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EVOLUTIONARY PSYCHOLOGY AND VIOLENCE

A Primer for Policymakers and Public Policy Advocates

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Psychological Dimensions to War and Peace
Harvey Langholtz, Series Editor

PRAEGER

Westport, Connecticut
London

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Homicide
An Evolutionary Psychological Perspective and Implications for Public Policy

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Why people kill other people is a question that fascinates everyone and for good reason. Understanding causal origins concerns everyone who wishes to curtail this universally abhorrent behavior. A host of theories has been proposed to explain why nearly 20,000 individuals within the United States have their lives prematurely terminated at the hands of another human each year. From a public policy perspective, understanding the causal origins of killing may be useful in guiding efforts to decrease its prevalence. Scientifically incorrect and incomplete theories of the causal origins of homicide, however, can result in wasted policy efforts and potentially preventable loss of life.

Existing theories of homicide include those that invoke social learning, media influences, specifics of culture, ills of upbringing, brain damage, and genetic abnormalities. In our view, all these theories have some merit, each accounting for a piece of the homicide variance pie. Rates of homicide, for example, vary tremendously across cultures. Canadians, for example, kill at a higher rate than do Japanese; Scottish kill at a higher rate than Canadians; and Americans kill at a higher rate than Scottish (Fingerhut & Kleinman, 1990). Assuming that genetic differences are not responsible for these rate differences, it is not unreasonable to propose that cultural or ecological factors influence homicide rates, even if we don't know precisely what those factors are. Even within a single country, such as America, homicide rates vary—generally they are higher in cities than in rural areas, higher in the south than in the north, and higher in large states such as California and Texas than in smaller states such as Rhode Island.

It would be surprising, to take a common theoretical perspective, if socialization and social learning played no part in the causal chain leading to homicide (Berkowitz, 1993). Parents who have guns in the home, peers who model violent behavior, and media messages that portray killing as a glamorous activity

can all be expected to influence young, impressionable minds. And some empirical evidence is consistent with these ideas (e.g., Smith & Zahn, 1999). There is also some evidence that males born with an extra Y chromosome are more prone to violence (Hoffman, 1977), as are boxers who have sustained frontal lobe damage (Johnson, 1969). Without denying the merits of these theories, we would like to suggest that an evolutionary perspective also might be useful in shedding some light on some links in the causal chain leading to homicide.

THE EVOLUTIONARY PROCESS

It is widely recognized that natural selection is the principle causal force responsible for complex organic design. Differential reproduction, occurring because of differences in design, is the essence of natural selection. Variants that lead their bearers to increased relative reproductive success will be represented in succeeding generations more than variants that do not. Natural selection is a ruthless executioner. The sole criterion preventing evolutionary oblivion is successful gene replication. Variants that fail to have effects that increase their replicative success are mercilessly weeded out. This execution process occurs relentlessly, generation after generation, acting like a genotypic sieve.

Those design features that succeed in passing through the extraordinarily long succession of selective filters tend to have remarkable properties. The most central property is that they have phenotypic effects that lead to their own propagation. But in complex multicellular species such as humans, they must also generally interact well with other properties of the organism. Renegade genes, lawless alleles, mutants that insert sand into the genotypic machinery, with some exceptions, tend to lead to organismic collapse and reproductive failure. Those that coordinate well with their fellow organismic travelers, that facilitate their functioning, tend to lead to reproductive success.

All living humans are remarkable collections of genes that have leaped over the successive hurtles generation after generation, surviving the gauntlet of hazards to survival, vagaries of reproduction, and interacting reasonably well with their traveling companions. They have been designed to interact with recurrent physical, social, or internal environments in ways that promote the reproduction of the individuals who possess them, or their genetic relatives (Buss et al., 1998; Hamilton, 1964; Tooby & Cosmides, 1990; Williams, 1966). They are all products of selection, or rather multiple selections, operating ruthlessly over hundreds, thousands, millions, even billions of years.

