

Original Article

Western Europe, State Formation, and Genetic Pacification

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Abstract: Through its monopoly on violence, the State tends to pacify social relations. Such pacification proceeded slowly in Western Europe between the 5th and 11th centuries, being hindered by the rudimentary nature of law enforcement, the belief in a man's right to settle personal disputes as he saw fit, and the Church's opposition to the death penalty. These hindrances began to dissolve in the 11th century with a consensus by Church and State that the wicked should be punished so that the good may live in peace. Courts imposed the death penalty more and more often and, by the late Middle Ages, were condemning to death between 0.5 and 1.0% of all men of each generation, with perhaps just as many offenders dying at the scene of the crime or in prison while awaiting trial. Meanwhile, the homicide rate plummeted from the 14th century to the 20th. The pool of violent men dried up until most murders occurred under conditions of jealousy, intoxication, or extreme stress. The decline in personal violence is usually attributed to harsher punishment and the longer-term effects of cultural conditioning. It may also be, however, that this new cultural environment selected against propensities for violence.

Keywords: aggression, gene-culture co-evolution, pacification, state formation, violence, Western Europe

Introduction

What distinguishes the State from earlier forms of social organization? The answer, according to sociologist Max Weber, is its monopoly on violence. A State is an entity that “successfully upholds a claim to the *monopoly* of the *legitimate* use of physical force in the enforcement of its order” (Weber, 1947, p. 154, italics in original).

Wherever this monopoly is absent, each adult male has the right to defend himself and his kin with whatever violence he deems necessary. There are courts to arbitrate disputes but they typically have no power to enforce their rulings, enforcement being left to the aggrieved party and his male kin. Use of violence is also a source of prestige; it is the

means by which men prove their manhood, attract potential mates, and gain respect from other men. This situation changes when the State comes into being. The right to violence is now limited to self-defense and defense of the State, with all other uses criminalized and even pathologized. The violent young male goes from hero to zero. At best, he is pushed to the margins of society and forced to consort with prostitutes. At worst, he is tried, convicted, and executed for his behavior.

State formation thus leads to a pacification of social relations, although the second process may occur at varying speeds. In this paper, we will look at the example of Western Europe, where pacification went through a slow initial phase, a much faster second phase, and a final phase of deceleration.

First Phase: The Age of Personal Violence (5th to 11th Centuries)

With the collapse of the Western Roman Empire in the 5th century and the rise of barbarian-ruled kingdoms, no entity could or would monopolize the use of violence. First, there was widespread reluctance to deny a man his right to settle personal disputes as he saw fit, even to the point of committing murder. This right was of course reciprocal. A murder could be avenged by the victim's brothers and other kinsmen—a prospect that kept violence within certain bounds. Thus, the barbarian rulers initially limited the death penalty to the extreme cases of treason, desertion, and cowardice in combat (Carbasse, 2011, p. 35).

The only other center of authority, the Church, opposed the use of violence, but its opposition was so systematic that the judiciary could not easily use violent means to curb violence. This stance was already taking shape in the late Roman period, as seen in a letter by Ambrose, the bishop of Milan (374–397) who, while defending the death penalty, praised judges who refrained from it (Frost, 2010; Swift, 1970). After the Empire's collapse, the bishops of France decided in 511 that an accused murderer could ask for and receive sanctuary in any holy place. Their decision was reiterated by Gregory the Great, the pope of the Western Church (590–604): “Let the Church extend its protection even to those who have spilled blood, for it must not contribute, even indirectly, to the shedding of their own blood” (Carbasse, 2011, p. 34).

As a result, and for almost opposite reasons, both the Church and the barbarian rulers stood in the way of any judicial effort to pacify social relations. The justice system sought not to punish violent acts as such but rather to keep them from degenerating into vendettas. This was the intent of the Salic Law, proclaimed in 507–511:

[The Salic Law] was a pact (*pactus*) “concluded between the Franks and their chiefs,” for the specific purpose of ensuring peace among the people by “cutting short the development of brawls.” This term evidently means private acts of vengeance, the traditional vendettas that went on from generation to generation. In place of the vengeance henceforth forbidden, the law obliged the guilty party to pay the victim (or, in the case of murder, his family) monetary compensation. This was an indemnity whose amount was very precisely set by the law, which described with much detail all of the possible damages, this being to avoid any discussion between the parties and to make settlement as fast, easy, and peaceful as possible. (Carbasse, 2011, pp. 33–34) [my translation]

Punishment was thus monetized. Killing a boy younger than 10 meant a payment of 24,000 dinars. Killing a free pregnant woman would cost a bit more: 28,000 dinars. Only 12,000 dinars had to be paid for killing a Roman who ate in the king's palace. Monetary compensation was impossible only for the murder of the king or for the murder of a free man by a slave.

