

*Martin Daly and Margo Wilson*

# Crime and Conflict: Homicide in Evolutionary Psychological Perspective

## ABSTRACT

Criminological theories are usually framed in sociological terms but always entail psychological assumptions. Psychological accounts, in their turn, entail assumptions about the adaptive “design” of evolved mental mechanisms and processes. Thus, explicit attention to recent theory and research on psychology and evolution can sometimes help criminologists generate productive hypotheses and avoid blind alleys. Homicide research is illustrative. Interpersonal conflicts are engendered by interactions among individuals whose psyches were designed by natural and sexual selection to make them effective competitors and effective nepotists (kin-benefactors). These considerations suggest numerous testable hypotheses about such matters as who is likely to kill whom, and how the demography of homicide perpetration and victimization is likely to vary among victim-killer relationships. An evolutionary psychological perspective inspires us to criticize recent criminological discussions of sex differences and age patterns in criminal offending, theories that contrast rational choice with emotional or impulsive behavior, and the medicalization of antisocial behavior as a pathology.

Criminological theory is overwhelmingly and appropriately framed in sociological terms, but it always entails assumptions or postulates about human desires, developmental susceptibilities, and social inferences. In other words, sociological concepts and theories rest on models of human psychology, models that are often implicit and unexamined (Mon-

Martin Daly and Margo Wilson are professors of psychology at McMaster University in Hamilton, Ontario, Canada. We thank John Monahan and Michael Tonry for comments on a draft of this essay and the Social Sciences and Humanities Research Council of Canada, the Harry Frank Guggenheim Foundation, and the Natural Sciences and Engineering Research Council of Canada for financial support

ahan and Splane 1980) and sometimes obsolete. Attending to what psychologists have discovered about how people process information and select their actions can be a great aid to criminologists, including even those primarily interested in macrosocial phenomena.

Psychological explanations, in their turn, rest on models of the functional organization of the human animal, and these models of our evolved "human nature" also warrant scrutiny. Attending to what evolutionists have discovered about the process that designed the human mind can be a great aid to psychologists in their investigations of the mind's structure and operations (Barkow, Cosmides, and Tooby 1992). Our thesis, then, is that the conceptual framework of evolutionary psychologists can be a valuable aid to criminological theory and research if criminologists can forsake disciplinary parochialisms and reflex denunciations of "reductionism."

Evolutionary psychology's brand of reductionism is not simplistic. Quite the contrary, in fact, for it treats social influence as more complex than do prevailing criminological models. Seeing people as active agents with intricately structured information-processing abilities and self-interests, evolutionary psychologists are critical of approaches that treat them instead as little more than putty shaped by the statistical sum of their experiences. Influential treatments of the "subculture of violence" (e.g., Wolfgang and Ferracutti 1967) and of mass media effects on "imitative" violence (e.g., Phillips 1983; Baron and Reiss 1985), for example, are flawed by virtue of their reliance on an unrealistic, implicit model of the human animal as a passive recipient of cultural influence rather than its active interpreter (Daly and Wilson 1989). In these and other discussions of the social patterning of criminal violence, social influence is often conceptualized as the mere elicitation of an arbitrary, thoughtless conformity when the actual processes involved are likely to be subtler. A sensible man will be quicker on the trigger in what he perceives to be a relatively violent setting than in an apparently peaceful one, for example, not because he has become acculturated or has internalized local norms about the legitimacy of violence but because of a shift in the perceived risk of life-threatening action by antagonists. For this sort of reason, the positive feedback of violence on itself, which is often blithely attributed to imitation or contagion or the reinforcing of norms, may be mediated by processes quite different than these terms imply. A more satisfactory account of "subcultural" and "imitative" effects must incorporate a specific characterization of the psychological processes by which the

effective variables influence individual actors. Nisbett and Cohen (1996) provide an outstanding example of such an approach with respect to regional differences in the legitimacy and prevalence of violence in the United States.

In this essay we outline an evolutionary psychological perspective on conflicts of interest and criminal violations of other people's interests, with principal reference to research on homicide. We argue that certain patterns in the incidence of conflict and crime are predictable consequences of psychological processes that have been designed by the evolutionary process of Darwinian selection to make individuals effective competitors and effective "nepotists" (kin-benefactors) in ancestral environments. We argue that this perspective sheds light on the roles of certain demographic and situational variables, some but not all of which criminologists already consider important as risk factors for crime perpetration and victimization. We discuss sex differences in crime in the light of evolutionary understandings of what the male-female phenomenon is fundamentally about, and we discuss age patterns in the light of evolutionary understandings of life span development. The school of criminological thought that is perhaps most congenial to this perspective is the "rational choice/routine activities" approach, but we suggest some caveats about "rationality." In conclusion, we offer some suggestions for research that will more explicitly acknowledge that emergent group-level phenomena are both the products of interactions of numerous actors and a crucial part of the social and material environment affecting those actors.

### I. Crime and Conflict

"Crime" is a socially constructed category of variable-specific content: acts that are deemed crimes in one time or place may be legitimate in others. It does not follow, however, that the set of things called "crime" is arbitrarily constituted. There is considerable overlap in the content of criminal codes, both written and traditional, from around the world. The acts that are most consistently criminalized are concentrated in a few principal domains: certain acts of violence, certain sexual acts, certain acts of expropriation, and certain betrayals of the collectivity to rival collectivities. In sum, crime consists overwhelmingly of self-interested action conducted in violation (or reckless disregard) of the interests of others.

If criminal activity derives from interpersonal conflicts of interest, then criminological understanding would surely benefit from a sound

theory of the fundamental nature of self-interests (Cohen and Machalek 1988; Daly and Wilson 1988*a*, 1988*b*; Vila 1994; Machalek 1995). Where do interests overlap and where do they conflict? What are the determinants of variable inclinations to challenge rivals or to expropriate material resources? What qualifies as a crucial resource anyway, and why are even immaterial social resources such as status perceived as limited and worth contesting? These are questions that are addressed at a fundamental level by the emerging synthesis of evolutionary psychology. Whereas “interests” and “conflict” are conceived as group-level phenomena by many criminologists, evolutionists see each person’s interests as distinct and consider theories that analogize collectivities to individual actors to be flawed (see Sec. IIC below).

The evolutionary conception of conflict is largely but not entirely a matter of resource competition. “Competition” refers to any conflict of interests in which one party’s possession or use of a mutually desired resource precludes another party’s possession or use of the same. This category clearly encompasses most of the criminal acts that are likely to be called “instrumental” or “rational,” but it also includes crimes that might be deemed “expressive” or “irrational.” Violence motivated by sexual rivalry is an obvious example. More subtle examples are the “face” and “status” disputes that constitute a very large proportion (perhaps the majority) of all U.S. homicides; the social resources contested in these cases are limited means to the end of more tangible resources (Wilson and Daly 1985). But not all conflicts are competitive according to the above definition. If a woman rejects one suitor for another, for example, then she and the spurned man have a conflict of interest, but they are not competitors, whereas the male rivals are. In general, competition is predominantly a same-sex affair because same-sex individuals are usually more similar in the resources they desire than opposite-sex individuals. There is a rich body of evolutionary theory, discussed below, concerning the ways in which sex, age, and other factors affect the intensity of competition, and this body of theory sheds light on the sulking demographic patterning of crime.

Although we believe that an evolutionary psychological approach is of broad applicability to the study of crime, we focus here on homicide. Homicide is in several ways the best prototype of crime. It is a major crime in all codes, exemptions of various forms of justifiable homicide notwithstanding. It stands at or near the top of everyone’s list of “serious” crimes. It is generally believed to be the most reliably detected and reported of crimes, hence the crime most amenable to unbiased

analysis of its correlates and putative causes. Finally, homicides are drastic resolutions of interpersonal conflicts and thus afford a window on the variable incidence and intensity of such conflicts. It is this latter idea—that homicide can be treated as a sort of “conflict assay” for testing theoretical ideas about the factors exacerbating or mitigating interpersonal conflict in particular relationship categories, life stages, and circumstances—that has inspired most of our own research on homicide, some of which is reviewed below. But before we get to matters of criminological substance, a general introduction to evolutionary psychology is required.

## II. Evolutionary Psychology

In criminology textbooks, the word “psychology” is used mainly with reference to personal attributes that differ among individuals, and especially those attributes that may be interpreted as abnormal deficits or pathologies. However, the study of stable individual differences, pathological or otherwise, constitutes only a small part of psychological science and not the part of greatest relevance for understanding crime as a social phenomenon.

### *A. Psychological Mechanisms and Processes Are Biological Adaptations*

Psychological science is primarily a quest to discover the mechanisms and processes that produce behavior and to characterize them at a level of abstraction that applies to everyone (or at least to everyone of a given sex and life stage). Psychology is closely related to physiology and neuroscience, but it is distinguished by its focus on an informational level of description: its constructs include memory encoding and retrieval, attention processes, recognition and categorization, attitudes, values, self concepts, motives, and emotions. When postulating such constructs, psychologists aim for a level of abstraction at which historical, cultural, and ecological variability can be explained as the contingent products of consistent panhuman psychological processes responding to variable circumstances and experiences. “Anger,” for example, is a motivational/emotional state that can be elicited in anyone, and that plays a role both in mobilizing physiological resources for violent action and in advertising one’s likelihood of engaging in such action. More controversially, perhaps, we propose that “male sexual proprietariness” is a sexually differentiated motivational/cognitive subsystem of the human mind, with behavioral manifestations that are culturally and historically variable but are nevertheless predictably related

to various aspects of the status and circumstances of the focal man, his partner, and his rivals. (This argument is developed in Sec. VIII below.)

Basic psychological constructs like “color vision” and “self esteem” and “anger” and “sexual proprietariness” are putative components of human nature. Insofar as they are complexly organized, they are almost certainly *biological adaptations*: attributes that are effectively organized, as a result of a long history of natural selection, to achieve some useful function such as respiration or image analysis or the vanquishing of rivals.

The proposition that some attribute is an adaptation is a hypothesis about special-purpose “design,” suggesting avenues of further inquiry (Williams 1966). Generating hypotheses about what such enigmatic lumps of tissue as the heart or lungs or liver are designed to accomplish were essential first steps for investigating their physiology and pathologies (Mayr 1983). The same goes for the successful investigation of mental “organs”: psychological mechanisms are designed to solve particular adaptive problems, and hypotheses about these adaptive functions give direction to the research enterprise in both obvious and more subtle ways (Daly and Wilson 1994a, 1995). A psychologist who assumes, for example, that the principal function of the psychophysiology of anger is to mobilize the organism for effective physical assaults will look for a somewhat different set of manifestations and social controls than another who instead assumes that anger functions primarily to threaten and deter so as to limit the costs of violent confrontations. The unwitting “designer” of adaptations—the “blind watchmaker” in Dawkins's (1986) memorable phrase—is Darwinian selection, the process that created existing adaptations in each living species as solutions to recurring problems confronted by many generations of its ancestors. These evolved solutions necessarily entail contingent response to environmental features that were statistical predictors, on average, of the fitness consequences of alternative courses of action in the past. (Darwinian “fitness” refers to reproductive posterity, or, somewhat more precisely, to the average success of a given phenotypic design in promoting its proportionate prevalence by promoting the relative replicative success of its bearer's genes in competition with their alleles in the environments of natural selection.)

It follows that evolutionary psychologists see no distinction in kind between “psychological” and “biological” phenomena. Influences and processes, which are best characterized at a psychological level (e.g., in

cognitive, interpretative, or experiential terms), are in incessant reciprocal interaction with the sorts of physiological states and processes commonly referred to as “biological” influences on behavior. Circulating blood levels of the male gonadal hormone testosterone, for example, have a variety of subtle effects on information processing and behavior, both by virtue of action in the central nervous system itself and by virtue of other peripheral effects, but testosterone levels are themselves affected by social experience and these effects are themselves affected by culturally specific considerations. A man’s perception that he has won in some sort of competition can lead to rapid elevations of circulating testosterone, even if the “competitions” are as arbitrary as a coin toss (McCaul, Gladue, and Joppa 1992) or as cerebral as a chess game (Mazur, Booth, and Dabbs 1992). Moreover, in one experimental study, an insult that engendered a surge of testosterone in men raised in the “honor” culture of the south in the United States, in which retaliatory aggression is admired, had no such influence on men raised in the north, where it is not (Nisbett and Cohen 1996). Thus psychophysiological adaptations often entail contingent response not just to immediate circumstances but also to the cumulative consequences of experience, including the assimilation and internalization of local cultural norms.

Discussions of criminal violence are frequently couched in the language of *pathology*. This is an appropriate framework insofar as violence is associated with alcohol-induced psychoses, delusions, and organic defects, as may often be the case (e.g., Raine 1993; Giancola and Zeichner 1995; Aarmland et al. 1996), but the language of pathology can mislead. Violent behavior is abhorrent, but that does not mean that violence is a pathology (Monahan and Splane 1980; Cohen and Machalek 1994). Pathologies are failures of anatomical, physiological, and psychological adaptations as a result of mishap, senescent decline, or subversion by biotic agents with antagonistic interests, failures that reduce the adaptations’ effectiveness in achieving the functions for which they evolved (Williams and Nesse 1991). Violence cannot in general be explained as a maladaptive byproduct of such failures since people and other animals possess complex psychophysiological machinery that is clearly designed *for* the production and regulation of violence.

The evidence of functional design in the psychophysiology of violence is diverse. In the first place, its elicitors are typically threats to survival and reproduction, and its effects are typically to counter those threats. Animals (including people) react violently to usurpation of es-

sential resources by rivals, and they direct their violence against those rivals (Huntingford and Turner 1987; Archer 1988). Behavioral ecologists have analyzed the cost-benefit structure of confrontational violence in terms of the conditional determinants of the expected consequences of fight versus flight and of escalation (e.g., Andersson 1980; Enquist and Leimar 1990; Colegrave 1994), and they have assessed whether animals actually behave in ways that are contingent on available cues of the probable costs and benefits of alternative actions (e.g., Chase, Bartolomeo, and Dugatkin 1994; Pruett-Jones and Pruett-Jones 1994; Turner 1994; Kvarnemo, Forsgren, and Magnhagen 1995). These analyses leave little doubt that violent interactions are regulated with sensitivity to probable consequences.