The process of natural selection gives rise to three products—adaptations, by-products of adaptations, and noise (Tooby & Cosmides, 1990; Williams, 1966). An adaptation may be defined as "an inherited and reliably developing characteristic that came into existence as a feature of a species through natural selection because it help to directly or indirectly facilitate reproduction during the period of its evolution" (Buss et al., 1998, p. 535). Each adaptation evolved

in response to a unique set of selection pressures over the course of its evolutionary history. This is the environment of evolutionary adaptedness (EEA) of an adaptation. The EEA is best described as the statistical aggregate of selection pressures responsible for the evolution and maintenance of an adaptation. Each adaptation has its unique EEA—an individualized time frame and corresponding aggregate of unique selective events that led to its evolution. The EEA of the human eye, for example, stretches back more generations and is an aggregate of different selection pressures than the EEA of bipedal locomotion or the EEA of human language.

Adaptive problems are features of an organism's environment, including the physical, social, and intraorganismic environment, which affect its reproduction. These range from finding food, combating predators, choosing mates, defending against aggressive rivals, and prioritizing and coordinating the activation of different body mechanisms. When adaptive problems recur generation after generation, they become the selection pressures that shape the genotype of an organism through the differential reproduction of the bearers of different alleles that reliably code for the development of even slightly different phenotypic characteristics. When a phenotypic characteristic is successful enough that it leads to more reproductive success in its bearers than nonbearers over a number of generations, leading to its eventual spread to all or most members of a species, it is considered to be an adaptation. Solving an adaptive problem then, that is, in the manner in which a feature contributes to reproduction, is the proper function of an adaptation. And each adaptation has its own unique function. Callus-producing mechanisms function to protect physiological structures beneath the skin; eye blink reflexes protect the eyes from physical threats; specialized fear of snakes, darkness, heights, and strangers each serve unique protective functions. The functions of adaptations, of course, need not lead directly to reproduction, but they must ultimately be tributary to reproduction. A motive to strive for status, for example, may have evolved through a tortuously long causal chain, involving (a) propulsion up the social ladder, (b) the consequent gaining of greater access to certain resources, (c) rendering the bearer more attractive to the opposite sex, (d) producing more bountiful mating opportunities, (e) eventually leading to being chosen as a mate, and (f) which in turn leads to sexual behavior that produces offspring. One of the central goals of evolutionary psychology is to identify adaptations and their proper functions, which require a description of the specific manner in which it historically has contributed to reproductive success.

Adaptations, of course, are not the only product of selection. The process of selection also produces by-products and a residue of noise. By-products are best regarded as reliably developing; incidental effects of adaptations. Reading lamps, for example, are designed to produce light, but they tend to produce heat as well. Heat is an incidental by-product of light production, and not part of its function (except in those cases where lights are intentionally designed to produce heat, as in the case of lamps that keep french fries warm in fast-food

restaurants). Analogously, the human belly button is a by-product of what was formerly an adaptation—the umbilical cord. As far as we can tell, the belly button per se has no function. It's not good at collecting food, fending off predators, or provisioning children. But the adaptation of which it is a by-product, the umbilical cord, is an astonishingly important and well-designed adaptation, without which the growing embryo would not gain the sustenance needed for its viability.

The hypothesis that something is a by-product carries with it the theoretical burden of specifying the adaptation of which the incidental effect is a part. Mere assertions of this or that characteristic being a by-product are theoretically vacuous without the proper specification of the adaptation it is proposed to be a by-product of. Both sets of hypotheses—those about adaptations and those about by-products—are most useful scientifically when they generate precise, testable predictions and can simultaneously account for known observations in a parsimonious manner.

AN EVOLUTIONARY PERSPECTIVE ON AGGRESSION

Common stereotypes of the evolutionary process depict it as "nature red in tooth and claw," with individuals fighting viciously for survival. As a sole depiction, this view is wildly misleading. The evolutionary process produces many adaptations designed to deliver benefits to others. Parental love, a motive that produces many benefits to children, is one example. But it's not the only one. Benefit delivering adaptations are also predicted to evolve when the recipients are other members of one's kin group, such as sisters, brothers, nephews, nieces, aunts, uncles, parents, grandparents, grandchildren, and even great grandchildren (Hamilton, 1964).