There were attempts over the next few centuries to broaden the scope of the death penalty but to little avail—partly because law enforcement was still rudimentary, partly because violence continued to be an accepted way of resolving personal disputes, and partly because of ongoing resistance from the Church:

...the duo “peace and charity” remained the supreme objective. This ideal had practical applications, since the legal forms of that time offered model agreements called “peace” or “concords” (today we would say “plea bargaining”) for even major crimes like murder. Clearly, the public justice system was used only in exceptional cases, the usual way of settling disputes being private in nature. (Carbasse, 2011, p. 36) [my translation]

Thus, for a long time, violent crime normally remained a personal matter to be settled through vengeance or monetary compensation. This judicial passivity may have been one reason why the Dark Ages lasted more than half a millennium.

Second Phase: The War on Murder (11th to mid-18th Centuries)

Change began in the 11th century with the strengthening of kingdoms throughout Western Europe and a shift toward a new consensus. The State no longer saw itself as an honest broker in personal disputes. Jurists were now arguing that the king must punish the wicked to ensure that the good may live in peace (Carbasse, 2011, pp. 36–56). The Church was coming around to the same view:

...a reaction began to arise in the 11th century against the previous system of monetary compensation. Henceforth, increasingly, it was felt that money could not be a sufficient compensation for such an infraction. The idea that the murder of a man is a crime too serious, an offence too manifest to the order of Creation, to be simply “compensated” by a sum of money was present from the early 11th century onward in the thinking of some bishops. (Carbasse, 2011, pp. 37–38) [my translation]

The theologian Thomas Aquinas (1225–1274) justified the death penalty by appealing to the common good:

...it is lawful to kill an evildoer in so far as it is directed to the welfare of the whole community, so that it belongs to him alone who has charge of the community's welfare. Thus it belongs to a physician to cut off a decayed limb, when he has been entrusted with the care of the health of the whole body. Now the care of the common good is entrusted to persons of rank having public authority: wherefore

they alone, and not private individuals, can lawfully put evildoers to death. [*Illa Ilae*, q. 64] (Aquinas, 1947)

The death penalty became not only more common but also more radical in its implementation. It was increasingly used not only for murder but also for other crimes (rape, abortion, infanticide, lèse-majesté, recurrent theft, counterfeiting, etc.). It also assumed increasingly horrendous forms: drawing and quartering, breaking on the wheel, and burning at the stake. Beginning in the 13th and 14th centuries, there were even cases of the convicted murderer being buried alive under the victim's casket (Carbasse, 2011, pp. 52–53).

This war on murder reached its peak in England and Flanders by the 16th century. The courts annually put to death one person out of every ten thousand. Over a lifetime, one or two out of every two hundred men would end up being executed (Savey-Casart, 1968; Taccoen, 1982, p. 52). Others died while languishing in prison. In one medieval English jail, 25% of all inmates perished before they could be tried. By comparison, only 25% of all inmates were eventually convicted (Ireland, 1987). Although Geltner (2006) describes medieval prisons as “mostly tolerable,” he goes on to note that “the confluence of imbalanced diets, cramped quarters, and poor hygiene meant that prisoners (somewhat like monks) were particularly prone to die in epidemics, as confirmed by their decimation during the Black Death.”

