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EVOLUTION AND THE BOUNDS OF HUMAN

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I. INTRODUCTION

This author engaged in the following activities during the spring of 2003: visited art galleries and museums in New York City. Read three novels, three short stories, and magazine and newspaper articles about, among other things, the social life of movie stars, new scholarship on the Christian gospels, advances in molecular biology, gay rights, and the cultural origins of anti-semitism. Watched a late night movie about the ill-fated Apollo-13 mission. Attended the ballet and two modern dance performances. Watched a basketball game on TV. Had coffee with a friend who works for a right-wing magazine. Met with a cousin who is a TV and radio talk show host and former stand-up comic and was introduced to his fiancee, a political scientist. Checked out the architecture of a church in which they will be married. Had lunch with a twenty-something cousin who works in a trendy Soho dance club. Attended an academic conference on law and social norms and read a book about medical ethics. Helped my 7-year old collect materials for a nature diorama, bought her a soccer goal and softball set, criticized the humorous poems written by my 13-year old, and attended children's dance and piano recitals. Listened to my 8-year old practice the cello and talked with him about prime numbers and the heat death of the universe. Shopped at a fashionable store with a stylish friend and bought two overpriced, uncomfortable pairs of shoes I didn't need. Obsessed about whether to buy a Dodge Caravan or a Sienna Toyota van.

What's all this got to do with survival of the fittest? A basic tenet of evolutionary theory is that the human organism is the product of a lengthy competitive struggle to survive and reproduce within a setting of mortal danger and natural scarcity. Evolu-

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tionary psychology posits that these ancient struggles decisively shaped human psychology and behavior. There is little apparent connection, however, between the imperatives of this process and the activities described above. Those activities relate to cultural preoccupations that absorb significant amounts of modern man's energies and fill many of his waking hours but have few obvious fitness consequences. These include the visual arts, music, religion, ideology, moral theory, dance, literature, drama, comedy, fashion, sports, scholarship, science, philosophy, mathematics, space exploration, journalism, and idle conversation. Why an organism shaped by the paramount need to survive and reproduce would be drawn to these pastimes is an enduring puzzle for evolutionary theory. Is it possible to explain why people spend their time this way?

Recent books on human evolution suggest some answers.[1] The last ten years have seen an impressive outpouring of work on the new science of evolutionary psychology by generalists, journalists, and professional scholars. Much of this opus seeks to bring experts' work in population biology and evolutionary theory before a broad popular and academic audience and to explore how evolutionary models of behavior can inform law and policy. Legal scholars have gotten into the act, applying evolutionary approaches gleaned from the scientific literature and popular treatments to a range of legal and social questions.[2] Although legal scholars run the gamut from enthusiastic to wary about evolutionary ideas, no one to my knowl-

[1] *See*, e.g., David Sloan Wilson, *Darwin's Cathedral: Evolution, Religion, and the Nature of Society* (2002); Elliot Sober and David Sloan Wilson, *Unto Others: The Evolution and Psychology of Unselfish Behavior* (1998); Geoffrey Miller, *The Mating Mind: How Sexual Choice Shaped the Evolution of Human Nature* (2000). The focus of this essay is primarily on these three books and articles by legal scholar Owen Jones (see *infra*), but it also draws on other recent work. See Steven Pinker, *The Blank Slate: The Modern Denial of Human Nature* (2002); Daniel Dennett, *Freedom Evolves* (2003); John Dupre, *Human Nature and the Limits of Science* (2001); Jonathan Michael Kaplan, *The Limits and Lies of Human Genetic Research: Dangers for Social Policy* (2000); Paul Rubin, *Darwinian Politics: The Evolutionary Origin of Freedom* (2002); and books by Matt Ridley, Robert Wright, Sarah Hrdy, David Buss, Janet Radcliffe Richards, and Thornhill and Palmer.

[2] *See*, e.g., work by John McGinnis, Todd Zywicki, Paul Rubin, Katherine Baker, Owen Jones, Erin O'Hara, and Kingsley Browne.

edge has squarely confronted the conundrum posed at the beginning of this essay. There is little discussion in this work of the aesthetic, dramatic, playful, spiritual, moral, or theoretical preoccupations of mankind. Rather, the focus is on behaviors with more direct and obvious effects on physical survival and reproductive prospects, including strategies for responding to harsh conditions and material scarcity, for besting others in power struggles over resources and sex, and for caring effectively for offspring. Although forms of cooperation that contribute to social order and material well-being may be included in the story, the picture that emerges evokes the cave man or woman concerned almost exclusively with securing physical survival and surmounting the material constraints of life.

This view of man as a species shaped by a life-and-death struggle against others and the natural elements has informed attempts by social scientists and academics – including legal scholars – to draw lessons for law and policy from evolutionary insights. The basic premise of evolutionary psychology, from which this view derives, is that the pressures exerted by the natural and social setting in the environment of evolutionary adaptation (EEA)[3] – which designates the lengthy period during which modern *homo sapiens* and his mammalian ancestors emerged from more ancient forms – endowed people with a set of psychological tendencies that enhanced their chances of physical survival and maximized successful reproduction. Theorists who seek to make use of evolutionary mechanisms to explain human behavior engage in a characteristic method of analysis. They begin by using historical, geological, ecological, and archeological evidence to describe the natural and social setting in which evolution occurred. An understanding of the constraints imposed by past environments then permits the identification of behaviors that were most adaptive within them. Specifically, the behaviors that were most adaptive were those that tended to maximize the organism's fitness, where fitness is defined as the ability to pass one's genetic material on to progeny through reproduction. Fitness is a measure of overall reproductive success. It is assumed that the tendencies underlying the most adaptive behaviors were retained by surviving organisms, with less adaptive traits dying out. The fitness-maximizing habits were incorporated

[3] Rubin, *supra* note 1, at p. 5.

into the human genetic repertoire and continue to govern choices and behavior today. Identification of the tendencies that were most adaptive during past critical periods thus facilitates predictions about current and future human behavior. It fixes the limits on human behavioral possibilities and informs the design of policies that will influence behavior in desirable directions.

The controversy surrounding the uses of evolutionary ideas in social science centers on the degree to which evolutionary insights shed light on prospects for social, political, and economic life. Those suspicious of applying evolutionary models to human behavior deny that these theories can identify innate human attributes or that they can generate knowledge of the potential for social change. In their wariness of efforts to develop a science of human nature, some critics have cast aspersions on the very notion that human behavior has been influenced by evolutionary forces.[4]

This essay occupies a middle ground by accepting the evolutionary model of human behavior but casting doubt on the use of evolutionary insights to set the limits of human possibility. It argues that, although the evolutionary paradigm is unquestionably valid and applicable to the human organism, a fully informed understanding of evolutionary mechanisms fundamentally alters the payoff of applying evolutionary insights to human behavior and greatly vitiates the political significance of the controversies surrounding this view of human development. Specifically, the flaw in most attempts to use evolutionary analysis to draw specific conclusions about social life is the failure fully to appreciate the significance of two evolutionary mechanisms – sexual selection and group selection – to which Darwin assigned importance and devoted considerable attention. A proper understanding of the role these mechanisms are believed to play in shaping behavior dramatically undermines the practical, predictive value of evolutionary analysis. Because an account that gives weight to these mechanisms is far more ambiguous, indeterminate, and complex than both proponents and critics of evolutionary approaches to behavior realize, evolutionary understandings yield few concrete – or controversial – recom-

[4] For such critiques, see, e.g., Philip Kitcher, *Vaulting Ambition* (1985); Anne Fausto-Sterling, *Myths of Gender* (1985); R. C. Lewontin et al., *Not in Our Genes* (1984).

mendations for law and policy. On the most general level, evolutionary insights counsel caution against dramatic, utopian schemes of "social engineering" and suggest that sweeping, sudden change may work less well than incremental measures in effecting social reform.[5] Beyond that, however, evolutionary psychology offers little specific guidance as to how to improve human behavior or reform social life. The payoffs from evolutionary theory for policy are meager.

This essay proceeds in three parts. The first outlines the framework for evolutionary analysis that is generally accepted by most scholars – including economists, social scientists, and legal academics – who apply evolutionary models to social questions. That method, which finds singular expression in the work of Owen Jones, a leading proponent of applying evolutionary concepts to legal issues, posits that behaviors that were most widely adaptive, or fitness-enhancing, during critical periods of evolutionary development will prove most prevalent and least mutable today. The second part then identifies the shortcomings of this framework and the analytic distortions that result. It argues that the power of evolutionary psychology to describe the limits of human behavior or to predict the likely influence of social intervention erodes significantly with the adoption of a more complete theory that gives adequate attention to mechanisms of sexual selection and group selection – as opposed to forms of natural selection that emphasize physical survival and resource-based reproductive success – in influencing human behavior. In discussing what is missing from recent treatments, the essay draws primarily on three books about group selection and sexual selection that describe these mechanisms and explore their potential influence on psychology, social structure, and culture.[6]

The essay then applies the expanded framework to aspects of human behavior that are commonly subjects of evolutionary analysis. Using as examples recent controversies surrounding the

[5] *See* discussion *infra*, part VII.

[6] Sober and Wilson, *Unto Others: The Evolution and Psychology of Unselfish Behavior* (1998); David Sloan Wilson, *Darwin's Cathedral: Evolution, Religion, and the Nature of Society* (2002); Geoffrey Miller, *The Mating Mind: How Sexual Choice Shaped the Evolution of Human Nature* (2000).

evolutionary origins of rape,[7] violence against women,[8] and differences between the sexes,[9] the final part of the essay examines the implications of the suggestion, critical to the analytic paradigm described in the first part, that currently observed behaviors can be traced to patterns that were most adaptive or fitness-enhancing during past periods of evolutionary development. It concludes that very little of practical or political importance turns on whether, using this form of analysis, a behavior appears to have been adaptive for individuals in the past. First, that a particular behavioral trait (such as the tendency to engage in forced sex) increased an individual's overall reproductive success enough to be retained in the human repertoire does not mean that the behavior was the best strategy in most circumstances or was displayed frequently. A more important objection, however, can be traced to limitations inherent in any attempt to determine which behaviors were most fitness-enhancing in critical periods of evolutionary development. Although an understanding of the evolutionary environment can help determine the fitness consequences of human behaviors that bore most directly and transparently on survival and reproduction, it is much less useful for behaviors that influenced fitness through more complex and less direct mechanisms. That constraint fosters an application of the standard analytic method that is necessarily tendentious and incomplete: the assessment of past fitness effects unavoidably emphasizes evolutionary mechanisms that allow fitness to be derived from what we know of past environments and slights those less amenable to a simple form of inference. The latter include sexual selection – the process, long acknowledged as a key

[7] *See* Thornhill and Palmer, *A Natural History of Rape* (2000); *see also* book reviews esp. Jerry Coyne, "Of Vice and Men," *The New Republic* (April 3, 2000); Frans B. M. de Waal, "Survival of the Rapist," *New York Times Book Review* (April 2, 2000); Jerry Coyne and Andrew Berry, "Rape as an Adaptation," 404 *Nature* 121 (March 9, 2000).

[8] *See* Martin Daly and Margo Wilson, *Homicide*; Owen Jones, "Time-Shifted Rationality and the Law of the Law's Leverage: Behavioral Economics Meets Behavioral Biology," *Nw. U. L. Rev.* 95 (2001), pp. 1141, 1190.

[9] *See*, e.g., David Buss, *The Evolution of Desire* (1994); David Geary, *Male, Female: The Evolution of Human Sex Differences* (1998); Linda Mealey, *Sex Differences: Developmental and Evolutionary Strategies* (2000); Anne Campbell, *A Mind of Her Own: the Evolutionary Psychology of Women* (2002). *See also* Steven Pinker, *The Blank Slate: The Modern Denial of Human Nature* (2002).

determinant of individual reproductive success, by which organisms choose their mates. The second mechanism is group selection – a more controversial process that operates through resource and reproductive competition between groups. Sexual selection and group selection undermine the ability to use evolutionary analysis to identify limits on human cultural, social, and behavioral possibility because these mechanisms can work against the expression of behaviors that would otherwise appear to have enhanced an individual's survival or reproductive advantage in past environments and thus can produce outcomes that run contrary to some behaviors that would be predicted to emerge under the pressures of competitive constraints. Behaviors that increase sexual opportunities by enhancing physical survival and resource accumulation can be identified from knowledge of the evolutionary environment, but behaviors that increase fitness through their attractiveness to the opposite sex cannot. Moreover, by sometimes favoring wasteful display, sexual selection propagates tendencies that would otherwise seem to be *non-adaptive*, in the sense of rendering the individual organism *less* able to survive and thrive within the natural and social environment. Group selection likewise can work to undermine the full range of adaptive mechanisms – including sexual display and intragroup competition – that promote individual fitness. Because groups outcompete rivals when members act to benefit others at their own expense, the forces of group selection can be predicted to promote behaviors that run contrary to individual fitness in all its forms. The knowledge we possess of past environments, although useful in identifying some fitness-promoting behaviors, is far less useful in identifying complex behaviors that may have helped groups survive in competition with others.

