

# KILLER INSTINCTS

What can evolution say about why humans kill — and about why we do so less than we used to? **Dan Jones** reports.

It is scientifically incorrect to say that we have inherited a tendency to make war from our animal ancestors ... that war or any other violent behaviour is genetically programmed into our human nature ... [and] that humans have a 'violent brain.'

These are the ringing words of the 'Seville Statement on Violence', fashioned by 20 leading natural and social scientists in 1986 as part of the United Nations International Year of Peace, and later adopted by the United Nations Educational, Scientific and Cultural Organization (UNESCO). It was written to counter the pessimistic view that violence and war are inevitable features of human life.

The decades since have not been kind to these cherished beliefs. A growing number of psychologists, neuroscientists and anthropologists have accumulated evidence that understanding many aspects of antisocial behaviour, including violence and murder, requires the study of brains, genes and evolution, as well as the societies those factors have wrought.

At the same time, though, historians,

archaeologists and criminologists have started to argue that in most places life was more violent — and more likely to end in murder — in the past than it is today. The time span of this apparent decline in violence has been too short for appeals to natural selection to be convincing. If humans have evolved to kill, then it seems that they have also evolved to live without killing, given the right circumstances.

## Going too far

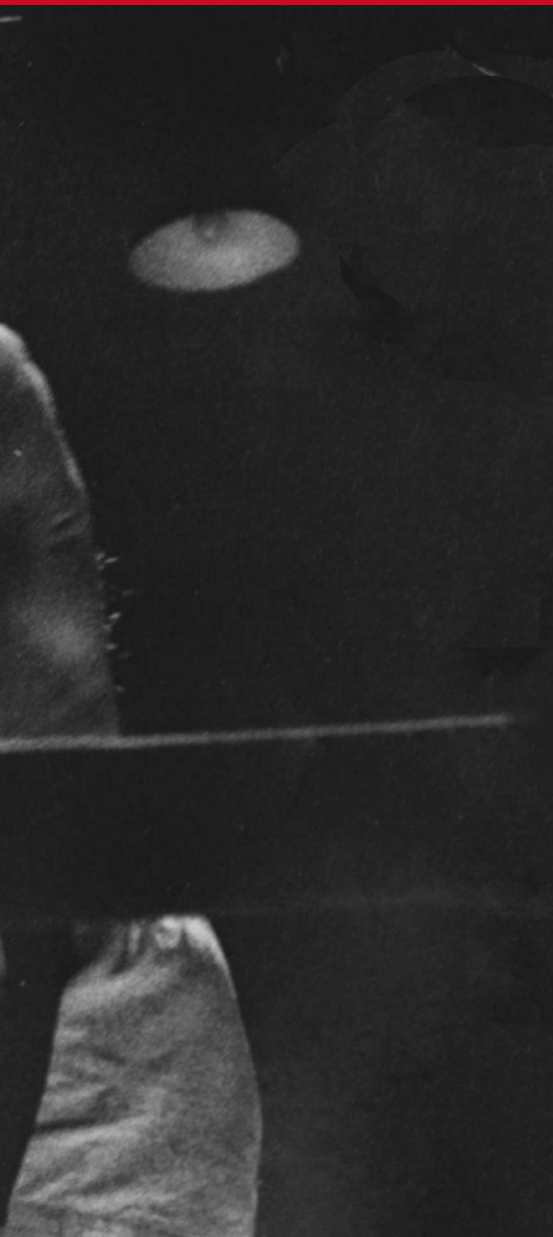
Just two years after the Seville Statement was issued, Martin Daly and Margo Wilson of McMaster University in Ontario, Canada, published *Homicide*<sup>1</sup>. The book was to become one of the founding texts of a new — or at least thoroughly rebranded — discipline called evolutionary psychology. Drawing on animal behaviour, anthropology and patterns of violence and murder in modern societies, Daly and Wilson provided an evolutionary account of the various forms of homicide, from one man killing another to spousal murder and the rarer killing of step-children. But although

they argued — in direct contradiction of the Seville Statement — that humans have brains and minds with violent proclivities, they also argued that killing was, by and large, not something that evolution had selected for.

Instead, Daly and Wilson argued that murderous actions are usually the by-product of urges towards some other goal. The purpose of the sometimes violent competition that goes with human urges for higher status and greater reproductive success is not to kill, any more than the purpose of its stylized quintessence boxing is. But sometimes people die.