The rising execution rate was paralleled by a steadily falling homicide rate throughout most of Western Europe (Clark, 2007, pp. 124–128; Eisner, 2001; Pinker, 2011; Spierenburg, 2008). There is widespread agreement that homicide rates were already falling in England when the earliest continuous records began in the early 16th century (Eisner, 2001, pp. 621–622). More fragmentary data suggest that this downward trend started sometime in the 14th century:

Typical estimates referring to the late Middle Ages range between 20 and 40 homicides per 100,000, while respective data for the mid twentieth century are between 0.5 and 1 per 100,000. . . . the early seventeenth century may be regarded as a decisive turning point. The average rates already decline somewhat from the fourteenth to the sixteenth centuries. (Eisner, 2001, pp. 628–629)

One might think that the falling homicide rate would have weakened support for the death penalty. Yet, initially, support strengthened, as seen in contemporary writings. The cautious endorsement by Thomas Aquinas gave way to a harsher stance. Thomas Hobbes (1588–1679) felt that no advanced society could develop where men are entitled to settle their personal disputes through violence and where people have no “other security than what their own strength and their own invention shall furnish them withal.”

In such condition there is no place for industry, because the fruit thereof is uncertain: and consequently no culture of the earth; no navigation, nor use of the commodities that may be imported by sea; no commodious building; no instruments of moving and removing such things as require much force; no knowledge of the face of the earth; no account of time; no arts; no letters; no society; and which is

worst of all, continual fear, and danger of violent death; and the life of man, solitary, poor, nasty, brutish, and short. [*The Leviathan*, 13] (Hobbes, 2010)

Arguing from natural law, John Locke (1632–1704) maintained that the State had a right to kill murderers:

...every man, in the state of nature, has a power to kill a murderer, both to deter others from doing the like injury, which no reparation can compensate, by the example of the punishment that attends it from every body, and also to secure men from the attempts of a criminal, who having renounced reason, the common rule and measure God hath given to mankind, hath, by the unjust violence and slaughter he hath committed upon one, declared war against all mankind, and therefore may be destroyed as a lion or a tyger, one of those wild savage beasts, with whom men can have no society nor security: and upon this is grounded that great law of nature, Whoso sheddeth man's blood, by man shall his blood be shed. [*Second Treatise of Government*, 2, 11] (Locke, 1980)

Third Phase: Abatement of the War on Murder (mid-18th to 20th Centuries)

By the mid-18th century, the execution rate was falling not just because fewer murders were being committed but also because a shrinking proportion of convicted murderers were being executed. Revulsion against the death penalty was growing among judges and jurors, while people in general were for similar reasons spurning once popular events like cock fighting, bear and bull baiting, and the burning of cats on Midsummer Day (Clark, 2007, pp. 182–183; Elias, 1978, pp. 203–204). The new mood was apparent in English law courts. “Whereas in the seventeenth century a quarter of those who stood trial were hanged, this had halved by the mid-eighteenth century, and fell further by 1800” (Morgan and Rushton, 1998, p. 68). This trend resulted more from jury leniency than from actual change to the law. In the early 19th century, for instance, hanging was still mandatory for theft of goods worth at least 40 shillings. To save a condemned man, a jury decided that a stolen 10-pound note was worth only 39 shillings. Another jury came to the same decision for a theft of 100 pounds! (Taccoen, 1982, p. 50). A similar change of mood could be observed in French law courts. In Dijon, the death penalty accounted for 13 to 14.5% of all sentences before 1750, 8.5% in 1758–1760, 6% in 1764–1766, and less than 5% after 1770 (Carbasse, 2011, p. 70). This abolition *de facto* was followed by abolition *de jure* in one European country after another from the mid-18th century onward (Carbasse, 2011, pp. 69–75).

Historians often link this trend to the spread of liberalism and Enlightenment thinking, yet the death penalty actually lost favor the most where liberalism seemed the weakest. In Russia, it was unofficially abolished by Elizaveta Petrovna (1741–1762), apparently out of Christian piety, only to be restored by Catherine the Great (1762–1796), who corresponded with Voltaire and professed Enlightenment ideals (Carbasse, 2011, pp. 74–75). Elsewhere, the death penalty disappeared in countries that were illiberal by any other standard, such as Tuscany in 1786 and the Habsburg dominions in 1787. The least progress was made in England, the very epicenter of liberalism, where nearly 300 infractions were still punishable by death in the late 18th century (Carbasse, 2011, p. 75).

Recapitulation

The cultural environment of personal violence has greatly changed over the last millennium in Western Europe. This timeline may be divided into three overlapping phases:

1. Beginning in the 11th century: increasing recourse to the death penalty for murder and, later, for other crimes.
2. From the 14th century to the 20th: gradual but dramatic decline in the homicide rate.
3. Beginning in the 18th century: growing unwillingness by courts to impose the death penalty, followed by formal abolition.

