness results from removal of the amygdala alone (Horel, Keating, & Misantone, 1975) and that stimulation of the ventral (lower) amygdala using the neurotransmitter glutamate produces aggression in cats (Shaikh, Schubert, & Siegel, 1994; Shaikh, Steinberg, & Siegel, 1993; Siegel, Schubert, & Shaikh, 1994). By the 1950s it was clear that damaging parts of the hypothalamus—the hub of the limbic system at the base of the brain—could make rats violent, while other hypothalamic lesions reduced violence (Ingram, 1956; Siegel, Roeling, Gregg, & Kruk, 1999). Likewise, stimulating different parts of an intact hypothalamus with electrodes could either raise or lower

aggression, confirming the pivotal role of the hypothalamus in the limbic, or emotional, brain.

Lesions of the septal area caused rage (Brady & Nauta, 1953), and combined with the effects of amygdala damage, this led to a model of aggression in which the hypothalamus was regulated by higher limbic structures (Smythies, 1970). The amygdala could increase aggression by exciting parts of the hypothalamus and the septal area (or other limbic areas) could reduce it through other hypothalamic areas. Some specifics are controversial, and refinements have been added. For example, the central amygdala can inhibit aggression even as the ventral amygdala enhances it. This inhibition seems to use enkephalin, an opiate-like neurotransmitter, to calm the aggressive circuits (Siegel et al., 1994). But the broader idea is accepted: Aggression requires the hypothalamus, which integrates messages from other parts of the limbic system, biasing it toward or away from violence (Siegel et al., 1999).

To trigger muscle action and arouse the circulatory system, the hypothalamus must relay its message to the spinal cord and out to the periphery. It does this through the central gray area of the midbrain (Flynn, Venegas, Foote, & Edwards, 1970). Rage and fighting can be teased apart with selective brain damage. Cats may have real rage as a prelude to attack, as shown by expressions under sympathetic nervous system control—widening of the eyes, growling and hissing, arching the back, and erection of the fur. But after certain brain lesions they will have only "sham rage"—the same expressive signs never followed by attack (Flynn et al., 1970). This distinction has held up in subsequent research (Panksepp, 1971, 1998; Schubert, Shaikh, & Siegel, 1996).

In essence, exciting the medial hypothalamus causes affective, emotional attack, while exciting the lateral hypothalamus causes a cool, calculated attack. The two output circuits traverse different parts of the midbrain (Schubert et al., 1996), which in turn control parts of the brain stem and spinal cord that produce the attack itself as well as the sympathetic nervous system that expresses angry emotions.

People with brain tumors causing damage to the medial hypothalamus or the septal area have trouble controlling aggression, especially if provoked by a real or imagined insult (Albert, Walsh, & Jonik, 1993). This supports the idea that the septal area inhibits rage and the amygdala stimulates it, both perhaps by regulating the medial (middle) hypothalamus. In some cases, a slowly growing tumor in the limbic system causes increasing irrational aggression over a number of years, while removing the tumor reduces aggression. Charles Whitman, a young Texan who killed his mother and his wife, then climbed a university tower and shot 38 people, was found at autopsy to have a rare brain tumor that may have chronically irritated his amygdala (Malamud, 1967; Moyer, 1987, p. 86).

Although epileptics are very rarely violent, a few with seizures in the amygdala have aggressive outbursts. People with records of criminal aggression have more EEG abnormalities than others, even other kinds of criminals (Elst, Woermann, Lemieux, Thompson, & Trimble, 2000; Moyer, 1987, p. 90; Trimble & Tebartz Van Elst, 1999). Finally, a brain basis for human aggression is supported by large studies of Vietnam veterans over two or more decades since sustaining head injuries

in that war. Compared to veterans with other brain damage, those with lower frontal lobe damage are more likely to have outbursts of rage at family members, friends, and colleagues (Grafman et al., 1996). These outbursts are fortunately more often verbal than physical, but they are severe and strain relationships and are consistent with the idea that the ventral part of the frontal lobe is the cortex of the limbic system, monitoring and regulating emotional activity.

Brain imaging studies of violent individuals also suggest that lower activity in the left frontal and temporal lobes reduces inhibition, leading to outbursts of physical rage (Nichoff, 1999, p. 110; Volkow & Tancredi, 1987). In an evaluation of 31 murderers, psychiatrist Jonathan Pincus found that frontal lobe damage often contributed to violent tendencies. But in the presence of two other factors—paranoid symptoms and childhood abuse—the chance of violence became very high. Thus a growing appreciation of the role of frontal lobe dysfunction in violence (Hawkins & Trobst, 2000) can now be tempered with an understanding of other psychiatric and experiential factors. Such studies are multiplying rapidly, and with the growing precision of imaging techniques, will soon form the core of our understanding of how the brain generates violence.

The most controversial insights have come from psychosurgery, a treatment with a long, dismal history. Today there are far more subtle forms of brain surgery and a growing acknowledgment that some surgical interventions may be justified in severe psychiatric illness unresponsive to other treatments (Ballantine, 1986; Rodgers, 1992). One type has been found helpful in the treatment of a very rare violent form of epilepsy (Delgado-Escueta, 1981; Pincus, 1981). As noted above, the vast majority of severe epileptics show no violence, but in a few rare cases the seizure is directed outward and can result in violent attacks.

A handful of patients in the United States and more in Japan and in some European and Latin American countries have received surgical treatment for this disorder (Ballantine, Bouckoms, Thomas, & Giriunas, 1987; Rodgers, 1992; Sano, 1962). One approach used in Japan and Argentina in treating extreme and frequent violent fits is destruction of an area 3 to 5 millimeters in diameter in the back of the medial hypothalamus (Sano, 1962). Another approach used in Japan, India, and the United States has been to damage portions of the amygdala (Mark & Ervin, 1970). Such procedures must be viewed skeptically, but they are part of a growing understanding of how violence is instantiated in the brain.

Another approach is neurochemical (Miczek, Weerts, Haney, & Tidey, 1994). Lab animals are given drugs that influence neurons or neurotransmitters in the junctions between them. For example, mice kept in isolation for several weeks have an increased tendency to fight, and they have either different levels or turnover of several neurotransmitters (Cairns, Hood, & Midlam, 1985). Furthermore, drugs directly affecting those neurotransmitters can increase or decrease isolation-induced fighting (Panksepp, 1998; Valzelli, 1973). (Genetic studies, including those involving gene manipulation, must often use isolation to bring out the added aggressiveness, further proof of the power of this experience, Maxson, 2000.)