Most evolutionary psychologists agree, in general terms, with this 'by-product' view, although there are exceptions. David Buss, of the University of Texas at Austin, and Joshua Duntley, of the Richard Stockton College of New Jersey in Pomona, have developed a controversial 'homicide adaptation theory'. The theory proposes that, over evolutionary history, humans have repeatedly encountered a wide range of situations in which the benefits of killing another person outweighed the

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costs — particularly when the assessed costs of murder are low, success is likely and other non-lethal options have been closed off<sup>2</sup>. The killing of an unwanted child or the stealthy murder of a sexual rival might be examples. “Homicide can be such a beneficial solution to adaptive problems in certain, specific contexts that it would be surprising if selection had not fashioned mechanisms to produce lethal aggression,” says Duntley. Other evolutionary psychologists are yet to be convinced. “I wouldn’t want to hitch my wagon to the by-product argument,” says Daly, “but I don’t think anyone, including Duntley and Buss, has figured out a good way to identify the hallmarks of homicidal adaptations.”

A key condition for an evolutionary account of homicide is an explanation of the fact that most deadly violence is committed by men. Evolutionary psychologists say that this is because men have evolved to compete more intensively than women in the race for status, material wealth and sexual partners. In terms of the by-product theory, men are more likely

to suffer the consequences when competition gets out of hand. This competitive kindling, Daly and Wilson argue, is at its most combustible in men of low socioeconomic status in regions of high social inequality, suffused with a sense of everything to gain and little to lose.

Although women also compete, they may be less likely to do so in ways that risk escalating to the use of deadly force because, for women, the costs of such escalation have historically been higher. Rebecca Sear at the London School of Economics and Political Science and Ruth Mace of University College London recently studied the effects of losing kin on child survival in 28 populations from around the world over the past three centuries<sup>3</sup>. The death of a mother has an impact on child survival — but often the death of a father does not. From a gene’s eye view, a woman who might die is thus a bigger problem than a man facing the same level of risk.

A meta-analysis<sup>4</sup> of studies looking at sex differences in aggression by John Archer of the University of Central Lancaster, UK, reveals that men and women don’t differ much in their experience of anger, the primary accelerator of aggression. Anne Campbell, an evolutionary psychologist at Durham University, UK, suggests that the differences in aggressive behaviour thus reflect differences in the strength of the factors controlling the behavioural expression of that anger. “Developmental studies show that girls generally score higher on empathy measures, are more fearful and are better at controlling their behaviour,” says Campbell.

In crude terms, women may in general have better brakes with which to stop a violent impulse and people who are violent may, in general, lack such brakes. Psychologist and neuroscientist Richard Davidson, of the University of Wisconsin-Madison, suggests that dysfunction in the brain circuits that normally inhibit emotional impulses — those associated with the prefrontal cortex — is a crucial prelude to violent outbursts<sup>5</sup>.

In 1997, Adrian Raine and Lori LaCasse, then at the University of Southern California (USC) in Los Angeles, and their colleague Monte Buchsbaum from Mount Sinai School of Medicine in New York published one of the first explanations of the neurobiology of homicide. Among the brains of 41 murderers pleading not guilty by reason of insanity, they found lower activity (as measured by glucose metabolism) in the prefrontal cortex, and greater activity in structures in the limbic system, thought to drive aggression, than they found in non-murderous brains<sup>6</sup>. “Put crudely, murderers don’t have the

prefrontal resources to regulate that unbridled emotional output,” says Raine.

Raine has since found a link between a lower volume of grey matter in an area of the prefrontal cortex known as the orbitofrontal cortex, which has been associated with decision-making and regulation of emotion, and more aggressive and antisocial behaviour. He says that the difference in the average volume of the orbitofrontal cortex between men and women accounts for about half of the variation in antisocial behaviour between the sexes. Just as evolution has shaped men’s bodies to be, on average, larger than women’s, it has also distributed the resources needed to regulate emotion and aggression unevenly between the sexes.

In an intriguing turn, Raine and his USC colleague Yaling Yang have recently pointed to a link between homicidal behaviour and the capacity to follow moral guidelines. Over the past six years, brain-imaging studies aimed at understanding moral judgements have illustrated the crucial role of the emotional feeling that comes with violating moral codes. Parts of the prefrontal cortex and amygdala that are abnormal in violent individuals and murderers are activated when making moral judgements. Raine and Yang have proposed that these systems serve as the engine that translates moral feelings into behavioural inhibition — an engine that has blown a gasket in the antisocial, violent and murderous<sup>7</sup>.