In light of this analysis, this essay concludes that the fact that particular behaviors appear to have conferred a competitive advantage for most individuals in most past situations says very little about whether such behaviors will dominate under modern conditions of complex social organization or whether they can be effectively controlled today. The suggestion that rape is an adaptive behavior, or that observed differences between the sexes have an evolved genetic basis, turns out to be of less pragmatic importance than many proponents of evolutionary analysis believe. The insight

that is key to dispelling the controversy is that evolution operates on more than one level and through more than one mechanism. The mechanisms sometimes work at cross-purposes; they can counter one another and cancel out, producing phenotypes – or behavioral manifestations – over a complex range. Although imperatives of individual survival and competition shaped many human desires and preferences, those tendencies will not always find expression in behavior. Group selection is thought to have equipped human beings with regulatory programs – such as responsiveness to social cues, group sanctions, and a broad array of cultural norms – that can curb strong impulses for the benefit of the group. Sexual selection rendered persons sensitive to the tastes and desires of the opposite sex. Responding to those desires can sometimes compromise a suitor's survival and well-being. The receptiveness to outside pressures and the opinions of others in the social group, inculcated through group and sexual selective processes, are as deeply rooted in evolved "human nature," and potentially as powerful an influence on behavior, as the quest for survival, resources, sexual opportunities, and individual advantage. That receptiveness can be conscripted, through various cultural forms, to curb inborn drives or cravings, even to the point of compromising individual reproductive success.

If traits shaped by various selective mechanisms can offset one another to a variable and unpredictable degree, evolution can throw up a far wider spectrum of behaviors than previously imagined. It becomes that much harder to determine which dispositions among a very broad range will manifest themselves in any particular setting. That difficulty undermines the methodology that attempts to draw a connection between the fitness consequences of a particular behavior in the past and the behavior's resistance to change in the present. The invalidity of that correspondence translates into an inability to use our knowledge of evolution to locate determinate limits on human culture, social structure, and behavior. Evolutionary analysis does not enable us to predict, for example, whether effective control of sexual violence or a convergence of sex roles is possible, or whether, on the other hand, those results are ultimately unattainable. As applied to the most pressing and interesting questions

of human social policy, the yield from evolutionary analysis is therefore limited.

II. THE BASIC PARADIGM OF EVOLUTIONARY PSYCHOLOGY AND THE LAW OF THE LAW'S LEVERAGE

The evolutionary approach to human behavior rejects biological exceptionalism. The human organism, like other creatures, represents the outcome of an evolutionary process. Evolutionary theory assumes that genes code for brain structures, which control patterns of behavior. During the long period during which the human species evolved from its mammalian ancestors – sometimes designated by evolutionists as the environment of evolutionary adaptation (EEA) – a spontaneous process of mutation regularly modified this genetic material. These modifications in turn produced behavioral variations. Environmental pressures and constraints, including natural scarcity and competition from other organisms, operated to favor the behavioral patterns that were most adaptive, or conducive to individual survival and successful reproduction. By enhancing reproductive success, adaptive behaviors resulted in the preservation and spread of genes coding for the most successful behaviors. The genetic makeup that emerged from this process influences man's behavior today, and is believed to do so in ways that are significantly constraining.

Although evolutionary analysis is of theoretical value in providing explanations for observed behaviors, the more interesting question – and the one that determines evolutionary psychology's payoff for law and policy – is whether this method can predict responses to social interventions or indicate whether desired goals for human social life can be achieved. Exploring this question requires an understanding of assumptions accepted by scholars who seek to base social speculation on evolutionary models. Owen Jones's attempt in a recent formulation to establish a systematic framework for drawing lessons for law and policy from an evolutionary approach to human behavior provides a succinct summary of the dominant thinking in this area. Jones's "law of the law's leverage," which serves as a handy foil for this essay's central argument, is as follows:

The magnitude of legal intervention necessary to reduce or to increase the incidence of any human behavior will correlate positively or negatively, respectively, with the extent to which a predisposition contributing to that behavior was adaptive for its bearers, on average, in past environments.[10]

This principle reflects an expectation that the ease of changing human behavior will vary inversely with how broadly adaptive – or fitness-enhancing – that behavior was "on average" for individuals in the range of natural environments present during the critical period of evolution. The term "on average" is ambiguous,[11] but seems to take into account both the degree to which a behavior enhanced the number of surviving offspring and the range of circumstances in which it had that effect. That is, greater adaptiveness correlates with a greater chance of reproductive success in the widest range of encountered circumstances.

Jones's law hinges on the relationship between degree of adaptiveness and behavioral inflexibility. If the most adaptive behaviors are those that enhanced reproduction under many encountered conditions, then few individuals will deviate from that behavioral winning formula in most situations and disparate environments will elicit similar responses from everyone. The behavioral repertoire will then appear relatively "hard-wired," stereotyped, and fixed. Although not all circumstances will trigger the behavior in question, most will. The environment would have

[10] Owen D. Jones, "Time Shifted Rationality and the Law of Law's Leverage: Behavioral Economics Meets Behavioral Biology," *Nw. U. L. Rev.* 95 (2001), pp. 1141, 1190. See also Wax, "Against Nature: On Robert Wright's *The Moral Animal*," *U. Chi. L. Rev.* 63 (1996), p. 307 (noting that evolutionary psychology may be useful for helping to identify the "price" of attempts to control behavioral tendencies that are more or less ingrained because previously adaptive or not).

[11] The ambiguity arises from the fact that a behavioral pattern that is displayed only under unusual circumstances can nevertheless be regarded as adaptive if retaining that behavioral option in reserve increases an organisms's average likelihood of survival and successful reproduction. Jones recognizes this possibility in his discussion of rape. See Owen Jones, "Realities of Rape: Of Science and Politics, Causes and Meanings," *Cornell L. Rev.* 86 (2001), pp. 1386, 1392 (noting that forced sex is a highly contingent, last-resort reproductive strategy, but commenting that "when the results of rape increased a raping male's reproductive success even marginally, *** a predisposition increasing the probability of forced copulation would appear in increasing percentages of males over many generations.") See discussion of rape *infra*, part VI.

to be taken to great extremes to elicit any significant variation in observed response. This description implies that outside interventions – including the familiar panoply of legal and social sanctions – are unlikely to prove effective in altering the behavior at issue. It follows that the law's leverage – indeed, the ability of any social, cultural, or environmental influence to modify behavior – will be at its weakest for highly adaptive behaviors.

The validity of the law of the law's leverage depends on the assumption that we can correctly infer from the environment in which evolution occurred those behaviors that would have maximized the chances of survival and transmission of genes in that setting. Indeed, this assumption is critical to the success of any attempt to parlay evolutionary theory into a theory of human nature. The use of this analytic paradigm to identify the repertoire of behaviors that comprise the core features of "human nature" – and to establish the constraints on possible human responses to external forces – thus depends critically on the ability to develop an accurate picture of the ambient conditions under which evolution occurred. Historical, anthropological, and ecological methods must be enlisted to develop the information needed to describe the environment of evolutionary adaptation in sufficient detail to put this paradigm to work.

Although this framework purports to provide a method for identifying the most pervasive and invariant behaviors, it does not suggest that all behaviors will fit this pattern, nor does it rule out significant interactions between genetic programs and environment. As John Maynard Smith points out,[12] no reasonable evolutionist holds such a narrowly constrained view of how genes control behavior in every case, and all recognize that behavior is the product of the interaction of genes with environment. It is a commonplace of behavioral genetics that all genes or gene complexes exhibit a "norm of reaction," which is a range of phenotypes, or outward manifestations, that vary as a function of surrounding circumstances. Some norms of reaction are narrow, with little difference in expression across a range of conditions, whereas others are broad and display significant variations in response as conditions change. A norm of reaction is a functional relationship in the form f(x,y) = z, where

[12] *See* Commentary in Patricia Gowaty (ed.), *Feminism and Evolutionary Biology: Boundaries, Intersections and Frontiers* (1997).

x gives the genetic variant of the pertinent traits, y the possible environments the organism could encounter, and z the behavioral outcome of the interaction of traits and environment. A relatively fixed trait is one for which the range of values for z will be small and narrow over all existing x and possible y. The behavior the genotype controls will be similar for relevant organisms in a variety of conditions. For other traits, the range of possible z can be very broad. The behavior the gene controls will show great flexibility and responsiveness to ambient conditions.

The precise functional relationship between x, y and z is deterministic in the sense that all behavior could be completely predicted if controlling genes, their functional norms of reaction, and all pertinent environmental inputs were fully known and characterized. That goal is not close to being achieved for almost all aspects of human behavior. Nonetheless, a highly responsive gene with a broad norm of reaction will produce behavior that appears less rigidly "determined," if only because that behavior will be hard to predict from known antecedents. That appearance is an illusion that contributes to a confused and imprecise use of terminology concerning causes of behavior. The difficulty of predicting human behavior, which is a function of limited knowledge and understanding, does not justify denying the fundamental materialist, causal paradigm for behavior, which is valid regardless of whether norms of reaction are broad or narrow.[13]

Against this background, it is easy to see how uncertainties can arise about what it means for evolutionary forces to "select for" behaviors. It is more accurate to say that evolution selects for genetic programs that determine not traits or behaviors as such, but rather an organism's reactions to surroundings. Not all programs code for highly stereotyped behavior, and there is nothing problematic about genetically programmed behaviors being expressed only infrequently or in unusual circumstances. Rather, a successful genetic program may be one that enables an organism to behave

[13] For an exposition of the relation of causal determinism to human behavior that explains why neither lack of causal knowledge nor lack of predictive success undermines the physical, determinist paradigm, see, e.g., Stephen J. Morse, "Deprivation and Desert," in William C. Heffernan and J. Kleinig (eds.), *From Social Justice to Criminal Justice: Poverty and the Administration of Criminal Law*, Vol. 114 (2000), pp. 130–132.

in quite a flexible manner, maintaining in reserve the capacity for a range of responses to meet special environmental or social needs.

In sum, genetically governed behavioral programs can be rigid or flexible, highly environmentally sensitive or relatively impervious to ambient cues. Jones's paradigm, in effect, provides a formula for predicting the magnitude of a particular behavior's norm of reaction. If a behavior served an organism well most of the time, then selective forces will insure that the organism "sticks to the script": there will be little spontaneous or induced variation in the behavior, and the norm of reaction will be narrow. Behaviors that were less adaptive or adaptive less frequently, if retained in the repertoire at all, will appear less "hard-wired" and more sensitive to environmental influence. Their norm of reaction will be broader.

Although Jones's formulation appears sound as a matter of theory, it founders in actual application. The concept of adaptiveness that is applied in practice (and commonly employed in seeking to identify the most robust human tendencies) is one that de-emphasizes or slights mechanisms – such as sexual selection and group selection – that bear more broadly on adaptive fitness. Because these mechanisms sometimes operate at cross-purposes from evolutionary forces that promote the survival of the individual organism, they are difficult to handle within the paradigm that attempts to link present-day behavioral flexibility to remote evolutionary conditions. As a result, an overly constricted view of adaptation too often dominates discussions, including Jones's analysis, that apply evolutionary psychology to social science issues.

Sexual selection and group selection are, effectively, wild cards that greatly increase the range of potential human behaviors and make it much harder to derive definitive conclusions using the standard analytic method of evolutionary psychology. As exemplified by the law of the law's leverage, that method begins by analyzing a behavior's degree of adaptiveness for individuals in the evolutionary environment, and infers that behavior's relative prevalence, invariance, and imperviousness to influence. The key insight is that sexual selection and group selection can operate at cross-purposes from other selective forces that favor the physical survival and successful reproduction of the individual organism and

can do so in ways that are very difficult to discern from what is known or likely to be known about the natural and social environment in which they operated. Moreover, traits preserved through sexual and group selection are likely to operate by suppressing or overriding other traits conducive to individual fitness, producing a complex – and for that reason highly unpredictable – range of behavioral combinations. Thus identifying a trait as reproductively successful or fitness enhancing for the individual over a range of past environments – with the resulting tendency to display that trait presently – need not imply that the expected behavior is impervious to control nor permit a firm statement about its resistance to environmental or cultural influence. Because strong evolutionary inculcation deriving from individual reproductive advantage does not in itself immunize behavioral traits from suppression or override by countervailing tendencies, it is a mistake to posit a straightforward relationship between individual survival value or adaptiveness and the amenability to influence and change.

The analysis below enlists recent insights into the operation of sexual selection and group selection to reveal the infirmity of the law of the law's leverage precept. It argues that although evolutionary models may help explain some widely observed behaviors, they are far less useful for predicting whether changes in law, mores, or culture, can alter dominant patterns. It is not possible to employ evolutionary logic or current behavioral observations to set effective limits on human cultural potential or social life.