In many species reduced brain serotonin activity lowers the threshold for aggressive reactions to frustration. In humans as in other mammals, decreased serotonin processing is reflected in lower levels of the serotonin metabolite 5-HIAA. Impulsively violent and antisocial individuals have low levels (Coccaro, 1995; Coccaro, Kavoussi, & Lesser, 1992; Coccaro et al., 1997), a relationship seen in children as well as adults (van Goozen, Matthys, Cohen-Kertenis, Westenberg, & van Engeland, 1999). Since the old association between aggression and a high rate of norepinephrine activity has also held up in other studies (Eichelman, 1992; Eichelman & Thoa, 1973), serotonin and norepinephrine may balance each other in controlling violent tendencies.

Drugs that raise serotonin levels increase a male monkey's chance of becoming dominant (Raleigh et al., 1995; Raleigh, McGuire, Brammer, Pollack, & Yuwiler, 1991), which seems at first to contradict the studies showing that lower 5-HIAA predicts violence. But *impulsive* aggression does not lead to a stable dominant role. Males must win fights to become dominant, but they must pick them sensibly, which means controlling rage. The same pattern has been found among females in two different macaque species; females with low 5-HIAA levels showed more evidence of high-intensity aggression, escalated aggression, fight wounds requiring medical attention, and lower status in the hierarchy (Westergaard, Suomi, Higley, & Mehlman, 1999).

### Male-Specific Mechanisms

Sex hormones, especially testosterone, have been repeatedly shown to affect aggression in animals. Testosterone promotes and/or facilitates aggression, certainly in males and possibly in females (J. M. Dabbs & Dabbs, 2000; J. M. J. Dabbs, Carr, Frady, & Riad, 1995; J. M. J. Dabbs & Hargrove, 1997). In various species testosterone injections can increase aggression and male castration can decrease it (Nichoff, 1999). Although it is not clear how testosterone affects aggression circuits in the brain, we know that testosterone injection lowers the firing threshold for fibers in the stria terminalis (Kendrick & Drewitt, 1979), a pathway from the amygdala to the hypothalamus.

Human studies are more complex, but there is ample evidence that normal levels of testosterone at least facilitate aggression (J. M. Dabbs & Dabbs, 2000). Some studies also suggest that steroid treatment, whether of androgen deficient men, normal athletes, or ordinary volunteers, can increase aggressive tendencies (Su et al., 1993). Conversely, aggression can be reduced by antiandrogen treatment or by a drug that blocks the gonadotropin-releasing hormone, the ultimate regulator of testosterone (Loosen, Purdon, & Pavlou, 1994). In James Dabbs's study of 4,000 army veterans, their natural testosterone level predicted their antisocial behavior (J. M. Dabbs & Morris, 1990). Significantly, it did so more strongly among poorer veterans, suggesting that in a worse environment biological differences matter more. In another criminal population, high testosterone level was associated with more violent and aggressive crimes during adolescence (Kreuz & Rose, 1972). Also, a large, long-term study of Norwegian school bullies found testosterone to be a significant

predictor of bullying, along with several social and psychological variables (Olweus, 1988; Olweus, Mattson, Schalling, & Low, 1980, 1988). Finally, testosterone level helps predict aggressive behavior in 5-to-11-year-old boys, especially those of lower cognitive ability (Chance, Brown, Dabbs, & Casey, 2000).

There has also been some cross-cultural testing of the testosterone-aggression relationship. A study of !Kung hunter-gatherers showed that hunting changes testosterone levels in a manner suggesting exercise rather than aggression (Worthman & Konner, 1987), but a later study found that more violent !Kung men, many of whom had scars from fights, had androgen levels correlated with their frequency of fighting (Christiansen & Winkler, 1992). This pair of findings suggests that in human hunter-gatherers as in other predators the biology of prey-killing is quite different from that of defensive aggression.

These are *activational effects* of testosterone, so-called because they activate existing neural circuits, but equally important are the *organizational effects* occurring much earlier in life. Aggression in adulthood is influenced by the amount of testosterone circulating very early in development (before birth in monkeys and just after birth in rats), and this effect is almost certainly the result of long-lasting changes in the brain (Collaer & Hines, 1995; Gorski, 1996). We know that preschool-age boys are more aggressive than girls at an age when circulating androgen levels are very low in both sexes. A classic experiment suggests that this difference is not due to differential rearing (Chamove, Harlow, & Mitchell, 1967). Rhesus monkeys were raised in total social isolation with no sex role training and no chance to identify with a parent. At age 3 each monkey was put in a room with an infant monkey of randomly chosen sex. Females cradled and cuddled the infant more while males hit the infant more, and the difference was highly significant.

Growing evidence suggests that structural brain differences help account for this and related findings (Gorski, 1996, 2000). As early as 1973 it was shown that there are structural differences between male and female brains (Raisman & Field, 1973). In the preoptic area of the hypothalamus male and female rats differed in the density of connections among local nerve cells. In addition, castrating males just after birth left them with the female pattern, and injection of testosterone into females just after birth gave them the male pattern (McEwen, 1978; Reinisch, 1974). This discovery helped explain the already established fact that in mice, rats, dogs, monkeys, and other animals testosterone and related male hormones, given to female young at birth or earlier, suppress female sexual postures and in some species abolish sexual cycling. In males, castration or an antitestosterone drug in early development suppresses normal male sexual behavior later in adulthood, despite replacement therapy with testosterone in adulthood. One of the key experiments in monkeys gave male hormones to female fetuses before birth (Goy, 1970). As juveniles, but before puberty initiated the activational effects of testosterone, these females showed a level of aggressive (rough-and-tumble) play between the ordinarily low female level and the much higher male level.

These and many other studies supported the view that preadolescent gender differences in aggressiveness were as biological in origin as the more easily understood

postadolescent ones. Over the ensuing decades the mechanism of the early organizational effects became clearer. Application of relevant hormones to slices of the neonatal mouse hypothalamus produced more and faster-growing extensions of neurons (Toran-Allerand, 1976). Later studies showed that the genes turned on by the hormone make proteins for nerve cell growth, which direct the cell in building extensions that will become axons and dendrites (Toran-Allerand, 1996).

