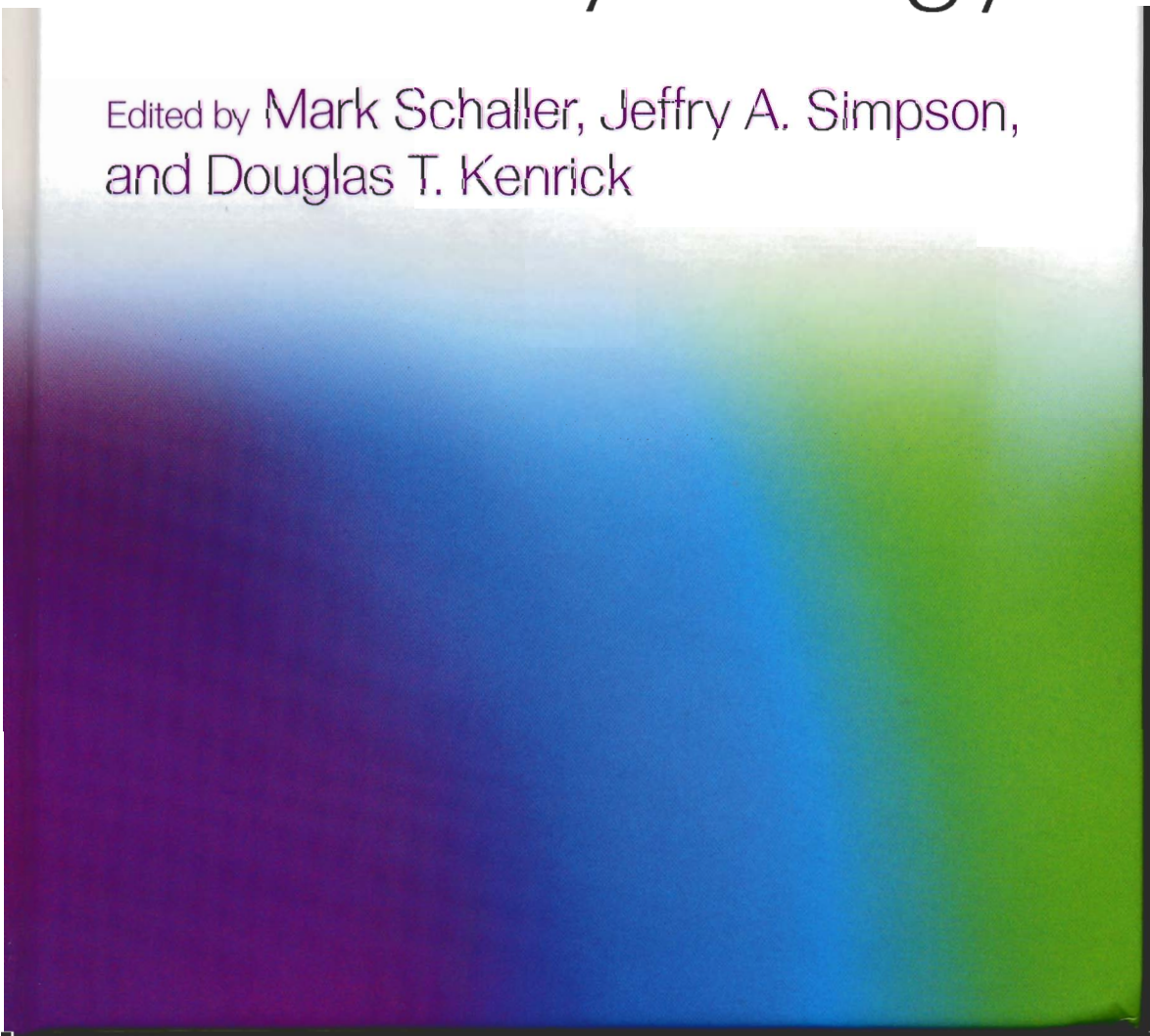
frontiers of social psychology

# Evolution and Social Psychology

Edited by Mark Schaller, Jeffry A. Simpson, and Douglas T. Kenrick



# 12

# The Evolution of Aggression

DAVID M. BUSS and JOSHUA D. DUNTLEY

Out of the more than 10 million animal species that exist, and out of the 4000 mammals that exist, only two species have been documented to form intense coordinated coalitions that raid neighboring territories for the purpose of killing conspecifics. These two species are chimpanzees and humans (Wrangham & Peterson, 1996).

Humans, like chimpanzees, form aggressive, male-bonded coalitions where members support each other in a mutual quest to aggress against others. Human history is filled with records of group-on-group warfare—the Spartans and Athenians, the crusades, the Hatfields and McCoys, the Palestinians and the Israelis, and the Tutsis and the Hutus of Rwanda. Across cultures, men commonly bond with one another to attack other groups or to defend their own group against attack. Humans and chimpanzees share this unique pattern of aggression with each other and with no other terrestrial species (Wrangham & Peterson, 1996). There is a key difference, however, in the way that scientists explain aggression perpetrated by chimps and the aggressive behavior of humans. In the case of chimpanzees, there is resounding agreement that their aggressive behavior is the designed output of context-specific adaptations. In explaining human aggression, social scientists are often quick to marginalize the causal role of evolution, or else mention but fail to adequately consider it (e.g., Baumeister & Vohs, 2004; Staub, 2004; Zimbardo, 2004).

As a result, the field of psychology lacks a complete understanding of questions like: Where does human aggression come from? Has evolution by natural selection fashioned specialized adaptations to inflict costs on other individuals? Have these evolutionary forces acted upon males and females equally, sculpting identical aggressive psychologies?

## THEORIES OF AGGRESSION

Contemporary psychological theories of aggression often invoke general learning mechanisms combined with explanations specifying the plagues of modern

living—violence in movies and TV, teachings in Western society, the purchase of toy weapons by parents for their children (Berkowitz, 1993). By watching aggressive models on TV, for example, children are said to acquire aggressive dispositions through observational learning (Berkowitz, 1993; Eron, 1982; Huesmann & Eron, 1986). Although these factors undoubtedly play a causal role in the development of aggression, they run aground as *complete* explanations when confronted with the historical and cross-cultural records.

They have trouble in explaining the bioarchaeological findings, which reveal a long history of human violence thousands of years before the invention of guns or TV, or even the rise of Western civilization (see Buss, 2005, for a review of this evidence). Fifty-nine human skeletons, for example, were recently found in a cemetery at Gebel Sahaba in Egyptian Nubia, dating from the Late Paleolithic, between 12 and 14,000 years ago. More than 40% contained embedded stone projectiles. Many had multiple wounds. The majority of injuries appear on male skeletons. Most wounds pierced the left sides of the crania and rib cages, suggesting right-handed killers who attacked while their victims faced them. This is merely one among dozens of discoveries from the bioarcheological record that provide conclusive evidence of humans killing other humans over deep time (Buss, 2005; Larsen, 1997).

Traditional theories of aggression that invoke the plagues of modern living also have trouble in explaining the prevalence of violence among traditional societies that are uninfluenced by Western civilization and entirely lack the exposure to TV (e.g., Chagnon, 1983). Among the Yanomamö of Venezuela, for example, 30% of males die at the hands of other humans, either from within their local tribe or as a result of wars with neighboring tribes (Chagnon, 1988). Although the Yanomamö may be unusually violent as a group, rates of homicide are commonly high among traditional societies, such as the Gebusi of West Africa (Keeley, 1996), the Ache of Paraguay (Hill & Hurtado, 1996) and the Tiwi of Northern Australia (Hart & Pilling, 1960). Even among the relatively peaceful !Kung San of Africa, homicide rates exceed those in the cities of Detroit and Los Angeles (Daly & Wilson, 1988). A deeper set of explanatory principles is needed to understand patterns of aggression in men and women, one that does not rely primarily on modern phenomena such as violence on TV, the mass media, Western society, toys, over-crowding, or the alienation of modern living.