III. SEXUAL SELECTION

In *The Mating Mind*, the psychologist Geoff Miller claims that conventional expositions of the theory of natural selection, which often emphasize the "survival of the fittest" organisms, provide an overly simple account of evolution. Although the individual's ability to stay alive long enough to reproduce successfully is a key element of fitness, it is not enough. Rather, "[e]very one of our ancestors managed not just to live for a while, but to convince at least one sexual partner to have enough sex to produce offspring."[14] This

[14] Miller, *supra* note 1, at p. 3.

insight was not lost on Darwin. Noting that "evolution is driven not just by natural selection for survival, but by an equally important process that he called *sexual selection through mate choice*,"[15] (emphasis in original), Darwin distinguished, in "A Theory of Natural Selection" and "The Descent of Man" respectively, between two crucial mechanisms of evolutionary change that emphasize different aspects of fitness as that attribute is measured by ultimate reproductive success. Those mechanisms are natural selection and sexual selection.

Natural selection is a term most commonly used to refer to evolutionary processes that favor organisms best able to withstand physical danger and environmental scarcity.[16] Because theorists who discuss natural selection recognize that the ultimate goal is reproductive success (of which individual survival is only a component part), natural selection can potentially encompass every mechanism that bears on individual reproductive outcomes. For this reason, the category is protean and imprecise, with discussions frequently touching on factors that bear on sexual success and attractiveness, including the ability to prevail in competition with others for reproductive opportunities and to attract mates through acquisition of resources and social power. Despite some overlap with sexual selection mechanisms,[17] however, the central focus of natural selection theory is on those aspects of fitness that relate to the physical health, well-being, and survival of the individual organism – that is, survival fitness. Survival fitness depends on the individual's capacity to meet the demands of the physical and social environment and to compete effectively with others in the group. By and large, the

[15] *Id.*

[16] See Miller, *supra* note 1, at pp. 3–7 (noting the "survivalist" emphasis of natural selection theory, with its disproportionate stress on physical survival advantage).

[17] Indeed, on a broad view of natural selection, sexual selection is but one mechanism encompassed by that category, which includes all mechanisms that select for everything affecting reproductive fitness. That is, natural selection should be viewed as including sexual selection. The issue is ultimately a semantical one. The contrast drawn here between natural selection and sexual selection (which follows Geoff Miller, who in turn follows Darwin) is a matter more of how the term is usually used by evolutionary theorists and social scientists than of how broadly it could be used.

vision created by natural selection theory is a pragmatic and materialistic one. The primary emphasis is on the organism's ability to surmount natural danger and scarcity and to outcompete rivals for reproductive and material resources. On this view, female reproductive capacity, which is in relatively short supply, counts as one more scarce commodity that a male must procure and monopolize in order to reproduce successfully.

Although the well-being and survival of the organism, as stressed by natural selection, is but one factor that determines reproductive prospects or individual fitness, it is not dispositive. "Natural selection for survival advantage"[18] is only one part of the story. "Sexual selection for reproductive advantage"[19] is necessary to complete the picture. Organisms must also attract the opposite sex. Sexual selection focuses selectively on one key bottleneck on the road to passing genes on to the next generation: the need to persuade members of the opposite sex to "have enough sex to produce offspring."[20] Sexual selection operates through mate choice and amplifies traits that cause individuals to appeal to the opposite sex.

A proper understanding of how selection mechanisms operate proceeds from a core set of insights, elaborated most recently by Robert Trivers and others, that were developed in response to widely observed patterns of behavioral sexual dimorphism, or differences in male and female behavior.[21] Males and females in mammalian species make dramatically different investments in reproduction. Because women are capable of producing only a few offspring in a lifetime, each child entails a large opportunity cost. The theory predicts that women will work hard to ensure that each child survives and thrives and will exercise great care in choosing fathers for their limited number of offspring. They will favor men with "fit" genes, since those genes will be transmitted to their children. They will also seek out men who display "uxorious" behavior, like loyalty and generosity, that will enhance their offspring's chances of survival. In contrast, because men can produce myriad children with little direct investment or opportunity cost, they will seek to

[18] Miller, *supra*, at p. 7.
[19] *Ibid*.
[20] Miller, *supra*, at p. 3.
[21] On behavioral dimorphism, see *infra*, part VI.

inseminate as many women as possible. Although preferring healthy women of reproductive age, they will otherwise be far less discriminating than women in choosing their sexual partners. Instead, they will invest in strategies that will help them attract and commandeer mates, including (but not limited to) accumulating resources and dominating other males.

Because differential reproductive investment makes women more discriminating than men, women's mate choices will tend to limit and direct men's reproductive opportunities. The preferences and tastes that drive women's mating decisions are the principal focus of the study of sexual selection. Female tastes operate as an important engine of evolutionary change because men who possess traits pleasing to women will have sex more often and produce more children. The favored traits will be passed on to more offspring of both sexes, further amplifying their fitness advantages.

Population geneticists have shown that female sexual preference is an effective mechanism for the dissemination of preferred attributes.[22] Although polygamy amplifies the power of sexual selection and enhances sexual dimorphism (because males with favored traits reproduce widely and disfavored ones little or not at all), sexual selection can also operate, albeit less dramatically, in monogamous or partly monogamous systems. That is because men with favored traits are able to outcompete their rivals for women's affections. Having their pick of women, they will tend to choose the most desirable – and thus the fitter – among them. These higher quality partnerships produce more surviving progeny.[23]

The key to realizing how a process that assigns a pivotal role to female choice might produce results at variance with those expected from natural selection alone lies in understanding which traits females (and to some extent males) may come to prefer in the opposite sex. The theory predicts that women will look for mates who are physically robust and mentally astute – that is, those who possess desirable social and physical attributes that can be passed on to the women's children. To a lesser extent they will also favor men who will help secure their children's survival

[22] Miller, *supra* note 1, at p. 71.

[23] See Miller, *supra* note 1, at p. 102. See also discussion of polygamy vs. monogamy *infra*, Part VI.

through immediate material support and nurture. The challenge for females is to identify men who possess the desirable traits. How can women know which men are the "fittest" in these respects? Women will develop an attraction to observable attributes and behaviors – including strength, courage, vigor, looks, intelligence, and personality – that pay off directly for survival, social success, and the ability to procure, defend, and provide resources. Overt physical attributes and manifest resources are at best imperfect guides to inherent fitness, however, so something more trustworthy is desirable. Critical to sexual selection theory is the prediction that females will also develop an attraction to signals of underlying hardiness that are hard to fake – reliable "fitness indicators" – and that men will develop the ability and willingness to give those signals. The most robust signals will tend to be those that are "difficult for low-fitness individuals to produce."[24] In general, the signals most likely to guarantee "truth in advertising" and thus to be found desirable are those that call upon extraordinary abilities, demand great effort, and are ostentatiously wasteful. Since only the most healthy and capable individuals can afford to make investments with little survival value, these displays will be difficult for low-fitness individuals to mimic without overly compromising their own survival chances. It follows that it will be in women's evolutionary interest to develop a refined appreciation for the exercise of rare, expensive, and useless skills with no immediate fitness payoffs and to find such displays "sexy." And it will be in men's interest doggedly to cultivate those skills and display them at every opportunity.

As Geoff Miller documents, elaborate, arduous, and impractical displays are observed in the courtship behavior of many species. The peacock's tail and the bower bird's ornate constructions are well-known examples. What forms might such displays take for human beings? Miller asserts that "the most distinctive aspects of our minds evolved largely through the sexual choices our ancestors made."[25] He argues that virtually all expressions of human artistry, intellectual ingenuity, personal virtue, and physical prowess originated in the tendency to engage in wasteful, fitness-revealing displays. Miller's discussion reveals how inadequate a

[24] Miller, *supra* note 1, at p. 281.
[25] Miller, *supra* note 1, at p. 3.

theory of natural selection is to the task of explaining the full range of human social and cultural endeavor. In particular, natural selection, narrowly conceived, cannot account for the universal urge to engage in activities that demand "application of skill beyond the pragmatically necessary."[26] The emphasis on surmounting scarcity does not predict the universal admiration for the "beautiful, the difficult and the costly" products of human effort.[27] On Miller's account, sexual selection far more than natural selection is responsible for the preoccupations and activities that make us quintessentially human and dominate our social and cultural existence.

Although some of man's higher endeavors have direct fitness payoffs, most fit uneasily within the framework dictated by natural selection's paramount concern with resources for biological survival. Artistic expression "has always been a puzzle for evolutionists." Artistry entails effort, and "effort is rarely expended without some adaptive rationale."[28] No purely functional explanation for this universal impulse seems entirely persuasive because the costs of artistic devotion often exceed any practical payoff.[29] Evolutionists have fallen back on explaining expressions of the aesthetic impulse as accidental side-effects, byproducts, or "exaptations"[30] of evolved attributes. That explanation is not wholly satisfying, as artistic activity is too pervasive to fit within the pattern expected of a chance event. Moreover, the artistic imperative is strong and universal. Aesthetic production is "ubiquitous across all human groups," children create art spontaneously and with little instruction or prompting, and the arts "are sources of pleasure for both the artist and the viewer."[31] Sexual selection theory, by positing direct reproductive payoffs, offers a more parsimonious and satisfying explanation for these striking observations. Men produced art because women liked it and found it sexually appealing. Women liked it because artistic expression is the quintessential form of wasteful display. Apart from its potential to give pleasure and elicit

[26] Miller, *supra* note 1, at p. 283.
[27] Miller, *supra* note 1, at p. 280.
[28] Miller, *supra* note 1, at pp. 258–259.
[29] Miller, *supra* note 1, at p. 261.
[30] See discussion, *infra*, and at note p. 98.
[31] Miller, *supra* note 1, at p. 259.

generalized admiration, it is useless: it has no immediate adaptive benefit. Although art has played various roles within different cultures, including the instrumental management of religious and political symbolism, the creation of beauty is one of its paramount goals. The pursuit of beauty requires both talent and the development of talent through sustained effort, which are costly and not easily faked. The difficulties inherent in high-quality artistic production render it a good fitness indicator. The challenge of excelling at art arguably separates those who are more "fit" (in possessing the physical and intellectual capacity and energy for true creativity) from those who are less so.

Sexual selection can also account for cultural activities that, despite some instrumental value, appear to produce too little direct fitness payoff to justify the energy invested. At first glance, the demands of natural selection would appear to predict the rise of science and advanced technology. Scientific expertise can help prolong life and protect human beings against environmental threats and natural scarcity. But that analysis fails to take into account the long gestation period required for many useful inventions. Modern technological creations are the delayed products of expertise that has accrued slowly over generations. Explaining how human beings gradually acquired the brain power necessary to attain some measure of useful technical mastery is but one variation on the challenge of accounting for the evolution of structures (such as the human eye) that require the orchestrated accumulation of small improvements that do not aid fitness until the structure is virtually complete. In the same vein, it is unclear why evolutionary forces would retain small cognitive improvements needed to build a brain capable of sophisticated scientific thought well before those changes yielded any concrete capacity to improve the conditions of life. Sexual selection shows how evolutionary pressures might work to preserve numerous minor "design innovations" – such as those that make men keener observers or more entertaining talkers – that, although not otherwise useful in the short term, create an incremental advantage in inciting erotic interest in the opposite sex.[32] That such talents are considered attractive today suggests they may

[32] On the "incremental design" problem, see Miller, *supra* note 1, at pp. 165–167.

have been found desirable in the past. And since persons of lesser ability will find it hard to display these talents, their exercise will operate as honest indicators of exceptional underlying capacities. In sum, sexual selection may have served as evolution's investment banker, nurturing changes that, although producing no immediate payoffs, yielded enhancements in health, well-being, and survival in the long term.

Finally, assigning a role to sexual selection – and to group selection as well, as discussed below – helps solve one of the most nettlesome problems in evolutionary theory: how to account for altruism. Evolutionists have sought to trace the emergence of moral codes and selfless practices to kin altruism (which protects shared genes) or reciprocal altruism (which offers immediate, transparent benefits from mutual cooperation). There is no room in this universe, however, for generosity towards non-relatives, or altruism with no expectation of return.[33] Much ingenuity has been expended in attempts to fit all observed instances of generosity into the "Procrustean bed of reciprocity,"[34] but the conundrum of free-

[33] Kin altruism makes sense under "selfish gene" theory: self-preservation of genes sometimes mandates help towards kin, because relatives share similar genetic material. *See* Richard Dawkins, *The Selfish Gene* (1976). Reciprocal altruism refers to practices in which mutual aid or cooperation enhances the overall fitness of all participants. An example is food sharing among bats, which helps smooth over individual variation in ability to locate sustenance.

In fact, however, reciprocally altruistic arrangements described by evolutionary psychologists often carry no firm guarantee of return for cooperators and are generally enforced only by the threat of future non-cooperation. As Sober and Wilson point out, reciprocal altruism is in this respect no different from more sophisticated moral systems – which advocate "pure" or unrecompensed generosity – in posing the need to overcome the free-rider problem. Self-sustaining systems of cooperation differ from one another in transparency and complexity, but neither reciprocal nor unconditional altruism escapes the dilemma of how behaviors vulnerable to exploitation through defection and non-reciprocation – and thus potentially disadvantageous for individuals – can gain a stable foothold and endure under competitive pressures. *See* Sober and Wilson, *Unto Others: The Evolution and Psychology of Unselfish Behavior* (1998) (arguing that simple reciprocal altruism and more complex moral systems lie on continuum). See discussion in note 54, *infra*.