These three phases were interrelated. The first one—the war on murder—succeeded all too well. The pool of violent men dried up until most murders occurred only under conditions of jealousy, intoxication, or extreme stress. Thus, the longer the death penalty was used, the less necessary it became. Violence ceased to be an accepted way for individuals to resolve their disputes or advance their interests; it became increasingly confined to collective actions, such as war, that were approved by a perceived higher authority. It also became a mark of shame, condemning those who practiced it to the margins of society, if not to the gallows. Success now went to the law-abiding man who bettered himself by peaceful means.

Possible Causes: Cultural Conditioning or Conscious Response to a More Secure Environment?

In sum, successive generations were less willing to engage in personal violence. But what was driving this behavioral change? Historians have generally looked for cultural causes. Norbert Elias (1978) argues that a new social structure was altering the personality structure via cultural conditioning:

...namely, the connection between social structure and personality structure. In this society there is no central power strong enough to compel people to restraint. But if in this or that region the power of a central authority grows, if over a larger or smaller area the people are forced to live in peace with each other, the molding of affects and the standards of the economy of instincts are very gradually changed as well. . . .Once the monopoly of physical power has passed to central authorities, not every strong man can afford the pleasure of physical attack. This is now reserved to those few legitimized by the central authority (e.g., the police against the criminal), and to larger numbers only in exceptional times of war or revolution.... (pp. 201–202)

Thus, someone who wished to gratify his pleasure in the manner of the sixteenth century by burning cats would be seen today as “abnormal,” simply because normal conditioning in our stage of civilization restrains the expression of pleasure in such actions through anxiety instilled in the form of self-control. (p. 204)

Manuel Eisner (2001) likewise attributes the homicide decline partly to greater external control by the State and sub-State actors, i.e., churches, schools, workplaces, and partly to greater internal control via new personality traits:

As institutions enforcing the state monopoly of power become more stable, heightened levels of security in social life bring about more intense social interdependencies. The psychic corollary of this social process involves a personality structure, which emphasizes the inhibition of spontaneous emotions and the ability to distance oneself from open displays of aggression. (p. 619)

This control theory has been criticized, as Eisner (2001) notes:

[Accordingly] medieval society with its high levels of violence represents some kind of an uncivilized state devoid of inner and outer controls on everyday behaviour. Many contemporary historians find this evolutionary perspective hard to reconcile with historical evidence. In particular, they emphasize that the notion of an unrestrained and child-like pre-modern individual constitutes a completely inadequate description of medieval reality. (p. 632)

Clearly, medieval men were not children. But their notion of manhood differed from ours, a man being one who readily used violence to defend himself and his kin not only from immediate danger but also from threats and insults. Today, such behavior might seem child-like. Back then, it seemed very adult.

Eisner's control theory is vulnerable to another line of criticism. In societies of Western European origin since the mid-20th century, external and internal controls on behavior have weakened, while "bad boys" have become more positively portrayed in popular culture. This cultural change seems to have caused a modest rise in violence among young men of European background, but nothing comparable to what existed a millennium ago (Eisner, 2001; Spierenburg, 2008, pp. 3–4). If strong external and internal controls had alone caused the pacification of social relations, what is to prevent a return to the earlier, less peaceful state once they have been relaxed? This prospect is evoked by Muchembled (2008, p. 8) in his history of violence in European societies. It also comes up repeatedly in works of modern fiction from *Lord of the Flies* to *A Clockwork Orange*, whose characters revert to barbarism when freed from the restraints of civilization. In reality, this reversion to barbarism has not happened.

A somewhat different explanation sees nonviolence as a conscious response to a more secure social environment. This position is defended by Roth (2011), who lists four correlates of the historical decline in the homicide rate:

1. belief that government is stable, has unbiased legal and judicial institutions, and will redress wrongs and protect lives and property;
2. trust in government and its officials, and belief in their legitimacy;
3. patriotism, empathy, and fellow feeling arising from racial, religious, or political solidarity;
4. belief that the social hierarchy is legitimate, that one's position in society can be satisfactory, and that one can command the respect of others without resorting to violence.