Most social psychology textbooks typically contain chapters on aggression that examine various explanations for its occurrence (e.g., Myers, 1995; Sabini, 1992). Among the explanations considered, one usually finds a section on the "instinct theory of aggression," usually attributed to Freud and the ethologist Konrad Lorenz. The section is selected to represent a class of "biological explanations." According to these accounts, aggressive energy is said to be an instinctual drive that builds up until it explodes. It may be "released" by external stimuli, but its continuous internal production guarantees that it will be "pushed out" one way or another.

This depiction of instinct theory is usually dismissed with dispatch. According to Myers (1995), for example, "the idea that aggression is an instinct collapsed as the list of supposed human instincts grew to include nearly every

conceivable human behavior ... what the social scientists had tried to do was to explain social behavior by naming it" (p. 438). The second argument for dismissal is that "instinct theory ... fails to account for the variation in aggressiveness, from person to person and culture to culture" (Myers, 1995, p. 439). According to this argument, "biological" represents those things that are invariant, and so evidence of cultural or individual variability requires "non-biological" explanations.

Berkowitz (1993) provides a more detailed critique. He dismisses the instinct conception on the following grounds: (1) scientists have not discovered any reservoirs of aggressive energy in the brain or rest of body; (2) research rarely reveals spontaneous aggression, but commonly finds that aggressive behavior occurs in response to external stimuli; and (3) there are different types of aggression, not a single type. Following these dismissals, textbook writers proceed to spend the bulk of their coverage on theories of aggression that invoke environmental conditions, such as observational learning as a result of media exposure to violence (for a notable exception, see Kenrick, Neuberg, & Cialdini, 2005).

Perhaps the dismissal of biological explanations was too hasty. During the domination of learning theory, which reigned over psychology for the bulk of the last century, biological explanations were commonly ridiculed. The dichotomies drawn between instincts and learning, biology and environment, or nature and nature, however, are now known to be misleading and logically incoherent (Tooby & Cosmides, 1992). These dichotomies obscure more than they reveal. A primary benefit of an evolutionary model of human aggression is that it is truly integrative. It does not deny the importance of environmental influences. Rather, evolutionary psychology gives us the conceptual tools to understand precisely how and why certain environmental factors affect the psychological adaptations that produce aggression.

The fact that humans show such behavioral flexibility and context-sensitivity is certainly enough evidence to discard notions of inflexible aggressive instincts invariably getting "pushed out" into behavior regardless of circumstances. But neither are humans passive receptacles for environmental forces, unformed lumps of clay until molded by reinforcement contingencies. A more complex model is needed—a model anchored in evolutionary psychology.

## AGGRESSION AS AN EVOLVED SOLUTION TO ADAPTIVE PROBLEMS

An evolutionary psychological perspective does not yield just one hypothesis about the origins of aggression or any other behavioral phenomenon. Within evolutionary psychology, several hypotheses are sometimes proposed and put into scientific competition with each other. Below we detail several adaptive problems for which aggression is hypothesized to be an evolved solution (see also Buss & Shackelford, 1997). We argue that humans have evolved complex situationally contingent adaptations to inflict costs on other humans in order to solve an array of diverse adaptive problems.

### Appropriate the Resources of Others

Humans, perhaps more than any other species, stockpile resources that historically have been valuable for survival and reproduction. These include fertile land and access to fresh water, food, tools, and weapons. There are many means of gaining access to the valuable resources held by others, such as engaging in social exchange, stealing, or trickery. Aggression is also a highly effective means of co-opting the resources of others.

Aggression to appropriate resources can occur at the individual or group level. At the individual level, one can use physical force to take resources from others. Modern-day forms include bullies at school who take lunch-money, books, leather jackets, or designer sneakers from other children (Olweus, 1978). Childhood aggression is commonly about resources, such as toys and territory (Campbell, 1993). Adult forms include muggings and beatings as a means to forcibly extract money or other goods from others. The *threat* of aggression may be enough to secure resources from others, as when a child gives up his lunch money to prevent being beaten or a small-store owner gives mobsters money for "protection" to prevent his or her business from being ransacked.

People, particularly men, often form coalitions for the purposes of forcibly co-opting the resources of others. Among the Yanomamö, for example, male coalitions raid neighboring tribes and forcibly take food and reproductive-aged women (Chagnon, 1983). Throughout human recorded history, warfare has been used to co-opt the land possessed by others, and to the victors go the spoils. Selection has favored aggressive strategies when the benefits, on average, outweighed the costs in the currency of fitness. Thus, one hypothesis of the origins of aggression is to acquire reproductively relevant resources.

### Defend against Attack

The presence of aggressive conspecifics poses a serious adaptive problem for would-be victims—they stand to lose valuable resources that are co-opted by the aggressors. In addition, victims may suffer injury or death, impeding both survival and reproduction. Victims of aggression may also lose in the currency of status and reputation. The loss of face or honor that results from being abused with impunity can lead to further abuse by others, who may select victims in part based on the ease with which they can be exploited or their unwillingness to retaliate.

Aggression, therefore, can be used to defend against attack. It can help to prevent one's resources from being forcibly taken and cultivate a reputation that deters other would-be aggressors. And aggression can be used to prevent the loss of status and honor that would otherwise follow from being victimized with impunity. Defense against attack, in summary, is a second adaptive problem for which aggression evolved as a solution.

### Inflict Costs on Intrasexual Rivals

A third adaptive problem is posed by same-sex rivals who are vying for access to the same resources. One such resource consists of access to valuable members of

the opposite sex. The image of the beach bully kicking sand in the face of a weaker man and walking away with the man's girlfriend is a stereotyped notion of intrasexual competition, but the underlying logic it conveys is powerful.

Aggression to inflict costs on rivals can range from verbal barbs to beatings and killings. Both men and women derogate their same-sex rivals, impugning their status and reputation to make the rivals less desirable to members of the other sex (Buss & Dedden, 1990). At the other end of the spectrum, men sometimes kill their same-sex rivals in duels. Bar fights that start as trivial altercations sometimes escalate to the point of death (Daly & Wilson, 1988). And men sometimes kill other men discovered to have had sex with their wives or girlfriends (Daly & Wilson, 1988).

Since evolution operates according to design differences that contribute to differential success at reproductive competition, a cost inflicted on a rival often can translate into a benefit for the perpetrator. According to this third evolutionary hypothesis, a key function of verbal and physical aggression is to inflict costs on same-sex rivals.

### *Ascend Dominance Hierarchies*

Aggression, in some contexts, functions to increase one's status or power within existing social hierarchies. Among the Ache of Paraguay and the Yanomamö of Venezuela, for example, men engage in ritual club fights with other men. Men who have survived many club fights are admired and feared, and so attain status and power as a result of their successful aggression (Chagnon, 1983; Hill & Hurtado, 1996). Modern societies have ritualized aggression in the form of boxing matches, for example, where the victor experiences status elevation and the loser status loss.

Men who expose themselves to danger in warfare to kill enemies are regarded as brave and courageous, and consequently experience an elevation in their status within the group (Chagnon, 1983; Hill & Hurtado, 1996). Within street gangs, men who display ferocity in their beatings of fellow or rival gang members experience status elevation (Campbell, 1993).

The hypothesis that physical aggression sometimes serves the adaptive function of status elevation does not imply that this strategy works in all groups. Aggression within many groups may result in a status decrement. A professor who punched another professor at a faculty meeting or while teaching a class, for example, would almost certainly experience a decline in status.

### *Dissuade Romantic Partners from Infidelity*

A fifth hypothesis is that aggression and the threat of aggression function to deter long-term mates from sexual infidelity. Much empirical evidence suggests that male sexual jealousy is the leading cause or precipitating context of spousal battering (Daly, Wilson, & Weghorst, 1982). Studies of battered women, for example, document that in the majority of cases, women cite extreme jealousy on the part of their husbands or boyfriends as the key factor leading to their abuse (Dobash

& Dobash, 1984). As repugnant as this may be, some men may beat their wives to deter them from consorting with other men. One method by which this is hypothesized to occur is through women's self-esteem (Buss, 2005). If self-esteem functions, in part, to track a person's mate value (Kirkpatrick & Ellis, 2001), getting beaten may lower a woman's self-esteem and hence self-perceived mate value, creating the belief that she would be unable to find a more desirable mate than the one she currently has.