In addition to contextual appropriateness, the motivational states of angry arousal entail postures appropriate for attack and defense and complex psychophysiological mobilization for effective violent action and for the temporary suppression of potential interference from other adaptations such as pain sensitivity. Animals exhibit diverse morphological structures that function solely or primarily as intraspecific weapons, and these are often sexually differentiated and characteristic of delimited life stages. There is neural machinery dedicated to aggression and this too is often sexually differentiated. Moreover, the sexual differentiation of physical aggression is itself variable across species, and the magnitude of sex differences in both overt weaponry and intrasexual aggressive behavior is systematically related to other variable aspects of social ecology (Daly and Wilson 1983). All of these facts testify to the potency of Darwinian selection in shaping the anatomy and psychology of intraspecific violence.

The misconception that human violence is merely pathological has perhaps been reinforced by studies linking it to disadvantaged backgrounds and environments. But these associations are by no means universal. In nonstate societies, like those in which the human psyche evolved, skilled violence was a prominent attribute of high-status men and a contributor to their success (Betzig 1986; Chagnon 1988, 1996). In modern state societies, the welfare of most people no longer depends on their own or their allies' violent capabilities, so violence is relatively rare and relatively likely to reflect psychological pathology. Nevertheless, disproportionate numbers of violent offenders are drawn from groups who lack access to the opportunities and protective state services available to more fortunate citizens, and who therefore find themselves in "self-help" circumstances much like those experienced

by most of our human ancestors. It is not at all clear that violence in such circumstances is usefully deemed pathological. Moreover, even in other circumstances, and even where violence is associated with an organic defect, there remains a functional organization to its contingent controls.

*B. Evolutionary Psychology Is Not a Monolithic Falsifiable Theory but a Framework for Generating Theories*

Science is a self-correcting, cumulative enterprise whose practitioners routinely and appropriately try to formulate mutually exclusive alternative hypotheses and revise their models to accommodate unexpected findings. Ironically, however, when evolutionists engage in these ordinary scientific practices, they are apt to encounter accusations of engaging in untestable pseudoscience. A common misunderstanding, even among self-styled “evolutionary psychologists,” is that “the evolutionary hypothesis” about sex differences or the age-crime relationship or whatever can and should be tested against “nonevolutionary” alternatives. But there is no single, privileged “evolutionary hypothesis” about any of these phenomena, and the only currently available alternative to the theory of evolution by selection is creationism, which is pseudoscience (see, e.g., Futuyma 1983). Evolution is “just a theory” in exactly the same sense as the atomic theory is just a theory. The proposition that the human animal and its psyche evolved under the influence of selection is a “fact” in the same sense (and as well established) as other scientific propositions at some remove from direct observation, such as the fact that brains process information or the fact that molecules are comprised of atoms. The alternatives to a particular evolutionary hypothesis are other evolutionary hypotheses.

Like other animals, human beings can be analyzed into subsystems that perform distinct tasks: respiration, learning, digestion, visual scene analysis, and so forth. These separate tasks are carried out by their separate bits of anatomical, biochemical, and psychological machinery, in the service of a functionally integrated, higher-order, organismic agenda. And what is that agenda? To manufacture additional, similar animals. This is the single superordinate “purpose” that natural selection, the process responsible for the fact that we possess complex adaptive attributes, designed them to achieve. We have placed the word “purpose” in quotation marks because it is important to stress that fitness is not literally an objective. The goals that animals (including

people) have evolved to monitor and pursue are more immediate things like full bellies and sexual satisfaction.

Evolutionists often say that functionally integrated systems with many parts and actions constitute a “strategy.” Elements in a particular flowering plant’s “reproductive strategy,” for example, might include sprouting in response to a threshold soil temperature, flowering at a certain day length, and maturing of the female parts of its hermaphroditic flowers before its male parts. The metaphorical nature of the language of strategy is obvious here; no one imagines that the plant has intentionality. Where this metaphor can be misleading is in the case of animals’ evolved strategies since one may slip unwittingly from claims about what the organism is “designed” to achieve into claims about what it is “trying” to achieve. This is especially problematic in the case of the human animal.

In other words, the purpose-like functionality of adaptations invites an uncritical equation between intentions, goals, and ambitions, on the one hand, and adaptive functions, on the other. Consider the idea that sexual motivation has evolved “to” promote reproduction. Several writers have erroneously taken this to imply that people must have evolved to pursue reproductive ends with strategic flexibility, and that evolutionists should therefore expect contraception to be eschewed unless it can be used as a means of allocating reproductive efforts to increase the numbers or improve the circumstances of one’s young. By similar logic, voluntary childlessness and vasectomy have been cited as evidence against “the evolutionary hypothesis.” But it should be obvious that evolved adaptations can be expected to be reproductively effective only in environments that are not crucially different from those in which the relevant history of natural selection took place (Symons 1990; Tooby and Cosmides 1990*b*). Thus, even a convincing demonstration that the innovation of modern contraception has left people blithely pursuing reproductively ineffectual objectives would in no way challenge the proposition that human sexuality is a complex psychological adaptation for the promotion of fitness.

The point here is that fitness plays a different role in evolutionary theory from the role that homeostasis or self-esteem or other monitored target states play in physiological and psychological theories. When the fitness consequences of behavior are invoked to explain it, they are properly invoked not as wants or goals but as explanations of why particular proximal objectives and motivators have evolved to play their particular roles in the causal control of behavior, and why they

are calibrated as they are. When male birds continuously follow their mates closely during the breeding season, for example, ornithologists interpret the behavior as *mate-guarding* and its fitness-promoting function as *paternity assurance*. These interpretations have inspired many testable hypotheses about the contingent causal control of behavior: mate-guarding has been found to vary in relation to several cues of the onset of female fertility, and to vary in relation to the proximity, abundance, and attractiveness of male rivals, for example, while the male's success in keeping his mate under guard has been found to be predictive of his subsequent level of participation in the care of his putative offspring (Davies 1992; Møller 1994). These facts were discovered as a direct result of theorizing that the adaptive function of the mate-guarding psychology of male birds resides in paternity assurance, and yet the bird neither knows nor cares about paternity per se.

Genetic posterity or fitness can be deemed the superordinate "purpose" of evolved psychologies, then, so long as the implication of functionality without intentionality is understood. But what use is it to identify superordinate purpose in this way? The very generality of the idea that reproductive posterity is the distal function of all adaptations may make it seem uselessly vague. Commanded by Darwinian gods to go forth and multiply, a dutiful Eve might sensibly ask, "But how, exactly?" So let's analyze Eve's task, from the top down rather than from respiration, et cetera, up.

People are manufactured out of other substances, so Eve's task immediately resolves itself into two major subtasks: garner the resources necessary for reproduction and convert those resources into more people. Moreover, making "more people" doesn't mean just *any* people. The specific adaptive attributes favored by selection are necessarily those that have somehow effectuated their own proliferation relative to alternative attributes within the same population. Thus, the people whose survival and reproduction our minds and bodies have evolved to promote are our descendants and other blood relatives. Although people often find common cause and cooperate with nonrelatives, and although there is a body of evolutionary theorizing concerned with such "reciprocal altruism" (Trivers 1971; Alexander 1987), shared interests and solidarity are most readily attained and maintained among blood kin. Moreover, all the males in a population have always been engaged in a sort of zero-sum game for the paternal half of the ancestry of future generations, while the females were playing a parallel game for the maternal half.

These considerations put a different gloss on the “two major sub-tasks” mentioned earlier. What people and other creatures must have evolved to do is to be effective competitors in intrasexual competition for essential reproductive resources in the social and material environments of selection, and to be effective “nepotists” in those environments (Hamilton 1964). And what they have certainly not evolved to do is to promote “the reproduction of their species,” as a prominent misunderstanding of natural selection would have it.

### *C. Groups Are Not Individuals*

Social scientists have repeatedly promulgated theories in which various characteristics of individuals—intentions and preferences, ambivalences, health and pathology, homeostatic regulation, and so forth—are attributed to collectivities. An evolutionary perspective suggests that such theories constitutes a weak metaphor, at best.

Evolutionary psychology and behavioral ecology began to flower only after a common fallacy, dubbed “greater goodism” by Cronin (1991), was dispelled. For 100 years after Darwin, most biologists had uncritically assumed that natural selection equips animals with the shared purpose of “the reproduction of the species.” This assumption was wrong (Williams 1966).

Natural selection is a matter of differential reproductive success, and it has consistently favored *those individual attributes most effective in out-reproducing alternative attributes within the same population*. The attributes that succeed by this criterion are not necessarily those that will best promote the population's welfare or persistence. Decades of theoretical and empirical work on “levels of selection” in biology (see, e.g., Dawkins 1982, 1986; Cronin 1991) have confirmed and clarified why the individual organism is the primary locus of complex integrated self-interest in the hierarchy of life. (The reason why the main locus of integrated self-interest does not reside at a level *below* that of the individual is that the expected fitnesses of an individual's organs or cells or genes are for the most part isomorphic with the whole organism's expected fitness, so selection favors those suborganismic elements that maximize this quantity at the organismic level. There are, however, important exceptions at the genetic level [see, e.g., Cosmides and Tooby 1981; Dawkins 1982; Haig 1993].)

Attempts to understand the behavior of societies, classes, cohorts, and other collectivities confront a special problem. The human mind is marvelously adept at constructing mental models of the agendas and

likely actions of intentional agents like ourselves. We apparently owe this talent to an evolved psychological mechanism, our so-called theory-of-mind module (e.g., Leslie 1992; Premack and Premack 1995). This extremely sophisticated cognitive device infers the idiosyncratic details and interconnections of the beliefs, plans, and intentions of each person we have to deal with, on the basis of that person's known history of actions and on the default assumption that his or her mind is like our own in its elements and rules but not in its detailed contents. The theory-of-mind module is essential for normal social functioning, and insight into its workings has been gained partly from study of the severe disability of those in whom it is defective or lacking, namely, autistics (Baron-Cohen 1995). It is obviously enormously useful to be able to anticipate the actions of other people by consulting a model of how what they know and don't know, what they want, and what they believe will interact and affect their actions. An apparent byproduct of this useful talent, however, is a (usually harmless) tendency to misapply the same sort of thinking to entities that are not intentional agents, such as computers or cars or "society."

In Canada, we are treated to an example of this sort of fallacious thinking whenever there is a multiparty election in which no party wins a majority of the parliamentary seats. Pundits can be counted on to explain that a disgruntled or skeptical public, trusting none of the contending parties to govern fairly or effectively, has expressed its preference for a minority government instead. We hope that the spuriousness and obfuscation produced by reifying the "body politic" is transparent in this case. The mere fact of a split vote provides no evidence about disgruntlement, skepticism, or trust on the part of anyone nor does the election of a minority government necessarily correspond to anyone's preferred result.

Social scientists are not immune to this sort of fallacious thinking. Treating "the patriarchy" as a cohesive, intentional agent, for example, clarifies nothing about conflict and power relations between the sexes while obscuring the relevance of men's conflicts with one another to their inclinations to control their wives coercively (see Sec. VIII below). Other cases are subtler. Discussions of "social disorganization," for example, may invoke the capacity of large amorphous segments of society, such as classes or subcultures, to "regulate themselves," piling one weak metaphor on another. Genuine "regulation" of perturbations is an attribute only of systems with a unity of purpose, an attribute "designed into" the system either by natural selection or by an inten-

tional agent. "Social pathology" is similarly metaphorical, for as noted above, a genuine pathology is something that compromises a functionally united entity's capacity to do what it evolved to do.

Individual organisms and their constituent parts have evolved to do many specific things, but collectivities above the level of the individual organism are not, in general, specifically organized to accomplish anything in particular (Williams 1966). Clubs, political parties, and other human organizations formed for common goals are conspicuous exceptions to this generalization. But classes, subcultures, and societies are not. Applying individual-level concepts like desire or preference or pathology to group-level entities whose unity of purpose does not approach that of individual organisms virtually guarantees that their causal dynamics will be misrepresented. When one speaks of what "society" encourages or what "the patriarchy" schemes to achieve, for example, one obscures the complexity of social processes and the ubiquity of conflicts of interest. This is not to say that groups qua groups have no properties worth talking about. But group-level properties are emergent and distinct from those of their constituent individuals. A society or polity or occupational group or class does not have preferences or intentions or pathologies. It has institutions, balances of power, a greater or lesser degree of consensus on each issue, and a certain distribution of wealth, among other things.

#### *D. Evolutionary Psychology Is Not Behavior Genetics*

As we noted earlier, psychological science is primarily concerned with the mechanism and processes that all normal individuals share, and this is equally true of evolutionary psychology. It is a fact that individuals respond differently to identical environmental inputs from the earliest developmental stages, and that some of that diversity is due to genetic differences. However, the notion that such genetic diversity is of central interest to evolutionists is a misconception.

Behavior genetics is the scientific discipline concerned with analyzing the degree to which behavioral differences between individuals within populations can be traced to genetic differences. This field has been largely isolated from evolutionary psychology (and behavioral ecology and sociobiology), whose main concerns are mental mechanisms and processes that are shared by all normal individuals, generating behavioral variation as contingent response, both immediate and enduring (developmental), to social and other environmental variation (Crawford and Anderson 1989; Daly 1996).

Confusion on this point derives largely from a mistaken belief that evolutionary psychological hypotheses imply that one should be able to discover genes “for” generating the proposed adaptations. Geneticists are able to identify genes that code “for” an attribute when some individuals have the gene and the condition while others do not, that is, when the attribute is “heritable.” An example is the rare MOA1 gene associated with impulsive violence, discovered by Brunner et al. (1993). However, the adaptations of interest to evolutionary psychologists are typically universal, and there is no reason to expect that there will be detectable heritable variation in their expression. Thus, although it is often asserted that hypotheses about evolved adaptations imply that heritability should be appreciable and demonstrable (e.g., Sussman, Cheverud, and Bartlett 1995), just the opposite is true. A substantial amount of heritable variation is *prima facie* evidence that the attribute under consideration is selectively neutral and hence not an adaptation at all (Falconer 1960). It is no accident, for example, that the variable attribute of our eyes that is most highly heritable, namely the color of the iris, plays no part in vision.