Do similar processes take place in humans? Doubts about this were partly dispelled by studying the condition and clinical treatment of people with anomalies of sexual and gender development. In one such condition, the adrenogenital syndrome, a mutation damages one enzyme in the adrenal cortex (Baker, 1980; Collaer & Hines, 1995; Ehrhardt, 1975), and this produces abnormally large quantities of testosterone. For girls with the syndrome, levels of the hormone are high throughout gestation. After birth the condition can be corrected through surgery and medical treatment, so that the hormone's effects are purely prenatal. Yet at age 10 and in adulthood these girls are psychologically different from their sisters and from unrelated controls. By their own and their mothers' reports, they play less with dolls, are more "tomboyish," and express less desire to be married and have children when they grow up. Studies on several samples of girls with adrenal hyperplasia corrected at birth showed similar results on toy preference, rough-and-tumble play, and preference for playing with boys (Hines & Kaufman, 1994).

A careful review of available studies of clinical syndromes and drug effects that could correspond to early masculinization of the brain concluded that "[e]vidence is most consistent for a developmental influence of androgens on sex-typical play. There also is some evidence supporting a role for androgens in the development of tendencies toward aggression ..." (Collaer & Hines, 1995). Combined with increasing animal evidence and direct evidence of sex differences in the human brain, these findings suggested that in humans, too, some psychosexual divergence may be due to masculinizing hormones acting on the brain before birth.

### Genetic Contributions

We have long known that aggression and violence have partly genetic bases in animals. A classic experiment took 14 purebred mouse strains and, after weeks of social isolation, brought 4 males together from each strain and counted the instances of chase, attack, and fight (Southwick, 1970). Scores ranged from less than 10 to 80, an almost tenfold difference. Blending of strains showed that aggressive genes are dominant, with the young resembling the more aggressive parent. In some crosses, unexpected synergistic effects occurred, producing offspring much more aggressive than either parent. Crosses drew either the father or mother from a given strain, so it was possible to take into account parenting or intrauterine effects. Cross-fostering infants of one strain to parents from another supported both possibilities. It was possible for the foster mother to influence the offspring, but some important strain differences in chase, attack, and fight were due to genetic effects alone.

Modern methods of gene technology have pointed to at least 15 genes on two chromosomes that affect aggression in male mice (Maxson, 2000) and additional ones that affect female aggression as well. Aggressiveness genes (Hen, 1996) include one that codes for a receptor for serotonin and another that makes an enzyme that removes norepinephrine and some other neurotransmitters. There are others, however, and they run the gamut of mechanisms for how genes influence behavior (Maxson, 2000). Take another example: a gene on the X chromosome codes for an androgen receptor. In wild mice the receptor combines with androgens, and the resulting molecule switches on several other genes in certain brain cells. But mutations prevent the combination of androgen and receptor and consequently produce peaceful male mice, even after social isolation. Chromosome 10 carries an estrogen receptor that works similarly, but in this case the mutant females are more aggressive than the wild ones—the opposite of the impact of the same mutation in males. Another way to increase aggression is by knocking out or inserting genes for the neurotransmitter enzyme monoamine oxidase A and the 1B subtype of the serotonin receptor. Knocking out an enzyme that makes nitric oxide yields a mouse that attacks more often and more lethally, by directing its bites more precisely at the opponent's neck instead of occasionally drifting down his back. Knocking out one of the histamine receptors, in contrast, decreases aggression.

Molecular genetic studies are also proceeding in humans. In a large extended family in the Netherlands, a new form of mild mental retardation was found to be X-linked, thus far more common in males (Brunner, 1993). It is also associated with attempted murder, rape, arson, and other acts of impulsive aggression that were not attributable to low intelligence alone. The syndrome was traced to a flawed enzyme, a type of monoamine oxidase that helps remove the neurotransmitters serotonin, norepinephrine, and dopamine. In a separate study, knockout mice were created with a defective gene for the same enzyme (Cases et al., 1995). Their brains had up to nine times the normal level of serotonin and twice the normal level of norepinephrine. The defect produced adult male mice that fought more with each other and were more likely to force their attentions on unwilling females—two symptoms shown by men in the Dutch kindred. And in another study of genetically engineered mice with this enzyme defect, drugs antagonistic to serotonin abolished their exaggerated aggressiveness (Shih et al., 1999).

Most recently the variants of this gene have been studied in many primate species, and it was shown that the human variants are present in all apes and Old World monkeys, but not in New World monkeys. This suggests that the mutation appeared after the split between Old World and New World monkeys but before the split between Old World monkeys and apes, around 25 million years ago. It has been suggested that this very old mutation is maintained at some level in the populations of Old World primates (including humans) because while some aggression is adaptive, impulsive or exaggerated aggression is not, maintaining the gene while limiting its spread (Gibbons, 2004b). This finding strengthens the research strategy of using monkeys and apes as models of aggression in humans.

In addition, a different study showed that mice lacking one serotonin receptor, the 1B, are very aggressive (Saudou et al., 1994). This subtype is abundant in the central gray of the midbrain—just the region that processes aggressive signals from the hypothalamus. Of course, the genetic change is only the first step in a developmental process. The Dutch men were mildly retarded and isolative, with occasional outbursts of very serious aggression. Their self-imposed isolation may have gradually increased their tendency to aggression, as it does in males of many other species. All genetics is developmental genetics and therefore assumes environmental influences in the growing fetus, infant, and child. But that does not make it meaningless to assert genetic influence. In normal human beings, traditional studies leave little doubt as to the power of genes in aggression, almost certainly many different ones (Gottesman, Goldsmith, & Carey, 1997). Some of these affect general traits that may influence the growth of aggression, such as pain sensitivity, impulse control, sensation seeking, and frustration tolerance. Such traits in a toddler could interact with environmental stress or cultural shaping to produce a variety of violent patterns, even without any dedicated brain circuitry for violence.

### How Does Aggression Become War?

It has been aptly said that in considering the nature of organized violence, "organized" is more important than "violence." Actually both words denote necessary contributions. It has also been said that war is only remotely related to individual violence, because it rests on discipline, planning, and rational strategy rather than on emotions such as anger and rage. This section will argue that the latter claim is wrong, although the emotional basis of war goes far beyond anger.

Groups in conflict are collections of individuals who feel that they have more to gain than to lose by fighting (Bueno de Mesquita, 1981; Low, 1993). In cultures of anthropological interest, by far the best predictor of war is the threat of natural disasters (e.g., weather or pests) that destroy food supplies (C. R. Ember & Ember, 1992), although this does not explain war in all settings (Wiessner & Tumu, 1998). But there does not need to be a conscious awareness of the role played by scarcity. In addition, a large proportion of societies that make war take women as captives, and these women often become wives or concubines (Divale, 1973; White, 1988).