### *Regain Former Mates*

A sixth evolutionary hypothesis is that aggression and the threat of aggression are part of strategies designed to reacquire mates who have broken off a romantic relationship. On the surface, the use of aggression to attract a former mate may seem counterintuitive. But aggression and the threat of aggression in these contexts could be used as a strategy of negative reinforcement, where aggression is a negative reinforcer that is removed when a relationship is established. The object of the aggression—the desired or former mate—is encouraged to establish a romantic relationship with the aggressor in order to avoid the costs of being a victim of aggression. Indeed, one of the functions of stalking is to regain mates who have defected (Duntley & Buss, 2006). When a man's romantic partner has left the relationship, stalking her inflicts a cost for any attempt she makes to mate with other men, while simultaneously deterring other men from approaching her.

### *Obtain Sexual Access to the Otherwise Inaccessible*

A seventh potential function of aggression is to obtain sexual access to women who are otherwise unwilling (Malamuth, 2005). Sexual aggression ranges from touching a woman's body without her permission, to using threats, to physically forcing a woman to have sex against her will (Buss, 1989). The rates of sexual aggression among humans, in fact, are alarmingly high. Some estimate that as many as 14–25% of women have been forced into unwanted sex at some point in their lives (e.g., Paton & Mannison, 1995). Some species are known to have adaptations to rape, such as scorpion flies and orangutans. One hypothesis is that humans have also evolved adaptations to rape (Thornhill & Palmer, 2000). Our reading of the research suggests that, at present, there is no compelling evidence that humans have evolved adaptations to rape (Buss, 2003; see Symons, 1979; for a similar assessment). Nonetheless, absence of evidence is not evidence of absence.

Whether rape is caused by adaptations specifically designed for forced intercourse, or alternatively is a byproduct of adaptations designed for other functions, evolved psychological mechanisms for aggression almost certainly play a critical role. Once the capacity for aggression evolved within the human repertoire, for example, it could be co-opted to solve adaptive problems that differ from those for which it was originally designed. Obtaining sexual access from unwilling women might be one of those adaptive problems.

## AGGRESSION AS A CONTEXT-CONTINGENT STRATEGY

This account of seven pivotal adaptive problems is undoubtedly incomplete; aggression probably is directed toward solving other adaptive problems as well. The key point is that aggression is not a unitary, monolithic, or context-blind strategy. Rather, aggression is likely to be highly context-specific, triggered primarily in circumstances that resemble those in which our ancestors confronted specific adaptive problems and reaped particular benefits.

Consider the use of spousal battering to solve the adaptive problem of a partner's potential infidelity. This adaptive problem is more likely to be confronted by men who are lower in relative mate value than their wives, for example, or who experience a decrement (e.g., loss of a job) in the resources that women value (Buss, 2003). Under these conditions, the probability that a woman might commit infidelity or defect from the relationship altogether is likely to be higher, and so the adaptive problem is confronted more severely. Men in these conditions are predicted to be more aggressive than men whose partners are less likely to commit infidelity or to defect from the relationship.

Adaptive benefits must be evaluated within the context of the costs of carrying out an aggressive strategy. Our use of the terms cost and benefit refer to the effects that a particular strategy had on the fitness of individuals over evolutionary time. Costs led to decreases in fitness and benefits led to fitness increases. Aggression, by definition, inflicts costs on others, and those others cannot be expected to absorb the costs passively or with indifference: "Lethal retribution is an ancient and cross-culturally universal recourse for those subjected to abuse" (Daly & Wilson, 1988, p. 226). One of the most robust findings in aggression research is that aggression tends to cause retaliatory aggression (Berkowitz, 1993; Buss, 1961). This can sometimes lead to escalating cycles of aggression and counter-aggression, as in the fabled family feud between the Hatfields and McCoys (Waller, 1993).

One critical context for costs pertains to the reputational consequences of aggression. Cultures and sub-cultures differ in whether aggression enhances or depresses status. Among "cultures of honor," for example, failure to aggress when insulted can lead to status loss (Nisbett, 1993). A daughter who has brought shame upon the family name by engaging in premarital sex, for example, may be killed as an "honorable" solution to the family's resultant status loss (Daly & Wilson, 1988). The failure to kill a dishonorable daughter may result in a substantial decrease in status in these cultures.

Another dimension of cost is the ability and willingness of the victim to retaliate. Among school children, bullies typically select victims or "whipping boys" who cannot or will not retaliate (Olweus, 1978). Similarly, the husband of a woman whose four strapping brothers and powerful father live nearby will think twice before beating her for flirting with someone else. The presence of extended kin, therefore, is one context of cost that should moderate the manifestation of spousal violence. Recent empirical evidence supports this prediction. In a study of domestic violence in Madrid, Spain, it was found that women with higher densities of genetic kin both inside and outside Madrid experienced lower levels of

domestic violence (Figueredo, 1995). A higher density of genetic kin within Madrid appears to have exerted a larger protective effect than kin outside Madrid, suggesting the importance of kin's proximity.

The key point is that an evolutionary psychological perspective predicts that evolved mechanisms will be designed to be sensitive to context, not the rigid invariant expression of aggression depicted in earlier instinct theories. Thus, findings of variability in aggression across contexts, cultures, and individuals in no way falsifies particular evolutionary hypotheses. Indeed, context-sensitivity of mechanisms proposed to produce aggression is a critical lever for testing evolutionary hypotheses.

Earlier researchers in this area concluded that variability simultaneously falsified "biological" theories and confirmed "learning" theories. Evolutionary psychology jettisons this false dichotomy by proposing a specific interactionist model—aggression as evoked by particular adaptive problems confronted in particular cost–benefit contexts. In principle, the mechanisms producing aggression could remain dormant for the entire life of an individual. If a problem ancestrally solvable by aggression is not encountered, cognitive adaptations to produce aggressive behavior will not be activated. Aggression, on this account, is based on evolved psychological mechanisms, but is not rigid or invariant and does not get "pushed out" regardless of circumstances.

## WHY ARE MEN TYPICALLY MORE PHYSICALLY AGGRESSIVE THAN WOMEN?

In a sample of homicides committed in Chicago from 1965 through 1980, 86% were committed by men (Daly & Wilson, 1988). Of these, 80% of the victims were also men. Although the exact percentages vary from culture to culture, cross-cultural homicide statistics reveal strikingly similar findings. In all cultures studied to date, men are overwhelmingly more often the killers and their victims are mostly other men. Any reasonably complete theory of aggression must provide an explanation for both facts—why men engage in violent forms of aggression so much more often than women and why other men are most often their victims.

An evolutionary model of intrasexual competition provides the foundation for such an explanation. It starts with the theory of parental investment and sexual selection. In species in which females invest more heavily in offspring than males, females are a valuable limiting resource on male reproduction. Male reproduction is constrained not by their ability to survive, but by their ability to gain sexual access to the high-investing females.

The sex difference in minimum obligatory parental investment (e.g., mammalian females bear the burdens of internal fertilization, placentation, and gestation) means that males can sire more offspring than females. Stated differently, the ceiling on reproduction is much higher for males than for females. This difference leads to differences in the variances in reproduction between the sexes. The differences between the haves and have-nots, therefore, are greater for males than for females.

The greater the variance in reproduction, the more selection favors riskier strategies (including intrasexual competition) within the sex that shows high variance. In an extreme case, such as the elephant seals off the coast of Northern California, 5% of the males sire 85% of all offspring produced in a breeding season (Le Boeuf & Reiter, 1988). Species that show higher variance in the reproduction of one sex compared to the other tend to be highly sexually dimorphic across a variety of physical characteristics. The more intense the effective polygyny, the more dimorphic the sexes are in size and form (Trivers, 1985). There is no reason to believe that the same principle would not apply to sex differences in corresponding cognitive mechanisms.