Perhaps evolutionary adaptationist hypotheses are so often misconstrued as hypotheses about behavior genetics because they invoke hypothetical genes “for” behavioral and psychological attributes in their theories. The point of such theories is not, however, to trace observed behavioral variation to genetic differences. Rather, population genetical models are used to address how selection would be expected to shape a given trait if minor, rare heritable variants were to arise (as they evidently do with respect to almost any quantifiable trait), and to predict what forms and magnitudes of the selected traits would be expected to become species-typical over evolutionary time. But since selection is constantly removing suboptimal variants (such as the deficient MOA1 gene that Brunner et al. [1993] found in a single human lineage), the residual heritable variation of any trait with important fitness effects is likely to be negligible.

Thus notwithstanding the genetical language, both theory and research in evolutionary psychology and behavioral ecology are directed toward the discovery of species-typical adaptations, and these are often expressed as contingent decision rules. For example, “mate-guarding” behavior varies among the mated males of a given bird species (and, no doubt, among human males as well), and this variation is intelligible as the product of a common psychology with contingent decision rules: the males respond to “bachelor pressure” as cued by one’s encounter

rate with lone males and to various other “risk” factors (e.g., Møller 1994). For this reason, environmental rather than genetic sources of behavioral variation provide the crucial tests of evolutionary psychological hypotheses (Crawford and Anderson 1989).

### III Who Victimizes Whom?

The preceding introductory overview is all the evolutionary psychology one needs to approach some criminological issues in a fresh way. An exemplary topic is family violence (Daly and Wilson 1988a).

According to current understandings of the evolution of social motives and behavior, the basic appetites, aversions, motives, emotions, and cognitive processes characteristic of any species, including *Homo Sapiens*, have been shaped by natural selection to produce social action that is effectively “nepotistic”: action that promotes the persistence of the actor’s genetic elements in future generations by contributing to the survival and reproduction of the actor’s genetic relatives. It follows that the basic psychological processes underlying solidarity and conflict in any social species should include processes that typically function to engender discriminative behavior in relation to genetic relatedness, and such processes indeed abound. Theory and research are in accord: other things being equal, cues that are ordinarily indicative of genetic relationship may be expected to mitigate animal conflict, and there is abundant evidence that they do (see, e.g., Hepper 1991).

In light of the ubiquity of nepotistic solidarity in the animal kingdom, some prevailing notions about intrafamilial conflict and violence in the human animal seem more than a little odd. Freudians would have us believe that the urge to kill one’s father is a universal element of the human male psyche, and the claims of some family violence researchers are scarcely less astonishing. According to Gelles and Straus (1985, p. 88): “With the exception of the police and the military, the family is perhaps the most violent social group, and the home the most violent social setting, in our society. A person is more likely to be hit or killed in his or her home by another family member than anywhere else or by anyone else.” To an evolutionary psychologist, these assertions are too surprising to escape critical scrutiny.

The first concept needing scrutiny is “family.” Following Marvin Wolfgang (1958), homicide researchers have typically partitioned the victim-killer relationship into three categories: stranger, acquaintance, and relative. However, the third of these is far too general, encom-

passing relationships whose qualitative distinctions greatly surpass those distinguishing “strangers” from “acquaintances.” The evolutionary psychological basis of the parent-child relationship, for example, is different from that characterizing the marital relationship since parent and child are genetic relatives with an indissoluble overlap in their fitness prospects whereas a comparable overlap in the expected fitness of marriage partners is predicated on reproduction and sexual fidelity. It follows that the specific potential sources of conflict in these two “family” relationships are utterly different, and the risk that conflict will become violent is vastly different, too (Daly and Wilson 1988a, 1988b).

In addition to calling prevailing taxonomies of relationship into question, these considerations raise the issue of “opportunities” for violence as a result of routine activity patterns. In the report of a U.S. presidential commission on “causes and prevention of violence,” Goode (1969, P. 941) posed the question, “Why do intimates commit violence against one another?” and replied, “Perhaps the most powerful if crude answer is that they are there.” This appeal to differential opportunity is true as far as it goes, but it begs the question of whether relationships are differentially risky when opportunity is controlled. Goode implies that they are not, especially if the concept of opportunity is extended to encompass the intensity of interaction as well as its frequency: “Moreover, again crudely but reasonably, we are violent toward our intimates—friends, lovers, spouses—because few others can anger us so much. As they are a main source of our pleasure, they are equally a main source of frustration and hurt.” Is such an analysis adequate? Or do the distinct sorts of “intimate” relationships differ in ways that are not simply a matter of differential opportunity, as an evolutionary theoretical analysis of relationships would lead us to expect? (Suspicion should be aroused by the omission of “children” from Goode's list of “intimates.” Its words surely apply to them at least as much as to “friends,” but perhaps the distinctive quality of parent-child intimacy is too obvious to ignore.)

One way to try to control for opportunity is to assess the incidence of violence between members of the same household, using information on the living arrangements of the population-at-large to specify the universe of potential victim-offender pairs. Daly and Wilson (1982) performed such an analysis of homicides in Detroit, with the results portrayed in figure 1. Clearly, Goode's analysis was *not* adequate. Coresiding persons who were not genetic relatives experienced a ho-

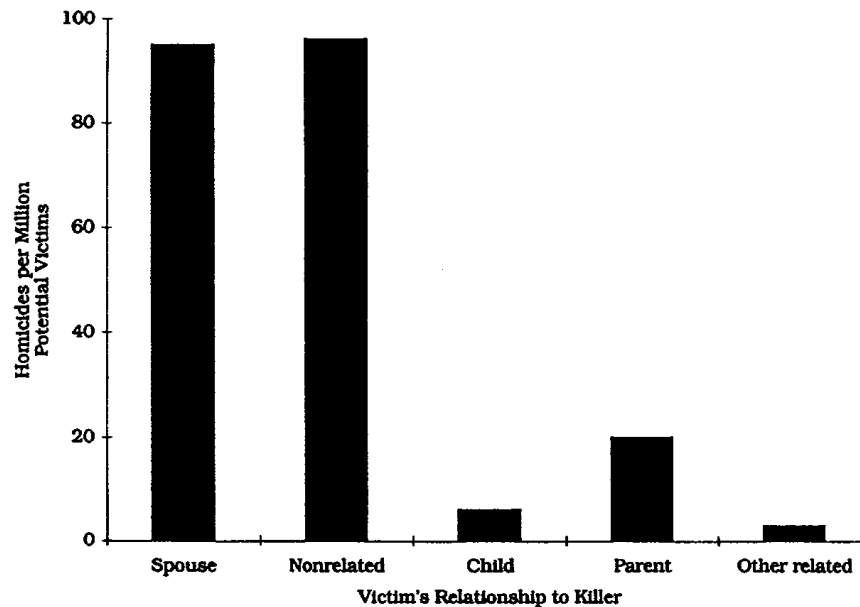


FIG. 1.—Rates of homicide in which victim and killer coresided in the same household in Detroit, 1972, by victim-killer relationship category. Note.—The 98 cases represent all solved within-household homicides known to the Detroit police. Denominators for rate determinations represent the numbers of coresiding dyads in the relevant category, in which the potential killer was an “adult” (age fourteen years or more) according to estimates from 1970 census information. “Parent” and “child” victims include step-relationships since these were not distinguishable from birth relationships in the household census data. Source.—Based on Daly and Wilson (1982).

micide rate more than eleven times greater than coresiding kin. Moreover, although so-called family homicide is seen to be mainly marital homicide, the risk incurred by other sorts of unrelated coresidents (roommates and boarders) was just as extreme and greatly exceeded the risk in more “intimate” family relationships, in apparent contradiction to Goode’s invocation of intimates’ special ability to evoke anger.

The more general points that figure 1 illustrates have been upheld in a variety of analyses of data from a variety of societies: kinship softens conflict, and the qualitative distinctions among relationships cannot be captured in simple dimensions like opportunity or intimacy (Daly and Wilson 1988b). The substance and intensity of conflicts are relationship-specific because particular social relationships—parent and child, spouses, unrelated friends, sexual rivals, and so forth—differ in their particular sources of potential and actual concordances and discrepancies in desired states of affairs.

Failures of reciprocation are common sources of conflict in virtually

all relationships, for example, but not in the parent-child relationship, which is uniquely characterized by an unbegrudged one-way flow of resources. Instead, parent-offspring conflicts tend to revolve around an issue peculiar to that relationship, namely the allocation of parental resources among offspring (Trivers 1974); this insight predicts and explains much about the peculiar epidemiology of infanticide and other kinds of parentally perpetrated violence (Daly and Wilson 1988a, 1995). Other relationships have their characteristic conflicts, too. When men kill their brothers, the usual issue of contention is the partitioning of familial resources, whereas when they kill their brothers-in-law, other issues, especially the mistreatment of the person's sister by her husband, predominate (Daly and Wilson 1988b). And in violent marital conflict, the bones of contention, and hence the demographic risk markers, are different again (see Sec. VIII below).

#### IV. Differences in Competition and Violence

Most lethal violence occurs not within the family but between unrelated acquaintances and strangers, and much of this violence arises in the context of competition for material goods and more intangible resources like face and status. Competition is predominantly a same-sex affair, and variations in rates of homicide involving unrelated same-sex persons can be considered a sort of assay of competition's local intensity (Daly and Wilson 1988b). Thus inequitable resource distribution obviously affects the local level of competition, and as we would expect, it is also a predictor of homicide rates (Krahn, Hartnagel, and Gartrell 1986; Hsieh and Pugh 1993), with same-sex nonrelative cases constituting the component of the homicide rate that varies most between times and places (Daly and Wilson 1988b). But whereas prevailing intensities of competition and gross rates of homicide are hugely variable in time and space, one difference is apparently universal: men kill unrelated men at vastly higher rates than women kill unrelated women, everywhere (see table 1).

Criminologists and other social scientists have offered a wide range of hypotheses to explain sex differences in the use of lethal violence. Unfortunately, most presuppose the psychic identity of the sexes and are clearly unsatisfactory. Many writers have attributed men's greater use of violence to some local aspect of one or another particular society, providing no candidate explanation for the phenomenon's cross-cultural generality (see Daly and Wilson 1988b, pp. 149-61). Others have invoked men's greater size and strength, but while this asymmetry

TABLE 1  
Numbers of Same-Sex Homicides in Which Victim and Killer Were Unrelated: Various Studies

Location/Society	Periods of Study	Male	Female
Chicago	1965-81	7439	195
Detroit	1972	316	11
Miami	1980	358	0
Canada	1974-83	2387	59
England and Wales	1977-86	2195	95
Scotland	1953-74	143	5
Iceland	1946-70	7	0
A Mayan Village (Mexico)	1938-65	15	0
Bison-Horn Maria (India)	1920-41	36	1
Munda (India)		34	0
Oraon (India)		26	0
Bhil (India)	1971-75	50	1
Tiv (Nigeria)	1931-49	74	1
BaSoga (Uganda)	1952-54	38	0
Gisu (Uganda)	1948-54	44	2
BaLuyia (Kenya)	1949-54	65	3
Banyoro (Uganda)	1936-55	9	1
JoLuo (Kenya)	1949	22	2
Alur (Uganda)	1945-54	33	1
!Kung San (Botswana)	1920-55	12	0

NOTE.—Data are from Daly and Wilson (1990), who included both original tabulations and every published study that they were able to find meeting the following criteria: (1) that the data set comprise all homicides known to have occurred in a given jurisdiction rather than a selected subset and (2) that same-sex, nonrelative cases be identifiable. Victim and killer were unrelated cowives of a polygynous man in the single female-female case in each of the Maria, Bhil, Banyoro, and Alur data sets, as well as in one BaLuyia case and one JoLuo case; cowives were not deemed marital “relatives,” because their relationship is analogous to that of unrelated male rivals, and hence were included.

may be relevant to differential use of violence against the opposite sex, it can hardly be said to predict or account for the sex difference portrayed in table 1; one might as readily have predicted that the group with the physical capacity to inflict the most damage (i.e., men) would be attacked least. What is too often missing from discussions of gendered behavior, including even those treatments that invoke “biological” (by which is usually meant hormonal) differences between the sexes, is any consideration of the different selection pressures confronting our male versus our female ancestors. When the zero-sum game that partitions paternal ancestry among males is played with different rules or parameters than the corresponding game among females, the

selective process favors different attributes, including psychological attributes, in the two sexes.

Sex-differential violence against same-sex antagonists appears to be one of many manifestations of the fact that the human male psyche has evolved to be more risk-accepting in competitive situations than the female psyche (Wilson and Daly 1985; Daly and Wilson 1990, 1994b). Our sex difference in intrasexual violence is one we share with other species in which the variance in fitness (and the risk of complete reproductive failure) is greater among males than among females. The morphological, physiological, developmental, and psychological evidence that human beings evolved under chronic circumstances of a somewhat greater fitness variance in males than in females is abundant and consistent, and this sex difference in fitness variance apparently persists across the gamut of human societies (Daly and Wilson 1983). In hunting and gathering societies, which provide the best model of the social circumstances in which the human psyche's characteristics evolved, there is less disparity of wealth than in agricultural societies or modern nation states and marriage is mainly monogamous, but it is still the case that men are both more likely to have many surviving children than women and more likely to have none (Howell 1979; Hewlett 1988; Hill and Hurtado 1995). The natural selective link between such a mating system and sex differences in competitive violence is well understood and uncontroversial (Williams 1966; Trivers 1972; Daly and Wilson 1988b): basically, greater fitness variance selects for greater acceptance of risk in the pursuit of scarce means to the end of fitness. Furthermore, reckless life-threatening risk-proneness is especially likely to evolve where opting out of competition promises to yield no fitness at all and is therefore the natural selective equivalent of death (e.g., Rubin and Paul 1979).

This sketch of sex differences in competitiveness and violence and their evolutionary origins is not the last word on the subject, and we fully expect to see it developed in now unanticipated directions. However, it has essentially no chance of being drastically overturned, both because it is too well established in a nexus of coherent theory and supportive research, and because it is fully consistent with whatever facts the several disciplines that have concerned themselves with the sexes have been able to establish. This last criterion of what makes a theory tenable may seem hardly worth stating, for who would cling to a theory whose premises or predictions have been proven false? Alas, criminologists have sometimes done just that. Hagan's (1986, 1990) "power-control theory" of sex differences, for example, is explicitly premised

on the behaviorist presumption that females and males react identically to contingencies and develop their differences only as a result of differential social treatment, although this presumption has long been rejected by those who study human sex differences and their development in childhood. There is remarkably little evidence that girls and boys are socialized differently with respect to such things as punishment or encouragement, despite hundreds of attempts to demonstrate such parental discrimination (Lytton and Romney 1991), but in a sense that is neither here nor there.