Consider a foot soldier. Going to war, he runs the risk of being maimed or killed, but against the background risks of life throughout most of history this may not have been excessive. He also stands to gain the material and sexual spoils of war, together with other rewards at home, and may be punished if he refuses or fails to perform well. This evolutionary risk-benefit analysis leads to and helps explain the subtler psychological gains. The soldier gets to turn his back on the thousand frustrations of home life, while elevating his importance in the eyes of his family; to commit for a time to a purpose that seems pure and clear; to experience the unique excitement of martial adventure; to express and assuage deep-seated frustration and grief; and to achieve the enduring satisfaction and respect for having faced and triumphed

over fear and having been willing to risk his life, which may become a lasting source of strength.

Others in the military hierarchy, including the leaders at the top, have purposes of their own, and how these articulate with those of the foot soldier is of the essence of the difference between individual and group conflict. All societies have individual violence, but some small-scale societies appear to have no organized violence in traditional settings. As noted, this is due to lack of organization, not lack of violence. Nor do they lack a propensity for hostility toward identified enemies. Throughout the world, from hunter-gatherer societies through nation-states, people show fear and contempt for neighboring peoples who are culturally or racially different, forming a nested hierarchy of tribal animosities. Karl von Clausewitz said that war is the continuation of political activity by other means, but even modern political conflict in many parts of the world conceals tribal or ethnic conflict that is older and more deeply felt (Ferguson & Whitehead, 1992/1999).

### *Pseudospeciation: Dichotomizing the Social World*

The psychoanalyst Erik Erikson called the process of dichotomizing the social world *pseudospeciation*. The Greeks had their barbarians, the Jews their Gentiles, the Christians their heathen. Ilongot headhunters feud murderously and enduringly with neighboring groups, while traditional highland New Guinea is a patchwork of homicidal enmities (Wiessner & Tumu, 1998). Even the !Kung refer to themselves as "the true people" and others as "strange" or "different." Violent tribal standoffs have occurred recently or are occurring throughout the world: Bosnians, Serbs, and Croats in the former Yugoslavia; Azerbaijanis and Armenians in Georgia; Sikh, Moslem, and Hindu in India and Pakistan; Sinhalese and Tamil in Sri Lanka; Sunni and Shi'a in the Islamic world; Jews and Arabs in Israel; Arabs and Black Africans in the Sudan; Catholics and Protestants in Northern Ireland. Many of these cases are the vestiges of conflicts that were even worse in the past and have the potential to flare up fully again. There is no people in the world that is free of such dichotomies, and they have roots in very basic types of societies. Among the Nuer, Nilotic cattleherders of the Sudan, "either a man is a kinsman ... or he is a person to whom you have no reciprocal obligations and whom you treat as a potential enemy" (Evans-Pritchard, 1940, p. 183).

Chimpanzees' incipient level of organized violence is a rudimentary version of what is observed in many small-scale societies (Johnson & Earle, 1987; Knauff, 1987). The transition from small to larger chiefdoms appears to be associated with the emergence of full-scale warfare, and this development may have led to the emergence of the state (Earle, 1991). Societies become more complex as their population increases, with such features as social stratification, division of labor, and taxation playing increasing roles. Closely allied military and religious hierarchies form the core of these societies, which continue to grow by conquest, but this process did not require the state. The Nuer, with their clear concept of who is an enemy and with certain advances in military recruitment, became an effective organization for

predatory expansion at the expense of their Dinka neighbors, despite having a relatively modest level of social complexity (Kelly, 1985; Sahlins, 1961).

With the advent of true religious and military hierarchies, this pattern becomes much clearer: Although cross-cultural studies show that military prowess leads to expanding boundaries whether the expansionist group is decentralized like the Nuer or centralized like the Aztec, it is also clear that more centralized political systems tend to have greater military sophistication (Otterbein, 1970). The hierarchical society involved in predatory expansion comes increasingly to resemble a state rather than a tribe or chiefdom. At this point we have the level of social organization exhibited by the great antagonists of the Bronze Age, and from there it is a small step—mainly technological—to the antagonisms of modern states (Cook, 2003; Schmookler, 1983). Nationalism, Toynbee said, is new wine in the old bottles of tribalism (Toynbee, 1972).

These antagonisms reflect another basic human tendency already alluded to: the inclination to dichotomize the social world—actually just a special case of dualistic thought (Douglas, 1966; Levi-Strauss, 1962; Maybury-Lewis & Almagor, 1989). Night and day, human and animal, village and "bush," tame and wild, good and evil, male and female, right and left—these are but a few of the dichotomies that have not just been recognized but institutionalized and invested with emotion in a wide range of human cultures. What is often perceptually a weak dichotomy or even a continuum is exaggerated by cognitive processes that make it seem to be two irreconcilable principles divided by an unbridgeable gulf.

It is not clear why the human mind has this propensity, but it may have to do with our low tolerance for ambiguity and for what psychologists call cognitive dissonance (Festinger, 1957). In phonetics, dichotomization is necessary for meaning; there may be a physical continuum between *p* and *b*, but we must make up our minds which one we are hearing in order to have a language that works (Jakobson & Halle, 1956/1971). Something similar may be true in other areas of cognition. In many situations during our evolution it must have been desirable to make decisions quickly, no doubt facilitated by an algorithm with two clear choices. Confronted with a stimulus, we have first to classify it as familiar or strange and then decide between approach and avoidance. Discrimination, desirable in matters of taste, becomes unfortunate, even tragic, in social classification. Yet such dichotomies as kin and nonkin, us and them, real people versus barbarians or strangers are almost universal tendencies.

Of course, these dichotomies are not merely cognitive, they have an emotional valence. Fear, and fear of the strange in particular, is a basic characteristic of nervous systems. Many studies, from those of how infants respond to novelty to those using brain stimulation in cats, have revealed a continuum from attention through arousal to fear. Mild stimulation of the amygdala can produce alertness while stronger stimulation in the same brain region can produce fear (Ursin & Kaada, 1960). Novelty, depending on the context, can produce attention or fear in infants.