[34] Miller, *supra* note 1, at p. 304. *See*, e.g., Robert Frank, *Passions Within Reason* (1989); Sober and Wilson, *Unto Others: The Evolution and Psychology of Unselfish Behavior* (1998).

riding persists: altruistic organisms are at a competitive disadvantage compared to self-regarding, non-kin peers. Sexual selection offers an alternative account of the emergence of altruistic practices and moralistic conduct. As Miller points out, acts of generosity, self-denial, and moral probity are generally very costly to individuals. Yet good moral character, as shown by willingness to engage in self-sacrificial acts, is widely admired in a broad range of cultures, and adherence to the demands of exacting moral precepts is considered attractive and even lovable. Some cultures honor a narrow Christian ethic of charity, while others admire idealism and the selfless service of principles. Still others valorize a self-sacrificial ethos of martial prowess and physical courage.[35] What these variations have in common is that living up to prescribed ideals is exacting, effortful, and wasteful of resources helpful to individual survival. Niceness, principled conduct, moral integrity, and physical courage provide no direct fitness payoffs and in most cases threaten to undermine survival fitness and resource command by putting individuals at a disadvantage relative to those with fewer scruples. For this reason, however, they serve as reliable fitness indicators, because

[35] Military prowess enables groups to compete effectively against rivals, but routinely requires exposure to danger and self-sacrificial acts that are inimical to individual survival. However, physical bravery can also be understood as a high stakes form of sexual display, with warriors trading off the potential for more offspring against the risk of disability and death. The idea that men fight primarily to please and win women – which is consistent with martial valor as sexual display – has a long cultural currency, which is exemplified by this passage from a review of a book on women in the military:

> [P]erhaps we have lost the ability to discern the true reasons why we fight any war. For women have always embodied those reasons – from stolen Helen at Troy, to the Betty Grable pinup photos and sensual female images on warplanes in World War II. The willingness of men to fight and die in wars for women (rather than alongside them) is not a paternalistic expression of women's inferiority, as feminists would have us believe. Rather, it affirms the superiority of the good life which women represent in any decent society – of home and hearth, of children and future generations, of beauty and love. Men have always been the ones to fight, but it was ultimately women who provided the purpose. Now we are blinded to these truths by utopian dreams of a sterile, androgynous future . . .
>
> Lee Bockhorn, "Women at Arms," *Policy Review* 70 (August, 2000/September, 2000) (reviewing Stephanie Gutmann, *The Kinder, Gentler Military: Can America's Gender-Neutral Fighting Force Still Win Wars?*)

persons who can afford to compromise their own well-being in the interests of vindicating moral ideals must be extraordinarily capable and strong. The theory also predicts that high-mindedness, virtue, and courage will carry an erotic charge: persons displaying those attributes will often be considered desirable and sexy. These qualities will tend to sway women's sexual choices, with predictable fitness consequences.

IV. GROUP SELECTION

The evolutionary model of behavior that tends to dominate social scientists' speculation about human nature is concerned primarily with the individual's fate within the group. The inexorable logic of individual competition generates a tug of war for resources and mates that penalizes those who sacrifice for others. Although this view can accommodate family solidarity (through kin selection) and social cooperation for safety, survival, and control of aggression (through reciprocal altruism), it gives pride of place to the rule of every person for himself. The individual selection model predicts that, even if man is not a complete sociopath, an individual will act to benefit others only when that choice pays off in his own enhanced fitness.[36]

Yet generosity goes far beyond what this model predicts, as people sometimes act with no obvious immediate or long-term genetic advantage nor any possibility of gain. In the *Descent of Man*, Darwin puzzled over "the fundamental problem of social life": the existence of "human moral virtues that appear designed to promote group welfare."[37] To explain this observation, Darwin proposed a mechanism of group selection to operate in conjunction with individual selection. In effect, he suggested that the "three ingredients of natural selection – phenotypic variation, heritability, and fitness consequences," could exist at the levels of cohesive groups.[38] Because, as noted, altruism puts individuals at a competitive disadvantage within groups, Darwin's description of group

[36] *See*, e.g., Chris Boehm, *Hierarchy in the Forest: The Evolution of Egalitarian Behavior*.

[37] David Sloan Wilson, *Darwin's Cathedral*, at p. 9.

[38] *Id.*

selection was viewed with skepticism and the idea fell out of favor with his followers. The problem noted by Darwin, however, did not go away: proponents of individual selection struggled to explain the emergence of cultural patterns, codes, and behaviors – such as martial self-sacrifice, religious celibacy, and monogamy – that appeared to undermine individual reproductive advantage.[39] The group selection concept was revived in the second half of the last century by theorists who employed population dynamics and game theory to investigate the emergence of cooperation under competitive pressures. These models provided new insights into the possibility of stable group selective dynamics.[40]

Despite continuing disagreement and controversy, the view that group selection has played a pivotal role in the evolution of man and other organisms now has a modest following among evolutionary theorists. Proponents draw strength from the theory's power to explain observed behaviors difficult to reconcile with individual selection and from the development of sophisticated group dynamic models showing how such behaviors could emerge.[41] Nonetheless, scholars who apply the insights of evolution to social science and policy have made relatively little use of this idea, and those who invoke group selection have failed fully to apprehend its significance. In recent 500 page tomes[42] that undertake comprehensive explorations of the implications of evolutionary models for human behavior, Steven Pinker and Daniel Dennett each give group selection a handful of pages. David Buss and Daly and Wilson barely mention it in their entire opus. It figures in passing or not at all in the work of legal scholars such as Owen Jones, Kingsley Browne, and

[39] On monogamy, see note 86 *infra*.

[40] *See* Sober and Wilson, *Unto Others*, at p. 84.

[41] The case for group selection theory is ably summarized in Elliot Sober and David Sloan Wilson, *Unto Others: The Evolution and Psychology of Unselfish Behavior* (1998); see also David Sloan Wilson, *Darwin's Cathedral: Evolution, Religion, and the Nature of Society* (2002) (applying group selection theory to religion and moral systems); Paul Rubin, *Darwinian Politics* (explaining group selection).

[42] Steven Pinker, *The Blank Slate: The Modern Denial of Human Nature* (2002); Daniel Dennett, *Freedom Evolves* (2003).

John McGinnis.[43] Other legal academics, such as Todd Zywicki[44] and Paul Rubin,[45] and science writers Matt Ridley[46] and Robert Wright,[47] give the concept somewhat more play, but fail to fathom its full implications for social life and for the uses of evolutionary paradigms to predict the bounds of human behavior.

The development of group selection theory in parallel with more conventional models of individual competition suggests that behavioral evolution is the product of multiple distinct processes that operate simultaneously on more than one level. Most discussions of how evolution shaped behavior stress competition for resources and hegemony between individuals within the small group setting during the evolutionary period. The genes that survived and were propagated through this process were those that enhance the fitness of the individual at the expense of his non-kin fellows. The driving force behind group selection, in contrast, is rivalry between groups. It operates through a competitive process that pits communities with different arrays of strategies against one another over time. The fundamental idea behind group selection is that

[43] *See*, e.g., Kingsley R. Browne, "Sex and Temperament in Modern Society: A Darwinian View of the Glass Ceiling and the Gender Gap," *Ariz. L. Rev.* 37 (1995), p. 971; Kingsley R. Browne, "Women at War: An Evolutionary Perspective," *Buff. L. Rev.* 59 (2001), p. 51; Owen Jones, "Evolutionary Analysis in Law: An Introduction and Application to Child Abuse," *N.C. L. Rev.* 75 (1997), p. 1117; Owen Jones, "Sex, Culture, and the Biology of Rape: Toward Explanation and Prevention," *Cal. L. Rev.* 87 (1999), p. 827. John McGinnis, "The Human Constitution and Constitutive Law: A Prolegomenon," *J. Contemp. Legal Issues* 8 (1997), p. 211; John McGinnis, "The Original Constitution and our Origins," *Harv. J. L. & Pub. Pol'y* 19 (1996), p. 251. In a recent e-mail, John McGinnis, a respected legal scholar who routinely employs evolutionary analysis in his work, stated that "I have not made any sex[ual] or group selection arguments in my writings," adding that "I am a skeptic of group selection arguments generally."

[44] *See*, e.g., Todd J. Zywicki, "Was Hayek Right About Group Selection After All?" *Rev. Austrian Econ.* 13 (2000), pp. 81–95; Todd J. Zywicki, "Evolutionary Psychology and the Social Sciences," *Human Studies Rev.* 13, available at: http://www.theihs.org/libertyguide/hsr/hsr.php/36.html.

[45] Paul Rubin, *Darwinian Politics: The Evolutionary Origin of Freedom* (2002).

[46] *See*, e.g., Matt Ridley, *The Origins of Virtue: Human Instincts and the Evolution of Cooperation* (1996).

[47] Robert Wright, *The Moral Animal: Evolutionary Psychology and Everyday Life* (1994).

groups exhibiting more fitness-enhancing behavior overall will grow faster than others. The competitive process that occurs between individuals is mimicked at the group level.

Although group fitness-enhancing practices can take many forms, successful strategies are characterized by individual restraint for the benefit of others within the group. Group competition tends to cause groups with more altruists to grow faster than groups with fewer, thus increasing the number of altruists overall compared to non-altruists. At the same time, however, competition among individuals within groups continues apace. This competition drives down the ratio of altruists to non-altruists within the group. Group selection theory explores the complex interaction of these opposing forces and attempts to identify circumstances in which altruistic tendencies might achieve stability within particular groups and in the population overall.

The sophisticated mathematics required to model and understand the dynamics of group selection is difficult to grasp and can produce counterintuitive results. The lack of transparency may account in part for persistent resistance to the idea.[48] However, David Sloan Wilson provides a simple example of group selection involving bird warning calls that is not hard to comprehend. Birds that cry out to warn of a predator's approach increase their own risk of being attacked but reduce the risk to others within their flock. Calling birds are altruists because they engage in behavior that increases others' fitness at the expense of their own.[49] Although calling behavior reduces individuals' relative reproductive success within groups, it confers an advantage for groups as a whole. That is, groups with many callers produce more surviving total offspring than groups with fewer. If that advantage is sufficiently large, calling behavior can take hold and spread among the population.

To demonstrate how this works, Wilson compares a group with one caller and nine non-callers (designated the non-altruistic group) – which has a survival rate of 50% for noncallers and 25% for

[48] Proponents' long-time failure to develop rigorous models also undermined acceptance of the idea. See Wilson, *Darwin's Cathedral*, at p. 12 (As a "naive expression of group-level functionalism rather than a principled argument," *** "early group selection literature was an easy target for criticism.")

[49] For a definition of altruism, *see* Sober and Wilson, *Unto Others*, at p. 6.

the caller – with a group with nine callers and one noncaller (the altruistic group). In the altruistic group, the sole noncaller has a 100% survival rate, and the remaining members, all callers, have a 75% survival rate. Although individual callers, relative to noncallers within their group, "are the losers in both cases," the callers' chances of survival in the altruistic group are far higher than even noncallers' chances in the non-altruistic group. Indeed, a calculation of probability of survival *across* groups reveals an average survival rate for noncallers of 55% (based on 100% for one noncaller and 50% for nine noncallers), and an average rate of 70% for callers (based on 75% for nine and 25% for one). On this view, "the average caller is more fit than the average noncaller." In other words, when group clustering is ignored and fitness is calculated for the entire population, calling is the better strategy and does not seem altruistic at all. The need to invoke group selection to explain individual behavior "appears to vanish." But as Wilson points out, that is "just an illusion. The need for multiple groups and variation among groups is absolutely essential for the calling behavior to evolve."[50] Specifically, the operation of group selection depends critically on a social structure that makes some individuals' fate dependent on others. For that purpose, a group is "defined as a set of individuals that influence each other's fitness with respect to a certain trait but not the fitness of those outside the group."[51]

The operation of group selection thus requires that groups be insular enough to make their members interdependent. But groups must also come under the pressure of competition from rival groups. Group selection theory predicts that selective intra-group dependency coupled with inter-group competition will produce patterns of behavior that differ in important respects from those that can be expected to emerge from individual selection alone. Because groups with more altruistic members best those with fewer, group selection will favor displays of other-regarding behaviors that enhance the survival of group members generally. Those same behaviors, however, may *undermine* or *diminish* individuals' survival chances relative to other members of their own group.

[50] Wilson, *Darwin's Cathedral*, at p. 13. For further examples, *see* Sober and Wilson, *Unto Others*, at pp. 101–131.

[51] Sober and Wilson, *Unto Others*, at p. 92.

The simultaneous operation of group and individual selective forces and the need to maintain the balance between selfish and other-regarding tendencies are thought to give rise to generalized, regulatory programs that permit the modulation and suppression of selfish impulses and behavior patterns that run contrary to group-regarding behavior. By shaping man's psychological makeup, group selection is believed responsible for the emergence of complex systems of morality and peaceable cooperation that make advanced civilizations possible. Group selection does not fully extinguish the traits that enhance individual fitness. Those dispositions remain part of the repertoire of human response, which is held in reserve to be expressed as circumstances demand. Rather, group selection will build in flexible mechanisms for suppressing the expression of individually adaptive, self-regarding tendencies. The operant control mechanisms, which are familiar features of organized societies, include codes of morality, social conventions, and group norms.[52] These devices, operating in conjunction with a moral psychology characterized by moral sentiments, a sense of justice, an aversion to shame, and the desire for social status and approval, may be powerful enough to hold pronounced tendencies at bay. By manipulating evolved psychological impulses that enhance receptiveness to group pressure and foster conformity to normative codes of conduct, societies tame elemental responses like aggressiveness and promiscuity that have socially destructive effects. Those traits do not disappear, but are subject to override through social control.