Furthermore, there are other evolutionary processes that result in various forms of altruism, cooperation, and mutualism. One is reciprocal altruism, whereby two cooperative individuals can both benefit by bestowing help on the other, resulting in "gains in trade" (Trivers, 1971). Hunting, for example, is a high-variance activity. In any given week, one hunter might be successful, the other hunter unsuccessful. If I share my meat with you when I am successful, and you share your meat with me when you are successful, we both benefit. Selection favors adaptations that exploit these opportunities for gains in trade, resulting in the evolution of cooperation through reciprocal altruism that can extend for years, decades, or even a lifetime (Axelrod & Hamilton, 1981). And natural selection can favor other forms of benefit-delivering adaptations, such as those involved when close friends become irreplaceable to each other (Tooby & Cosmides, 1996) and when the interests of a married couple become deeply intertwined (Buss, in press). The evolutionary process, in short, can result in many adaptations that are rightly regarded as nice, kind, cooperative, altruistic, and benefit bestowing.

Nonetheless, it is also true that evolution by selection is fundamentally a competitive process. Alleles for adaptations can evolve only if they succeed in out-propagating other competing alleles that happen to be present in the population at the same time. At the most general level of abstraction, this competitive process can take two forms. The first form is competition for the acquisition of reproductively relevant resources—for example, more efficiently acquiring food or more reliably acquiring reproductively valuable mates. This process can be called "competitive" even if the competing organisms never encounter each other. In "scramble food competition," for example, organisms are merely struggling as best they can to secure far-flung food that happens to exist in the local environment. Individuals with adaptations or design features that facilitate success at scrambling for food are favored by selection at the expense of those that are less adept at scrambling for food.

In addition to acquiring reproductive resources for self, however, a second general means of reproductive competition involves inflicting costs on competitors. Holding one's own resource acquisition constant, for example, one can increase one's *relative* reproductive success by depriving rivals of access to those same resources. The stealing of resources from a rival, for example, can simultaneously decrease the competitor's reproduction while increasing the resources available for one's own reproduction. When resources are limited, finite, or scarce, inflicting costs on competitors can be an extraordinarily effective means of increasing one's own relative reproductive success.

This theoretical perspective suggests that, in addition to whatever cooperative and benefit-bestowing adaptations have evolved, selection has also likely produced adaptations in humans whose proper function is to inflict costs on competitors. Stated differently, aggression can be an evolved solution to a number of specific adaptive problems (Buss & Shackelford, 1997a, 1997b). Aggression can function to co-opt the reproductively relevant resources of others, such as food, tools, weapons, or territory. It can be used to defend against incursion on one's own resources from others. It can be used to inflict costs on rivals through physical injury or reputational damage, hindering a rival's ability to compete for resources. Aggression can be used to negotiate status or dominance hierarchies by displacing a higher-ranking rival or preventing a lower-ranking rival from ascending in rank. Aggression can be used to cultivate a social reputation that deters others from inflicting costs. When choosing a victim, most people would think twice about stealing from a Mafia hit man, tangling with a professional boxer, or flirting with the girlfriend of a member of the Hell's Angels motorcycle gang. Aggression can be used to deter long-term mates from sexual infidelity (Buss & Shackelford, 1997b; Daly & Wilson, 1988). And aggression can be used to reduce the resources expended on genetically unrelated children, as when a stepfather drives a stepson away from the home. In sum, although aggression is commonly viewed as repugnant under many circumstances, it is clear that adaptations designed to inflict costs

on other humans can evolve, have evolved, and can be designed to solve a large array of diverse adaptive problems.