The homicide decline undoubtedly correlates with a more secure environment, but this correlation does not prove that the latter is the root cause. Indeed, the arrow of causality may run the other way. Wherever personal violence is rare, people can more easily trust others, even strangers, and develop a sense of security that extends beyond immediate kin. Roth's secure environment theory is also vulnerable to the criticism that applies to Eisner's control theory. For instance, Roth points to the rise of patriotism and other forms of solidarity, yet this factor has weakened considerably in Western societies over the past half-century. Nonetheless, the homicide rate has risen only modestly, at least within the native population.

A Genetic Cause?

Should we also look for a genetic cause? Was the historical decline in the homicide rate due, at least in part, to a steady removal of individuals who were more genetically prone to personal violence? Although many authors, particularly evolutionary psychologists, believe that some individuals are more violence-prone than others, particularly young men, they nonetheless deny that this propensity has changed during historic times, on the assumption that human genetic evolution ended during prehistory and that any subsequent behavioral change must involve cultural evolution alone (Wood, 2011). Thus, Robert Muchembled (2008) writes:

The fact that the variables of sex and age concerning the act of homicide have little changed over the past seven centuries in the West appears at first sight to confirm the thesis of the predatory and murderous nature of humans. But the downward historical trend in crimes of blood results essentially from a slow cultural evolution. It is especially due to the decrease in conflicts among young males, whether those of the elite who frequently killed each other in duels or those of the people who often engaged in virile confrontations and fighting with knives in public places. Explanations are to be sought in the radical change in the male notion of honor and in the pacification of human relations, first in the public place and then, more slowly, in family life.... (pp. 8–9) [my translation]

Does this cultural evolution exclude a parallel genetic evolution? The above author seems to think so, since the behavioral change took place during historic times. Yet humans did not stop evolving back in the Pleistocene. At least 7% of our genome has changed over the last 40,000 years, and the pace of human genetic evolution actually accelerated by over a hundred-fold some 10,000 years ago (Hawks, Wang, Cochran, Harpending, and Moyzis, 2007). By then, our ancestors had spread over the earth from the equator to the Arctic and were entering new cultural environments rather than new natural environments. Beginning around 6,000 years ago, some of them had to adapt to environments where the State sought to monopolize the use of violence and punish those who violated that monopoly for personal ends. Adaptation meant becoming more averse to personal violence and thus more receptive to harsher State punishment, including frequent use of the death penalty. In Western Europe, this increasingly draconian removal of violence-prone individuals would end only when revulsion against murder began to turn on the death penalty itself.

This process must have had genetic consequences, since aggressive/antisocial behavior is moderately to highly heritable. A meta-analysis of twin and adoption studies estimated the heritability at 40% (Rhee and Waldman, 2002). A later twin study found a heritability of 96%, where the subjects were 9–10 year-olds of diverse ethnic backgrounds (Baker, Jacobson, Raine, Lozano, and Bezdjian, 2007). This higher figure has been attributed to the narrow age range and the use of a panel of evaluators to rate each subject. In the latest twin study, the heritability was 40% when the twins had different evaluators and 69% when they had the same one (Barker et al., 2009). We see similar estimates for many if not most behavioral traits (Turkheimer, 2011). As for the actual neural basis, there is less certainty. Perhaps a predisposition to violence is due to stronger impulsiveness and weaker internal controls on behavior (Niv, Tuvblad, Raine, Wang, and Baker, 2012). Perhaps the threshold for expression of violence is lower. Perhaps ideation comes easier (van der Dennen, 2006). Or perhaps the sight and smell of blood is more pleasurable (vanden Bergh and Kelly, 1964).

A Model of Gene-Culture Co-Evolution

To explain the historical decline in the homicide rate, we will argue for an explanation that combines cultural and genetic evolution: State repression of personal violence created a cultural norm that favored individuals who were temperamentally less inclined to personal violence; such individuals steadily became more prevalent, thus shifting the norm further in the direction of nonviolence—in short, gene-culture co-evolution. To test this hypothesis, we will compare two sets of data: the execution rate at the height of the war of murder (1500–1750) and the falling homicide rate during the same period. We will simplify historical reality by making three assumptions:

1. The death penalty was the only selection pressure acting against personal violence;
2. Without the death penalty, condemned men would have each killed only one person on average over a normal lifetime; and
3. Condemned men had no offspring at the time of execution.