Regardless of whether sex-role socialization is a powerful force or an overrated one, it is clear that girls and boys differ in how they are affected by the same variations in experience (e.g., Bee et al. 1984; Flinn et al. 1996), even on the day of birth (e.g., Balogh and Porter 1986). This is hardly surprising given that the brains of human females and males differ in numerous anatomical and physiological details as a result of the effects of gonadal hormones at developmental stages ranging from before birth into adulthood (de Lacoste, Horvath, and Woodward 1991; Witelson 1991; Breedlove 1994; Gur et al. 1995). Moreover, besides their developmental (“organizing”) influences, circulating levels of sex-typical hormones have a wide range of immediate (“activating”) effects on emotion, mood, and cognition (e.g., Kimura and Hampson 1994; Sherwin 1994; Vangoozen et al. 1995).

For all these reasons, any theory that attributes sex differences merely to sex-biased treatment is a nonstarter. This is certainly not to say that “nature” triumphs over “nurture,” a claim that is as simplistic and counterproductive as the reverse. The attributes of women and men and the magnitude and nature of their differences can undoubtedly be changed by a host of environmental manipulations, some odious, some justifiable. What is clear, however, is that the developmental processes by which the sexes come to exhibit psychological and behavioral differences in adulthood are much more intricate and interesting than the obsolete but enduring notion that differential socialization tells the tale. And thinking about how the selection pressures encountered by ancestral women and men are likely to have differed has proven to be a valuable aid to those interested in characterizing and explaining sex differences (e.g., Gaulin and Hoffman 1988; Daly and Wilson 1990; Buss et al. 1992; Symons 1995).

#### V. The Age-Crime Relationship

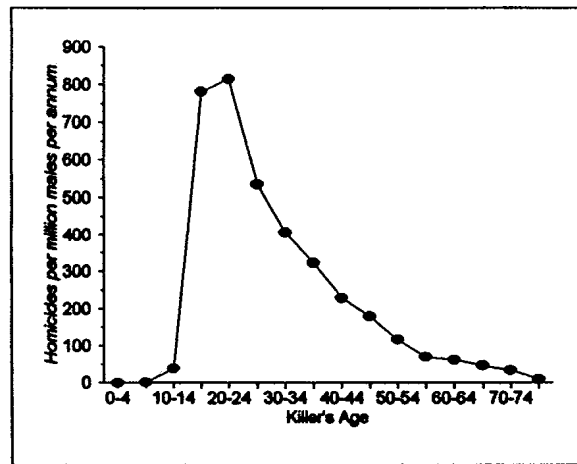
There is an age pattern in criminal violence that is almost as robust as the sex difference: rates of offending rise rapidly after puberty to a peak

in young adulthood and then decline more slowly. Figure 2 illustrates this pattern with respect to same-sex nonrelative homicides in Canada, England and Wales, and Chicago.

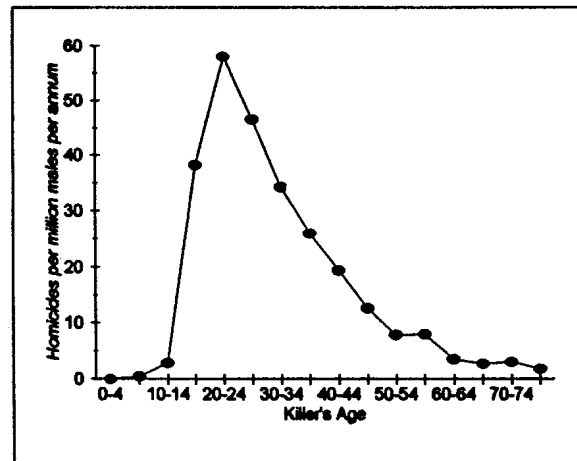
Challenging the criminological community to explain this striking pattern, Hirschi and Gottfredson (1983, p. 554) asserted that “the age distribution of crime is invariant across social and cultural conditions,” and that “the age distribution of crime cannot be accounted for by any variable or combination of variables currently available to criminology.” A flurry of critical reactions ensued, including some unconvincing efforts to explain the pattern on the basis of received wisdom. Tittle (1988), for example, argued that the old standbys of “labeling theory” and “social control theory” could account for the age pattern perfectly well, but unfortunately, Gove (1985) had used the same “labeling theory” as Tittle to deduce precisely the opposite—that offending should increase throughout the life span. Arguably, what Tittle’s and other ripostes to Hirschi and Gottfredson really show is that “labeling theory . . . social control theory,” “strain theory,” and the like are not predictive theories at all but conceptual frameworks that one might cheerfully invoke in discussing the data however the chips might fall.

In our view, a more promising line of theory treats criminal offending as risk acceptance and treats life-span developmental change as adaptive modulation of risk acceptance. Wilson and Herrnstein (1985) have argued, with considerable evidentiary support, that engaging in predatory violence and other risky criminal activity is associated with having a short “time-horizon,” such that one weighs the near future relatively heavily against the long term. The link with age has been illuminated by Rogers (1994), who has shown that life-span developmental changes in such time-horizons (more specifically, in the rates at which one “discounts” the future) are predictable products of natural selection. More remarkably, Rogers (1994) has predicted the expected form of evolved age patterns in time discounting on the sole basis of characteristic human schedules of age-specific fertility and mortality, and his predicted curve looks a lot like the “age-crime curve.”)

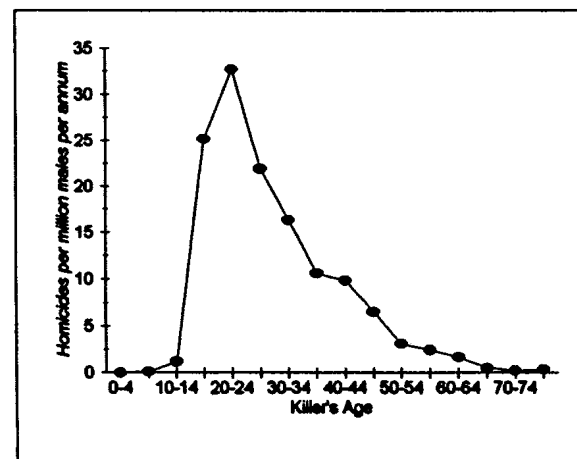
Three years after their initial salvo, Hirschi and Gottfredson (1986) expanded on their claim of an “invariant” age pattern in criminal offending. They argued that the observed age-crime relationship could not be attributed to a correlated factor of employment status, on the basis of evidence that working and nonworking teenagers incur similar arrest rates. They further denied that acquiring a mate is relevant to



*a, Chicago, 1965-89*



*b, Canada, 1974-92*



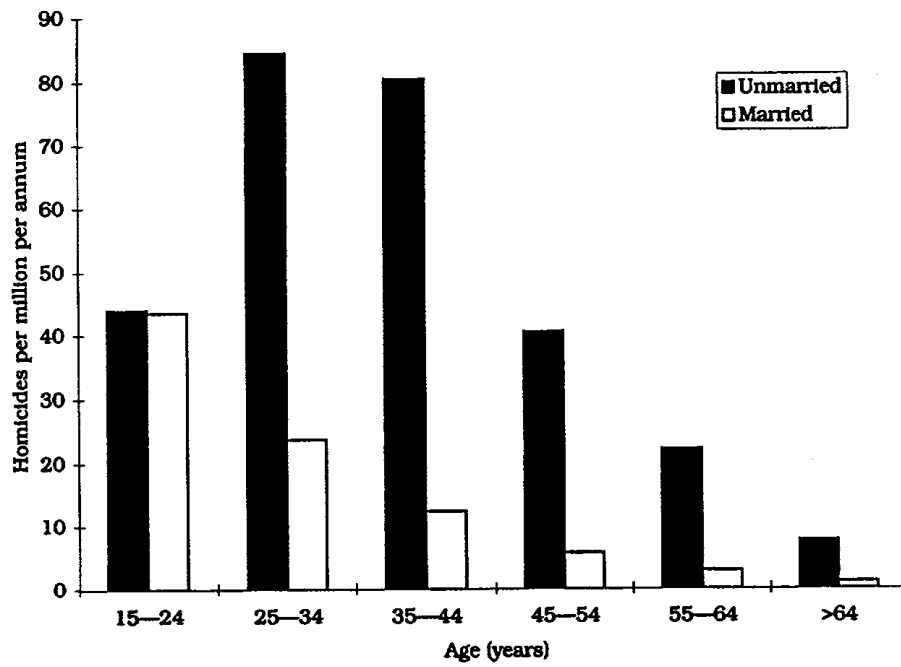
*c, England and Wales, 1977-90*

FIG. 2.—Age-specific rates at which males killed unrelated males in three data sets consisting of all homicides known to police. Source.—Based on Wilson and Daly (1994).

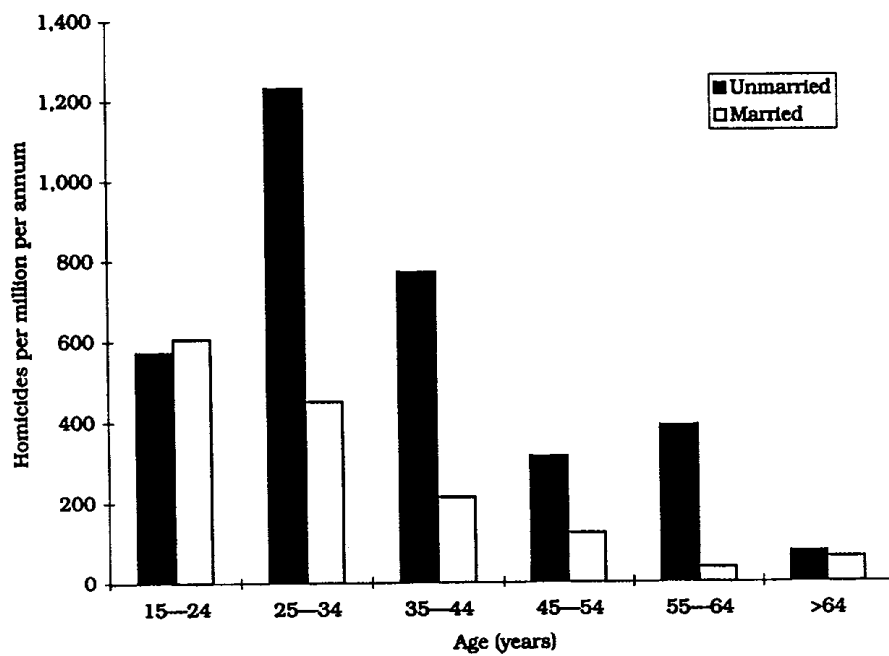
the adult diminution in offending, on the basis of evidence that delinquent boys are more, not less, likely to have girlfriends than their non-delinquent age-mates. And they denied that becoming a father plays any role either, although on this point they presented no evidence at all. They concluded that “change in crime with age apparently cannot be explained ... by change in the social situation of people over the course of life” (1986, p. 67).

This argument is as provocative to evolutionary psychologists as to sociologists. If such psychological phenomena as “risk acceptance” and “time discounting” indeed mediate the age-crime curve and have been shaped by natural selection, we should expect them to be contingently responsive to social and material cues. Granted that Rogers’s (1994) model suggests that an evolved schedule of life-span developmental change in time discounting might be manifest as age-related change in behavior even if social and material circumstances could be held constant. And granted, too, that young men are apparently specialized, both physically and psychologically, for competitive risk acceptance; male muscle strength and aerobic capacity, for example, rise and fall in a pattern rather like that of the age-crime curve, even when effects of exercise are controlled, and various sorts of voluntary risk-taking rise and fall similarly (review by Daly and Wilson 1990). Granting all that, it still does not follow that risk acceptance should have evolved to follow its life-span trajectory utterly unaffected by circumstantial cues of risk’s costs and benefits. A married father, for example, has more to lose (and perhaps less to gain) in dangerous confrontations than does a childless bachelor of the same age, and we can think of no reason to imagine that the human psyche should have evolved to ignore such differences of personal circumstance.

So is Hirschi and Gottfredson’s (1986) claim that changing social circumstances are irrelevant to the age-crime curve correct? Well, it is certainly overstated. In homicide, both employment status and marital status are indeed poor predictors of offense rates by teenagers, but they are very good predictors at subsequent ages (Wilson and Daly 1985; Daly and Wilson 1990). Figure 3 illustrates this point with respect to marital status, and as we predicted on evolutionary psychological grounds, being married is apparently pacifying. The hypothesis that being married reduces men’s inclination to engage in violently dangerous risk-taking, rather than being an incidental correlate of other risk factors, is further supported by the finding that both divorced and widowed men exhibit elevated age-specific homicide rates like those of



a



b

FIG. 3.—Age-specific rates of killing unrelated males by married men versus unmarried men in Canada in 1974–83 and Detroit in 1972. *a*, Canada; *b*, Detroit. Source.—Based on Daly and Wilson (1990).

never-married men (Daly and Wilson 1990). This and similar evidence with respect to nonlethal criminal offending (Kposowa, Singh, and Breault 1994; Farrington and West 1995) suggests that men who revert to unmarried status also revert to a mindset vis à vis risk acceptance that is more like that of bachelors than that of married men.

Marital status evidently matters, then. However, massive age effects persist in figure 3, and the same is true when one controls for the substantial effects of employment status (Wilson and Daly 1985). Rogers's (1994) theory of an evolved trajectory of life-span developmental change in discounting provides some reason to doubt that the age-crime relationship would disappear altogether even if one were to control for all relevant age-related changes in circumstances simultaneously. However, no such analysis is at present feasible, and no one knows how *much* of the age-related variability in crime will eventually prove to be attributable to age-related changes in social and material circumstances. What is already clear is that it must be a large fraction of the total.

There is irony in this story. Hirschi and Gottfredson proposed on the basis of limited evidence that the age-crime relationship is impervious to social factors and attributed it by default to "biology." But "biological" is not the antithesis of "social," quite the contrary, since social factors are the crucial proximate causes of behavioral variations in biological theories of social action. It was biological theorizing that made us suspicious of Hirschi and Gottfredson's claims: It seemed inconceivable that a social psyche that evolved by selection should be insensitive to such important modulators of one's cost-benefit situation as marital and employment statuses. And our selection-minded skepticism about Hirschi and Gottfredson's claim has proven to be sound.