It's important to bear in mind that adaptations for aggression do not operate as "blind instincts" that robotically drive a person to inflict costs on other humans in a manner oblivious to circumstances; quite the opposite. Blind, robotic, aggressive impulses would be ruthlessly selected against, compared with a more advantageous alternative: Having aggression as one strategy within a menu of strategies, activated only under a highly specific sets of co-occurring conditions. A simple example will illustrate this point. Other humans vary in physical formidability. Attacking a highly formidable human is far more risky than attacking a weak and vulnerable one. Selection should have favored information-processing devices that calculate relative formidability and decision rules to aggress or not to aggress depending on the outcome of this calculation. Adaptations to aggress blindly would have been mercilessly selected against in comparison to highly situation-contingent aggression adaptations.

Assessment of relative physical formidability, of course, is only one among many features of contexts that decision-rules for aggression should be selected to be contingent on. Others include the extensity and formidability of the victim's kin group and coalition, the reputational consequences of enacting an aggressive strategy, the risk of future retaliation, the availability of alternative means of solving the particular adaptive problem, the costs and benefits of those alternatives, and many others. The key point is that adaptations for aggression are not blind or oblivious to context; they are expected, on theoretical grounds, to be exquisitely sensitive to individual and social circumstances.

It is also important to note that it is exceedingly unlikely that there evolved a gene for aggressive behavior in context A, and another gene for aggressive behavior in context B, and so on. It is more likely that numerous genes interact, leading to the reliable development of information-processing mechanisms in the brain. These mechanisms form sets of decision rules that (a) recognize adaptive problems, (b) evaluate multiple contextual features historically important to the solution of the adaptive problem, and (c) adopt the behavioral solution determined by historical contingency to yield the greatest benefit at the lowest cost. The solution adopted may or may not be the optimal solution in any given situation. Its adoption, because it is based on extant information as it relates to historical contingency, may be suboptimal because of (a) contextual features overlooked in the evaluation of the situation and other forms of uncertainty, such as having no knowledge of the fact that a rival has a large, socially powerful kin network; (b) experiential calibration of decision rules in contexts sharply different from those encountered in another context, such as having been in numerous relationships in which one's romantic partners were unfaithful and starting a new relationship with a faithful mate; (c) incorrect identification of a context as would occur if decision rules were "tricked" into adopting a behavioral strategy in light of novel circumstances that resembled

historical contingency, but actually were not historically contingent, or (d) selection for decision rules that work well on average, but are not perfectly matched to all of the specific features of a context required to render an optimal solution 100% of the time.

Understanding that evolved aggression adaptations are designed to be highly sensitive to context helps to clarify a common misunderstanding about evolutionary perspectives on aggression. Some social scientists erroneously believe that findings of individual differences within culture or variations across cultures in the rates of aggression somehow contradict an evolutionary explanation. They don't. A physiological analogy will help to show why. Although callus-producing mechanisms are universal across humans, there are tremendous individual differences within cultures and between cultures in the thickness and distribution of calluses. These differences occur because different individuals and different groups of individuals experience different rates and types of repeated friction to their skin. American academics tend to have few calluses; tennis players develop them on their favored hands; construction workers develop them on their arms; and Yanomamo Indians develop them on their feet. These variations, of course, do not falsify the hypothesis that humans universally have evolved callus-producing mechanisms. Instead, they illustrate that evolved callus-producing mechanisms are designed to be highly sensitive to contextual variations—universal adaptations that are required to explain the variability. The same applies to hypothesized aggression adaptations. Universality or species-typicality is sought at the level of underlying psychological design, not at the level of manifest behavior. Confusion about this key issue is largely responsible for misunderstandings about the evolutionary psychology of aggression and other psychological adaptations, including those that might be designed to kill other humans.

THE EVOLUTION OF HOMICIDE

Killing may be regarded as the ultimate form of aggression, even though it is a very unique kind of act. Killing members of one's own species, contrary to widely held beliefs by many, turns out to be widespread in insect species, mammalian species, and primate species (Buss & Duntley, under review). It occurs in stingless bees, scorpions, spotted hyenas, lions, langur monkeys, and chimpanzees. Male lions, when they usurp a resident male, routinely kill (or attempt to kill) the lion cubs sired by the displaced male. The killing causes the female lion to enter estrus, at which time the new reigning male reinseminates her. No animal biologist, to our knowledge, doubts that male lions have evolved adaptations designed to perform these kinds of killings.