It may be that our basic stance toward the world—mild arousal and attentiveness to every new stimulus we experience, in order to process it and react to it—is on a

physiological continuum with a flight from danger. For infants, the second half of the first year is dominated by new distinctions in the social world, as a previously generalized responsiveness to people is reshaped by wariness toward or fear of strangers and by attachment to a primary caregiver (Bowlby, 1969–1977; Lewis & Rosenblum, 1973). The tendency to flee to a protector is bound up with the tendency to fear, and since the world contains many surprises, we probably all have some of both in our everyday lives. If the infant's fear of strangers is transformed in adulthood into something like contempt, then the flight to a protector may take the form of obedience, conformity, chauvinism, or loyalty.

### Group Psychology, Mass Psychology

Because of this inclination, people may submerge their independence in the purposes of a higher authority, a collective will, or both. The fear and anxiety we feel even in everyday life, exacerbated by the impact of a complex world on our relatively simple minds, may be assuaged by unburdening ourselves of responsibility for our actions. We reduce this sense of responsibility and its concomitant anxiety by hewing to a set of rules, participating in collective action, or following a leader. Rules, although they can become rigid, are the most benign of the three options.

More ominous by far is the mass or mob psychology that can sometimes emerge from group loyalty and collective action. Charles Mackay, in his nineteenth century classic *Extraordinary Popular Delusions and the Madness of Crowds*, describes it:

In reading the history of nations, we find that whole communities suddenly fix their minds upon one object, and go mad in its pursuit; that millions of people become simultaneously impressed with one delusion, and run after it, till their attention is caught by some new folly more captivating than the first. We see one nation suddenly seized, from its highest to its lowest members, with a fierce desire of military glory; another as suddenly becoming crazed upon a religious scruple; and neither of them recovering its senses until it has shed rivers of blood and sowed a harvest of groans and tears, to be reaped by its posterity. . . . Men, it has been well said, think in herds; it will be seen that they go mad in herds, while they only recover their senses slowly, and one by one. (1841/1980, pp. xix–xx)

This passage was gravely prophetic of the calamitous twentieth century.

Mackay treats an impressive variety of social phenomena, in itself instructive: lynch mobs and witch hunts; reckless investment schemes such as the South Sea Bubble and the Tulip mania; fads, pilgrimages, revolutions, and wars; all these and more are grist for an analytic mill concerned with the muting of individual will. The mass hysteria of collective violence is what concerns us here, but we should view it in the context of a general human susceptibility to psychological and behavioral contagion, now well demonstrated by psychologists (Hatfield, Cacioppo, & Rapson, 1994). That is, the idea that one should bathe in certain holy waters, wear a bustle or miniskirt, or hate and persecute a particular group of people can take hold of a person for no greater reason than that it has already taken hold of so many others. The fear of

ostracism, of being left behind—in effect, the fear of being different and incurring the same wrath—must play a role.

Humans are not really herding animals but (by evolutionary history) members of small groups with complex social dynamics. In our original small groups the rudiments of these processes were no doubt present. A classic experiment in social psychology showed that a subject will predictably deny the evidence of his or her perception of even something as simple as the relative length of lines if a small group of others (confederates of the experimenter) make clear their own denial (Asch, 1951). This repeatedly proven tendency to conform is close to the heart of group psychology. But the “crazed” mass psychology described by Mackay may result in part from population densities that violate the small-group dynamics we evolved with.

Whether in large or small groups, a common manifestation of mass psychology is the identification and destruction of enemies. This contagious enmity takes two forms. The first identifies weak internal enemies, isolates them, and destroys them. Lynch mobs, witch hunts, inquisitions, and genocide are examples. The enemies are viewed as strange, confusing, evil, and dangerous to the spiritual and physical life of the larger group. Their elimination becomes a ritual of purification and is seen as an absolute good (Burkert, Smith, Hamerton-Kelly, & Girard, 1987; Girard, 1979). The second form identifies external enemies, similarly viewed but more capable of defending themselves. The concept of holy war is related to traditions of animal and human sacrifice in ancient societies, partaking of a widespread human attitude that bloodshed is sacred. In a strange reversal, a war *becomes* sacred because of the sacrifice of lives.

Biblical and many other sacrifices attempt to purify the community by exporting sins to the victim. Ilongot headhunting occupies an intermediate position between sacrifice and war, because it is directed against external enemies, yet “it involves the taking of a human life with a view toward cleansing the participants of the contaminating burdens of their own lives” (Rosaldo, 1980, p. 140). Through a process of *mimesis* (Girard, 1979), the collective emotions of two groups exchanging reciprocal contagious enmity eventually justify each other: that is, what may have begun as an irrational fear becomes a rational one as each side contemplates the threat that stems from the growing fear and hatred in the other.

Experiments in social psychology have illuminated the process of group formation and of the emergence and consequences of the us-them distinction. One, known as the Robbers Cave Experiment, addressed questions of group identity and competition through research on young boys (Sherif, Harvey, White, Hood, & Sherif, 1961). Muzafer Sherif led a group that studied 22 average, normal 11-year-old boys, all middle-class Protestants with similar educational backgrounds. During the summer between the fifth and sixth grades, the boys were taken to a 200-acre camp in the Robbers Cave State Park, a densely wooded section of the San Bois Mountains of southeastern Oklahoma.

In Stage 1 of the study, which lasted a week, the boys were randomly divided into two matched groups that differed in no measurable way. Competition was discouraged and there were joint activities, but the groups nevertheless began to show signs

of competitive attitudes—they named themselves Eagles and Rattlers, spoke disparagingly of each other, and began to react territorially to each other's "incursions."

In Stage 2, a tournament of planned contests was set up between the two groups—baseball, tug-of-war, tent-pitching, skits, treasure hunts, and cabin inspections. Trophies, medals, and four-bladed knives were offered as prizes.

After the second day of the tournament, the "good sportsmanship" stated in specific words during the initial period and exhibited after the first contests ... gave way, as event followed event, to increased name-calling, hurling invectives, and derogation of the out-group to the point that the groups became more and more reluctant to have anything to do with one another. (p. 101)

In time, "derogatory stereotypes and negative attitudes toward the out-group were crystallized" (p. 208). Again, there were no differences between these groups, yet bigotry was easily created by arbitrarily assigning and labeling matched boys.

But in Stage 3, the two groups were rebled and given important goals to reach together—such as fixing the water tank that had supposedly been damaged by vandals, so that all the boys would have water to drink. This third stage greatly reduced prejudice and conflict in just a few days; while at the end of Stage 2 there was practically no crossover between the two groups in the question of whom the boys considered their friends, there was considerable healing of this split by the end of Stage 3.