The first assumption leads us to underestimate the intensity of selection against personal violence, while the third one leads us to overestimate. The second assumption probably leads us to underestimate, since many of the condemned men were bandits who would have each killed several people over a normal lifetime. On the other hand, some were guilty of non-capital offences, e.g., treason, recurrent theft, counterfeiting, etc. Overestimation due to the third assumption is difficult to quantify but would have likely decreased as the shifting cultural norm began to marginalize violent men on the mate market.

To model this selection against personal violence via the execution rate, we will need to know two variables: (1) the additive heritability of personal violence and (2) the selection differential, i.e., the overall strength of natural selection. We postulate simple truncation selection in our model, but any kind of function leading to directional selection would work as well since the model depends only on the selection differential and not on the manner in which the trait distribution is pruned or amplified.

Remarkably, many regimes of selection reduce to a single model called the breeder's equation, a robust workhorse of quantitative genetics. This equation describes evolutionary change to a quantitative trait as $r = h^2s$. There are three terms, where r is the

response to selection, h^2 is the additive heritability of the trait, and s is the selection differential. The equation assumes a normal distribution, which tends to be produced by the reshuffling of genetic material during reproduction.

The response to selection is the change in a trait over one generation between parents and their offspring. The additive heritability is the fraction of a trait's variance that parents genetically transmit to their offspring. The selection differential is the difference between a trait's mean value in the population and its value in the next generation after selection.

We will now estimate the selection differential from two sets of data: (1) the historical decline in the homicide rate and (2) the execution rate. If the two estimates are comparable in value, we will retain the hypothesis that the latter explains the former.

1. Estimating the selection differential from the historical decline in the homicide rate

In our model, the response to selection is the historical decline in the homicide rate between 1500 and 1750, a period of approximately 10 generations when the “war on murder” was at its height and for which we have good historical data. At the beginning of that period, the English homicide rate was about 20 to 40 per year per 100,000 people. At the end, it was about 2 to 4 per 100,000, i.e., a 10-fold reduction (Eisner, 2001). The behavioral threshold for expression of homicide thus shifted over time. In other words, we imagine the propensity for homicide as a normally distributed variable with a threshold value. Anyone whose propensity exceeds the threshold will murder someone. The effect of selection is to shift the distribution of the underlying variable without changing its standard deviation.

In 1500, the threshold stood at 30 per 100,000 people and was 3.43 standard deviations (SD) to the right of the population mean, assuming a standard normal distribution and assuming, conservatively, that each murder was committed by a unique non-recurring murderer. In 1750, the threshold was 3.99 SD to the right. The overall rightward shift was therefore 0.56 SD or 0.056 SD per generation. This is the response to selection. If we take the estimate of 0.69 for the heritability of aggressive behavior, the selection differential is $0.056/0.69 = 0.08$ SD per generation. The mean heritable propensity for violence thus shifted 0.08 SD leftward with each passing generation. Given the continuing stream of new mutations of small effect, this selection would not have seriously depleted the pool of genetic variability for selection to act upon (see Lande, 1976, Fig. 2).

2. Estimating the selection differential from the execution rate

Can this leftward shift be explained by the high execution rate between 1500 and 1750? During that period, 0.5 to 1% of all men were removed from each generation through court-ordered executions and a comparable proportion through extrajudicial executions, i.e., deaths of offenders at the scene of the crime or in prison while awaiting trial. The total execution rate was thus somewhere between 1 and 2%. These men were permanently removed from the population, as was the heritable component of their propensity for homicide. If we assume a standard normal distribution in the male population, the most violent 1 to 2% should form a right-hand “tail” that begins 2.33–2.05 SD to the right of the mean propensity for homicide. If we eliminate this right-hand tail and leave only the other 98–99% to survive and reproduce, we have a selection differential of 0.027 to 0.049 SD per generation.

Should the hypothesis be retained?

The reader can see that this selection differential, which we derived from the execution rate, is at most a little over half the selection differential of 0.08 SD per generation that we derived from the historical decline in the homicide rate. To an unknown degree, however, the execution rate must under-predict this decline because our model assumes that a propensity for homicide leads to murder only once in a lifetime. In reality, each executed offender had probably killed more than one person on average and would have gone on to kill a significantly higher number if allowed to live. Bandits, for example, often killed not only the people they robbed but also any witnesses.