V. SEXUAL SELECTION, GROUP SELECTION, AND THE USES OF EVOLUTIONARY PSYCHOLOGY

Accounts of evolution that incorporate mechanisms of sexual selection and group selection, like those that stress natural selection, are only theories. Like many theories, they are open to challenge on a number of grounds. Although the role of sexual selection in evolution is well-established and widely accepted, there is disagreement about its workings and outcomes. Many evidentiary and theoretical questions have been raised about the practical importance of sexual

[52] *See* Sober and Wilson, *Unto Others*. *See also* Robert Frank, *Passions Within Reason* (1989).

choice in shaping human behavior.[53] Group selection is even more controversial, with challenges routinely mounted within the field to its coherence and evidentiary foundations.[54] Despite all these difficulties, sexual selection and group selection draw strength from their explanatory power. Both theories account for observed patterns that are difficult to square with the strong premium predicted for individual survival fitness, or with selection for individual fitness alone. The following discussion is premised on the assumption that both group and sexual selection have played a role in the emergence of higher order and culturally complex functions, including familiar aesthetic and intellectual activities (in the case of sexual selection) and the creation of moral and normative codes of conduct (in the case of both group and sexual selection). It accepts an understanding of how these mechanisms operate that has been developed by leading proponents. As shown in the next sections, these understandings have important implications for the uses of evolutionary theory and for lessons that can be drawn for law and public policy.

A. Sexual Selection

If the forgoing account of sexual selection is reasonably accurate, what are the implications for evolutionary psychology as an applied science? In particular, how does sexual selection affect the usefulness of evolutionary insights as a guide to choices in law and public policy?

[53] *See* Miller, *supra* note 1, at p. 75.

[54] Group selection theory has been faulted for the paucity of real-life examples of its active operation in higher organisms and for the lack of reliable historical data on conditions conducive to selection among groups. Sober and Wilson, *Unto Others*, at pp. 189–191 (noting that "except for a few hints about between-group replacement processes, we cannot produce the smoking gun of group selection in action.") Perhaps the thorniest problem, however, is that of origination: It is hard to explain how groups populated by altruists actually emerged and flourished long enough to compete successfully with other groups. Because altruism tends to pay off through cooperation with like-minded others, the occasional altruistic "mutant" will be ruthlessly eliminated through competition before a critical mass of altruists can gain a stable foothold within a discrete population. See Sober and Wilson, *Unto Others*, at pp. 135–136 (noting that "a model that requires altruists to exist at a frequency of 20 percent (for example) before they can be favored by natural selection fails to address a fundamental problem about how altruism can evolve.")

The theory of sexual selection would appear at first blush to add greatly to the explanatory power of an evolutionary approach to human behavior. As noted, it provides a plausible account of activities and attributes that are otherwise perplexing for a view that emphasizes physical survival and command of resources. Sexual selection also appears to explain persistent differences between the sexes in observed patterns of cultural display, with men as the dominant producers of high culture in all its forms.

Although taking account of sexual selection enhances the power and reach of evolutionary explanations, it does not follow that it helps us with evolutionary psychology as an applied or predictive science. Indeed, ascribing a key role to sexual selection greatly complicates efforts to use evolutionary analysis to derive insights into possible forms of social life or to develop programs for influencing behavior. That is because it is far harder to predict the degree and direction of response to ambient conditions – including deliberate manipulation in the form of law or policy – if human psychology is the product of sexual selection rather than natural selection alone. Not only does sexual selection inject new variables into the evolutionary mix, but the added factors are by their very nature, much harder – indeed often impossible – to derive from our knowledge of the evolutionary environment. The problem is ultimately an epistemological one: when mate choice is critical to the selection of traits, knowledge of the evolutionary environment will not tell us much about which traits will be chosen and thus which will preserved through "hard-wired" genetic inheritance down the generations. This insight undermines the usefulness of a formulation like Owen Jones's law of the law's leverage, which predicts that behavioral tendencies that enhanced the organism's fitness during the evolutionary period will tend to be commonplace, "hard-wired" and resistant to change. Critical to the operation of Jones's law is the assumption that we can identify the traits that enhanced fitness in the evolutionary period. As explained below, sexual selection belies that assumption. Thus while the law of the law's leverage arguably works well on the premise that natural selection for survival fitness is the dominant force steering evolutionary development, its payoff declines precipitously once sexual selection is acknowledged to play a powerful role in determining fitness.

Sexual selection confounds the analysis by suggesting that ancestral individuals confronted with the option of engaging in behaviors that improved their own survival-based fitness (in the sense of enhancing physical well-being and resources) might well have chosen to forgo that option and do the very *opposite*. According to sexual selection theory, evolution could favor conduct that enhanced survival as well as conduct that compromised it. It is not that natural selection ceased to operate or that there was no pressure to engage in self-preservation. Rather, just as the forces of individual selection and group selection co-existed, survival selection and wasteful sexual selection proceeded simultaneously. From this mix, a set of complex tendencies, often operating at cross-purposes, emerged, and were inscribed into the ancient behavioral repertoire. But that observation makes it difficult to predict how people will respond to any situation today. We are capable of both exigent, direct self-interest and wasteful display. Not only is the number of potential combinations of these attributes very large, but in seeking to use knowledge of the past environment to predict which combination will obtain under which present circumstances, evolutionary theory runs out. As presently practiced by evolutionary theorists and social scientists, evolutionary analysis supplies no systematic framework for determining in any instance which element of our makeup will prevail over others. That deficiency is not likely to be remedied by advances in the field, because there are inherent limits to what we can know about those aspects of the evolutionary period that matter to the operation of sexual selection. In particular, we have almost no way of knowing what types of wasteful displays – if any – people (and especially women) favored in their mates in the remote past. Ecology doesn't help us much and ethnography is likely to remain in short supply.

These observations spell trouble for any attempt to formulate a reliable precept in the form of the law of the law's leverage. As noted, this tenet and its variations suggest that the cost or difficulty of altering a human behavior will be proportional to the extent to which that behavior was adaptive for its bearers, on average, in the relevant environment of evolutionary adaptation. Once adaptiveness in the evolutionary period is determined, the rule enables us to infer how difficult a behavior will be to manipulate. But what precisely

is meant by "adaptive" here? On the most comprehensive view, a behavior is adaptive if it enhances fitness in the broadest sense. It must result in the successful transmission of the genes that control for it, however that is accomplished. Both the capacity to survive through natural selection and the ability to attract mates through sexual selection determine "adaptiveness" in this sense.

But this paradigm is only useful if we solve the recognition problem: we must be able to distinguish which behaviors were more likely, or less likely, to make for reproductive success over the spectrum of past environments. If "adaptiveness" is viewed through a constricted evolutionary lens – that is, if it is assessed almost entirely in terms of physical survival and material success – then the task of deciding which behaviors will persist, although always speculative, is far less so than if sexual selection comes into play. Although our understanding of the environment that shaped the emergence of homo sapiens from its nearest primate ancestors is far from complete,[55] the available evidence supplies a fairly detailed picture of the conditions that our evolving forebearers faced. From this can be derived the behaviors most likely to enhance biological survival and reproductive success. This reasoning fails us once sexual selection enters the equation. According to sexual selection theory, the ability to surmount environmental and physical challenges (including brute social competition), which is the focus of natural selection theory, is only part of what makes for reproductive success and thus only one component of "adaptiveness." The desires and tastes of the opposite sex decisively influenced which behavioral propensities were passed on to succeeding generations.

Assigning a significant role to sexual choice, as motivated by those tastes, makes it virtually impossible to determine which behaviors were the most "adaptive on average" during the evolutionary period because the pressures exerted by the opposite sex's preferences during the evolutionary period are, by their very nature, much harder to derive from our knowledge of the past than the selective pressures brought to bear on the organism by natural and environmental scarcity. There are clearly "better" or "worse" ways to triumph over biological hardships. Stronger, fleeter, healthier, and

[55] Miller, *supra* note 1, at p. 289.

smarter organisms will almost always win out over inferior specimens. In contrast, the environmental constraints imposed during evolution have no obvious bearing on which traits will come to serve as *proxies* for fitness and thus which will come to please the opposite sex.

A fundamental tenet of sexual selection theory is that traits that signal fitness via the proxy of wasteful display will appeal to the opposite sex and enhance the organism's reproductive success. It is difficult to move beyond this generalization, however, to more specific predictions. The principle of wasteful display is indeterminate because the possibilities for wasteful display are endless. There are numerous options for signaling fitness and no apparent "best solution" to the task of reliably revealing biological superiority. Because there are many ways to show one is fit enough to dissipate resources, similar natural environments can throw up many different signaling systems. As expressed through the vagaries of fashion, custom, and taste, those systems can take on a dizzying variety of forms. The array will be wider, broader, more varied, and more arbitrary than the patterns that would emerge from the exigencies of mere survival. Although some aspects of sexual attraction are predictable, the appeal of culturally contingent display is, by definition, obscure. The irreducible element of randomness and novelty inherent in those forms defies our ability to determine from our knowledge of past conditions which organisms were most likely to appeal to the opposite sex, and thus which "hard-wired" traits were most likely to be passed on to succeeding generations.

Not only does the task of deriving from existing information which specific behavioral programs were favored by sexual selection seem insurmountable, but it is also possible that no *specific* behaviors were so favored. Evolution may have chosen a highly flexible and generic program that says "display" but leaves open the display's content. That program might operate as a vessel to be filled by a kaleidoscope of diverse and contingent cultural forms. In effect, evolution may have bequeathed a capacity to value almost anything that is difficult, rare, or special. In that case, we would expect a high degree of variation in the assignment of status and prestige and in the particular qualities that societies (and women) admire. In turn, people would develop a flexible, multi-purpose

capacity to respond when necessary to women's preferences by suppressing or deflecting the predominantly self-seeking tendencies otherwise favored by the operation of natural selection without sexual selection. That such a generalized program for desirable display was "adaptive" would not rule out such variation. Nor would it be inconsistent with a high degree of cultural contingency and responsiveness to ambient circumstances.

In sum, we possess no surefire method for identifying the particular behaviors sexual selection favored. We have no way to know, for the distant past, "what a woman wants." Specifically, we lack the tools to develop a firm picture of what teenage girls wanted – and that is what must be determined, since young, fertile women were the prime agents of sexual choice throughout the evolutionary period. But then we cannot identify which behaviors were "adaptive," or fitness-enhancing, in the broadest sense. Since sexual selection makes it harder to know which specific behaviors were adaptive in the past, it impedes our knowledge of which ones, by hypothesis, are now harder to change. We then cannot determine which behavioral patterns will now prove more resistant to social or environmental manipulation as opposed to those that can be better controlled.

The key aspect of sexual selection that confounds identification of adaptive – and relatively immutable – behaviors is that sexual selection can operate across a very broad spectrum from behaviors to their opposite. It is as likely to favor forms of display that enhance survival directly (by increasing safety, health, or wealth) as those that compromise it. Sexual selection can favor wasteful activities that, by definition, *undermine* other aspects of individual fitness. That means, in effect, that sexual selection has the capacity to work at cross-purposes to natural selection for physical well-being or survival, to the point of curbing or canceling the expression of tendencies that vindicate those goals. If contrary programs run simultaneously, then observed behavior will often represent an unpredictable blend of traits shaped by countervailing forces. The permutations this scenario can generate would appear to be almost limitless, with outcomes representing the dominant influence of (extravagantly wasteful, impractical) sexual selection or of (parsimonious, pragmatic) natural selection, or of myriad combinations in

between. From a proposition and its opposite, anything follows. This picture makes it quite hard to look back at what occurred millennia ago to derive the patterns we would expect to see today. Since it is impossible to say what mix counted as most "adaptive" in the evolutionary environment, it is hard to apply the law of the law's leverage to determine the precise combination that might prove most difficult or easy to alter today.

An example that illustrates how sexual selection complicates applying a law of the law's leverage-like principle to social policy can be drawn from a recent article by this author. The article seeks to explain voters' consistent endorsement of a moralistic distinction between deserving and undeserving recipients of public welfare, and their observed unwillingness to support individuals viewed as depending unnecessarily on public resources, as an expression of innate attitudes that evolved to help facilitate the development of systems of reciprocal aid during remote periods of human history.[56] It speculates that evolution favored individuals able to form stable "insurance" collectives designed to assist community members in times of emergency or distress. In the absence of a centralized authority to enforce mutual agreements by force, the stability and cohesion of such arrangements depended on allegiance to strong norms of reciprocity that demanded contributions from able-bodied citizens, reserved aid to the truly needy, and punished opportunism. It is predicted that evolutionary pressures would favor the development and retention of moral attitudes – including a strong antipathy to "freeloaders" – that are vital to sustaining the necessary cooperative norms.