Effective polygyny means that some males gain more than their "fair share" of copulations, while other males are shut out entirely, banished from contributing to the ancestry of future generations. Such a system leads to more ferocious competition within the high-variance sex. In essence, polygyny selects for risky strategies, including those that lead to violent combat with rivals and those that lead to increased risk-taking to acquire the resources needed to attract members of the high-investing sex. Members of one's own sex are primary competitors for valuable members of the opposite sex.

Violence can occur at the top as well as the bottom of the hierarchy. Given an equal sex ratio, for each man who monopolizes two women, another man is consigned to bachelorhood (Daly & Wilson, 1996). For those facing reproductive oblivion, a risky, aggressive strategy may represent a last resort. The homicide data reveal that men who are poor and unmarried are more likely to kill than their more affluent, married counterparts (Wilson & Daly, 1985). In short, there are two sides to the use of aggression in competitive contexts marked by some degree of polygyny: (1) aggression by a male to "win big," thereby gaining access to multiple mates, and (2) aggression to avoid total reproductive failure by being shut out of mating altogether.

To understand why men would take large risks in mating contexts, let us consider an analogy: Foraging for food. Consider an animal that is able to secure a foraging territory that provides just enough food to stay alive, but insufficient food to breed. Outside this territory are risks, such as predators that may prey upon the animal if the animal leaves its home territory. In this situation, the only males who succeed in breeding are those willing to take risks to venture outside of their secure territory to get food. Some will be killed by predators, of course, and that is why venturing outside is risky. But some will manage to avoid predators, secure additional food, and thereby successfully breed. Those who fail to take the risks to venture outside their territory will fail to breed entirely. This situation selects for risk-taking as a strategy for breeding. Selection in this context acts as a sieve, filtering out those who fail to take risks. Those who play it safe will not leave descendents.

As Daly and Wilson (1988) note, "sexual dimorphism and violent male–male competition are ancient and enduring elements of our human evolutionary history" (p. 143). Current levels of sexual dimorphism among humans are roughly the same as those of our ancestors living 50,000 years ago. Male–male combat among humans, as among other sexually dimorphic mammals, is a leading cause of injury and death among males.

Modern humans have inherited the psychological mechanisms that led to ancestral success. This is not to imply that men have a conscious or unconscious desire to increase their reproductive success. Nor is it meant to imply that men have an "aggression instinct" in the sense of some pent-up energy that must be released. Rather, men have inherited from their ancestors psychological mechanisms sensitive to contexts in which aggression probabilistically leads to the successful solution of particular adaptive problems.

This account provides a parsimonious explanation for the two facts revealed in the cross-cultural homicide record. Males are more often the perpetrators of violence because they are the products of a long history of mild but sustained effective polygyny characterized by risky strategies of intrasexual competition for access to the high-investing sex. The fact that men die on average seven years earlier than women is but one of the many markers of this aggressive intrasexual strategy (Trivers, 1985).

Men are the victims of aggression far more than women because men are in competition primarily with other men. It is other men who form the primary sources of strategic interference, other men who impede access to resources needed to attract women, and other men who try to block their access to women. To the victors go the spoils. The losers remain mateless and sustain injury or even early death.

Women also engage in aggression, and their victims are also typically members of their own sex. The forms of aggression committed by women, however, are typically less florid, less violent, and hence less risky than those committed by men—facts accounted for by the theory of parental investment and sexual selection (see Campbell, 1995, 2002). In studies of verbal aggression through derogation of competitors, for example, women slander their rivals by impugning their physical appearance and hence reproductive value (Buss & Dedden, 1990; Campbell, 1993).

Not only are the functions of aggression in different contexts distinct, the kinds of costs that different forms of aggression inflict are unique. Sexual aggression may deprive women of their preferred mate, subject them to physical harm and reputational damage, and expose them to sexually transmitted diseases. Physical aggression can inflict injuries to body and reputation. And homicide brings the life of another individual to an end. Arguably no other form of aggression has captured the attention of the public and researchers more than murder.

## DO HUMANS HAVE EVOLVED HOMICIDE ADAPTATIONS?

"Then she said that since she came back in April she had fucked this other man about ten times. I told her how can you talk love and marriage and you been fucking with this other man. I was really mad. I went into the kitchen and got the knife. I went back to our room and said were you serious when you told me that. She said yes. We fought on the bed, I was stabbing her and her grandfather came up and tried to take the knife out of my hand. I told him to go and call the cops for me. I don't know why I killed the woman, I loved her" (Carlson, 1984, p. 9).

Roughly 1 in 15,000 people is murdered in the United States each year (Stolinsky & Stolinsky, 2000). On first glance, this seems like a fairly rare event. But computed over a 75-year lifespan, this equates to a 1 in 200 chance of being murdered at some point during an individual lifetime (Ghiglieri, 1999). In 1999, homicide ranked 14th among the leading causes of death for men and women of all ages (Centers for Disease Control, 2002). But for men between the ages of 15 and 35, it was the second leading cause of death. For black men between 15 and 35, homicide was the leading cause of death.

Homicide rates in the United States are much higher than in many industrialized nations, exceeding those in the United Kingdom and Japan by a factor of 10; exceeding those in France, Austria, Sweden, and Germany by a factor of 9; and exceeding the rates in Canada, Italy, Portugal, Korea, and Belgium by a factor of 5. But the homicide rates in many other countries are equivalent to or exceed those in the United States (United Nations, 1998). The lifetime likelihood of being murdered in Venezuela and Moldova is 1 in 90, twice that of the United States. In Estonia and Puerto Rico, the likelihood is 1 in 60, three times that of the United States. And in Colombia and South Africa, the likelihood is better than 1 in 20 that a person will die at the hands of a murderer, more than 10 times the lifetime homicide risk in the United States. Even among those nations that currently exhibit low homicide rates, a lack of murder is not a consistent part of their history. Historical evidence suggests that the relative absence of homicide in some countries is a recent invention (e.g., Ruff, 2001; Dower & George, 1995).

Within-culture rates of homicide typically do not include casualties of warfare or genocide. In addition, the murder rates in these nations would undoubtedly be much higher were it not for emergency medical interventions that were not available to our ancestors for most of our evolutionary history. This is precisely the point made by a recent "Ambulance-Homicide Theory." Researchers found that faster ambulances and better emergency room care were significantly responsible for the decrease in homicide rates over the last three decades in the United States. In fact, it has been estimated that there would be 30,000 to 50,000 additional murders in the United States each year—tripling, quadrupling, or more the current homicide rate—without the advances in emergency-care technology that have occurred during the last 30 years (Harris, Thomas, Fisher, & Hirsch, 2002).

Mainstream social scientists often explain the sex differences in homicide rates within the United States by invoking "culture-specific gender norms" (e.g., Berkowitz, 1993). This theory encounters an empirical problem: The sex difference is found in *every culture* across the globe for which homicide statistics are available (Daly & Wilson, 1988). Theories that invoke local cultural norms obviously cannot satisfactorily explain a universal human pattern.

Actual homicides are statistically rare, and thus difficult to study. For every homicide that is actually committed, however, there may be dozens or hundreds of *thoughts* or *fantasies* that individuals entertain about killing another human being. Consider this homicidal fantasy reported by a male undergraduate: "I wanted to kill my old girlfriend. She lives in (another city) and I was just wondering if I could get away with it. I thought about the (price of) airfare and how I might set up an alibi. I also thought about how I would kill her in order to make

it look like a robbery. I actually thought about it for about a week and never did come up with anything" (Kenrick & Sheets, 1993, p. 15). This man did not kill his girlfriend. But the recurrence of thoughts about homicide opens up a window for investigation into the psychology of murder.