Furthermore, our model considers only selection via the death penalty and ignores class differences in reproductive success, as per Clark (2007). A pacified society tends to marginalize violent men and confine them to the lower classes, which in pre-modern times reproduced at a lower rate than did the middle and upper classes. The violent male was often childless; even if spared the ultimate penalty, his reproductive opportunities were limited. The law-abiding were the ones who stayed married longer, had more children, and raised more of them to adulthood.

On the other hand, we may have overestimated the intensity of selection against personal violence. Did many violent men reproduce before running afoul of the law? And were they necessarily the ones executed? Executions were usually not for murder but for crimes like highway robbery and horse theft. Murder cases generally went unsolved. Indeed, the justice system was less interested in finding the culprits for specific major crimes than in profiling the criminally minded, often on the basis of minor offences. If someone had crossed the behavioral threshold for a petty crime, it was assumed that he or she would more easily commit, or may have already committed, crimes of greater importance. *Qui vole un œuf vole un bœuf*.

Finally, our model fails to explain the lag between the decline in the execution rate, which began in the 18th century, and the leveling off of the homicide rate, which began circa 1900 (Eisner, 2001). This lag may be partly due to the delay of one generation between the execution rate and the presumed selection effects on the next cohort of young males. A probably more important reason is that death sentences were for a long time typically commuted to life imprisonment without parole, with the result that condemned men were allowed to live but not to reproduce. This last point also shows that our model ignores the impact of State repression of personal violence outside the time frame of 1500 to 1750.

Conclusion

To explain why the homicide rate fell so dramatically in Western Europe, historians point to the State's imposition of ever harsher punishment for personal violence. In the case of the death penalty, such punishment not only prevented repeat offences but also deterred many first-time ones. Eventually, so it is argued, these external controls were internalized via cultural conditioning into a new personality structure. Through continual compliance with the new behavioral norm, people began to shun violence automatically, just as Pavlov's dogs began to salivate on hearing the sound of a bell. In theory, such conditioning should gradually lose its power once the controls come off, especially if "bad boys" begin

to impose their norms in popular culture; hence, the oft-expressed fear that Europeans will return to the level of personal violence that prevailed a millennium ago.

This has not happened. Perhaps the State-imposed norm of nonviolence had effects beyond those of cultural conditioning, one of them being the better life chances of individuals who could better comply because of their stronger aversion to personal violence, in addition to their stronger impulse control, concern for others, and future time orientation. This behavioral package helped prevent the sort of circumstances that could lead to homicide and, ultimately, the death penalty. It also helped individuals exploit the possibilities of a relatively nonviolent environment, thereby gaining benefits for themselves in almost every area of life, be it in finding a mate whose family could provide resources and other assistance, in finding an employer and remaining employed, in finding trustworthy associates and being trusted, and so on. Increasingly, it was the meek who would now inherit the earth.

As Wood (2011) has noted, historians have correctly linked the decline in personal violence to a new “sensibility” of self-control, foresight, and empathy. They have been less able, however, to explain how these parallel historic trends relate to each other and to the presumed underlying cause: “[Historians of violence] have not needed evolutionary psychology to point out such trends: however, evolutionary thinking offers helpful explanations of *why* such influences *work*, potentially solidifying our understanding of what factors have influenced changes in the prevalence of (and reactions towards) physical aggression.”

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References

- Aquinas, T. (1947). *The summa theologica of St. Thomas Aquinas*. New York: Benziger Bros.
- Baker, L. A., Jacobson, K. C., Raine, A., Lozano, D. I., and Bezdjian, S. (2007). Genetic and environmental bases of childhood antisocial behavior: A multi-informant twin study. *Journal of Abnormal Psychology, 116*, 219-235.
- Barker, E. D., Larsson, H., Viding, E., Maughan, B., Rijdsdijk, F., Fontaine, N., and Plomin, R. (2009). Common genetic but specific environmental influences for aggressive and deceitful behaviors in preadolescent males. *Journal of Psychopathology and Behavioral Assessment, 31*, 299-308.
- Canopy [software] (2013). Austin, TX: Enthought Corporation.
- Carbasse, J-M. (2011). *La peine de mort* (Que sais-je? series). Paris: Presses Universitaires de France.
- Clark, G. (2007). *A farewell to alms. A brief economic history of the world*. Princeton and Oxford: Princeton University Press.
- Eisner, M. (2001). Modernization, self-control and lethal violence: The long-term dynamics of European homicide rates in theoretical perspective. *British Journal of Criminology, 41*, 618-638.
- Elias, N. (1978). *The civilizing process, Vol. 1: The history of manners*. New York: Urizen Books.