Geoff Miller might regard this account as yet one more misguided attempt "to find the hidden evolutionary benefits of human kindness"[57] by fitting observed patterns of generosity – such as conditional willingness to support the unfortunate – into the "Procrustean bed of reciprocity."[58] The theory is that the (conditional) altruistic attitudes held by voters today arise from sentiments

[56] Wax, "Rethinking Welfare Rights: Reciprocity Norms, Reactive Attitudes, and the Political Economy of Welfare Reform," *L. & Contemp. Probs.* 63 (2000), p. 257.

[57] Miller, *supra* note 1, at p. 306.

[58] Miller, *supra* note 1, at p. 304.

that evolved to support reciprocal arrangements that paid off in fitness benefits in the past. But sexual selection – as well as group selection[59] – obviates the need to tie generosity to individual interests. Not all altruism need be viewed as reciprocity in disguise because evolution can select for generosity as such. If, for example, self-sacrificial moral acts operate as fitness-indicating forms of sexual display – to put it bluntly, if women come to like generous men and want to sleep with them – then that is all that is required for those tendencies to take root and flourish in the human repertoire. But once that possibility is accepted, all bets are off. Although individual selection is thought to account for selfishness, kin solidarity, and limited forms of reciprocal cooperation, sexual selection is hospitable to the most extreme forms of generosity with no strings attached. Observed behavior towards the less fortunate most likely reflects the mixed influence of sexual, individual survival-based, and group selective programs, with different elements coming to the fore in different circumstances. Once again, the possibilities presented by these permutations would appear to cover so much ground that there would be few meaningful limits on the potential range from Scrooge to saint. If people can be generous or selfish or anything in between, it's hard to say what they cannot be. To be sure, the continued and pervasive influence of a robust sense of fairness suggests that reciprocity-based impulses, shaped by the exigencies of survival, remain a key part of our psychological makeup. But the theory of sexual selection introduces the possibility that reciprocity-based impulses, although perhaps always present, are subject to override. The recognition that dispositions arising from multiple programs can potentially sum to anything on the spectrum from altruism to narrow self-interest drives home once again that "adaptive" – and even strongly adaptive – is not synonymous with inflexible. Nor

[59] See discussion *infra*. Explaining the specific development of norms of mutual support for the purpose of insuring against risk may or may not require recourse to group selective dynamics. On the one hand, insurance generates winners and losers and appears to reduce the fitness of some members of the group who would do well without it, at least ex post and also perhaps ex ante. On the other, it is possible in some circumstances that entering into an insurance pool against calamity might actuarially increase the well-being of all group members ex ante, if potential risks are factored in. Robert Sugden's formulation, discussed in Wax, *supra* note 51, is ambiguous on this point.

does identifying adaptive traits supply the sought-after ability to predict which behaviors over a very broad range will actually be displayed.

In sum, that we may be capable of a virtually unlimited range of behavioral outcomes in this area undermines the ability to use evolutionary knowledge to predict much of anything about how a society will treat the poor. Everything will depend on precise social conditions and the direction of social influence. That we are capable of a very broad array of behaviors does not mean that behavioral control cannot be better achieved. Social science advances may someday permit us to discover the conditions that will foster expression of altruistic, as opposed to fairness-based, impulses. But manipulating the conditions of social generosity will require knowledge of a complex norm of reaction that takes into account predilections forged by a variety of evolutionary mechanisms. The rules of response cannot be derived from any simple principle that ties past adaptiveness to present behavioral rigidity.

B. Group Selection

Similar comments are in order regarding the implications of group selection theory for discerning the rules of human behavior. The uncertainties that surround the workings of group selection make it difficult to apply a principle like the law of the law's leverage to identify the traits that were most adaptive in the past and thus most likely to be preserved in genetic programs that closely control behavior. These uncertainties concern the complexity of patterns created by the mix of cooperation and competition at the individual and group level, the intransigent limits on our ability to know the extent to which the competitive conditions conducive to group selection operated in the past, and the sheer combinatorial range that can result from the simultaneous expression of traits forged through group pressures and individual competition.

Much indeterminacy springs from the fact that the patterns that can arise to equip groups to compete with one another are by their very nature intricate and variable in character and add a formidable level of complexity to the already complicated dynamics of individual competition. Sophisticated game theoretic calculations are necessary to fathom the effects of particular strategies on group-

based outcomes. The analytic methods are still being worked out and conclusions are often controversial.

In addition, the nature of the interactions themselves generate indeterminacy. According to the so-called "folk theorem,"[60] multiple stable equilibria can emerge from repeated interactions among and within groups of individuals that adopt different combinations of cooperative and competitive strategies. Moreover, behavior can get stuck in suboptimal patterns that remain stable for indefinite periods. There is equivocation on the implications of the folk theorem. This is reflected in uncertainty surrounding the concepts of evolutionary stability and optimality that bear on outcomes to be expected from group competition over time. On the one hand, it is often assumed, in keeping with conventional Darwinian thinking, that groups displaying the most "adaptive" behavioral patterns will outlast those with practices less conducive to competitive success. But the folk theorem raises questions about the precise meaning of "most adaptive" in the context of social and species evolution and casts doubt on assumptions that practices meeting this description can be identified, that they will necessarily emerge, or that groups displaying those patterns are destined to prevail over the long haul.[61] Modeling exercises reveal that the ultimate outcome of group interaction is highly path dependent – it can turn on small differences in starting points or "rules of the game" including the temporal order in which strategies meet and compete.[62] Minor variations can have large effects, with stable equilibria easily perturbed. In short, predicting from antecedent information which cooperative strategies will be adopted and which will prevail, both within groups and

[60] *See* Rubin, *supra* note 1, at p. 60 ("One theorem in game theory (called the folk theorem) is that essentially anything can happen in [repeated games]. That is, one equilibrium is cooperation; other equilibria include complete noncooperation. There are an infinite number of possible equilibria.").

[61] *See*, e.g., Bryan Skyrms, *Evolution of the Social Contract* (1996), at p. 37 ("Is it not simply a matter of time before dominating [individual] strategies [in complex iterated interactions] take over? This conclusion may seem plausible, but it does not follow ***").

[62] *See* Sober and Wilson, *Unto Others* at p. 86; Brian Skyrms, *Evolution of the Social Contract* (1996); Robert Sugden, *The Economics of Rights, Cooperation, and Welfare*; Herbert Gintis, *Game Theory Evolving* (2000).

from competition between groups, is an intricate exercise that may turn on small, barely discernible differences and admit of no one unique solution. These dynamics compound the difficulty of moving straightforwardly from knowledge of ambient conditions during periods of evolutionary development to the identification of tendencies, grounded in genomic programs, that will be preferentially selected and preserved. They add yet another layer of complexity to the task of predicting which social patterns will emerge from evolutionary pressures and thus which can be identified as the most hard-wired or resistant to change.

A second difficulty with mapping the trajectory of group selection arises from considering how the initial step in the Darwinian process works for the emergence of complex behaviors from group competition. Darwinian selection assumes a mechanism for change, or mutation, in genes, which produces a corresponding change in the traits – including behavioral tendencies – that are controlled by those genes. Competition then selects for behavioral variants that maximize reproductive success. Under ordinary biological conditions, genetic mutation occurs randomly at a very slow rate, generating a steady stream of (mostly) minor behavioral modifications over the long haul. But the balance of behavioral preservation and change is also a function of a dynamic process of cultural modulation and transmission that proceeds in parallel with genetic change. That process employs mechanisms of learning, inculcation, and imitation, and abides by rules that are psychological and social rather than chemical and genetic. Because the time frame of biological mutation is very slow and the crucial period of group selection among man's immediate ancestors so compressed, cultural change almost certainly proved more important than genetic change in driving the process of group selection.

The dynamics of cultural processes are poorly understood. We lack a systematic knowledge of the balance of forces that governed cultural innovation and preservation in the past and therefore cannot know how rapidly or how often cultures generated the types of behavioral "mutations" or modifications upon which competitive group selective forces could operate. The laws that apply to mutations at the biological level do not govern the pace and logic of cultural mutation and new cultural practices are not "hard-wired"

like chemical changes in DNA. Therefore, cultural patterns that are spread by competition or that come to dominate in many populations may still remain highly malleable and amenable to radical and sudden revision. The unknowns that surround cultural change further undermine our ability to understand the role that group selection played in shaping human behavior and confound the systematic application of the Darwinian model to infer which traits were selected by evolutionary forces.[63]

Yet another complicating factor concerns the past existence of conditions that allowed group selection to operate at all. All evidence strongly suggests that our immediate ancestors lived in groups and thus were relentlessly exposed to competition from other individuals within their communities. This implies that individual selection was a constant feature of the period of evolutionary adaptation. The same cannot be said for group selection. Group selection occurs only under specialized conditions: it requires active and intense rivalry between groups. But very little is known about how often ancient groups met, clashed, or grappled for similar resources. The understanding of human prehistory needed to determine whether inter-group conflict was an important feature of the primitive landscape and whether past societies were shaped by group selective processes is currently lacking and is unlikely to improve soon. Indeed, the information may never become available. We can therefore only guess whether conditions conducive to group selection existed at all, prevailed occasionally or erratically, or were a pervasive feature of critical periods of human development. Thus the very uncertainties that make group selection controversial within evolutionary psychology and engender doubts about its importance as a developmental force also undermine our ability to say whether genetic programs for the "best" group strategies actually were selected. This further impedes the move from the past adaptiveness of group practices to their present resistance to change.

Finally, the very nature of the behaviors that are thought to arise from group selection, combined with the terms of their interaction with patterns shaped by individual selective forces, confound

[63] For discussion, *see* Robert Boyd and Peter Richerson, *Culture and the Evolutionary Process* (1985).

key assumptions behind the law of the law's leverage and frustrate the task of identifying behaviors most likely to resist influence. As already noted, group selection theory yields the insight that evolution is a multi-level process, generating traits that point in contrary directions. Evolution will favor groups with altruistic members, since those behaviors yield advantages in intergroup competition. But individual competition within groups will select for selfishness.[64] That means that higher order evolutionary pressures will tend to promote behaviors that are the *opposite* of those favored by individual selection.

Because variable circumstances may have demanded different combinations of selfish and unselfish conduct, the cause of fitness would have been served by preserving the capacity to express a spectrum of behaviors as circumstances demanded. There are good reasons for evolution to retain self-regarding traits in the human repertoire. Although sometimes counterproductive, they are essential to survival under less organized or quiescent conditions. But selfish, violent, and rapacious impulses also undermine group stability and cooperation. Thus group selective forces may have given rise not only to the primary impulses of generosity, but also to regulatory programs directed at modulating the expression of self-regarding traits forged by individual competition.

A variety of social control mechanisms, drawing on widely shared features of human psychology, are observed to perform this modulating function in different cultures. Commonly observed patterns include the creation and adherence to group norms and expectations and the assignment of social status and approbation based on conformity to dominant customs. Codes of morality, although varied in content, tend to evince common elements: Diverse cultures admire virtue and selfless generosity and discourage exploitation and unprovoked violence towards members of the "in" group.[65] Most groups impose codes of sexual morality that seek to restrain sexual predation and check the untrammeled expres-

[64] Sober and Wilson, *Unto Others*, at p. 91 (In general, "selfishness is favored by individual selection (or, more precisely, selection among individuals within groups), while altruism is favored by group selection (or, more precisely, selection among groups within the global population).")

[65] *See* Rubin, *supra* note 1, at p. 79; Pinker, *supra* note 1, at chapter 15.

sion of drives which, although potentially advantageous to some individuals, can create conflict and unrest within communities.

In addition to adopting similar values in some cases, cultures also draw on generic features of human psychology to enforce group-regarding behaviors. Common moral sentiments and reactive attitudes guide judgment and motivate behavior towards others. Tendencies towards group loyalty and solidarity, and the penchant for vengeance and punitiveness towards scofflaws, are crucial to the effective maintenance of other-regarding practices.[66] By manipulating both higher order and basic impulses (such as aversion to shame, the desire for social status or approval, and the quest for material gain), societies may go a long way towards curbing elemental responses of aggressiveness, selfishness, and promiscuity. Both selfish impulses and the capacity to suppress them are grounded in an evolved "nature" that is forged by dynamic processes operating on more than one level. As I have previously stated, "it takes a gene to beat a gene."[67]

This discussion sheds further light on how taking account of group selection casts doubt on the cogency of a principle like the law of the law's leverage. First, traits and tendencies forged through multi-level selection and operating in combination can produce a sweeping range of behavioral responses. Multi-level selection theory teaches that "what evolves depends on the relative strength of opposing forces."[68] These forces can pull in divergent directions with variable force, depending on complex circumstances.[69] The ultimate outcome is a vectoral sum that spans a broad spectrum, with observed conduct running the gamut from rapacious violence to saintly self-abnegation and extending to countless combinations in between. These possibilities are achieved by enlisting generic, multi-purpose mechanisms that give rise to elemental moral

[66] *See*, e.g., Fehr and Gachter, "Altruistic Punishment in Humans," *Nature* 415 (2002), p. 137.