### A lethal legacy

Men are not just more likely to kill other people than women are, they are also more likely to do so in groups — and for some researchers it is in these realms that killing offers real evolutionary value. The murder of one person by another may be almost accidental, an unlooked for by-product of aggression. The murder of members of one group by those of another could be an adaptive behaviour that evolution has encouraged.

Humans are not the only primates to form coalitions that kill members of neighbouring communities. Since the behaviour was first reported at the Jane Goodall research centre in Gombe, Tanzania, in the 1970s, five long-term study sites dotted around Africa have seen murderous ‘gang violence’ in chimpanzees. In one case that is hard not to see as a war, the adult males of one community systematically attacked and killed the males of another group over a period of years, with the victorious group eventually absorbing the remaining victims.

Harvard anthropologist Richard Wrangham

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— Martin Daly



has been observing primates in the wild for more than 30 years. He thinks that the roots of chimpanzee warfare lie in the social organization and behavioural ecology of their societies. Although chimps live in communities of around 150, they are rarely all found together. Instead they typically travel around their territory in parties of up to 20 animals. From time to time, a roaming party from one group will cross paths with a roaming party of another. If they are of equal size, there will be a lot of screaming and charging. When there is an imbalance of power, the larger party will often try to isolate and attack an enemy chimpanzee, sometimes holding their victim down while the frantically excited attackers hail down lethal bows.

Although these attacks can be risky — small parties have been seen running to attack a lone neighbour only to find themselves surrounded by a much larger party, at which point they hurriedly try to flee — they can also have big pay-offs, especially over the long-term. By dominating or eliminating neighbouring communities, aggressors can expand their range, which means a better food supply, healthier adults and faster reproduction<sup>8</sup>.

Raids on neighbouring communities are also common in anthropologists' accounts of small-scale human societies. These often follow the chimpanzee template: a small band of men leaves its home ground, sneaks up on the neighbours and tries to kill one or more of them. Wrangham, working with Michael Wilson of the University of Minnesota in St Paul and Martin Muller of the University of New Mexico in Albuquerque, has moved beyond remarking on the general similarity to looking at some real numbers. They compared death rates from conflict between groups of chimps in the five long-term study sites<sup>9</sup> with data for inter-group human conflicts in numerous subsistence-farmer and hunter-gatherer societies assembled by anthropologist Lawrence Keeley of the University of Illinois at Chicago. Overall, humans and chimpanzees showed comparable levels of violent death from aggression between groups.

### A history of violence

Moving from studies of chimpanzee coalitional violence and comparisons with small-scale tribal conflicts to understanding modern warfare is, however, far from straightforward. 'War' is a broad term, points out Robert Hinde, a zoologist at the University of Cambridge, UK, and one of the signatories to the Seville Statement. Although Hinde mostly agrees



with Wrangham's take on the parallels between inter-community conflicts in chimpanzees and humans, he has reservations about extrapolating too much from these studies. "In major international wars people do what they do mainly because it is their duty in the role they occupy; combatants in institutionalized wars do not fight primarily because they are aggressive," says Hinde, who served as a fighter pilot in the Second World War.

But some of the normal machinery that inhibits violence — the moral engine described by Raine and Yang — might become selectively disengaged in warring armies. Ideology, propaganda and denigration of the out-group can harden the barrier between 'us' and 'them', says Hinde — a barrier to which the mind's moral faculty is very sensitive. As a result, killing comes to feel permissible. Even, sometimes, right.

What about comparisons of aggression and killing within groups? Chimps often turn on their own, particularly infants and young adults. According to Wrangham and his colleagues, in-group killing exceeds death from between-group conflict in at least some chimp communities. Humans in small societies, by contrast, die much less frequently from fights within their group than from group battles. One possible explanation is that they simply fight less. Anthropologist Victoria Burbank of the University of Western Australia in Crawley has recorded<sup>10</sup> rates of non-lethal acts of physical aggression in an aboriginal Australian population; by Wrangham's reckoning, chimps display such behaviour 200 times more frequently, if not more.

For an increasing number of behavioural

scientists, including Hinde, this prosocial lack of violence looks like a fundamental aspect of human nature — the human ability to generate in-group amity often goes hand in hand with out-group enmity. Using computer simulations, economists Jung-Kyoo Choi from Kyungpook National University in South Korea and Samuel Bowles from the University of Siena in Italy have produced models in which altruism and war co-evolve, promoting conflict between groups and greater harmony within them<sup>11</sup>. "It all falls into place when you see the evidence that early humans lived in small, competing groups," says Hinde. "Your group was more successful if you cooperated with its members but not with outsiders."