#### VI. Evolutionary Psychology and "Rational Choice"

Rogers's (1994) future-discounting theory indicates that youthful risk-proneness and disdain for the future are predictable products of natural selection. One might call them "rational," which is not to say that we or most readers of this essay would deem them sensible. A rational choice makes sense given the actor's personal utilities, and as Gardner (1993, p. 71) notes, "The rational choice theory is not concerned with how people process information, and no-one claims that people make everyday choices by assigning numbers to outcomes and calculating utilities. The claim is that an outsider observing a sufficiently consistent pattern of choices could find numbers describing the person's val-

ues that would rationalize the choices.” Nevertheless, hypotheses invoking “rational choice” are often marred, perhaps especially in economics and in criminology, by the theorists’ uncritical adoption of a folk psychological conception of rationality and decision. A more subtle evolutionary psychological conception would better reflect the diversity of processes that mediate choices among behavioral alternatives and would be a boon to criminological discussion.

Evolutionists routinely model the costs and benefits of alternative decision rules about such matters as how many eggs a bird should lay before she begins incubating them, or when a plant or animal should stop channeling all its accrued energy into further growth and start putting some into reproduction. These determinations are aptly termed “decisions” insofar as they are complexly contingent on environmentally given information that imperfectly but usefully predicts relevant future conditions. To everyday folk psychology, this sounds like a metaphor, and perhaps a rather stretched metaphor at that. Genuine decisions are surely the products of deliberation by conscious human beings. Unfortunately for this folk conception, however, experimental psychologists have demonstrated repeatedly that people do not necessarily enjoy privileged insight into the determinants of their own decisions, and that the phenomenology of deliberation and reasoned choice can be illusory and reconstructive. Psychology experiments in which the causal determinants of some phenomenon or experience have been controlled by the experimenter elicit explanations from observers and from the decision makers themselves that are coherent and plausible but demonstrably incorrect (Nisbett and Wilson 1977; Nisbett and Ross 1980; Kahneman, Slovic, and Tversky 1982). For example, people might give an elaborate explanation for why they liked one film sequence more than another, when in fact their preferences were best accounted for by white noise levels manipulated by the experimenter. Moreover, in addition to leading us to misperceive the reasons for our actions, retrospective “theorizing” leads us to misrecall our pasts, sometimes dramatically (e.g., Ross 1989; Newman and Baumeister 1996).

The implication of these findings is certainly not that human decision making and the inferential procedures that inform it are inept, as has sometimes been implied. Our inference and choice procedures apparently deal with naturalistic inputs very well (Gigerenzer and Hoffrage 1995; Cosmides and Tooby 1996). Rather, the point we mean to stress is that neither decision processes themselves nor their logic and

functionality are necessarily transparent to introspection. A great deal of inaccessible information processing by complex evolved machinery, designed by selection specifically to make such decisions, is involved.

This complex evolved machinery includes the emotions. Emotional states are functional operating modes whose specific elements are design features facilitating effective responses to the situations that arouse them (deSousa 1987; Frank 1988; Nesse 1990). An admonition like “don't get mad, get even” is therefore grounded in confusion: getting mad is a means to the end of getting even. If it were generally (or on average) the case that fear, anger, jealousy, and other emotional states interfered with our capacities to make decisions that furthered our interests, then we would have evolved to be affectless zombies. That we have not is testimony to the functionality of emotional states, as is the incapacity of people whose emotional mechanisms are operating abnormally (Nesse 1990).

Folk psychology's contrasting of reason versus emotion is thus a false antithesis, and it is an antithesis that has sown some mischief in criminology. Cusson's (1993) otherwise admirable discussion of the importance of fear during the commission of crimes, for example, is weakened by his conceiving of this emotional state simply as an impediment to decisive action rather than as an aid to prudent choice. And Katz's (1988) refreshingly novel treatise on the neglected thrills of crime commission is ultimately unenlightening because of its unsatisfactory framing as a challenge to rational choice theories.

Once the complexity of the psychological machinery generating even our “rational” choices is acknowledged, it no longer seems odd to speak of a physiological decision about when to ovulate, or to refer to choice points in growth and development, using the same language that we apply to the process that selects among behavioral options. In all these cases, some elaborate and only partially understood procedure, involving evolved information-processing machinery, the traces of individual experience, and contemporary extrinsic inputs, generates one choice rather than another. And if the deliberative homunculus of folk psychology seems not to be involved in deciding how much you will let your bone calcium be depleted during lactation, well, he contributes nothing toward a genuine explanation of how you decide what to eat or what to wear, either.

Consider, in this light, Gottfredson and Hirschi's (1990) critique of Wilson and Herrnstein (1985), whom they accused of embracing incommensurable ideas about crime and criminality. The latter authors

had argued that delinquents are particularly apt to discount future consequences, a proposition that Gottfredson and Hirschi endorsed. But these critics maintained that Wilson and Herrnstein must then repudiate the “strain theory” that they allegedly also accept, in which “the potential delinquent looks into the future and sees dismal prospects. As a consequence, he turns to a life of crime designed to brighten these prospects. In other words, in strain theory the delinquent is especially future oriented as compared to the nondelinquent” (p. 114). According to Gottfredson and Hirschi, discounting the future is the antithesis of responding to one’s prospects, dismal or otherwise. But to an evolutionary psychologist, predictive cues of dismal prospects are precisely the sorts of cues that would be expected to engender such discounting.

Continuing in the same vein, Gottfredson and Hirschi (1990) attack another ostensible contradiction in Wilson and Herrnstein’s theorizing as follows: “The idea that offenders are likely to be concerned with equity is also contrary to the notion that they more heavily discount time: equity concerns, as described by Wilson and Herrnstein, require that the person compare his effort/reward ratio with the effort/reward ratios of others.... people who feel inequitably treated must have put forth the effort that justifies their feelings (otherwise we would be talking about envy). But people who discount the future do not exert themselves for uncertain future benefits, and the notion of inequity at the point of crime is therefore incompatible with the image of the offender at the point of criminality” (p. 114). One need not embrace Wilson and Herrnstein’s analysis to recognize that these criticisms implicitly rely on a folk psychological conception of conscious deliberation. A young man need not engage in melancholy future-oriented contemplation to apprehend cues of dismal prospects, nor to increase his acceptance of risk in response. Indeed, we could substitute an insect, or a tree, for the young man in the last sentence. Folk conceptions of how it feels to deliberate about what to do next are superfluous distractions. The essential theoretical idea is adaptive adjustment of risk acceptance in response to relevant cues. Similarly, one need hardly cogitate about the future to be passionately concerned with equity, as is evident to any parent with two or more children (see Frank 1985).

One sort of information that ought to affect discounting of the future is information bearing on the likelihood that one *has* a future. Reason to doubt that you’ll be alive tomorrow is reason to grab what you can today. Under rational choice, an increase in mortality in one’s reference group increases the appeal of risky action in pursuit of quick

returns, especially if the sources of that excess mortality are independent of the actors' choices. But what sort of evidence would bear on such risk adjustment? One possibility is some sort of semistatistical apprehension of the distribution of local life spans. This need not be so complex as it sounds. If both grandfathers of a young man were dead before he was born, and more than a couple of his primary school classmates are already dead too, and gray-haired men stand out in his neighborhood by virtue of their rarity, there may be something going on that he should attend to.

### VII. Making Sense of Individual Differences

We have stressed that psychological theory and research have been more concerned with human nature than with human diversity (see also Monahan and Splane 1980). Nevertheless, such diversity exists and demands explanation. Much of it, but not all, depends on the contingent responsiveness of the psyche to differences in circumstance. In explaining and predicting the behavior of others, ordinary people rely on what they think they know about stable personal characteristics—whether someone is fair-minded or jealous or short-tempered or whatever—because such attributions appear to carry useful information about the reasons for past actions and the likelihoods of future actions. These imputations can be excessive or misguided, but the strategy is basically sound: stable individual differences really do account for a substantial proportion of behavioral diversity.

Why this should be so is a challenging question for evolutionists (Tooby and Cosmides 1990a; Buss 1991; Daly 1996). If selection favors an optimal species-typical design, what maintains such diversity? Why, for example, is variation in violent aggressivity largely a matter of personalities? Why should selection not have favored the single fittest available set of social psychological propensities, with the result that everyone's behavioral repertoire would include facultative violence in more or less similar response to more or less the same threats and challenges?

A partial answer is that people probably are alike in this regard to a much greater extent than is initially evident. Although people react differently to the same immediate situation, there may be greater consistency at the level of facultative developmental response to experiential contingencies. Certainly it is a fact that expertise based on experience makes violence more available as a social tool (e.g., Coie et al. 1991), and this makes sense insofar as expertise in the use of violence

raises its effectiveness. Moreover, the information that is relevant for decision making in dangerous confrontations has greater time depth than just the immediate situation: how short one's temper "should" ideally be, for example, depends on statistical attributes of one's social milieu that can be induced only from cumulative experience over a long time (if at all). There is thus every reason to expect "personality" differences in how people react to a common immediate situation, even if their psyches respond to experience in exactly the same way.

There is considerable evidence that readiness to use violence is indeed developmentally labile, and some of this evidence suggests that this developmental lability may be functional for the actors in the manner just suggested. In a cross-cultural analysis of nonstate societies, Low (1989) has shown that it is specifically in societies that have repeatedly engaged in war in their recent history that parents and others inculcate aggressivity, strength, skilled use of weapons, and tolerance of pain in boys. In Western industrialized nations such as the United States, there is some evidence that people with childhood experience of violence, whether as victims or as witnesses, are likely to use violence (Widom 1989; Dodge, Bates, and Pettit 1990). Longitudinal studies of juvenile delinquents and career criminals reveal a prior history of various social transgressions including violence (e.g., Tonry, Ohlin, and Farrington 1991; Sampson and Laub 1993).

Psychiatrists have identified a personality type that is particularly likely to engage in violent aggressivity: the "antisocial personality." Diagnostic criteria include a history of conduct disorder prior to age fifteen and a continued pattern of "disregard for and violation of the rights of others" into adulthood (American Psychiatric Association 1994, p. 649). There are apparently a number of reliable risk factors associated with the development and maintenance of antisocial personality, including poverty, maleness, early maturity, poor school performance, parental criminal history, and psychopathology, and having a lone mother in loco parentis (e.g., Tonry, Ohlin, and Farrington 1991; Moffitt 1993). These risk factors largely overlap the risk factors for juvenile delinquency and violent crime (e.g., Wilson and Herrnstein 1985; Farrington 1991; Sampson and Laub 1993), and juvenile offenders and career criminals are indeed often diagnosed as antisocial personalities (Olweus, Block, and Radke-Yarrows 1986; Moffitt 1993). Moreover, these same risk factors characterize many urban communities with high rates of violence (Krahn, Hartnagel, and Gartrell 1986; Sampson 1991; Coulton et al. 1995). All of these considerations sug-

gest that this “disorder” is largely a facultative developmental response to indicators of the futility of developing a more “prosocial” personality. (Which is not to deny that persons diagnosed with antisocial personality disorder are often dysfunctional. Insofar as the diagnosis is not merely pejorative, the individuals most likely to be so diagnosed may be those in whom the psychological mechanisms regulating violent behavior are not appropriately modulated by relevant context-specific cues because of “errors” in information-processing; see Dodge, Price, and Bachorowski 1990).

Notwithstanding the likely relevance of social environments to antisocial personality, there is also considerable evidence from twin and adoption studies that it is substantially heritable (Carey 1994; Gottesman and Goldsmith 1994; Lyons 1996). Hence the question raised earlier remains: why does genetic variability affecting traits like antisocial personality persist? Behavior geneticists have seldom considered their findings in the context of Darwinian selection, so the question has scarcely been addressed (but see Rowe 1994).

Possible answers to this puzzle appear to be few. One is that selection has been weak and the variability is (or was) effectively neutral with respect to fitness. This is perhaps especially plausible when the attributes in question develop as interactive products of particular genotypes and particular novel aspects of current environments. Sensitivity to novel chemical pollutants, for example, can be highly heritable, but the differential sensitivity of different genotypes will have been inconsequential in ancestral environments in which those chemicals did not exist. A second possibility is that selection pressures are heterogeneous in time, space, or both, so that no single optimal phenotype can become universal across the population’s whole range of environments. Finally, perhaps the most interesting possibility in the present context is that of *frequency-dependent selection*.

A set of alternative types is said to incur frequency-dependent selection when their respective fitnesses vary systematically in relation to their relative numbers. In some animals, for example, there is a “rare male mating advantage” (Ehrman 1972) such that females prefer as mates whichever of two varieties of male is rarer in the local population, with the result that the rarer type outreproduces the commoner and neither is likely to go extinct. Mealey (1995) and accompanying commentaries discuss the possibility that “sociopaths” –an exploitative and often charming personality type, apparently lacking empathy–might be maintained analogously in human populations, with

their success as deceivers tending to be inversely correlated with their prevalence.

It is theoretically possible that heritable diversity in violent aggressivity has been maintained in human populations by frequency-dependent selection, but we think it is unlikely. The routine occurrence of specialized warrior castes throughout human history (McCarthy 1993) may sound consistent with the idea that selection could have maintained multiple male types, but there is no particular reason to believe that the fitness benefits of being a warrior have been inversely related to their proportionate abundance. Furthermore, the degree of individual variability in violent experience and action that we see in contemporary mass society may be an evolutionary novelty because in the sort of nonstate societies in which we evolved, virtually all men were likely to have had sporadic experience of life-threatening interpersonal violence (Chagnon 1996). Heritable variation in violence in the modern world could thus be analogous to heritable variation in sensitivity to novel pollutants: a sort of previously neutral genetic diversity with novel expression.

#### VIII. Violence against Wives

Most of the criminal violence that we have considered thus far is perpetrated in the context of competition among men for material and social resources. But men also commit violence against women, including even their marriage partners. This sort of violence against “intimates” requires a different analysis. Wilson and Daly (1992*a*, 1993*a*) have proposed that violence against wives is largely to be understood as a reflection of sexually differentiated mental mechanisms of sexual proprietariness, which evolved in an ancestral social milieu in which assaults and threats functioned to deter wives from pursuing courses of action that threatened their husbands’ fitness. The cognitive/emotional mental “module” of male sexual proprietariness responds to cues indicative of a risk of usurpation of the valued sexual relationship by rivals, cues that vary from indirect probabilistic indicators of such risk to irrefutable evidence.