[67] Wax, "Against Nature: On Robert Wright's *The Moral Animal*," *U. Chi. L. Rev.* 63 (1996), pp. 307, 322.

[68] Sober and Wilson, *Unto Others* at p. 91.

[69] *See* Wilson, *supra* note 1, at p. 11 (describing group selection as "a process that can occur but which also must contend against forces that pull in other directions").

impulses. Groups can make use of these impulses to check and suppress selfish tendencies. A system of impulses checked by other impulses produces maximum flexibility and acute environmental sensitivity. Within a framework of basic moral precepts and emotions, these regulatory systems can accommodate highly variable cultural practices and modes. The analogy to language is instructive. The cognitive structure of grammar is now recognized to be stylized and fixed. Yet this capacity can accommodate very different languages that are contingent in content and almost limitless in the concepts they can express.[70]

Likewise, cultural systems of social control, by enlisting mechanisms that can be put to many uses, will be capable of generating a vast array of behavioral outcomes. The complexity of the forces at work has pronounced implications for evolutionary speculation. Although the historical rarity and fragility of some social arrangements suggest limits on their feasibility, evolutionary theory informed by multi-level selection provides no sound theoretical basis for ruling particular social possibilities completely out of bounds. The rules that determine actual norms of reaction to environmental and social contingencies will necessarily be complex and, for the foreseeable future, obscure. Looking at a particular behavior in isolation to gauge its likely past benefits for the individual conveys little about whether that behavior is so "hard-wired" that it resists modification by cultural and social factors, because that behavior evolved along with other traits that make conduct vulnerable to social control. Social science has yielded some rudimentary understanding of why people are virtuous or vicious and why they cooperate or compete, but further progress is likely to be slow. And that progress will come primarily through empirical investigation rather than conceptual and theoretical analysis.

In short, while the law of the law's leverage seems plausible at first blush, its defect is that it takes no account of the advantages that can flow from an organism's ability to modulate or control its own behavior. Jones's formulation simply ignores the possibility that evolution can select for multiple, parallel behavioral programs

[70] *See* Pinker, *The Blank Slate*; *see also* Pinker, *The Language Instinct* (1994).

that operate simultaneously and pull in countervailing directions, or that organisms may benefit from developing the ability to regulate or suppress behaviors that may sometimes prove vital, and sometimes detrimental, to survival. The key lies in understanding the role that the exigencies of group living played in the evolution of "human nature." Because the expression of impulses that can work in favor of individual fitness goals in some, or even many, environments can prove counterproductive in others, traits that were once *highly* adaptive for individuals within the group, and therefore widely retained in the behavioral repertoire, would have to be suppressed when circumstances dictate. Mechanisms for exerting effective social control are essential to this mission.

For purposes of evaluating the law of the law's leverage, therefore, an important lesson of group selection is that there is no necessary correlation between a pattern's apparent past adaptive value for the individual organism and its present pervasiveness or amenability to effective group influence. In short, the fact that traits gave individuals a competitive advantage within the group in the past says little about how easy they are to control or suppress today. The dynamics of group selection suggest that evolution can equip the human organism with a high degree of sensitivity to group norms and mores, which can modulate even powerful impulses. Behavior that was good for individuals in the past will not necessarily be rigidly expressed in most circumstances today, nor will it necessarily prove recalcitrant to suppression using the conventional instruments – either formal or informal – of social control. Indeed, this analysis shows why many strong, universal human tendencies may be very sensitive to group cues and amenable to override by familiar social and cultural forces.

The law of the law's leverage thus has limited currency because, even conceding that past adaptiveness decisively shaped psychology, individuals may nonetheless be quite responsive to attempts to punish them for giving vent to powerful innate dispositions. Nor is there any principled reason to suppose that social management of elemental leanings will inevitably entail intolerable costs to human flourishing and psychological well-being. Taking account of the complexity introduced by the simultaneous operation of different mechanisms of selection casts doubt on simplistic

assertions about the costliness of deflecting deep-seated impulses, the unhappiness that will result from repressing fervent desires, and the degree to which efforts to extinguish ingrained behaviors will encounter resistance. This is not to deny that some patterns of conduct may prove robust and recalcitrant, or that curbing some tendencies may cause frustration or sacrifice. But we cannot look to evolutionary theory to map this terrain or to reveal which social goals are feasible or productive of a stable, workable social order. On the individual level, the elements of broad adaptiveness – including the traits or behaviors that enhance fitness through sexual selection and natural selection for survival – may work at cross purposes and foster disparate or even contradictory behaviors. Once group-based dynamics are added to the mix, there is simply no reason to posit any straightforward and predictable relationship between individual adaptiveness – by which is meant enhancement of fitness in competition with other group members – and amenability to change. The relationships are more complicated and more qualified than the law of the law's leverage suggests. Nor can we know ahead of time whether behavior can be modified through legal intervention as opposed to other methods. The tendency to adhere to group mores and to respond to social sanctions is as much a part of human nature as more elemental impulses grounded in individual reproductive advantage. We must therefore reserve judgment on the capacity of societies – through law and otherwise – to induce people to go against impulses that enhanced their reproductive prospects in primitive environments. Likewise, the emotional and mental consequences of sublimating urges for the greater good are not amenable to inference from first principles. These aspects of our nature may yield to empirical investigation but cannot be derived from evolutionary models alone.

VI. APPLICATIONS: SEXUAL DIMORPHISM AND RAPE

A. Sexual dimorphism

Sexual dimorphism is a central theme of evolutionary analysis. Evolutionary models purport to explain how male and female reproductive self-interest generates contrasting predispositions and

behaviors and yields divergent social roles. Closely related to these observations are theories about the evolutionary origins of behaviors, such as rape and sexual violence, that appear to bear directly on reproductive prospects. This section assesses these controversies in light of the forgoing discussion of sexual selection and group selective mechanisms.

Although views on the sources and malleability of sex differences vary, a divide exists between the position that gender-based behaviors are largely "socially constructed" and the belief that innate components, shaped by evolutionary forces, decisively influence observed patterns of behavior. Nor surprisingly, discussions in the social science literature of the evolutionary origins of sexual dimorphism focus on behaviors with straightforward survival and reproductive payoffs and stress individual competition within groups. Differences in behaviors such as risk-taking, mate guarding, status seeking, preferences for multiple sex partners, patterns of violence, and others, are tied to evolutionary advantages for individual men and women. The prediction is that women, as compared to men, will on average be more risk averse, less violent, less status-conscious, more nurturing, more oriented to relationships, less interested in mechanism and abstraction, and more attached to their children. Women will value monogamy and seek mates with status and resources. Men, in contrast, will have a greater taste for sexual variety, will value youth and beauty in women, will strive competitively to attain status and command resources, and will seek to control sexual access to their mates.[71] These predictions generally comport with empirical observation. That an evolutionary approach appears to explain behavioral patterns that dominate worldwide is thought to be a significant payoff of the theory.

Social science discussions of the evolutionary origins of sexual dimorphism are often informed by variants of the reasoning behind the law of the law's leverage: Differences between men and women in traits bearing on reproductive prospects are assumed to have been adaptive in a wide range of past environments. The pronounced enhancements in fitness ascribed to these different behavioral patterns will give rise to strong leanings that are genetically "hard-wired." These genetic programs will channel male and

[71] For a summary *see*, e.g., Pinker, *The Blank Slate*, chapter 18.

female behavior into rigid forms that, although amenable to modest variation, are largely resistant to change. Attempts to alter these fundamental patterns through "social engineering" are ultimately misguided and doomed to failure.

Examples of work in this vein include David Buss's surveys of behaviors and attitudes related to love, sex, and reproduction, Daly and Wilson's studies of male-on-male and male-female violence,[72] Owen Jones's work on rape and familial child abuse,[73] and Kingsley Browne's discussions of women in the military[74] and sex differences in labor markets.[75] Mixing social science data and theory, these authors document various behavioral disparities between men and women observed in a cross-section of societies throughout the world and speculate on the evolutionary origins of the patterns. Because these authors are more concerned with describing observed behaviors and tracing their evolutionary origins than with exploring prospects for reform, most do not focus their inquiry on whether legal or policy interventions can effect significant changes. Nonetheless, the assumptions behind the law of the law's leverage loom large in their analysis, which bodes ill for significant transformations of existing practices. The observation that certain differences tend to appear over a broad range of social circumstances suggests that these patterns were the most adaptive in primitive environments and will tend to emerge in diverse societies. Because dominance over a range implies resistance to influence, the clear lesson is that there are male and female "natures," and that these will prove intransigent.

This logic is evident, for example, in the work of legal scholar Kingsley Browne. Browne claims[76] that women's relative scarcity

[72] *See* Buss, *The Evolution of Desire*; Daly and Wilson, *Homicide*; Daly and Wilson, *The Truth About Cinderella: A Darwinian View of Parental Love* (1999); Daly, *Sex, Evolution and Behavior: Adaptations for Reproduction* (1983).

[73] *See* Jones, "Realities of Rape: Of Science and Politics, Causes and Meanings," *Cornell L. Rev.* 86 (2001), p. 1386; Jones, "Sex, Culture, and the Biology of Rape: Toward Explanation and Prevention," *Cal. L. Rev.* 87 (1999), p. 827; Owen Jones, "Evolutionary Analysis in Law: An Introduction and Application to Child Abuse," *N.C. L. Rev.* 75 (1997), p. 1117.

[74] *See* Browne, "Women at War: An Evolutionary Perspective," *Buff. L. Rev.* 59 (2001), p. 51.

[75] Browne, "Sex and Temperament in Modern Society: A Darwinian View of the Glass Ceiling and the Gender Gap," *Ariz. L. Rev.* 37 (1995), p. 971.

[76] *Id*. at p. 971.

in workplace positions of authority is not due primarily to labor market discrimination, but rather stems from choices that women make in light of their evolved preferences and desires. Browne asserts that women's avoidance of career goals that call for ambition and reward competitiveness expresses their tendency to be less socially competitive than men. The observation that "much of what we see in the workplace" can be traced to "a biological basis for sex differences in temperament"[77] suggests that labor market discrimination is not the main culprit impeding women's progress in the workplace. This view has clear implications for employment law: Because women's labor market status is most likely due to individuals' preference-driven "supply side" choices rather than to "demand side" discrimination, stepping up enforcement of existing anti-discrimination laws is unlikely to improve women's prospects.

Browne's discussion clearly rests on the assumption that the propensities that give rise to differential workplace outcomes are robust and will consistently influence men's and women's behavior. Because the quest for status and high-stakes risk-seeking go "against the grain" of many women, they will resist even forceful attempts to push them in directions that demand these attributes. Likewise, it will be difficult to suppress the same behaviors in men. The results of efforts to effect change in both directions are likely to be disappointing.[78] Policies channeling women into occupations that usually attract men, and vice versa, will encounter resistance, require coercive measures, and generate unhappiness. Re-arranging social life so that men and women share child care equally will also prove difficult, ineffective, and counterproductive, and will increase dissatisfaction among both sexes.

For Browne and others who believe that the sexes evolved to possess different average psychological profiles, behavioral tend-

[77] *Id*. at p. 1101.

[78] *See*, e.g. Kingsley Browne, *Ariz. L. Rev.* 37 at pp. 1101–1103, 1103 ("In order to achieve 'equality,' the risk-taking propensities of women would have to increase to match those of men. Because this appears to go 'against the grain' of the human psyche, it may be difficult to achieve."); Pinker, *The Blank Slate*, at pp. 356–357; Steven Rhoads, *Taking Sex Differences Seriously: The Biology of Gender and Its Social Implications* (draft) at chapter 10. *See also* Michael Levin, *Feminism and Freedom* (1988).

encies grounded in fitness effects can be expected to frustrate utopian social efforts to achieve equality of outcomes for men and women in a range of arenas.[79] Browne, for example, takes a dim view of heavy-handed social programs that aim to erase all social and behavioral distinctions between the sexes.[80] Although warning against the naturalistic fallacy by observing that what is natural is not necessarily good or morally right and not denying outright the possibility for significant reform, Browne advances objections largely on instrumental grounds and stresses the extreme difficulty and high cost of attaining uni-sex goals. Sameness will simply prove too hard, too costly, and too inhospitable to human fulfillment and the satisfaction of deep-seated wants to prove worthwhile. Equality between the sexes is not worth the candle.

While an evolutionary account of sexual dimorphism may help shed light on the factors contributing to the sexual division of responsibility in the workplace and elsewhere, predictions about the efficacy of efforts to modify observed patterns must be regarded with greater skepticism. The discussions of love, sex, reproduction, and competition that commonly inform analyses of evolved sex differences conjure up an impoverished vision of social life in which each person pursues primarily his own self-interest and other people are viewed as threats, as occasions for sexual satisfaction, or as sources of valuable resources. There is much that is missing from this picture. The key elements of human culture that are caught up in regulating or "incentivizing" behavior – including morality, religion, social custom, group values, and political ideology – don't loom large, and sophisticated forms of social and symbolic activity receive little play. In addition, these discussions slight the role of sexual selection, and the desire and need to please the opposite sex,

[79] For discussions of the likely futility of some social programs related to sexual equality, see Browne, "Women at War: An Evolutionary Perspective," *Buff. L. Rev.* 59 (2001), p. 51; Browne, "Sex and Temperament in Modern Society: A Darwinian View of the Glass Ceiling and the Gender Gap," *Ariz. L. Rev.* 37 (1995), p. 971; Steven Rhoads, *Taking Sex Differences Seriously: The Biology of Gender and Its Social Implications* (draft); Pinker, *The Blank Slate*. *Cf.* Janet Radcliffe Richards, *Human Nature After Darwin* (2000) (embracing an evolutionary paradigm, but arguing that sexual equality is achievable).