When it comes to humans, however, even evolutionists get leery about invoking adaptations for homicide, even when confronted with killings that occur in contexts remarkably similar to those witnessed in other species. Infanticides, for example, are attributed by some evolutionists to "failures of engagement

of the normal mechanisms of parental love" (Daly & Wilson, 1998). Killings of rivals are attributed to "maladaptive byproducts of mechanisms that evolved for non-lethal functions." The idea that humans might have evolved adaptations whose dedicated function is to murder other humans seems to be so abhorrent that it has not been seriously entertained, scrutinized, or examined. In contrast, we have proposed a theory that appears to be radical in this context—that humans have evolved not one, but many adaptations whose proper function is to produce the death of other humans (Buss & Duntley, under review; Duntley & Buss, 1998; see also Ghiglieri, 1999; Tooby & Cosmides, 1988; Wrangham, 1999).

There are many potential benefits, evolutionarily speaking, to killing conspecifics, given the right set of contextual features. These include eliminating intrasexual competitors; gaining access to a rival's material resources; gaining access to a rival's fertile mates; cultivating a reputation that deters exploitation from others; protecting oneself from injury, rape, or death (self-defense function); protecting one's kin from injury, rape, or death; protecting one's mate from injury, rape, or death; eliminating resource-absorbing infants or children who have poor prospects for survival or reproduction; eliminating resource-absorbing infants or children who are genetically unrelated to oneself; and eliminating infants or children who interfere with investments in vehicles better able to translate finite investments into fitness (Buss & Duntley, under review).

In fact, viewed dispassionately from an evolutionary perspective, the surprise is not why killing occurs. Because the fitness benefits of killing can be so large and manifold, the surprise is that killing is not more common. And to explain that, we must explain another facet of our theory of "Murder by Design," which invokes the principle of antagonistic coevolution.

Coevolution is a principle that is commonly invoked to explain reciprocal evolutionary changes in interacting species. Predators and prey are prototypical examples of antagonistic coevolution. Prey animals that are slow and less agile than their conspecifics tend to be dinner for predators. In succeeding generations, those prey animals who survived and reproduced tend to be slightly more agile and fleet of foot. This greater agility imposes selection pressure on predators; the slow and clumsy predators fail to eat and so starve to death, compared with their more agile contemporaries. Each increment in the speed and evasive ability of prey selects for corresponding increments in the speed and counter-evasion tactics of predators. In this manner, reciprocal evolutionary changes occur in predators and prey, as each evolves in response to the adaptations in the other. Analogous coevolutionary arms races occur among parasites and hosts.

Although rarely invoked, analogous coevolutionary arms races can occur within members of the same species. They can occur between the sexes, as when deception by men selects for deception-detection mechanisms in women in certain mating contexts (Buss, in press). As another example, if infidelity is

advantageous for women, but not for their husbands, it will produce a coevo-lutionary arms race in which male sexual jealousy will evolve as a defense against infidelity, which will cause women to evolve mechanisms that mute signals of its occurrence, which in turn will select for more sensitive infidelity-detection devices in men. These kinds of antagonistic coevolutionary arms races are probably widespread in humans, and can spiral endlessly as adaptations and counteradaptations become more and more sophisticated.

Our theory of "Murder by Design" invokes the principle of antagonistic coevolution. Although killing is sometimes advantageous to the killer, it is usually markedly costly to the victim (Buss & Duntley, under review). It ter-minates all future reproductive opportunities of the victim. The victim's mates may become reproductively valuable resources available to rivals. The victim's children may become more vulnerable and potentially exploitable without the victim around to protect them. The entire lineage of the victim can be jeop-ardized by his or her death, producing cascading fitness costs down successive generations. For these and other reasons, it's very bad for one's fitness to be killed.