As with other sorts of interpersonal conflicts, we can treat the relatively rare phenomenon of lethal violence against wives as a window on the broader phenomenon of marital conflict. This is not to suggest that uxoricides serve the killers’ interests. We propose, instead, that they are epiphenomena: nonadaptive byproducts of masculine psychological processes, which evolved because of the utilities of their nonle-

thal manifestations. Neither do we suggest that man's violent capabilities and inclinations evolved in the specific context of marital conflict since violence and threat are effective means of coercive control in various relationships and contexts. However, by proposing that uxoricides are epiphenomena of male motives whose functions are coercion and deterrence, we do mean to imply that lethal and nonlethal violence against wives share commonalities of motive, of causal dynamics, of circumstance, of marital history, and of factors that exacerbate or mitigate the severity and frequency of assaults. This implication is for the most part supported by comparisons between uxoricide and nonlethal wife assault (Wilson, Johnson, and Daly 1995).

The ostensible motive in the majority of uxoricides is the husband's aggrieved intolerance of the real or imagined alienation of his wife, either through adultery or through her quitting the marriage. Daly and Wilson (1988*b*) reviewed several studies of well-described spousal homicide cases from a diversity of societies, and in each sample, such sexual proprietariness was apparently the primary motivational factor in over 80 percent of the cases; see also Allen (1990), Mahoney (1991), Campbell (1992*a*), Crawford and Gartner (1992), and Polk (1994). In studies of nonlethal violence against wives, ostensible rationales are more diverse than in the lethal cases, but the dominant motive is apparently the same. When asked what are the primary issues around which violent incidents occurred, both beaten wives and their assailants nominate "jealousy" above all else (Rounsaville 1978; Dobash and Dobash 1979, 1984; Brisson 1983).

The idea that the discovery of wifely infidelity is an exceptional provocation, which is likely to elicit a violent rage, is cross-culturally ubiquitous, perhaps universal (Daly and Wilson 1988*b*). Indeed, such a rage is widely considered so compelling as to mitigate the responsibility of violent cuckolds. In Anglo-American common law, for example, killing upon the discovery of a wife's adultery has been deemed to be the act of a "reasonable man" and to warrant a reduced penalty (Edwards 1954). Violent sexual jealousy is considered normal or at least unsurprising both in societies in which the cuckold's violence is seen as a reprehensible loss of control (e.g., Dell 1984) and in those where it is seen as a praiseworthy redemption of honor (e.g., Safilios-Rothschild 1969; Besse 1989; Chimbos 1993). While one may interpret these phenomena as indicative of the cross-cultural ubiquity of misogyny and patriarchy, such interpretations beg the question of the sources of the specific content of violent men's perceived grievances. Men are appar-

ently much less likely to assault their wives for profligacy or stupidity or sloth, and they cannot invoke these failings as provocations in the courtroom. In fact, the only provocations that are invested with the same power as wifely adultery to mitigate a killer's criminal responsibility in our common-law tradition are physical assaults upon himself or a relative (see, e.g., Dressler 1982).

Granting the motivational relevance of jealousy to transitory rages and hence to the violent incidents themselves, however, one may still ask whether those husbands who are especially proprietary and controlling are also the husbands who are especially violent. Battered women often maintain that not only are their husbands violently jealous about interactions with other men, but that they are so controlling as to curtail the wives' contacts even with female friends and family (e.g., Hilberman and Munson 1978). In a 1993 survey, a national probability sample of over 12,000 Canadian women were asked about their experiences of sexual harassment, threats, and sexual and physical violence by marital partners and other men (Johnson and Sacco 1995). Those women whose husbands had assaulted them physically were especially likely to also affirm that their husbands engaged in various autonomy-limiting behaviors such as insisting on knowing the woman's whereabouts at all times, objecting to and curtailing social interactions outside the home, and exerting unilateral control on the family finances (Wilson, Johnson, and Daly 1995). The more serious the assaults, the more prevalent were these other controlling behaviors, so it appears that especially proprietary, controlling husbands are often also especially violent husbands.

Rather than wife assault being one of a set of alternative tactics of proprietary men, then, assault goes hand in hand with other means of control. There are undoubtedly stable individual differences ("personality" differences) between men in this regard, but much of the intrasocietal diversity in these correlated manifestations of male sexual proprietariness represents contingent response to circumstantial variables such as the parties' ages, material resources, and other considerations that are readily interpreted as valid indicators to the proprietary man of risk of loss of his wife (Wilson, Daly, and Wright 1993; Wilson, Johnson, and Daly 1995).

Violence against wives varies systematically between as well as within societies, and an evolutionary psychological perspective can shed light on both sorts of variability. Wherever social cues likely to

activate male sexual proprietariness are salient, recurring, and prevalent, we may expect to see a high incidence of its manifestations. Jealousy and anger are linked in male sexual psychology, suggesting that cues of imminent threat of loss of sexual exclusivity entail some risk of violence everywhere (Daly and Wilson 1988*b*), but the prevalence and intensity of such violence may be expected to reflect local sanctions. Moreover, the target of a jealous man's ire may be the woman, the rival, or both, and again, this "decision" may be expected to reflect sanctions, as well as the social status of each party and the circumstances of the alleged trespass.

Some phenomena, such as age-related changes in fertility, are cross-culturally general and likely to account for within-society variability in more or less consistent ways; men are probably more jealous of wives who are young and attractive to other men than of older wives in all societies (Wilson and Daly 1993*a*; Wilson, Daly, and Scheib 1997). Moreover, a man is vulnerable to cuckoldry as a result of wifely infidelity only when his wife is fertile; while he may be concerned to protect a pregnant wife from various sorts of harms, he need not protect her from insemination by rivals. In a rare investigation of human mate-guarding, Flinn (1988) found that men indeed appear to be sensitive to such correlates of cuckoldry risk. Other potential cues of cuckoldry risk vary between societies. Cross-cultural variations in residential patterns, for example, are likely to be systematically related to husbands' perceptions of risk of alienation of wives: A man whose wife has been under continuous surveillance, either by himself or by trusted allies such as close kin, can be relatively confident; conversely, unmonitored absences may be deemed cause for concern (e.g., Fricke, Axinn, and Thornton 1993).

We expect that husbands' violence will prove to be more prevalent where it is more legitimate, for even if angry reactions are widespread and "automatic," enraged men are seldom impervious to social controls. Quantitative data bearing on this issue are sparse, but the ethnographic record appears to indicate that societies vary greatly in their incidences of severe wife assault, and that even vengeful husbands are sensitive to the probable costs of violence. Several authors have argued that wife battering is rarer or less severe in societies where wives retain close contact with their genealogical kin, whose proximity deters husbands from serious assaults (e.g., Campbell 1992*b*; Chagnon 1992; Draper 1992; Smuts 1992). Variation in the protection provided by

male kin is apparently related to variable vulnerability of wives within societies, too, including even societies that are relatively matrilocal (H. Kaplan and K. Hill, personal communication 1990).

Factors such as the risk imposed by desperate, disenfranchised male rivals vary across societies and may therefore be expected to account for some of the between-society variance in proprietary manifestations. Accordingly, we expect the degree of coercive constraint of wives, including violence, to reflect cues of the local, contemporaneous intensity of male sexual competition and poaching. Such cues might include encounter rates with potential male rivals; whether they are encountered alone or in all-male groups as opposed to being accompanied by women (that is, cues of bachelor pressure); cues of the status, attractiveness, and resources (hence, mate value) of rivals relative to oneself and of other social groups or categories (lineages, castes, etc.) relative to one's own social group or category; and cues of local marital (in)stability. These are untested propositions, which we list in order to illustrate how adaptationist thinking can help generate hypotheses in cross-cultural research.

### IX. Conclusion

In the preceding sections, we have tried to illustrate how adaptationist, selectionist thinking can be applied in criminological research. Even macrosocial phenomena are emergent from and partly to be understood in terms of the acts of individuals. Variations in the intensity of competition experienced by young men or in rates of violence against women, for example, are social phenomena that are affected by other group-level phenomena such as the population's age structure and local marital practices, but the links between these sociological phenomena will never be fully elucidated without consideration of the perceptual, inferential, and decision-making processes of individuals. This is "good reductionism" (Tooby and Cosmides 1992; Dennett 1995), and sociologists who study crime and justice already embrace it: Their theories are replete with psychological claims and assumptions, and appropriately so. What is perhaps less widely appreciated is that the relationship between evolutionary biology and psychology is to some degree analogous to that between psychology and sociology: The truths of the former, lower-level discipline are necessarily foundations of whatever we may hope to discover in the latter, with the result that

theorizing at any one level is likely to be more efficient and fruitful the better informed the theorist is about current knowledge and ideas at the foundational level.

Consider again the idea that understanding violence against wives requires consideration of its utility as a means of coercive control. Men do not assault their wives merely because they have the opportunity, or merely because of inadequate sanctions, violent temperaments, or the effects of alcohol. These factors are important, but they do not account for the systematic patterning of violence against wives as a function of demographic and situational variables. Thinking of men's motives as evolved adaptations suggests that sexually proprietary inclinations will respond to demographic, social, and material indicators that are likely to be perceived by husbands as cues of risk of uxorial usurpation and loss of control. This line of thought led us to investigate the surprisingly neglected issues of the effects of estrangement (Wilson and Daly 1993*b*), the marriage partners' ages (Wilson, Johnson, and Daly 1995; Wilson, Daly, and Scheib 1997), and children of former unions (Daly and Wilson 1996) on rates of marital violence, and all of these have proven to be important risk factors. Thinking evolutionarily has also suggested several demographic and cross-cultural hypotheses that are still untested (Wilson and Daly 1992*b*, 1993*a*). However, it is no surprise to an evolutionist that additional factors that were already much discussed in the literature on violence against wives, such as the strength of legal sanctions and the degree of isolation from family and friends, are also important. A successful theory of the sources of variability in rates of violence against wives will have to be "vertically integrated" (Barkow, Cosmides, and Tooby 1992), incorporating multiple factors and levels of explanation.

So where can imminent progress in criminology be expected as a result of evolutionary insights? One promising area concerns socialization effects and the sources of individual differences. The presumption of potent parental influence that still dominates the social sciences has been falsified by research (e.g., Hetherington, Reiss, and Plomin 1994; Rowe 1994), and evolutionary psychological insights are leading to new ideas about when and to what degree familial environments are influential in child development (e.g., Sulloway 1996) and about the domains in which peer influence is likely to be prepotent (e.g., Harris 1995; Pinker 1997). It is also increasingly evident that genetic diversity

within (not between) populations accounts for a large proportion of behavioral diversity, including criminal behavior (Carey 1994; Lyons 1996), but the meaning and implications of these findings remain obscure. Researchers with a professional interest in related topics such as “criminal careers” have mostly ignored these findings, perhaps out of a misplaced antipathy to biology, but the findings must be confronted and understood. Evolutionary psychology is not behavior genetics and does not in general predict heritable diversity, but it is essential for understanding the implications of the results of behavior geneticists. Testable hypotheses about what these results mean are now being formulated by evolutionary psychologists (Rowe 1994; Mealey 1995; Daly 1996).

We also expect evolutionary psychological theorizing to contribute increasingly to understandings of how aggregate sociological phenomena like crime rates are causally linked to their social determinants through the perceptions and inferences of individuals. What factors facilitate or dampen recklessness, competitive escalation, trust, coalitional solidarity, the social distance to which empathy and moral duty are extended, and so forth (Machalek and Cohen 1991; Wright 1994; Petrinovich 1995; Chagnon 1996)? Are the cognitive changes associated with hormonal fluctuations important, and what functions do they serve? Are the effects of age on risk taking mediated by changing inferential processes, changing priorities, or other changes? Are social comparison and inequity of greater salience to people in certain age-sex categories than to others? Might loyalties to gangs and other in-groups be better understood as manifestations of specialized social psychological processes adapted to the domains of kin group solidarity and coalitional aggression in social conditions without central authority? Do media portrayals distort unconscious inferences about the local prevalence of violence and crime, thus affecting behavioral thresholds, and if so, to exactly what aspects of these portrayals is the human mind most responsive? These are psychological questions, investigation of which will undoubtedly profit from evolutionary adaptationist thinking (Daly and Wilson 1989; Tooby and Cosmides 1992; Simpson and Kenrick 1997). Links to macrosocial phenomena such as variations in moral and legal codes have also begun to be elucidated (Alexander 1987; Nisbett and Cohen 1996).

That the human animal is a product of the process of evolution by selection is uncontroversial, but the implications of this fact for the so-

cial sciences are likely to be far-reaching (Dennett 1995). Evolutionary insights should not be viewed as alternatives to sociological and psychological analyses but as complementary components of a more complete understanding.

#### REFERENCES

- Aarsland, Dag, J. L. Cummings, G. Yenner, and B. Miller. 1996. "Relationship of Aggressive Behavior to other Neuropsychiatric Symptoms in Patients with Alzheimer's Disease." *American Journal of Psychiatry* 153:243-47.
- Alexander, Richard D. 1987. *The Biology of Moral Systems*. Hawthorne, N.Y.: Aldine de Gruyter.
- Allen, Judith A. 1990. *Sex and Secrets. Crimes Involving Australian Women since 1880*. Melbourne: Oxford University Press.
- American Psychiatric Association. 1994. *Diagnostic and Statistical Manual of Mental Disorders. Fourth Edition (DSM-IV)*. Washington, D.C.: American Psychiatric Association.
- Andersson, Malte. 1980. "Why Are There So Many Threat Displays?" *Journal of Theoretical Biology* 86:773-81.
- Archer, John. 1988. *The Behavioural Biology of Aggression*. Cambridge and New York. Cambridge University Press.
- Balogh, Rene D., and Richard H. Porter. 1986. "Olfactory Preferences Resulting from Mere Exposure in Human Neonates." *Infant Behavior and Development* 9:395-401.
- Barkow, Jerome, Leda Cosmides, and John Tooby, eds. 1992. *The Adapted Mind*. New York. Oxford University Press.
- Baron, J. N., and P. C. Reiss. 1985. "Same Time, Next Year; Aggregate Analyses of the Mass Media and Violent Behavior." *American Sociological Review* 50:357-63.
- Baron-Cohen, Simon. 1995. *Mindblindness and the Language of the Eyes. An Essay in Evolutionary Psychology*. Cambridge, Mass.: MIT Press.
- Bee, Helen L., Sandra K. Mitchell, Kathryn E. Barnard, Sandra J. Eyres, and Mary E. Hammond. 1984. "Predicting Intellectual Outcomes; Sex Differences in Response to Early Environmental Stimulation." *Sex Roles* 10:783-803.
- Besse, Susan K. 1989. "Crimes of Passion: The Campaign against Wife Killing in Brazil, 1910-1940." *Journal of Social History* 22:653-66.
- Betzig, Laura L. 1986. *Despotism and Differential Reproduction: A Darwinian View of History*. Hawthorne, N.Y.: Aldine.
- Breedlove, S. Marc. 1994. "Sexual Differentiation of the Human Nervous System." *Annual Review of Psychology* 45:389-418.
- Brisson, Norman J. 1983. "Battering Husbands. A Survey of Abusive Men." *Victimology* 6:338-44.