Similar findings have been repeated many times with adults and under a variety of more controlled conditions (Robinson & Tajfel, 1997; Tajfel, 1982). They strongly confirm the ease with which prejudice against arbitrarily formed out-groups emerges, the relative ease with which the prejudice can be reversed if and when in-group and out-group members are brought together again, and the exacerbation of the prejudice by giving the in-group members frustrating experiences or experimentally lowering their self-esteem (Robinson & Tajfel, 1997; Tajfel, 1982).

### The Role of Leaders and Authority

Mackay's observations on mass or crowd psychology have been confirmed and extended (Canetti, 1981; Hatfield et al., 1994), and it is reasonable to think of an army at war as a kind of controlled mass psychology. Yet a human group, however large, is not a herd and may not be merely a mob if it has a leader. Freud's monograph, *Group Psychology and the Analysis of the Ego* ("group psychology" being a questionable translation of the German word, *Massenpsychologie*) takes the view that mass psychology operates fundamentally in relation to a leader (Freud, 1922/1949). Still, the submerging of individual will is similar:

The lack of independence and initiative in their members, the similarity in the reactions of all of them ... the weakness of intellectual ability, the lack of emotional restraint, the inclination to exceed every limit in the expression of emotion and to work it off completely in the form of action ... (pp. 81–82)

Freud does not, however, limit his analysis to extraordinary popular contagions:

We are reminded of how many of these phenomena of dependence are part of the normal construction of human society, of how little originality and courage are to be found in it, of how much every individual is ruled by those attitudes of the group mind which exhibit themselves in such forms as racial characteristics, class prejudices, public opinion, etc. (p. 82)

He views group psychology as a type of hypnosis:

Hypnosis is not a good object for comparison with a group formation, because it is truer to say that it is identical with it. Out of the complicated fabric of the group it isolates one element for us—the behavior of the individual to the leader. (p. 78)

He also emphasizes that the hypnotic power of suggestion is exercised not only by the leader but mutually by rank-and-file group members. Thus the flight to a protector—what Erich Fromm called the "escape from freedom" (Fromm, 1994)—is a flight to the certainty of leader and group alike. Freud's two main illustrations are not mobs but armies and churches, both of which have an us-them distinction as a core feature. Groups and leaders hypnotize their followers, sometimes in isolation but often in relation to an enemy.

Nowhere in the psychological literature is the submerging of individual will to authority clearer than in Stanley Milgram's experiments in which naive subjects were ordered to give presumed electric shocks to an unseen person they thought was another subject but was really a confederate of the experimenter (Milgram, 1963; Milgram, 1974). Most people studied gave what they believed were very dangerous shocks simply because they were ordered to do so by an authority figure. "What is the limit of such obedience?" the experimenter later asked (p. 188).

At many points we attempted to establish a boundary. Cries from the victim were inserted; they were not good enough. The victim claimed heart trouble; subjects still shocked him on command. The victim pleaded to be let free, and his answers no longer registered on the signal box; subjects continued to shock him. (p. 188)

Adding the encouragement of peers to the orders of the experimenter made the obedience even more reflexive. "And what is it we have seen?" Milgram asks:

Not aggression, for there is no anger, vindictiveness, or hatred in those who shocked the victim. Men do become angry; they do act hatefully and explode in rage against others. But not here. Something far more dangerous is revealed: the capacity for man to abandon his humanity, indeed, the inevitability that he does so, as he merges his unique personality into larger institutional structures.

This is a fatal flaw nature has designed into us, and which in the long run gives our species only a modest chance for survival. (p. 188)

Freud the psychoanalyst and Milgram the social psychologist both write of the way nature or evolution has designed us, and their assessment does not contradict current views in evolutionary psychology. In modern terms, certain special individuals, with personalities unrepresentative of their populations but with views that tap into the worst in human nature, can sway large groups of people in unfortunate directions.

### Does Competition for Resources Lead to War?

As previously noted, cross-cultural analysis of hundreds of societies of anthropological interest shows that scarcity resulting from natural disasters, and the fear of such scarcity, form the single best predictor of the frequency of war, explaining fully 50 percent of the variance (C. R. Ember & Ember, 1992). In the long archeological record of violence, it appears to some authorities that "ecological imbalance ... is the fundamental cause of warfare" (LeBlanc & Register, 2003, p. 69).

This idea is not new. In 1798 Thomas Malthus published an essay on population based on two facts: that we need food, and that "the passion between the sexes is necessary and will remain" (Malthus, 1798, p. 14). He predicted a *geometric* progression of human numbers against an *arithmetic* increase in food, with eventual catastrophic results. Today many believe that Malthus has been proved wrong. The population has increased geometrically since he wrote, but so has the food supply, and the projected disaster has therefore not occurred. Worldwide breeding has slowed, and the population "bomb" will be defused during this century.

This view is naive and dangerous. It misses three key points. First, as archeologists have definitively shown since Malthus's *Essay*, the catastrophe of overpopulation, diminishing agricultural returns, ecological destruction, and population crash through war, disease, and famine has happened repeatedly in human history. Sites of great civilizations remind us that the process Malthus described is old, reliable, and real. The disasters that doomed such civilizations, belying their arrogance, were species-wide, but they were continual and predictable according to Malthus's reasoning (Ayes, 1999, pp. 125–131). The species persisted, but when we think of the enormous suffering of the people in those dead civilizations—the hopes dashed, the fear in their children's faces, the sight of those children succumbing to sword, plague, famine, and flame—or at a minimum, dragged from their homes to become paupers and slaves—we can wish we had done more than survive. The Malthusian cycle was not just a model of future events, it was a summary of what had already happened many times.

Second, since Malthus wrote, the process has widened and intensified. A few years after his book came out, the people of France (as Tolstoy put it) decided to go to Russia, carrying Napoleon like a flag. Europeans and then Asians overflowed into land they conveniently claimed was empty, and since it was not, proceeded to empty it by murdering its inhabitants or infecting them with deadly diseases. The English, French, Germans, Spanish, Portuguese, and Dutch went to Africa, South America, and Australia, always prepared for, and frequently carrying out, ethnic wars. In the nineteenth century the newcomers to North America brutally slaughtered one another in disagreement over the fate of the slaves they had brought from Africa. In the twentieth century, the people of Germany went to Russia twice, and France as well, shouting "Lebensraum!" The second time they murdered 11 million civilians, including 6 million Jews, which did leave them some extra living room.