The evolutionary psychologists Doug Kenrick and Virgil Sheets have capitalized on this opportunity. They conducted two studies on a total of 760 undergraduates. The methods were simple. They asked subjects to provide demographic information, including age and sex, and then to describe the last time they had thoughts about killing someone. They inquired about the circumstances that triggered the violent thoughts as well as the content of those thoughts: "who you wanted to kill, how you imagined doing it, etc" (Kenrick & Sheets, 1993, p. 6). They queried subjects about the frequency of fantasies, the specific relationship with the person they thought of killing, and whether the fantasy had been triggered by a physical attack, a public humiliation, or any of a list of other triggers.

The two studies revealed similar results, so we will focus only on the second study, which was larger and more detailed in scope. First, more men (79%) than women (58%) reported experiencing at least one homicidal fantasy. Second, 38% of the men, but only 18% of the women, reported having had several homicidal fantasies. And third, men's fantasies tended to last longer than women's fantasies. Most women (61%) reported that their homicidal thoughts typically lasted only a few seconds. Most men reported that their homicidal thoughts lasted a few minutes, with 18% reporting that their fantasies lasted a few hours or longer. These findings support the hypothesis that men are psychologically more disposed to homicide than women—a finding also supported by statistics of actual homicides.

Sex differences were also apparent in the triggers of homicidal thoughts. Men were more likely to have homicidal thoughts than women in response to a personal threat (71% vs. 52%), the fact that someone stole something from them (57% vs. 42%), a desire to know what it is like to kill (32% vs. 8%), a conflict over money (27% vs. 10%), and a public humiliation (59% vs. 45%). Men and women differed in the targets of their homicidal fantasies. Men were more likely to fantasize about killing a stranger (53% vs. 33%), a national leader (34% vs. 17%), a boss (35% vs. 21%), and a roommate (34% vs. 23%).

The logic of inclusive fitness theory predicts greater conflicts between children and their stepparents than between children and their genetic parents, and the homicidal fantasy evidence bears this out. Of those who had lived with a stepparent, fully 44% reported fantasies about killing them. And among those who lived for longer than six years with a stepparent, an even larger number—59%—reported such homicidal fantasies. In contrast, the figures for killing a mother or father were lower—31% and 25%, respectively.

How can these findings be explained from an evolutionary perspective? There are two distinct avenues of explanation. The one adopted by Kenrick and Sheets (1993), and also by Daly and Wilson (1988), may be called the "byproduct hypothesis." According to this hypothesis, murder is the byproduct of psychological mechanisms that evolved for their nonlethal consequences. For example, males have evolved a psychological propensity for violence as a means of coercive control and eliminating sources of conflict. This propensity typically results in

threats of violence or sub-lethal violence as the behavioral output. Occasionally, however, there is a "slip" in the brinkmanship, such that the violence accidentally bubbles over into a homicide: "There is brinkmanship in any such contest, and the homicides by spouses of either sex may be considered slips in this dangerous game" (Daly & Wilson, 1988). The same slips may occur in other forms of homicide, such as male–male homicide.

An alternative is "Homicide Adaptation Theory" (Buss & Duntley, 2006). According to this theory, humans, and especially men, have evolved specific psychological mechanisms that steer them toward the murder of conspecifics under certain, predictable circumstances such as warfare, intrasexual rivalry, or spousal infidelity or defection. Humans presumably have homicidal fantasies as one component of these evolved homicide adaptations. In many circumstances, the costs of killing are evaluated to be too great—in all societies, a person risks the wrath of kin and punishment from other interested members of the group (Daly & Wilson, 1988). These costs are weighted and deter many from killing. The hypothesis is not that men have a "killer instinct" whereby they are impelled to kill regardless of circumstances. Rather, we are proposing that acts of killing are one part of the behavioral output of evolved homicide mechanisms triggered by specific contextual inputs. The presence of these inputs indicates an adaptive problem for which homicide was ancestrally a solution that, on average, led to greater levels of survival and reproduction than competing behavioral strategies. Homicide is only one among many possible solutions for any given adaptive problem. Whether homicide or some other strategy is adopted depends on cost–benefit calculations made by evolved mechanisms designed to weigh the likely outcomes of competing strategies. Most of the time, after all of the costs and benefits associated with committing homicide are considered, nonlethal measures will be adopted instead. Buss and Duntley (2006) hypothesize that, in ancestral environments, homicide would only have been an effective solution to rare, very specific adaptive problems.

According to Homicide Adaptation Theory, murder should not be considered as just the extreme end of a continuum of violence. It is an evolutionarily unique and powerful strategy (Buss, 2005; Buss & Duntley, 2006; Duntley, 2005; Duntley & Buss, 2005). Killing a conspecific leads to the absolute end of direct competition between two individuals. The person who is killed can no longer compete with his killer. A murdered competitor can no longer directly influence the environment or social context that he shared with his murderer. The unique outcomes of homicide would have created equally unique selection pressures to shape human psychology specifically for contexts of homicide (Buss & Duntley, 2006; Duntley & Buss, 2005).

Different ancestral problems required different specific solutions. We propose that there are *multiple*, different psychological adaptations for homicide, each of which is devoted to the solution of different kinds of adaptive problems. The problems incumbent in committing infanticide, for example, are quite different from those that need to be solved in contexts of warfare. As a result, psychological design for infanticide is hypothesized to be distinct from psychological design for warfare. Similarly, psychological design for mate homicide in men is distinct from psychological design for mate killing in women. Some information

processing mechanisms are undoubtedly shared between the different adaptations for homicide and with adaptations for the solution of other domains of adaptive problems. Selection would favor the sharing of subroutines performing the same function over reinventing them anew for each psychological adaptation. However, we argue that any given adaptation for homicide has at least one design feature that is distinct from other adaptations.

## *Nature of Psychological Mechanisms for Homicide*

We hypothesize that there were specific combinations of adaptive problems individuals recurrently faced in the evolutionary past that would have been best solved by killing. Selection would have favored individuals who possessed psychological adaptations that reliably led to the production of murderous behavior when they faced such contexts. The best solution to most adaptive problem contexts faced by our ancestors did not involve homicide. However, the potential fitness gains accomplished by the use of murder to solve a small, specific set of adaptive problems would have selected for psychological adaptations to kill.

We hypothesize that psychological mechanisms for homicide function to steer an individual in the direction of adaptive behaviors that reliably result in the death of another individual. This is accomplished through a variety of affective, motivational, and computational systems that narrow in on murder as the solution to adaptive problems. The adaptive problems to which we are referring are fluid, unfolding and changing over time. As time passes and other individuals pursue adaptive strategies, the nature of adaptive problems changes. And the solution to one set of adaptive problems may reliably create others. It is the reliable unfolding of adaptive problems that shaped psychological adaptations in humans over evolutionary time, including those that end others' lives.

The adaptive problems homicide is capable of solving, the range of behaviors capable of killing specific conspecifics, and the consequences of the homicide combine to create the selection pressures that shaped adaptations for murder. A large number of distinct adaptive problems are potentially solvable by homicide. We hypothesize that psychological adaptations for homicide are correspondingly numerous and distinct. Different adaptive problems were ancestrally solvable by murdering a cheating mate, for example, than by killing a disabled newborn. The range of behaviors capable of ending the lives of each of these people is largely nonoverlapping. Different levels of force are required to strangle an infant and an adult. There is different risk of the killer being injured in each case. The majority of the consequences of each kind of homicide are also distinct. An infant poses less danger to the killer than an adult. Different categories of adaptive problems are potentially solvable through the murder of infants and adults. Different reputational consequences also follow from each kind of homicide. The differences between each kind of killing illustrate the very large chasm in the selection pressures that shaped psychological adaptations for each kind of murder. These differences would have shaped corresponding differences in the adaptations' functional design.