- Brunner, Han G., M. Nelen, X. O. Breakefield, H. H. Ropers, and B. A. van Oost. 1993. "Abnormal Behavior Associated with a Point Mutation in the Structural Gene for Monoamine Oxidase A." *Science* 262:578-80.
- Buss, David M. 1991. "Evolutionary Personality Psychology." *Annual Review of Psychology* 42:459-91.
- Buss, David M., Randy J. Larsen, Drew Westen, and Jennifer Semmelroth. 1992. "Sex Differences in Jealousy: Evolution, Physiology, and Psychology." *Psychological Science* 3:251-55.
- Campbell, Jacquelyn C. 1992a. "If I Can't Have You, No One Can: Issues of Power and Control in Homicide of Female Partners." In *Femicide*, edited by Jill Radford and Diana E. H. Russell. New York: Twayne.
- . 1992b. "Wife Battering: Cultural Contexts versus Western Social Sciences." In *Sanctions and Sanctuary. Cultural Perspectives on the Beating of Wives*, edited by Dorothy Counts, Judith K Brown, and Jacquelyn C. Campbell. Boulder, Colo.; Westview.
- Carey, Greg. 1994. "Genetics and Violence." In *Understanding and Preventing Violence: Biobehavioral Influences*, vol. 2, edited by A. J. Reiss, Jr., K. A. Miczek, and J. A. Roth. Washington, D.C.: National Academy Press.
- Chagnon, Napoleon A. 1988. "Life Histories, Blood Revenge, and Warfare in a Tribal Population." *Science* 239:985-92.
- . 1992. *Yanomamö: The Last Days of Eden*. New York: Harcourt Brace Jovanovich.
- . 1996. "Chronic Problems in Understanding Tribal Violence and Warfare." In *Genetics of Criminal and Antisocial Behaviour* (CIBA Foundation Symposium 194), edited by Gregory R. Bock and Jamie A. Goode. Chichester, United Kingdom: John Wiley.
- Chase, Ivan D., Costanza Bartolomeo, and Lee A. Dugatkin. 1994. "Aggressive Interactions and Inter-contest Interval: How Long Do Winners Keep Winning?" *Animal Behaviour* 48:393-400.
- Chimbos, Peter D. 1993. "A Study of Patterns in Criminal Homicides in Greece." *International Journal of Comparative Sociology* 34:260-71.
- Cohen, Larry E., and Richard Machalek. 1988. "A General Theory of Expropriative Crime: An Evolutionary Ecological Approach." *American Journal of Sociology* 94:465-501.
- . 1994. "The Normalcy of Crime. From Durkheim to Evolutionary Ecology." *Rationality and Society* 6:286-308.
- Coie, John D., Kenneth A. Dodge, Robert Terry, and Virginia Wright. 1991. "The Role of Aggression in Peer Relations: An Analysis of Aggression Episodes in Boys' Play Groups." *Child Development* 62:812-26.
- Colegrave, N. 1994. "Game Theory Models of Competition in Closed Systems: Asymmetries in Fighting and Competitive Ability." *Oikos* 71:499-505.
- Cosmides, Leda, and John Tooby. 1981. "Cytoplasmic Inheritance and Intra-genomic Conflict." *Journal of Theoretical Biology* 89:83-129.
- . 1996. "Are Humans Good Intuitive Statisticians after All? Rethinking Some Conclusions of the Literature on Judgment under Uncertainty." *Cognition* 58:1-73.
- Coulton, Claudia J., Jill E. Korbin, Marilyn Su, and Julian Chow. 1995.

- “Community Level Factors and Child Maltreatment Rates.” *Child Development* 66:1262-76.
- Crawford, Charles B., and Judith L. Anderson. 1989. “Sociobiology: An Environmentalist Discipline?” *American Psychologist* 44:1449-59.
- Crawford, Maria, and Rosemary Gartner. 1992. *Woman Killing: Intimate Femicide in Ontario, 1974-1990*. Toronto: The Women We Honour Action Committee.
- Cronin, Helena. 1991. *The Ant and the Peacock*. Cambridge: Cambridge University Press.
- Cusson, Maurice. 1993. “Situational Deterrence: Fear During the Criminal Event.” In *Crime Prevention Studies*, vol. 1, edited by Ronald V. Clarke. Monsey, N.Y.: Criminal Justice Press.
- Daly, Martin. 1996. “Evolutionary Adaptationism; Another Biological Approach to Criminal and Antisocial Behaviour.” In *Genetics of Criminal and Antisocial Behaviour* (CIBA Foundation Symposium 194), edited by Gregory R. Bock and Jamie A. Goode. Chichester, United Kingdom. John Wiley.
- Daly, Martin, and Margo I. Wilson. 1982. “Homicide and Kinship.” *American Anthropologist* 84:372-78.
- . 1983. *Sex, Evolution and Behavior*, 2d ed. Belmont, Calif.: Wadsworth.
- . 1988a. “Evolutionary Social Psychology and Family Homicide.” *Science* 242:519-24.
- . 1988b. *Homicide*. New York. Aldine.
- . 1989. “Homicide and Cultural Evolution.” *Ethology and Sociobiology* 10:99-110.
- . 1990. “Killing the Competition.” *Human Nature* 1:83-109.
- . 1994a. “Evolutionary Psychology: Adaptionist, Selectionist and Comparative.” *Psychological Inquiry* 6:34-38.
- . 1994b. “The Evolutionary Psychology of Male Violence.” In *Male Violence*, edited by John Archer. London: Routledge.
- . 1995. “Discriminative Parental Solicitude and the Relevance of Evolutionary Models to the Analysis of Motivational Systems.” In *The Cognitive Neurosciences*, edited by Michael Gazzaniga. Cambridge, Mass.: MIT Press.
- . 1996. “Evolutionary Psychology and Marital Conflict: The Relevance of Stepchildren.” In *Sex, Power, Conflict: Feminist and Evolutionary Perspectives*, edited by David M. Buss and Neil Malamuth. New York. Oxford University Press.
- Davies, Nicholas B. 1992. *Dunnock Behaviour and Social Evolution*. Oxford: Oxford University Press.
- Dawkins, Richard. 1982. *The Extended Phenotype*. Oxford: Freeman.
- . 1986. *The Blind Watchmaker*. Harlow, United Kingdom: Longman.
- de Lacoste, Marie-Christine, D. S. Horvath and D. J. Woodward. 1991. “Possible Sex Differences in the Developing Human Fetal Brain.” *Journal of Clinical and Experimental Neuropsychology* 13:831-46.
- Dell, Susan. 1984. *Murder into Manslaughter*. Oxford: Oxford University Press.

- Dennett, Daniel C. 1995. *Darwin's Dangerous Idea*. New York. Transaction.
- deSousa, Ronald. 1987. *The Rationality of Emotions*. Cambridge, Mass.: MIT Press.
- Dobash, Rebecca E., and Russell P. Dobash. 1979. *Violence against Wives*. New York: Free Press.
- . 1984. "The Nature Antecedents of Violent Events." *British Journal of Criminology* 24:269-88.
- Dodge, Kenneth A., John E. Bates, and Gregory S. Pettit. 1990. "Mechanisms in the Cycle of Violence." *Science* 250:1678-83.
- Dodge, Kenneth A., Joseph M. Price, and Jo-Anne Bachorowski. 1990. "Hostile Attributional Biases in Severely Aggressive Adolescents." *Journal of Abnormal Psychology* 99:385-92.
- Draper, Patricia. 1992. "Room to Maneuver: !Kung Women Cope with Men." In *Sanctions and Sanctuary: Cultural Perspectives on the Beating of Wives*, edited by Dorothy Counts, Judith K. Brown, and Jacquelyn C. Campbell. Boulder, Colo.: Westview.
- Dressler, Joshua. 1982. "Rethinking Heat of Passion: A Defense in Search of a Rationale." *Journal of Criminal Law and Criminology* 73:421-70.
- Edwards, J. L. 1954. "Provocation and the Reasonable Man: Another View." *Criminal Law Review*, pp. 898-906.
- Ehrman, Lee. 1972. "Genetics and Sexual Selection." In *Sexual Selection and the Descent of Man, 1871-1971*, edited by Bernard Campbell. Chicago: Aldine.
- Enquist, Magnus, and Olof Leimar. 1990. "The Evolution of Fatal Fighting." *Animal Behaviour* 39:1-9.
- Falconer, Douglas S. 1960. *Introduction to Quantitative Genetics*. New York: Ronald.
- Farrington, David P. 1991. "Psychological Contributions to the Explanation of Offending." *Issues in Criminological and Legal Psychology* 1:7-19.
- Farrington, David P., and Donald J. West. 1995. "Effects of Marriage, Separation, and Children on Offending by Adult Males." *Current Perspectives on Aging and the Life Cycle* 4:249-81.
- Flinn, Mark V. 1988. "Mate Guarding in a Caribbean Village." *Ethology and Sociobiology* 9:1-28.
- Flinn, Mark V., Robert Quinlan, Mark Turner, Seamus A. Decker, and Barry G. England. 1996. "Male-Female Differences in Effects of Parental Absence on Glucocorticoid Stress Response." *Human Nature* 7:125-62.
- Frank, Robert H. 1985. *Choosing the Right Pond*. New York. Oxford University Press.
- . 1988. *Passions within Reason: The Strategic Role of the Emotions*. New York. Norton.
- Fricke, Tom, William G. Axinn, and Arland Thornton. 1993. "Marriage, Social Inequality, and Women's Contact with Their Natal Families in Alliance Societies." *American Anthropologist* 95:395-419.
- Futuyma, Douglas J. 1983. *Science on Trial. The Case for Evolution*. New York: Pantheon.
- Gardner, William. 1993. "A Life-Span Rational-Choice Theory of Risk Tak-

- ing.” In *Adolescent Risk Taking*, edited by Nancy J. Bell and Robert W. Bell. Newbury Park, Calif.: Sage.
- Gaulin, Steven J. C., and Harol A. Hoffman. 1988. “Evolution and Development of Sex Differences in Spatial Ability.” In *Human Reproductive Behaviour*, edited by Laura Betzig, Monique Borgerhoff Mulder, and Paul Turke. Cambridge: Cambridge University Press.
- Gelles, Richard J., and Murray A. Straus. 1985. In *Crime and the Family*, edited by A. J. Lincoln and M. A. Straus. Springfield, Ill.: Thomas.
- Giancola, Peter R., and Amos Zeichner. 1995. “An Investigation of Gender Differences in Alcohol-Related Aggression.” *Journal of Studies in Alcohol* 56: 573-79.
- Gigerenzer, Gerd, and Ulrich Hoffrage. 1995. “How to Improve Bayesian Reasoning without Instruction: Frequency Formats.” *Psychological Review* 102:684-704.
- Goode, William. 1969. “Violence among Intimates.” In *Crimes of Violence*, vol. 13, edited by D. J. Mulvihill and M. M. Tumin. Washington, D.C.: U.S. Government Printing Office.
- Gottesman, Irving I., and H. H. Goldsmith. 1994. “Developmental Psychopathology of Antisocial Behavior: Inserting Genes into Its Ontogenesis and Epigenesis.” In *Threats to Optimal Development. Integrating Biological, Psychological, and Social Risk Factors*, edited by C. A. Nelson. Hillsdale, NJ.: Erlbaum.
- Gottfredson, Michael R., and Travis Hirschi. 1990. *A General Theory of Crime*. Stanford, Calif.: Stanford University Press.
- Gove, Walter, 1985. “The Effect of Age and Gender on Deviant Behavior: A Biopsychosocial Perspective.” In *Gender and the Life Course*, edited by Alice S. Rossi. New York. Aldine.
- Gur, R. C., L. H. Mozley, P. D. Mozley, S. M. Resnick, J. S. Karp, A. Alavi, S. E. Arnold, and R. E. Gur. 1995. “Sex Differences in Regional Cerebral Glucose Metabolism during a Resting State.” *Science* 267:528-31.
- Hagan, John. 1986. “The Unexplained Crimes of Class and Gender.” In *Critique and Explanation*, edited by T. F. Hartnagel and R. A. Silverman. New Brunswick, NJ.: Transaction.
- . 1990. “The Structuration of Gender and Deviance: A Power-Control Theory of Vulnerability to Crime and the Search for Deviant Exit Roles.” *Canadian Review of Sociology and Anthropology* 27:137-56.
- Haig, David, 1993. “Genetic Conflicts in Human Pregnancy.” *Quarterly Review of Biology* 68:495-532.
- Hamilton, William D. 1964. “The Genetical Evolution of Social Behaviour,” pts. 1 and 2. *Journal of Theoretical Biology* 7:1-52.
- Harris, Judith R. 1995. “Where Is the Child's Environment? A Group Socialization Theory of Development.” *Psychological Review* 102:458-89.
- Hepper, Peter G., ed. 1991. *Kin Recognition*. Cambridge: Cambridge University Press.
- Hetherington, E. Mavis, D. Reiss, and Robert Plomin, eds. 1994. *Separate Social Worlds of Siblings. The Impact of Nonshared Environment on Development*. Hillsdale, N.J.: Erlbaum.