The Russians built a 70-year empire on a process of *self*-destruction, killing scores of millions of their own people. The Japanese went to the South Pacific, Korea, and

China, and the French and the Americans went to Southeast Asia. From time to time the conquering peoples withdrew from exotic places they had gone to, leaving millions of confused or chaotic lives in their wake for generations. Tens, if not hundreds, of millions of people were starving at any given time. Refugee populations throughout the world swelled to enormous proportions. Genocide or something like it took place, with between hundreds of thousands and millions of civilian deaths, in Turkey, Europe, Indonesia, Uganda, Cambodia, Rwanda, and, on a smaller scale, the former Yugoslavia. In the second half of the twentieth century, an era without a major armed conflict, at least 50 million people died in small wars. The collapse of the Soviet Union and its empire left in its wake many small ethnic conflicts that had been suppressed by its power and by the large confrontational logic of the Cold War. There was no peace dividend because there was no change in the basic processes underlying war. Malthus was right. Because the slowing of human population growth will be accompanied by a proportionally larger increase in the material aspirations of the individuals added, Malthus is likely to continue to be right.

### A Tentative Model of War and Ethnic Violence

Let us pause here to sketch briefly the model of collective violence that has been presented. It holds that

1. competition between individual organisms is an intrinsic feature of animal life
2. individual violence, sometimes fatal, is a general characteristic of animal evolution and is also found in all human societies
3. common emotions including frustration, fear, and grief may predispose an individual to aggression
4. physiological, biochemical, and genetic contributions to the tendency to violence are well established
5. males are more disposed to violence than females, partly for biological reasons
6. groups in conflict are collections of individuals who feel that they have more to gain than to lose by fighting
7. a dualistic tendency in human thought exaggerates observed natural differences, including those in the social world
8. fear is a fundamental characteristic of nervous systems, and fear of the strange can stimulate and exacerbate hatreds
9. individuals readily submerge their independent wills to the will of a collective and/or an authoritative leader, partly because this reduces fear
10. the growth in human numbers, combined with periodic natural disasters, produces scarcity and the fear of scarcity, conditions favorable to war.

### A Modest Proposal

This and other analyses show that war and ethnic violence can be understood in an evolutionary context (Boehm, 2003; Fishbein & Dess, 2003; Low, 1993). It is

tempting to conclude from this that war and ethnic violence will be impossible to prevent or stop. So far, they have been. In fact, they will be extremely difficult to prevent or stop, something quite different, and there is no excuse for failing to make the attempt.

Consider again the analogy. Cancer has been a scourge of humankind from time immemorial, although to different degrees in different times and places. It takes many forms, but all have in common uncontrollable growth. It has proven genetic and proven environmental contributions, although their relative importance may differ for different forms. And it has been very difficult to eliminate or even reduce, precisely because its essential processes are so similar to the processes of normal life and growth.

Nevertheless, no one is prepared to give up on the goal of cancer control. Great strides have been made, both in treatment and prevention. The treatments remain ugly and imperfect, but they are effective in some kinds of cancer and partly effective in others. Prevention has accomplished at least as much, increasingly so as we have learned that treatments are extremely difficult to develop. All the strategies and tactics we do have result from research. And part of the message of this research is that the tendency to develop cancer is inherent in human biology, and indeed in a sense it is continually happening and continually but imperfectly held in check by other biological processes. Obviously the recognition of the essential nature of cancer, using all the tools of science, has been crucial to combating it.

No one has any difficulty with this characterization, and no one offering it would ever be accused of taking a fatalistic approach to cancer or implying that nothing can be done about it. On the contrary, we all understand that only the truest possible characterization of it and of the inherent natural tendency we have to develop it can give us any hope of control.

Imagine taking the same approach to violence and war—grant that they are in some sense inherent in human nature, do everything possible to understand the process as a behavioral science problem, and set about to solve the problem based on that understanding. Suppose we were to develop a Centers for Conflict Control (CCC) or, more modestly, Centers for Conflict Intervention (CCI) analogous to the Centers for Disease Control (CDC) or the World Health Organization. The role of the CCI would be to monitor outbreaks of ethnic violence vigilantly and to respond to them before they become large. Interventions by the international community would be less dangerous and costly and more likely to succeed if they could be systematically mobilized before the violence passes a critical threshold or tipping point.

In the realm of disease, this did not happen with HIV-AIDS, but it did happen with SARS. CDC and other international health officials responded promptly to the emergence of an apparently new and deadly virus and implemented effective local, national, and transnational programs using communication, mobilization, education, quarantine, treatment, and containment. What could have been a worldwide epidemic of historic proportions remains an obscure communicable disease of interest mainly to specialists. The public health community has responded to hanta

virus, ebola, Legionnaire's disease, and other epidemiological threats with similar effectiveness.

As I write, a genocidal or near-genocidal episode of ethnic violence is unfolding in Darfur, in western Sudan. What response has the world made?—some newspaper and magazine articles, a little discussion about intervention at the United Nations, and the usual hand-wringing by human rights activists and nongovernmental aid organizations. The following are excerpts from a *Washington Post* editorial:

#### **Crisis in Darfur**

Saturday, April 3, 2004; Page A22

ACCORDING TO THE United Nations, one of the world's worst humanitarian crises now afflicts a Muslim people who face a horrific campaign of ethnic cleansing driven by massacre, rape and looting. These horrors are unfolding not, as Arab governments and satellite channels might have it, in Iraq or the Palestinian territories, but in Sudan, a member of the Arab League. Maybe because there are no Westerners or Israelis to be blamed, the crisis in Darfur, in northwestern Sudan, has commanded hardly any international attention. Though it has been going on for 14 months, the U.N. Security Council acted on it for the first time yesterday, and then only by issuing a weak president's statement. More intervention is needed, and urgently.

The victims of the ongoing war crimes are non-Arab African people who have lived in the Darfur region for centuries. In February 2003, as the Sudanese government began to negotiate a peace agreement with rebel movements representing the non-Arab peoples of the south, an insurgent movement appeared ... Early this year, after the breakdown of a cease-fire, it launched a scorched-earth offensive in the region that, according to the United Nations and human rights groups, has taken on the character of an ethnic war.

According to a report issued this week by Human Rights Watch, "the government of Sudan and allied Arab militia, called Janjaweed, are implementing a strategy of ethnic-based murder, rape and forcible displacement of civilians." More than 750,000 people have been forced from their homes, and 100,000 more have fled across the border to neighboring Chad, an area of desperate poverty and little war. The dead number in the tens of thousands. ... Humanitarian aid groups have had almost no access ....