None of this means that a tendency to kill is set in stone; if anything, it shows that humans have evolved to be much less of a risk to each other within groups than they would be if they were as bellicose as chimps. And there is evidence that this risk is reducing further in studies of death rates from both inter-group homicide and intra-group warfare, both of which seem to have plummeted over the millennia.

Incessant tit-for-tat tribal raids in which a high percentage of people took part led to shocking rates of death at human hands, spears, axes and clubs. Harvard psychologist Steven Pinker was relying on estimates of this violence derived by anthropologists when he suggested that "if the wars of the twentieth century had killed the same proportion of the population that die in the wars of a typical tribal society, there would have been two billion deaths, not 100 million."<sup>12</sup>

A decline in inter-personal violence (as opposed to inter-group war) can be seen over the shorter timescale and narrower field of modern European history. Criminologist Manuel Eisner at the University of Cambridge

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Violent urges predate modern humans.



has documented a trend of declining homicide rates estimated from historical records left by coroners, royal courts and other official sources spanning Europe from the twelfth century to the modern day<sup>13</sup>. After rising from an average of 32 homicides per 100,000 people per year in the thirteenth and fourteenth centuries to 41 in the fifteenth, the murder rate has steadily dropped in every subsequent century, to 19, 11, 3.2, 2.6 and finally 1.4 in the twentieth century. England is typical of the trend, going from 23 homicides per 100,000 people per year to 1.2 over the same period.

Eisner rules out better policing and improved medical treatment as causes of the decline for the simple reason that it started before professional police forces appeared and techniques for dealing with wounds became more effective. And a few centuries is too short a time for evolution to

have shaped human nature much. A part of the answer that is consistent with an evolutionary approach is a long-term reduction in inequalities of life circumstances and prospects — the inequalities that Daly and Watson see as driving the conflict that leads to killing as a by-product. “In places such as Sweden where every cabbie drives a Mercedes,” says Daly, “people don’t bother to kill so often.” Better provisioning of life’s necessities has also powered the decline, agrees Duntley. When contested resources are made more plentiful, he says, conflict over resources decreases and homicide rates drop.

### Moral rearmament

The picture, though, is hardly simple. Societal specifics play a part as great as or greater than that of any evolutionary generalities. Eisner points out that across Europe, both geographically and through time, countries with the highest homicide rates are typically plagued by familial feuding and blood revenge, such as in the Scottish highlands in the eighteenth century and Sardinia in the nineteenth. The death toll was frequently exacerbated by cultures laying weight on a male strength in arms and a willingness to demonstrate it. Perhaps against the spirit of Daly’s argument, violence was particularly prevalent in élites, who would often use it with impunity against their social inferiors. “Violence is a very functional thing, and the élites used it to their advantage,” claims Eisner, pointing out that violence as a phenomenon of lower-class youths — the sort of violence Daly and Wilson have studied in Chicago crime statistics — is a recent trend.

“In the early modern period, local élites and nobility become integrated into the state and they increasingly find violent and aggressive behaviour to be useless or dysfunctional,” says

Eisner. “It becomes much better to be economically successful, and so the élites abandon their violent behaviour.” Systems of justice in which the right people are pardoned and the right people punished push up the costs of violence and homicide, and can put an end to the otherwise incessant family feuds. They can also provide clean alternatives to the shedding of civil blood. According to Eisner, European records reveal that 10–20% of medieval homicides were related to conflicts over land ownership. “Administrations that determine who owns what, and access to civil law courts that help you resolve disputed claims, make resorts to violence much less likely — in a modern society, it’s actually counterproductive,” he says.

A drop-off in war could also lead to reductions in other forms of violence. In cultures and societies with a recent history of warfare, children tend to be socialized to tolerate pain and to react aggressively, which prepares them for the possibility of becoming a soldier (arguably something that evolution would favour) or a potentially deadly brawler (probably something it wouldn’t). But in much of the world, histories of warfare are becoming more distant. “If we grow up without these experiences, which is the case for most people in modern democracies that could affect how aggressive we are and our moral views of our options,” says Wilson.

The evidence suggests that humans may indeed have what the Seville Statement called a ‘violent brain’, in as much as evolution may favour those who go to war. But evolution has also furnished us with a moral sense. The complexities of the relationship between morals and violence may prove a fruitful field for future research, in as much as they can be disentangled from the social and historical factors that clearly hold great sway over the ultimate levels of violence. Evolution is not destiny; but understanding it could help maintain the hard-to-discern progress of peace.

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Killing and camaraderie could have co-evolved.