- Hewlett, Barry S. 1988. "Sexual Selection and Paternal Investment among Aka Pygmies." In *Human Reproductive Behaviour*, edited by Laura Betzig, Monique Borgerhoff Mulder, and Paul Turke. Cambridge: Cambridge University Press.
- Hilberman, Elaine, and Kit Munson. 1978. "Sixty Battered Women." *Victimology* 2:460-70.
- Hill, Kim R., and A. Magdalena Hurtado. 1995. *Aché Life History: The Ecology and Demography of a Foraging People*. Hawthorne, N.Y.: Aldine.
- Hirschi, Travis, and Michael R. Gottfredson. 1983. "Age and the Explanation of Crime." *American Journal of Sociology* 89:552-84.
- . 1986. "The Distinction between Crime and Criminality." In *Critique and Explanation*, edited by Timothy F. Hartnagel and Robert A. Silverman. New Brunswick, NJ.: Transaction.
- Howell, Nancy. 1979. *Demography of the Dobe !Kung*. New York: Academic Press.
- Hsieh, Ching-Chi, and M. D. Pugh. 1993. "Poverty, Income Inequality, and Violent Crime: A Meta-analysis of Recent Aggregate Data Studies." *Criminal Justice Review* 18:182-202.
- Huntingford, Felicity, and Angela Turner. 1987. *Animal Conflict*. London: Chapman & Hall.
- Johnson, Holly, and Vincent Sacco. 1995. "Researching Violence against Women: Statistics Canada's National Survey." *Canadian Journal of Criminology* 37:281-304.
- Kahneman, Daniel, Paul Slovic, and Amos Tversky, eds. 1982. *Judgment under Uncertainty*. New York: Cambridge University Press.
- Katz, Jack. 1988. *Seductions of Crime*. New York: Basic.
- Kimura, Doreen, and Elizabeth Hampson. 1994. "Cognitive Patterns in Men and Women Influenced by Fluctuations in Sex Hormones." *Current Directions in Psychological Science* 3:57-61.
- Kposowa, Augustine J., Gopal K Singli, and K D. Breault. 1994. "The Effects of Marital Status and Social Isolation on Adult Male Homicides in the United States; Evidence from the National Longitudinal Mortality Study." *Journal of Quantitative Criminology* 10:277-89.
- Krahn, Harvey, Timothy F. Hartnagel, and John W. Gartrell. 1986. "Income Inequality and Homicide Rates: Cross-National Data and Criminological Theories." *Criminology* 24:269-95.
- Kvamerno, Charlotta, Elisabet Forsgren, and Carin Magnhagen. 1995. "Effect of Sex Ratio on Intra- and Inter-Sexual Behaviour in Sand Gobies" *Animal Behaviour* 50:1455-61.
- Leslie, Alan. 1992. "Pretense, Autism and the Theory-of-Mind Module." *Current Directions in Psychological Science* 1: 18-21.
- Low, Bobbi S. 1989. "Cross-Cultural Patterns in the Training of Children: An Evolutionary Perspective." *Journal of Comparative Psychology* 103:311-19.
- Lyons, Michael J. 1996. "A Twin Study of Self-Reported Criminal Behaviour." In *Genetics of Criminal and Antisocial Behaviour* (CIBA Foundation

- Symposium 194), edited by Gregory R. Bock and Jamie A. Goode. Chichester, United Kingdom: John Wiley.
- Lytton, Hugh, and David M. Romney. 1991. "Parents' Differential Socialization of Boys and Girls: A Meta-Analysis." *Psychological Bulletin* 109:267-96.
- Machalek, Richard. 1995. "Basic Dimensions and Forms of Social Exploitation. A Comparative Analysis." *Advances in Human Ecology* 4:35-68.
- Machalek, Richard, and Larry E. Cohen. 1991. "The Nature of Crime: Is Cheating Necessary for Cooperation?" *Human Nature* 2:215-33.
- Mahoney, Martha R. 1991. "Legal Images of Battered Women: Redefining the Issue of Separation." *Michigan Law Review* 90:1-94.
- Mayr, Ernst. 1983. "How to Carry out the Adaptationist Program?" *American Naturalist* 121:324-34.
- Mazur, Alan, Alan Booth, and James M. Dabbs, Jr. 1992. "Testosterone and Chess Competition." *Social Psychology Quarterly* 55:70-77.
- McCarthy, Barry. 1993. "Warrior Values. A Socio-Historical Survey." In *Male Violence*, edited by John Archer. London: Routledge.
- McCaul, Kevin D., Brian A. Gladue, and Margaret Joppa. 1992. "Winning, Losing, Mood, and Testosterone." *Hormones and Behavior* 26:486-504.
- Mealey, Linda. 1995. "The Sociobiology of Sociopathy: An Integrated Evolutionary Model." *Behavioral and Brain Sciences* 18:523-41.
- Moffitt, Terri. 1993. "Adolescence-Limited and Life-Course Persistent Antisocial Behavior: A Developmental Taxonomy." *Psychological Review* 100: 674-701.
- Møller, Anders P. 1994. *Sexual Selection and the Barn Swallow*. Princeton, NJ.: Princeton University Press.
- Monahan, John, and Stephanie Splane. 1980. "Psychological Approaches to Criminal Behavior." In *Criminology Review Yearbook*, vol. 2, edited by E. Bitner and S. Messinger. Beverly Hills, Calif.: Sage.
- Nesse, Randolph M. 1990. "Evolutionary Explanations of Emotions." *Human Nature* 1:261-89.
- Newman, Leonard S., and Roy F. Baumeister. 1996. "Toward an Explanation of the UFO Abduction Phenomenon: Hypnotic Elaboration, Extraterrestrial Sadomasochism, and Spurious Memories." *Psychological Inquiry* 7:99-197.
- Nisbett, Richard E., and Dev Cohen. 1996. *Culture of Honor: The Psychology of Violence in the South*. Boulder, Colo.: Westview.
- Nisbett, Richard E., and Lee Ross. 1980. *Human Inference: Strategies and Shortcomings of Social Judgement*. Englewood Cliffs, NJ.: Prentice Hall.
- Nisbett, Richard E., and T. D. Wilson. 1977. "Telling More than We Can Know: Verbal Reports on Mental Processes." *Psychological Review* 84:231-59.
- Olweus, Dan, J. Block, and Marian Radke-Yarrows, eds. 1986. *Development of Antisocial and Prosocial Behavior*. New York. Academic.
- Petrinovich, Lewis. 1995. *Human Evolution, Reproduction, and Morality*. New York: Plenum.

- Phillips, David P. 1983. "The Impact of Mass Media Violence on U.S. Homicide." *American Sociological Review* 48:560-68.
- Pinker, Steven. 1997. *How the Mind Works*. New York. Norton.
- Polk, Kenneth. 1994. *When Men Kill*. Cambridge: Cambridge University Press.
- Premack, David, and Ann James Premack. 1995. "Origins of Human Social Competence." In *The Cognitive Neurosciences*, edited by Michael Gazzaniga. Cambridge, Mass.: MIT Press.
- Pruett-Jones, Stephen, and Melinda Pruett-Jones. 1994. "Sexual Competition and Courtship Disruptions: Why Do Male Bowerbirds Destroy Each Other's Bowers?" *Animal Behaviour* 47:607-20.
- Raine, Adrian. 1993. *The Psychopathology of Crime and Criminal Behavior as a Clinical Disorder*. San Diego, Calif.: Academic.
- Rogers, Alan R. 1994. "Evolution of Time Preference by Natural Selection." *American Economic Review* 84:460-81.
- Ross, Michael. 1989. "Relation of Implicit Theories to the Construction of Personal Histories." *Psychological Review* 96:341-57.
- Rounsaville, Bruce J. 1978. "Theories in Marital Violence: Evidence from a Study of Battered Women." *Victimology* 3:11-31.
- Rowe, David C. 1994. *The Limits of Family Influence. Genes, Experience, and Behavior*. New York. Guilford.
- Rubin, P. H., and C. W. Paul. 1979. "An Evolutionary Model of Taste for Risk." *Economic Inquiry* 17:585-96.
- Safilios-RodLseheld, Constantina. 1969. "'Honor' Crimes in Contemporary Greece." *British Journal of Sociology* 20:205-18.
- Sampson, Robert J. 1991. "Linking the Micro- and Macrolevel Dimensions of Community Social Organization." *Social Forces* 70:43-64.
- Sampson Robert J., and John H. Laub. 1993. *Crime in the Making: Pathways and Turning Points through Life*. Cambridge, Mass.: Harvard University Press.
- Sherwin, Barbara B. 1994. "Estrogenic Effects on Memory in Women." *Annals of the New York Academy of Sciences* 743:213-31.
- Simpson, Jeffrey, and Douglas Kenrick, eds. 1997. *Evolutionary Social Psychology*. Mahwah, NJ.: Erlbaum.
- Smuts, Barbara. 1992. "Male Aggression against Women: An Evolutionary Perspective." *Human Nature* 3:1-44.
- Sulloway, Frank J. 1996. *Born to Rebel: Radical Thinking in Science and Social Thought*. New York: Oxford University Press.
- Sussman, Robert W., James M. Cheverud, and Thad Q. Bartlett. 1995. "Infant Killing as an Evolutionary Strategy: Reality or Myth?" *Evolutionary Anthropology* 3:149-51.
- Symons, Donald. 1990. "Adaptiveness and Adaptation." *Ethology and Sociobiology* 11:427-44.
- . 1995. "Beauty Is in the Adaptations of the Beholder: The Evolutionary Psychology of Human Female Sexual Attractiveness." In *Sexual Nature, Sexual Culture*, edited by P. R. Abramson and S. D. Pinkerton. Chicago: University of Chicago Press.

- Tittle, Charles R. 1988. "Two Empirical Regularities (Maybe) in Search of an Explanation: Commentary on the Age/Crime Debate." *Criminology* 26:75-85.
- Tonry, Michael, Lloyd E. Ohlin, and David P. Farrington. 1991. *Human Development and Criminal Behavior*. New York: Springer-Verlag.
- Tooby, John, and Leda Cosmides. 1990a. "On the Universality of Human Nature and the Uniqueness of the Individual; The Role of Genetics and Adaptation." *Journal of Personality* 58:17-67.
- . 1990b. "The Past Explains the Present. Emotional Adaptations and the Structure of Ancestral Environments." *Ethology and Sociobiology* 11:375-424.
- . 1992. "The Psychological Foundations of Culture." In *The Adapted Mind*, edited by Jerome Barkow, Leda Cosmides, and John Tooby. New York: Oxford University Press.
- Trivers, Robert L. 1971. "The Evolution of Reciprocal Altruism." *Quarterly Review of Biology* 46:35-57.
- . 1972. "Parental Investment and Sexual Selection." In *Sexual Selection and the Descent of Man, 1871-1971*, edited by Bernard Campbell. Chicago: Aldine.
- . 1974. "Parent-Offspring Conflict." *American Zoologist* 14:249-64.
- Turner, George F. 1994. "The Fighting Tactics of Male Mouthbrooding Cichhds: The Effects of Size and Residency." *Animal Behaviour* 47:655-62.
- Vangoozen, Stephanie H. M., Peggy T. Cohenkettenis, Louis J. G. Gooren, Nico H. Frijda, and Nanne E. Vandepoll. 1995. "Gender Differences in Behavior: Activating Effects of Cross-sex Hormones." *Psychoneuroendocrinology* 20:343-63.
- Vila, Bryan. 1994. "A General Paradigm for Understanding Criminal Behavior: Extending Evolutionary Ecological Theory." *Criminology* 32:311-59.
- Widom, Cathy S. 1989. "The Cycle of Violence." *Science* 244:160-66.
- William , George C. 1966. *Adaptation and Natural Selection*. Princeton, NJ.: Princeton University Press.
- Williams, George C, and Randolph M. Nesse. 1991. "The Dawn of Darwinian Medicine." *Quarterly Review of Biology* 66:1-22.
- Wilson, James Q., and Richard J. Herrnstein. 1985. *Crime and Human Nature*. New York: Simon & Schuster.
- Wilson, Margo I., and Martin Daly. 1985. "Competitiveness, Risk-Taking and Violence: The Young Male Syndrome." *Ethology and Sociobiology* 6:59-73.
- . 1992a. "The Man Who Mistook His Wife for a Chattel." In *The Adapted Mind*, edited by Jerome Barkow, Leda Cosmides, and John Tooby. New York: Oxford University Press.
- . 1992b. "Who Kills Whom in Spouse Killings? On the Exceptional Sex Ratio of Spousal Homicides in the United States." *Criminology* 30:189-215.
- . 1993a. "An Evolutionary Psychological Perspective on Male Sexual Proprietariness and Violence Against Wives." *Violence and Victims* 8:271-94.

- . 1993b. "Spousal Homicide Risk and Estrangement." *Violence and Victims* 8:3-16.
- . 1994. "A Lifespan Perspective on Homicidal Violence: The Young Male Syndrome." In *Proceedings of the 2nd Annual Workshop of the Homicide Research Working Group*, edited by C. Rebecca Block and Richard L. Block. Washington, D.C.: National Institute of Justice.
- Wilson, Margo I., Martin Daly, and Joanna E. Scheib. 1997. "Femicide: An Evolutionary Psychological Perspective." In *Feminism and Evolutionary Biology*, edited by Patricia A. Gowaty. New York: Chapman Hall.
- Wilson, Margo I., Martin Daly, and Christine Wright. 1993. "Uxoricide in Canada: Demographic Risk Patterns." *Canadian Journal of Criminology* 35: 263-91.
- Wilson, Margo I., Holly Johnson, and Martin Daly. 1995. "Lethal and Nonlethal Violence against Wives." *Canadian Journal of Criminology* 37:331-61.
- Witelson, Sandra F. 1991. "Neural Sexual Mosaicism: Sexual Differentiation of the Human Temporo-Parietal Region for Functional Asymmetry." *Psychoneuroendocrinology* 16:131-53.
- Wolfgang, Marvin E. 1958. *Patterns in Criminal Homicide*. Philadelphia: University of Pennsylvania Press.
- Wolfgang, Marvin E., and Franco Ferracutti. 1967. *The Subculture of Violence*. London: Tavistock
- Wright, Robert. 1994. *The Moral Animal*. New York. Pantheon.