Just as there are likely differences in the psychological adaptations that lead to murder as the solution to different adaptive problems, there are also probable

similarities in the function of many, if not all, homicide mechanisms. What follows is a brief outline of some of the evolved functional components of human murder adaptations (for a more complete treatment, see Buss & Duntley, 2006).

### *Sensitive to Adaptive Problems Solvable by Homicide*

It would not be adaptive for homicide adaptations to be activated invariantly across contexts, just as it would not be adaptive for a person to actively experience a fear of snakes if there were no snakes nearby. Because committing homicide frequently involves the risk of incurring significant costs, such as being punished or killed by the victim's kin and social allies, one design feature of adaptations for murder is that they should only become activated when an individual faces problems with extremely high fitness consequences ancestrally solvable by killing a conspecific. We hypothesize that such contexts include threats to the lives of self or kin, the loss of a valuable mate, the loss of valuable territory or resources, and the loss of status and reputation.

### *Catalog Homicide-Relevant Information*

A second hypothesized design feature of adaptations for murder is the cataloging of homicide-relevant information present in the local environment. Such information includes: specific methods of killing and the location of tools for murder available in local environments, the lethality of each method, and the particular reputational consequences of killing in solution to different adaptive problems. Other mechanisms are hypothesized to simultaneously keep track of the particular costs and benefits of each method of killing. This information would be used to calibrate murder adaptations to favor some available murder strategies over others.

### *Estimate Formidability of Victims*

One danger of murdering another person is the risk of being physically injured in the process. To address this problem, we hypothesize that selection fashioned mechanisms to factor the physical formidability of the victim into decisions about which among available methods would be most effective at killing the person. Similar mechanisms would also estimate the formidability of the kin and social allies of the intended victim, providing information about the ability to fend off retribution from them and control the resources that may be acquired through killing.

### *Forecast Likely Consequences of Murder*

The range of outcomes of killing in solution to each adaptive problem is hypothesized to be as recurrent over our evolutionary history as the specific contexts leading to murder. This would have provided selection pressure for mechanisms capable of forecasting the likely future consequences of murder, such as the reputational consequences of the homicide and the probability and type of retribution likely to be pursued by the kin and social allies of the victim.

### *Cognitively Simulate Killing*

Symons (1979) argues that sexual fantasies evolved to deal with rare, complex problems. His argument is based on the premise that a function of ideation is to help solve the adaptive problems. Even if only a small fraction of sexual fantasies lead to an actual sexual encounter, the fantasies themselves are still functional, low-cost preparations for events with potentially high fitness consequences. It is the high fitness consequences of sexual behavior that selected for the production of fantasies about sex. Similarly, we argue that the high fitness consequences of homicide selected for specific, directed thoughts of murder.

We hypothesize that elaborate fantasies about killing are not required in every context in order to effectively produce homicidal behavior. The problems a new mother needs to solve in order to commit infanticide, for example, are very small in number and simple in nature. Newborns are helpless to defend themselves and are physiologically fragile. Their deaths can be produced with greater haste, with less planning, and can be more easily blamed on causes other than murder. We hypothesize that the so-called "shaken baby syndrome" is the result of activation of adaptations for infanticide. It is a frequently occurring behavior in adults who become frustrated with the costs inflicted on them by a squalling infant. Parents who shake their babies often report that they only did it to try to quiet their children down. The behavior also reliably leads to infant death from traumatic brain injuries (Geddes et al., 2003). The killing of healthy, adult rivals, on the other hand, is relatively more difficult to complete and would benefit from the additional computational power of scenario building. Adults will actively fight back against a killer. Substantially more force is required to bring about rivals' violent deaths. It is also more difficult to make the violent death of a rival look like something other than a homicide, which may lead the genetic relatives and social allies of a murdered rival to seek revenge on the killer.

A number of problems need to be addressed in order for a cognitive system to support homicidal ideations. First, psychological mechanisms must activate scenario building and focus it on homicide as the solution to an adaptive problem or problems. We hypothesize that homicidal ideation, like actual murders, will be more likely to occur when the elimination of another individual contributes to the solution of numerous adaptive problems simultaneously. The more problems killing solves, the more likely someone will end up dead. Consistent with Symons's logic about sexual fantasies, thoughts of murder occur in response to rare, complex sets of circumstances for which the devotion of greater cognitive resources is required to evaluate the efficacy of and possibly implement a homicidal strategy.

Once ideation is activated and focused to explore a homicidal strategy, specific content must be provided to move the scenario forward. Not any nor all kinds of content would be appropriate for a murder fantasy. We hypothesize that mechanisms evolved specifically to direct scenario building for homicide. These mechanisms select and organize inputs, and introduce them into homicidal fantasies across time. "Decisions" about what input to introduce and when are based on the ancestral frequency and fitness consequences of similar scenarios calibrated by experience acquired during ontogeny. We hypothesize that not one, but many

homicidal scenarios may be constructed, guided by psychological mechanisms that organize and reorganize the introduction of inputs over time to explore the range of possible contingencies and outcomes of a plan to kill. In sum, mechanisms are hypothesized to vary the kind of information introduced and the timing of the introduction of specific variables across multiple, distinct incarnations of a plan for murder. Homicide mechanisms are also hypothesized to change the values of the individual variables that are introduced.

We hypothesize that specific mechanisms evolved to forecast the likely future costs and benefits of each specific behavior leading to a homicide. These forecasts are based on two factors: would-be killers' fantasized future representations of themselves (FFK for fantasized future killer) and features of the fantasized future environment (FFE) relevant to a plan for murder. Some features of both the FFK and FFE are essentially unchanging, such as a person's height and the force of gravity, and would be constants in calculations of the likely outcomes of a homicidal strategy. Other features are more variable. We hypothesize that mechanisms evolved to produce estimates of the values of variable features of the FFK and FFE in which a strategy of homicide may be adopted.

Each variable feature is likely variable only within a specific range of values, often functionally represented in terms of a normal distribution. For example, the formidability of intended murder victims is likely to vary predictably within a fairly narrow range. Estimates could be based on such factors as their size, age, and observations of their behavior. These estimates are hypothesized to be integrated into calculations of the likely future effectiveness of a particular plan for murder.

### *Uncertainty*

An important factor hypothesized to increase the complexity of using murder as part of a strategy to solve adaptive problems is uncertainty. Varying degrees of uncertainty pervade every aspect of adaptive problems solvable by homicide. There is uncertainty about the reliability of the environmental cues that activate adaptations for homicide. For example, is a rival having clandestine sexual encounters with a person's mate or are the two of them just friends who enjoy each other's company? Uncertainty also surrounds the estimates of variables entered into calculations of every aspect of a homicide scenario—from how much physical force a particular weapon will require to end someone's life, to how vigorously the victim will fight back, to how easily the murder could be covered up, to how likely genetic relatives of the victim will be to seek revenge. Seeking out additional information is one strategy to decrease uncertainty. A person can test the strength of social alliances, the lethality of a weapon, or learn the daily routines of intended victims to discover when they are most vulnerable. Meticulous planning of every detail of a murder informed by additional information may also make killers' minds more certain of the outcome of their plans. Some degree of uncertainty, however, always remains.

As a homicidal strategy actually unfolds over time, some aspects of a situation may occur in ways that were not anticipated. This can happen for at least three reasons. First, incorrect knowledge may be entered into the calculations that are the

underpinnings of plans for murder. Assumptions may be made about the formidability of a victim, for example, based on their size, weight, and observations made of them in limited contexts. If the victim earned a black belt in martial arts years before observations were made, then information about his or her formidability would be in error and some methods of killing the person would be less likely to be effective. Second, unanticipated events may confound a plan to kill. For example, a victim may unexpectedly bump into a friend while jogging in the evening, an activity the victim usually does alone. The presence of the victim's friend may be enough to derail plans for the victim's murder. Finally, killers may fail to enter a relevant piece of information into their homicidal plans. A murder may be planned for night, for example, after the victim is asleep. Killers may not consider how much the darkness would cripple their ability to navigate in the victim's home.