As I write this, in September, little further has been done. On May 4, 2004, while genocide was emerging under the aegis of his government, the Sudanese envoy to the United Nations was elected to a three-year term on the U.N. Human Rights Commission.

This comes almost exactly on the tenth anniversary of the genocide in Rwanda, and as the war crimes tribunal for that massive crime is proceeding. Major General Romeo Dallaire of Canada had commanded a small contingent of 450 peacekeepers after the United Nations—and its member countries—withdraw 2,000 other troops just as the genocide was getting under way. Dallaire testified for seven days in February before the U.N. International Criminal Tribunal for Rwanda, sometimes tearfully, saying that he could have saved hundreds of thousands of people slaughtered in 1994 had he been provided with enough troops and equipment by the United Nations. Kofi Annan, now Secretary General, had been the official in charge who denied Dallaire's request and withdrew the 2,000 troops.

As shown by Samantha Power in her disturbing book on genocide, the Rwanda mass murders fell squarely in the tradition of other twentieth-century genocides—that of the Turks against the Armenians in 1915–1916, of the Germans against the Jews in the 1940s, of the Khmer Rouge against other Cambodians in the late 1970s, of Iraq against the Kurds in 1987–1988, and of the Serbs against the Bosnian Muslims in the early 1990s—in that each was preventable at an early stage *if the international community had acted*, which in each case it did not (Power, 2002).

What prevents the assembly of an apparatus of cooperating governments that could respond to the emerging Darfur genocide the way they responded to SARS? There are political obstacles of course, but those exist in the realm of disease as well—some nations have suppressed evidence of epidemics in their midst. But we have reached the point with infectious disease where globalization has become undeniably real, so we act in spite of the embarrassment and resistance of governments. And there is another reason, more relevant to the subject of this chapter: We understand the biology and epidemiology of infections and we know they are very powerful because they are natural. Perhaps when we concede the same about violence and war, we will have the resolve to respond to them in a similar way.

We can find a closer, encouraging analogy in the International Atomic Energy Agency, a transgovernmental apparatus for limiting nuclear weapons proliferation. While hampered by political factors, it has in the past two years made modest progress in assessing and perhaps limiting proliferation in Iran and Korea and in bringing about an end to Libya's nuclear weapons program. But for the untimely interference of the government of the United States, it would have proved beyond reasonable doubt its claim that there were no nuclear weapons in Iraq.

Surely at least this level of success could be achieved in relation to emerging genocides—which, according to Raphael Lemkin, who coined the term, occur with almost “biological regularity” (Power, 2002, p. 22). It seems unlikely that the apparatus of intervention could be the United Nations, which has repeatedly proven itself unwilling and ineffective. Perhaps a broad group of governments of advanced countries could build this apparatus to intervene in emerging genocides, the one-sidedness of which should allow a high degree of agreement. Ethnic war on a larger military scale will be more difficult to address, and international war harder still. It is not easy to imagine an agency that could have intervened to separate Pakistan and India, two nuclear powers, when they were in a precarious confrontation. But the control of ethnic violence has to start somewhere, and a serious effort addressing emerging genocides would be a good first step.

## Conclusion

This chapter has presented a biologically based viewpoint on the human tendency to violence, as well as the more complex tendency to organized violence and specifically ethnic conflict. This viewpoint is not really new; most great religious traditions would find it familiar, since it presents in scientific language and supports with scientific evidence some very old hypotheses about human nature. These religious

traditions also advise us, for example, that we should recognize our baser passions, including aggressive ones; that we should strive to subdue those passions; that we should try to love our neighbors as ourselves; and that we should not follow a multitude to do evil. Where the sentiments in the advice originate is a question in itself, but their wide occurrence in religious traditions supports the hypothesis of a violent tendency in human nature. Yet the same traditions provide justifications for sanctioned or sacred violence that give periodic opportunities for the expression of this tendency, sometimes on a very large scale.

In 1932 Albert Einstein wrote to Sigmund Freud to begin an exchange of views on war (Einstein, 1963):

How is it that these devices succeed so well in rousing men to such wild enthusiasm, even to sacrifice their lives? Only one answer is possible. Because man has within him a lust for hatred and destruction. In normal times this passion exists in a latent state, it emerges only in unusual circumstances, but it is a comparatively easy task to call it into play and raise it to the power of a collective psychosis. (p. 202)

This is a great oversimplification, since the posited “lust for hatred and destruction” exists only under certain circumstances. A more general and easily evoked human emotional state is the anger that arises in response to frustration, fear, and grief. Combined with an easy slide into dichotomous thought that may lead to pseudospeciation, the outcome can be ethnic violence, including war or genocide.

Freud, who believed in a death instinct, expressed “entire agreement” with Einstein about the lust for destruction (Freud, 1932/1959, p. 280). They differed, however, on one important point: Freud claimed that “whatever fosters the growth of culture works at the same time against war” (p. 287). Einstein was skeptical of culture's civilizing power, and an anthropologist has to side with Einstein. Civilization emerged in ecological settings where warlike tribal groups were able to operate as organizations for predatory expansion. Karl Marx famously claimed that capitalism emerged from the mud with blood oozing from every pore. This may not be true of capitalism, but it is literally true of what we call civilization, which emerged from the mud of irrigated agricultural land acquired and protected by much slaughter. Joining military force to religious ideology, the early civilizations suppressed and pacified increasing numbers of people who, through taxation, provided resources for further expansion. Confrontation with another similar entity was the inevitable outcome. This pattern has changed little in the thousands of years leading up to the nuclear age. We flatter ourselves that we control the process, but human weakness, human nature, and human biology loom large in the risk of ethnic violence and war.

We say that we need water, food, sex, exercise, sleep, love, peace of mind, even entertainment, but we never say that we need enemies, or even that we like to have them, that they make us feel alive and give us meaning, by setting in motion certain biological processes that we do not understand but that operate deep within us, stimulating and shaping our will. We freely acknowledge that all those other needs are ones we share with other animals. But the thought that the murderous gang

ambushes of chimpanzees could have anything to do with the things we think, feel, and do as we carry out ethnic violence is abhorrent to us. If we could end this denial and attain this bit of self-knowledge—accept at last, in the service of a higher good, this affront to human dignity—perhaps it would help us move toward a world where, if we could not embrace our enemies, we could at least leave them alone.

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