- Frost, P. (2010). The Roman State and genetic pacification. *Evolutionary Psychology*, 8(3), 376-389.
- Geltner, G. (2006). Medieval prisons: Between myth and reality, hell and purgatory. *History Compass*, 4, 261-274.
- Hawks, J., Wang, E. T., Cochran, G. M., Harpending, H. C., and Moyzis, R. K. (2007). Recent acceleration of human adaptive evolution. *Proceedings of the National Academy of Sciences (USA)*, 104, 20753-20758.
- Hobbes, T. (2010). *The Leviathan*. Peterborough: Broadview Press.
- Ireland, R. W. (1987). Theory and practice within the medieval English prison. *The American Journal of Legal History*, 31, 56-67.
- Lande, R. (1976). The maintenance of genetic variability by mutation in a polygenic character with linked loci. *Genetics Research*, 26, 221-235.
- Locke, J. (1980). *John Locke, second treatise of government*. Indianapolis: Hackett Publishing.
- Mathematica Version. 9.0 [software] (2012). Champaign, IL: Wolfram Research, Inc.
- Morgan, G., and Rushton, P.. (1998). *Rogues, thieves and the rule of law. The problem of law enforcement in north-east England, 1718-1800*. London: UCL Press.
- Muchembled, R. (2008). *Une histoire de la violence. De la fin du Moyen Âge à nos jours*. Paris: Éditions du Seuil.
- Niv, S., Tuvblad, C., Raine, A., Wang, P., and Baker, L. A. (2012). Heritability and longitudinal stability of impulsivity in adolescence. *Behavior Genetics*, 42, 378-392.
- Pinker, S. (2011). *The better angels of our nature: Why violence has declined*. New York: Viking.
- Rhee, S. H., and Waldman, I. D. (2002). Genetic and environmental influences on antisocial behavior: A meta-analysis of twin and adoption studies. *Psychological Bulletin*, 128, 490-529.
- Roth, R. (2011). Biology and the deep history of homicide, *British Journal of Criminology*, 51, 535-555.
- Savey-Casart, P. (1968). *La peine de mort*. Geneva: Librairie Droz.
- Spierenburg, P. (2008). *A history of murder. Personal violence in Europe from the middle ages to the present*. Cambridge: Polity Press.
- Swift, L. J. (1970). St. Ambrose on violence and war. *Transactions and Proceedings of the American Philological Association*, 101, 533-543.
- Taccoen, L. (1982). *L'Occident est nu*, Paris: Flammarion.
- Turkheimer, E. (2011). Still missing. *Research in Human Development*, 8(3-4), 227-241.
- Vanden Bergh, R. L., and Kelly, J. F. (1964). Vampirism. A review with new observations. *Archives of General Psychiatry*, 11, 543-547.
- Van der Dennen, J. M. G. (2006). Review essay: *The murderer next door: Why the mind is designed to kill*. *Homicide Studies*, 10, 320-335.
- Weber, M. (1947). *The theory of social and economic organization* (A. M. Henderson and T. Parsons, Trans). Glencoe, IL: Free Press.
- Wood, J. C. (2011). A change of perspective: Integrating evolutionary psychology into the historiography of violence, *British Journal of Criminology*, 51, 479-498.

Appendix A: Notes on the Model

We computed means of truncated normal distributions above. There may be published tables, but we used two computer programs in order to check the results.

First, Mathematica from Wolfram Research (2012) returns the mean of a standard normal distribution truncated from $-\infty$ to 0.99 with this:

```
Mean[TruncatedDistribution[{-Infinity,.99}, NormalDistribution[0, 1]]]
```

all on the same line.

Second, the SciPy package for the Python language returns the same answer with these two lines of code:

```
from scipy.stats import truncnorm
```

```
truncnorm(-Inf,.99).mean()
```

Python and SciPy are available for all popular Linux distributions. A free package that includes the required software is available for other operating systems at www.enthought.com under the name Canopy from Enthought Corporation (2013).