It is important to understand how uncertainty can limit the power of homicide scenario building for at least two reasons. First, it suggests that cognitive adaptations for murder must have evolved ways of dealing with the different kinds of uncertainty. Second, it illustrates how errors in plans to kill that stem from problems of uncertainty can derail an attempt at homicide and effectively save a victim's life. In many contexts, we propose that the psychology of would-be killers is not absolutely committed to ending the life of another person rather than doing something else, even if they have a complete plan for murder and have begun implementing that plan. Other intervening factors can redirect a killer's homicidal strategy to nonlethal alternatives at any point in time until their victim is dead.

Clearly, killing people is not the only strategy capable of solving the adaptive problems that can be solved by murder. We propose that mechanisms evolved to weigh the costs and benefits of homicide relative to alternative strategies for the solution of adaptive problems. The process of creating elaborate homicidal scenarios, of developing a plan to end another person's life, we argue, most often leads people to evaluate that the costs of killing are too high and the benefits too low to actually commit murder.

When a homicidal strategy is evaluated to be too costly, we hypothesize that evolved mechanisms to inhibit killing steer an individual away from lethal behaviors. Such mechanisms include: emotional charging that makes thoughts or behaviors leading to homicide feel aversive, the diversion of attention to other, nonlethal strategies, and focused scenario-building dedicated to specific nonlethal alternatives. In rare instances when a course of action involving conspecific killing is evaluated to be the best among alternative strategies, however, we propose that specific evolved mechanisms motivate murder. These mechanisms include: blindness to nonlethal alternatives to homicide, the suspension of empathy or sympathy for the victim, emotional charging capable of producing murderous behaviors, and endocrinological rewards for the exploration and implementation of behaviors capable of killing.

## *The Power of Scenario Building*

It is important not to overestimate the power of unguided scenario building in producing homicidal behavior or any behavior. There is no empirical basis to

broadly assert that all behaviors, including homicide, can be accounted for by human ability to cognitively simulate events and "figure things out." Without restrictions on the kinds of information that qualify as relevant inputs and the range of behavioral strategies capable of solving problems, the process of scenario building would succumb to combinatorial explosion (Tooby & Cosmides, 1992), rendering it functionless and a massive waste of cognitive resources. A complete theory of scenario building needs to specify the function of people's fantasies, explain why people fantasize about some things and not others, explain where information inputs to the scenarios come from and why they are used instead of other inputs, explain how cognitive simulations are developed over time, and explain the specific relationship between thoughts of future events and future behaviors. Simply positing that people "learn" how to figure things out is not an adequate explanation without a complete account of how learning takes place, why some things are learned and others are not, and why the building of some scenarios—such as homicidal ideations—persists among people for whom killing likely would never be the most adaptive strategy.

In our arguments, we propose that cognitive simulations require specific inputs to define and guide the situation under consideration that are linked to specific behavioral outputs. We propose that selection operated to define these aspects of scenario building. Over our evolutionary history, individuals who possessed and utilized an evolved menu of inputs that predefined and guided cognitive simulations would have been at an advantage over those with no such guidance. As selection operated on scenario building, it would have favored some menus of inputs, some directions for the unfolding of scenarios, and some consequent behaviors over others. Although cognitive simulations may indeed help to figure things out, they do not do so blindly. The foundation of their content was shaped by the experiences of our ancestors.

Two competing evolutionary hypotheses of killing—the "byproduct hypothesis" and "Homicide Adaptation Theory"—have not yet been pitted against each other in empirical tests. The high prevalence of homicidal fantasies, the predictability of the circumstances that trigger them, the evidence on sex differences, and the premeditated quality of many homicides, however, do not accord well with the byproduct hypothesis. Additionally, advocates of the byproduct hypothesis have failed to specify precisely which mechanisms homicide is a byproduct of, or how these mechanisms reliably malfunction to produce homicide in fairly predictable circumstances. Homicide Adaptation Theory, in contrast, is quite clear about the hypothesized functions of psychological mechanisms that lead to murder. Research designed to test these competing evolutionary hypotheses is underway. Within the next decade, we can expect a resolution of the debate about whether humans have evolved specific homicide mechanisms.

## CONCLUSIONS

From the perspective of evolutionary psychology, aggression is not a singular or unitary phenomenon. Rather, it represents a collection of strategies that are manifest

under highly specific contextual conditions. The mechanisms underlying aggression have emerged, on this account, as solutions, albeit repugnant ones, to a host of distinct adaptive problems, such as resource procurement, intrasexual competition, hierarchy negotiation, and mate retention.

From an evolutionary perspective, variability in aggression—between the sexes, across individuals, over the lifespan, and across cultures—is predicted. This contrasts markedly from earlier instinct theories in which aggression was presumed to be manifest invariantly, "pushed out" in all people one way or another. It also contrasts with domain-general learning accounts by hypothesizing specific, dedicated psychological mechanisms that have evolved over thousands of generations in response to particular social adaptive problems. Simultaneously, however, an evolutionary perspective illustrates the point that documented variability does not imply that biology is irrelevant. An evolutionary psychological perspective is truly interactionist—it specifies a set of causal conditions in which particular features of the perpetrator, victim, social context, and adaptive problem are likely to evoke aggression as a strategic solution.

An evolutionary perspective suggests at least seven classes of benefits that would have accrued to ancestors who used an aggressive strategy: Appropriating the resources of others, defending oneself and kin against attack, inflicting costs on intrasexual rivals, negotiating status and power hierarchies, deterring long-term mates from infidelity or defection, aiding in the reacquisition of mates, and acquiring sexual access to otherwise inaccessible individuals.

Sound evolutionary arguments predict that aggression is likely to emerge more strongly among men, with both aggressors and victims being men. Given a mating system with some degree of polygyny, selection will favor "risky tactics" among men both to gain sexual access to more women than their "fair share" and to avoid being excluded from mating entirely. The empirical evidence provides strong support that most physical aggression is perpetrated by men and most of the victims are men.

Evolutionary psychologists have advanced two contrasting hypotheses designed to explain the evolution of killing other human beings. The first hypothesis suggests that killings are nonadaptive or maladaptive byproducts of adaptations designed to use nonlethal violence and the threat of violence as a means of coercively controlling other human beings. The second hypothesis suggests that humans, especially men, have evolved specific homicide adaptations that are designed to motivate killing other humans under specific circumstances when the benefits outweigh the costs. The high prevalence of homicidal fantasies, the predictability of the circumstances that trigger them, the evidence on sex differences, and the premeditated quality of many homicides all seem to support Homicide Adaptation Theory (Duntley & Buss, 2005), although further research is needed to pit predictions from the two theories against each other directly.

An evolutionary psychological perspective on human aggression contains many limitations. This perspective currently cannot account, for example, for why three men confronted with a wife's infidelity will result in a beating in one case, a homicide in the second case, and getting drunk in the third case. It currently cannot account for why some cultures, such as the Yanomamö, seem to require male

violence to attain a position of status, whereas in other cultures aggression leads to irreparable reputational damage. The current evolutionary psychological account of aggression is limited in these and many other respects.

Even at this preliminary stage of inquiry, however, an evolutionary psychological account of aggression has heuristic value, suggesting particular lines of investigation not examined by other approaches. It can account parsimoniously for a host of otherwise inexplicable findings, such as the universally greater prevalence of aggression by men against other men, the ubiquity of male sexual jealousy as a cause of spousal violence and spousal homicide, and the identification of step parenting as a causal context putting children at risk of aggression. As such, an evolutionary psychological account brings us one step closer to understanding why humans everywhere inflict violent costs on other humans.

## ACKNOWLEDGMENTS

The authors thank Doug Kenrick, Mark Schaller, and Jeff Simpson for helpful comments on an earlier draft of this chapter.

## REFERENCES

Baumeister, R. F., & Vohs, K. D. (2004). Four roots of evil. In A. G. Miller (Ed.) *The social psychology of good and evil*. New York: Guilford.