Because of the manifold costs of getting killed, as soon as killing entered the human population as a strategy, coevolutionary forces would have immediately begun to prevent its occurrence. Any mutation that favored the prevention of being killed would have enjoyed an enormous fitness advantage. Just as selec-tion favored specialized fears to prevent dying from snakebites, selection would have favored the evolution of antihomicide mechanisms to avoid becoming a victim of homicide. Antihomicide strategies, including killing to prevent being killed, would then have had two effects on the evolution of homicide adapta-tions. First and most obvious, they would have made it more risky and costly to attempt to kill other humans. This would have driven the homicide rate down, because the net fitness benefits of killer strategies would have become sharply reduced.

The second effect is more insidious and involves a further iteration in the coevolutionary cycle. The design of evolved killing strategies would have be-come more sophisticated. Design features would have evolved to allow killers to escape the costs imposed by antihomicide mechanisms. Tactics would have evolved to evade defense mechanisms. Contexts would have been chosen in which the risks of killing would have been minimized or the net benefits max-imized. The psychology of killers would have evolved to choose victims selec-tively, deceive victims by masking homicidal intent, choose killing in conditions of anonymity, and many others (Buss & Duntley, under review). Of course, further iterations in the coevolutionary spiral would have produced increas-ingly refined antihomicide defenses, such as deception-detection devices, avoid-ance of contexts in which one's life might be vulnerable, producing armaments and fortifications, and many others (see Duntley & Buss, in preparation). The coevolutionary arms race between killer and antikiller strategies continues to spiral with no end in sight.

At this single slice in time, we believe that humans have already gone through multiple iterations of the coevolutionary process and currently possess a highly elaborate and complex psychology of killing, as well as a correspondingly elaborate and complex antihomicide psychology. Dozens of specific predictions deriving from this theory of evolved murder mechanisms have been, and are being, confirmed empirically (e.g., Buss & Duntley, under review; Buss & Duntley, 2002; Shackelford et al., 2000; Shackelford, Buss, & Weekes-Shackelford, in press).

PUBLIC POLICY IMPLICATIONS

More than 563,000 homicides occur worldwide each year, representing a global rate of roughly 10.7 for every 100,000 individuals (Mercy & Hammond, 1999). The United States shows homicide rates almost exactly at the average for countries worldwide, logging a rate of 10 per 100,000 per year. Some countries, such as those in Sub-Saharan Africa show rates four times as high. Other countries, such as China, show rates only half as high as those in the United States.

These global figures, however, mask the types of individuals who are especially likely to be victims of murder. The rates of homicide are 3.5 times as high for males as they are for females, suggesting high sex linkage in patterns of victimization. The age distribution of homicides also differs sharply between the sexes. Whereas the risk of a female being killed is highest in infancy, the risk of a male being killed peaks in the 15 to 29 year age group—precisely the ages at which males engage in the most intrasexual competition. Indeed, homicide is the third leading cause of death for men worldwide in the 15–44 year-old age bracket, accounting for nearly 9% of all deaths (Mercy & Hammond, 1999).

Policies aimed at solving these problems range from efforts at gun control to attempts to impose deterrents to murder, such as capital punishment. As two authors recently noted, however, "the development and implementation of effective policies and programs for preventing violence must be firmly grounded in science" (Mercy & Hammond, 1999, p. 298). To cite another author, one can view the law as a "lever" designed to move human behavior in certain directions deemed desirable—to prevent people from committing some types of acts (e.g., murder), and to encourage them to perform other types of acts (e.g., provision their children) (Jones, 1999). The effectiveness of the law, or any other form of public policy, hinges on the accuracy of the psychological model on which laws and policies are based. Inaccurate, ill-informed, or scientifically inaccurate models will lead to policies that are ineffective in producing the desired changes in human behavior.

Although our evolution-based theory of homicide was developed to explain the causal origins of homicide and the specific contexts in which it occurs, not

specifically as a tool to be used in the service of public policy, we believe none-theless that it might be used to good effect to offer some novel suggestions, albeit quite provisional and preliminary, that might inform efforts at shaping public policy.