Berkowitz, L. (1993). *Aggression: Its causes, consequences, and control*. New York: McGraw-Hill.

Buss, A. H. (1961). *The psychology of aggression*. New York: Wiley.

Buss, D. M. (1989). Conflict between the sexes: Strategic interference and the evocation of anger and upset. *Journal of Personality and Social Psychology, 56*, 735–747.

Buss, D. M. (2003). *The evolution of desire: Strategies of human mating* (Rev. ed.). New York: Basic Books.

Buss, D. M. (2005). *The murderer next door: Why the mind is designed to kill*. New York: Penguin.

Buss, D. M., & Dedden, L. A. (1990). Derogation of competitors. *Journal of Social and Personal Relationships, 7*, 395–422.

Buss, D. M., & Duntley, J. D. (2006). *Homicide adaptation theory*. Manuscript submitted for publication.

Buss, D. M., & Shackelford, T. K. (1997). Human aggression in evolutionary psychological perspective. *Clinical Psychology Review, 17*, 605–619.

Campbell, A. (1993). *Men, women, and aggression*. New York: Basic Books.

Campbell, A. (1995). A few good men: Evolutionary psychology and female adolescent aggression. *Ethology and Sociobiology, 16*, 99–123.

Campbell, A. (2002). *A mind of her own: The evolutionary psychology of women*. Oxford: Oxford University Press.

Centers for Disease Control and Prevention National Center for Injury Prevention and Control. (2002). http://webapp.cdc.gov/sasweb/ncipc/leadcaus10.html

Chagnon, N. (1983). *Yanomamö: The fierce people* (3rd ed.). New York: Holt, Rinehart, & Winston.

Chagnon, N. (1988). Life histories, blood revenge, and warfare in a tribal population. *Science*, 239, 985–992.

Daly, M., & Wilson, M. (1988). *Homicide*. Hawthorne, NY: Aldine.

Daly, M., & Wilson, M. (1996). Evolutionary psychology and marital conflict: The relevance of stepchildren. In D. M. Buss & N. Malamuth (Eds.), *Sex, power, conflict: Evolutionary and feminist perspectives* (pp. 9–28). New York: Oxford University Press.

Daly, M., Wilson, M., & Weghorst, S. J. (1982). Male sexual jealousy. *Ethology and Sociobiology*, 3, 11–27.

Dobash, R. E., & Dobash, R. P. (1984). The nature and antecedents of violent events. *British Journal of Criminology*, 24, 269–288.

Dower, J. W., & George, T. S. (1995). *Japanese history and culture from ancient to modern times*. Princeton, NJ: Markus Wiener.

Duntley, J. D. (2005). Adaptations to dangers from humans. In D. M. Buss (Ed.), *The handbook of evolutionary psychology*. New York: Wiley.

Duntley, J. D., & Buss, D. M. (2005). The plausibility of adaptations for homicide. In P. Carruthers, S. Laurence, & S. Stich (Eds.), *The structure of the innate mind*. New York: Oxford University Press.

Duntley, J. D., & Buss, D. M. (2006). *The evolutionary psychology of stalking*. Department of Psychology, University of Texas. Manuscript in preparation.

Eron, L. D. (1982). Parent–child interaction, television violence, and aggression of children. *American Psychologist*, 37, 197–211.

Figueredo, A. J. (1995). Preliminary report: Family deterrence of domestic violence in Spain. Department of Psychology, University of Arizona.

Geddes, J. F., Tasker, R. C., Hackshaw, A. K., Nickols, C. D., Adams, G. G., Whitwell, H. L., & Scheimberg, I. (2003). Dural hemorrhage in non-traumatic infant deaths: Does it explain the bleeding in 'shaken baby syndrome'? *Neuropathology & Applied Neurobiology*, 29, 14–22.

Ghiglieri, M. P. (1999). *The dark side of man: Tracing the origins of violence*. Reading, MA: Perseus Books.

Harris, A. R., Thomas, S. H., Fisher, G. A., & Hirsch, D. J. (2002). Murder and medicine. *Homicide Studies*, 6, 128–166.

Hart, C. W., & Pilling, A. R. (1960). *The Tiwi of North Australia*. New York: Hart, Rinehart, & Winston.

Hill, K., & Hurtado, A. M. (1996). *Ache life history*. New York: Aldine De Gruyter.

Hill, R. (1945). Campus values in mate selection. *Journal of Home Economics*, 37, 554–558.

Huesmann, L. R., & Eron, L. D. (1986). *Television and the aggressive child: A cross-national comparison*. Hillsdale, NJ: Lawrence Erlbaum Associates.

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

Kenrick, D. T., Neuberg, S. L., & Cialdini, R. B. (2005). *Social psychology: Unraveling the mystery*. New York: Allyn & Bacon.

Kenrick, D. T. & Sheets, V (1993). Homicidal fantasies. *Ethology and Sociobiology*, 14, 231–246.

Kirkpatrick, L. A., & Ellis, B. J. (2001). An evolutionary-psychological approach to self-esteem: Multiple domains and multiple functions. In M. Clark & G. Fletcher (Eds.), *The Blackwell handbook in social psychology: Vol. 2. Interpersonal processes* (pp. 411–436). Oxford, England: Blackwell.

Larsen, C. L. (1997). *Bioarcheology: Interpreting behavior from the human skeleton*. Cambridge: Cambridge University Press.

Le Boeuf, B. J., & Reiter, J. (1988). Lifetime reproductive success in northern elephant seals. In T. H. Clutton-Brock (Ed.), *Reproductive success* (pp. 344–362). Chicago: University of Chicago Press.

Malamuth, N. (2005). Sexual coercion. In D. M. Buss (Ed.), *The handbook of evolutionary psychology*. New York: Wiley.

Myers, D. G. (1995). *Social psychology* (5th ed.). New York: McGraw-Hill.

Nisbett, R. E. (1993). Violence and U.S. regional culture. *American Psychologist*, *48*, 441–449.

Olweus, D. (1978). *Aggression in schools*. New York: Wiley.

Paton, W., & Mannison, M. (1995). Sexual coercion in high school dating. *Sex Roles*, *33*, 447–457.

Ruff, J. R. (2001). *Violence in early modern Europe 1500–1800*. Boston: Cambridge University Press.

Sabini, J. (1992). *Social psychology* (2nd ed.). New York: Norton.

Staub, E. (2004). Basic human needs, altruism, and aggression. In A. G. Miller (Ed.), *The social psychology of good and evil*. New York: Guilford.

Stolinsky, S. A., & Stolinsky, D. C. (2000). Homicide and suicide rates do not covary. *The Journal of Trauma, Injury, Infection, and Critical Care*, *48*, 1168–1169.

Symons, D. (1979). *The evolution of human sexuality*. New York: Oxford University Press.

Thornhill, R., & Palmer, C. (2000). *A natural history of rape: Biological bases of sexual coercion*. Cambridge, MA: MIT Press.

Tooby, J., & Cosmides, L. (1992). Psychological foundations of culture. In J. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind* (pp. 19–136). New York: Oxford University Press.

Trivers, R. (1985). *Social evolution*. Menlo Park, CA: The Benjamin/Cummings Publishing Company.

United Nations. (1998). *United Nations 1996 demographic yearbook*. New York: United Nations.

Waller, A. L. (1993). The Hatfield–McCoy feud. In W. Graebner (Ed.), *True stories from the American past* (pp. 35–54). New York: McGraw-Hill.

Wilson, M., & Daly, M. (1985). Competitiveness, risk-taking, and violence: The young male syndrome. *Ethology and Sociobiology*, *6*, 59–73.

Wrangham, R., & Peterson, D. (1996). *Demonic males*. Boston: Houghton Mifflin.

Zimbardo, P. G. (2004). A situationist perspective on the psychology of evil: Understanding how good people are transformed into perpetrators. In A. G. Miller (Ed.), *The social psychology of good and evil*. New York: Guildford.