We start with the premise that everyone has the capacity to commit homi-cide—we all have inherited specialized adaptations designed to murder other humans. Our studies have shown, for example, that most people state, at a minimum, that they would be willing to kill to prevent themselves from being killed, and also would be willing to kill to prevent their children from being killed. Whether these and other homicide mechanisms are engaged or activated depends critically on contextual circumstances. Our theory offers a specification of what those circumstances are likely to be for each type of homicide, thus offering a set of contexts toward which policy efforts might be specially di-rected.

Infanticide offers an obvious illustration. Evolutionary analyses of infanti-cide have revealed several distinct contexts in which children's lives are in danger—factors missed by nonevolutionary approaches. One of the greatest risk factors, for example, is having a stepparent in the home. Compared with residing with both genetic parents, preschool children who reside with a step-parent are 100 times more likely to be killed (Daly & Wilson, 1988). Although it has not been conclusively shown that this effect occurs because of evolved infanticide adaptations, as we argue (Buss & Duntley, under review), or because it is an incidental by-product of the failure to engage the normal evolved mech-anisms of parental love, as others have argued (Daly & Wilson, 1998), evolu-tionary thinking clearly is what led to this important discovery. It is important to bear in mind that most stepparents do not kill their stepchildren, and there is the risk of inflicting reputational damage to stepparents by overgeneralizing these results. Nonetheless, it is clear that having a stepparent in the home is the single largest homicide risk factor for preschool children, dwarfing all other risk factors. Perhaps public policy could be aimed at educating stepparents on the special risks that they face as a consequence of being in this social situation. Additional risk factors to infants discovered by evolutionary psychologists in-clude when the woman giving birth is young, unmarried, and lacks an investing father and when the infant is premature, unhealthy, or deformed, which may render investment in the child a potentially fruitless effort in terms of fitness (Daly & Wilson, 1988).

A second example pertains to women who are at risk of being killed by their romantic partners, those who presumably love them. According to our theory, men have evolved specific mate killing mechanisms that are engaged in spe-cialized circumstances—when they are discovered committing a sexual infi-delity and when they unceremoniously "dump" the man. Indeed, our empirical studies of homicidal fantasies reveal that rejected men frequently contemplate killing the woman who has spurned them, even though they do not act on these fantasies (Buss & Duntley, under review). Many men in this situation

have the recurrent thought: "If I can't have her, no one can." Some state that "If she won't live with me, then she won't live at all." And empirically, sexual infidelities and breaking up with a husband or de facto spouse who wants to continue the relationship are the strongest risk factors for adult women being killed (Daly & Wilson, 1988; Shackelford et al., in press), especially if they are young and hence highly reproductively valuable (Shackelford et al., 2000). Furthermore, the first six months of the breakup are the most dangerous for the woman. Many women agree to meet with a potentially homicidal ex-mate "just one last time," failing to realize the special dangers of this time and circumstance.

In summary, one implication of our theory for public policy is to identify the circumstances in which evolved homicide mechanisms are most likely to be activated and to direct special efforts at educating people about these circumstances.

A second approach would be to capitalize on the evolved antihomicide mechanisms that humans naturally possess (Duntley & Buss, in preparation). Many approaches to modern psychology treat "emotions" as somehow opposed to "rationality" (Buss, 2001). Emotions are presumed to cloud thinking, preventing logical thought. As a consequence, people are sometimes encouraged to get rid of their fears or to ignore them as irrational, instinctual baggage from a past long forgotten. If our theory is correct, and some of these fears are actually activated antihomicide mechanisms, then ignoring the danger signals they provide may prove lethal. Identifying with greater precision the nature of these emotion-based antihomicide defenses and training people to attend to their signals may provide a second avenue for decreasing the risk of being killed.

Clearly, at this early stage in our evolutionary homicide theory, it would be premature to base any sweeping public policy on its tenets. Nonetheless, we believe that the theory is the most comprehensive and scientifically accurate theory of homicide yet proposed, and that exploring the insights it provides might ultimately give us tools to reduce the incidence of homicide.

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