[80] *See*, e.g., Browne, *Ariz. L. Rev.* 37 at pp. 1105–1006.

as distinct mechanisms that drive evolutionary development and add significantly to the complexities of human social response.

Kingsley Browne's discussion of prospects for sexual equality in labor markets, for example, assigns little role to social disapproval, cultural values, emotional appeals, ideology, group mores, and other features of the social order thought to be shaped by sexual selection and group selection. To be sure, there may be important limitations to the reach of these devices that are pertinent to the workings of labor markets: work that requires attributes, like sheer intellectual ability, which are not subject to will and may be differentially present in men and women, may resist channeling through cultural sanctions. Because success as a physicist, for example, requires specialized intelligence and mental talents, no social or cultural transformation may ever completely equalize male and female representation in this field. The high degree of variation of women in science across cultures and nations suggests, however,[81] that there may be room for considerable movement even in this arena. As for other occupations or social roles that depend less on highly specialized abilities, the possibilities must be regarded as even more open-ended. While it may ultimately prove true that "people aren't malleable enough to create a society of perfect behavioral symmetry between men and women,"[82] it is not clear how much convergence can be achieved. Modern western societies have gone much farther than was ever thought possible in the not too distant past. Certainly more sexual equality has been achieved than a straightforward application of the law of the law's leverage would seem to countenance.

The status of the "women question" in modern American society illustrates the importance of factors that are not much emphasized in evolutionary accounts of gender roles. It is fair to say that sexual parity has attained the status of a mainstream ideology that is accepted by a significant and influential segment of the population. Laws, policies, and informal practices that support this

[81] Rachel Ivie et al., "Women Physicists Speak: The 2001 International Study of Women in Physics," in *Women in Physics: The IUPAP International Conference on Women in Physics* 49, 50 (Beverly K. Hartline & Dongqi Li eds., 2002).

[82] Robert Wright, "Feminists, Meet Mr. Darwin," *The New Republic* (Nov. 28, 1994), pp. 44–45.

social goal routinely advance across the board. Ironically, a "social constructivist" theory of gender, which denies that the sexes differ significantly in evolved or innate characteristics, is a key component of the ideology that informs these attitudes. As with other aspects of "politically correct" thinking, endorsement of the core elements of the feminist agenda is a prerequisite for attaining to virtually all positions of influence and esteem, regardless of political affiliation. Holding the "right" attitudes has become an important marker of membership in circles that dominate social and economic life, and positions of status are assigned only to those who are willing to commit to – or at least to refrain from disavowing – the ideal of equality between the sexes in most social spheres.

An evolutionary explanation for the dramatic recent surge in support for feminist ideals within Western cultures is hard to derive from a focus on natural survival selection and individual competition alone. It is not clear how individual reproductive success would be enhanced by a consensus commitment to equal rights for women. Although there is no straightforward line from feminist practice to group advantage either, traits shaped by group selection and sexual selection offer more promise in accounting for these cultural trends. People are equipped with the generic capacity to embrace other-regarding ideals as defined and accepted by the group. The psychological structures that facilitate group solidarity and coordinate action can be conscripted to a wide variety of causes and goals. The feminist project of equal rights and opportunities for women is one that people can learn to embrace, regardless of its payoff for the individual. Commitment to the goal of sexual equality can also be understood as a component of sexual display. That category is open-ended and capacious enough to include the ostentatious conformity to a wide variety of norms and practices. These can include allegiance to the goals of sexual equality, which has the added benefit of being "wasteful" in the sense of conflicting with men's exertion of control over women – a practice that would tend to enhance the individual's fitness. By marking out the declarant as "right-minded," high-minded, and willing to sacrifice immediate self-interest to principle, the embrace of equality ideals represents a way to curry favor with (or at least avoid the disfavor of) beautiful

and desirable women.[83] The conscription of such display programs, in combination with other mechanisms for promoting normative ideologies, might be powerful enough to override conflicting behavioral currents. Although somewhat cynical, this view at least possesses an explanatory power that a more conventional evolutionary focus does not.

It may be objected that this account does violence to the core of sexual selection theory, which predicts sexual dimorphism in a range of display-related behaviors. As Miller states, sexual selection is usually invoked "to explain the differences between women and men."[84] Those differences are thought to arise from female choosiness, which puts pressure on men to compete for female attention. As males with favored traits monopolize females, the chosen attributes will amplify rapidly and become concentrated in successive generations. Although female offspring will inherit the favored genes, they will not necessarily express them, and the characteristics of males and females will diverge. It follows that wasteful and abundant display will be largely the purview of the male of the species, and that men will develop a genetic tendency to dominate in this arena. This comports with observation: throughout human history, men have overwhelmingly surpassed women as producers of high culture.

The notion that sexual selection endows men (but not women) with the propensity to engage in wasteful display is arguably in tension with the more open-ended potential for affecting behavior ascribed to sexual selection above. It sets the stage for the view, in keeping with the law of the law's leverage, that the display gap between men and women is hard-wired by evolution and will resist change.

Doubts remain, however, about whether the law of the law's leverage or a like principle applies here. Does it follow from what we know that the display gap will never narrow significantly, so that we can say with confidence that it will probably persist? Miller's analysis suggests that the story is not so simple. Human beings

[83] *See*, e.g., Miller, *supra* note 1, at pp. 330–332 (suggesting that women favored sympathy in courtship, and that "politically correct" attitudes are evidence of sympathy writ large).

[84] Miller, *supra* note 1, at p. 15.

do not manifest anything like the pronounced – indeed virtually complete – sex-based divergence in display-related behaviors that is seen in many other species and that a simplified theory of sexual selection predicts. Although cultural output is predominantly male, men and women are similarly endowed with the cognitive capacities and artistic sensibilities that would appear to make cultural production possible. Geoff Miller discusses two possible explanations for this convergence in human beings. First, the extreme, "runaway" sexual dimorphism predicted on simple models of sexual selection hinges on the assumption that males with favored traits will dramatically outbreed others. That outcome depends on a high degree of functional polygamy, with the most successful males monopolizing almost all opportunities for reproduction. But sexual selection can operate in monogamous species as well (through competitive assortative mating producing greater reproductive success for the "fittest" pairs).[85] The resulting sexual dimorphism in those circumstances is more muted and less predictable. Instead of all the choosiness going one way (with only men's access restricted), monogamy and limited polygamy force women to compete as well. There will be some sexual selection, with display and competition, on both sides, but the balance between the sexes will be hard to predict.

Human beings are now more monogamous than polygamous, but it is not clear how long this pattern has prevailed. The degree of monogamy or polygamy practiced in the past – and during key evolutionary periods – is not known with certainty, and the evolutionary origins and logic of monogamy are poorly understood.[86] The inability to know exactly what mating patterns obtained

[85] *See* Miller, *supra* note 1, at p. 195; see also *supra*.

[86] *See* Miller, *supra* note 1, at pp. 74–76 (suggesting that human beings were more polygamous in the past, although acknowledging that the evidence is sketchy). Why human beings have come to adopt monogamy rather than polygamy is a subject of speculation. There are several possible explanations grounded in individual selective advantage. Temporary pair-bonding and sustained paternal investment may protect vulnerable offspring. Males may benefit because smaller harems or single partners are easier to monopolize sexually. Or females' desire for sexual loyalty and long-term commitment may have exerted significant pressures on men to adopt these behaviors. On the other hand, monogamy would appear to be incompatible with the intra-group competition that drives individual selection to the extent that it prevents men from seeking reproductive advantage by procuring more than one mate. Monogamy may nonetheless

throughout human evolutionary history and precisely how sexual selection really worked makes it hard to determine how much genetically-based behavioral convergence between the sexes should be expected.[87] Uncertainty about how much dimorphism can be traced to sexual selection generates uncertainty as to how much can be attributed to contingent social and cultural factors (such as restrictive customs or politics) rather than to innate psychological attributes.

Another element that complicates efforts to determine the genetic contribution to behavioral sex differences is the form sexual display takes in animals with advanced cognitive functions. The types of display for which human beings have developed a special capacity require advanced, creative intelligence. As Miller notes,[88] sexual selection only works if "consumers" of the display are not easily pleased. Sexual selection places exacting demands on those in the audience, who must judge, discriminate, and distinguish the skillful from the inept. Identifying and appreciating outstanding cultural products from science to music to visual art to clever repartee requires a high degree of intellectual and artistic discernment. When it comes to human forms of sexual display, it takes one to know one. As Miller explains:[89]

> there is much more overlap between those aspects of the brain used for producing sexually attractive behavior and those aspects of the brain used for assessing and judging that behavior. For example, speaking and listening use many of the same language circuits. The production and appreciation of art probably rely on similar aesthetic capacities. It takes a sense of humor to recognize a sense of humor. Without intelligence, it is hard to appreciate another person's intelligence. The more psychologically refined a courtship display is, the more overlap there may be between the psychology required to produce the display and the psychology required to appreciate it.

represent an adaptive group strategy. By preventing powerful males from monopolizing females, the rule of "one woman per male" may allow groups to flourish by minimizing infighting and reducing rebellion against a sexually dominant leadership class. *See* Miller, *supra* note 1, at p. 192; pp. 93–107.

87 *See* Miller, *supra* note 1, at pp. 196–205.

88 Miller, *supra* note 1, at pp. 91–92.

89 Miller, *supra* note 1, at p. 92.

In sum, the mental equipment needed for high accomplishment is quite similar to that needed to recognize it. This suggests that men and women are more closely matched in their aesthetic and intellectual capabilities than their differential output over the course of history would suggest. But this only begs the question of whether the observed output disparity is the product of innate differences or contingent social forces, and leaves open whether more phenotypic equity could be achieved under as yet unrealized conditions.[90]

This discussion suggests that a comprehensive understanding of the mechanisms of evolutionary change undermines the potential for a persuasive forward-looking account that assigns observed sex differences in behavior to rigid genetic disparities rather than to contingent cultural or political forces. Although sexual selection may have contributed significantly to current patterns, there are simply too many uncertainties surrounding the historical opera-

[90] *See* Miller, *supra* note 1, at pp. 82–85. Of course, an alternative possibility is that cultural attainment depends not just on cognitive capacity or creative sensibility but on the compulsion or drive to produce. Perhaps sexual selection fuels a "hard-wired" dimorphism in productivity that accounts for historically observed differences in men's and women's cultural achievements. But the mere observation that there appear to be differences in drive – or in anything else – cannot suffice to settle whether those differences are genetically fixed or environmentally contingent. Rather, the challenge is to start from initial conditions and apply evolutionary logic to predict what genes will be retained. Indeed, the strength of the law of the law's leverage is its implicit recognition that a theory that assumes that all currently observed and prevalent behaviors (including sex differences) are "hard-wired" – and thus particularly resilient – explains nothing. The goal of a plausible evolutionary theory is not to validate the genetic origins of behavior. All behavior ultimately originates in biology. Rather, it is to decide *which* current patterns or behavioral differences are more likely to depend on inflexible and determinate genetic programs and which on contingent social or environmental conditions. Although Jones's link between past adaptiveness and current inflexibility is problematic in many respects, his analysis at least acknowledges the need to find a method for decided *ex ante* – and independently of contemporary behavioral patterns – which behaviors were more adaptive during evolution and which less so. In attempting to move from what is known about the evolutionary environment and its effects on reproductive success to conclusions about *which* behaviors among those now observed are most likely to resist change, Jones's discussion strives to avoid the circularity of taking the widespread prevalence of a behavior as evidence for rigid genetic control and narrow norm of reaction.

tion of that process to permit definitive conclusions about origins. Because we cannot know which specific male behaviors conferred an adaptive advantage through sexual selection, we cannot apply the law of the law's leverage to know how difficult or easy it would be to narrow the gap between the sexes. Although the perdurability and ubiquity of some sex differences in behaviors are impressive, we lack the theoretical tools to identify the causes of those differences.

B. Rape and Sexual Violence

Sexual selection and group selection potentially alter the implications of an evolutionary approach to the origins of rape and sexual violence. Following the lead of Wilson and Daly,[91] Owen Jones suggests that male violence or the threat of violence against unfaithful sexual partners was an adaptive behavior that, by helping men monopolize women's reproductive capacity, enhanced male reproductive success.[92] The value of controlling women gave rise to male sexual possessiveness, which was mediated through powerful, unruly, and reflexive emotions of sexual jealousy and rage. Jones also discusses the controversy surrounding Thornhill's and Palmer's book, *A Natural History of Rape*,[93] which argues that rape represents an "adaptive" behavior.[94] The authors' position is that the propensity to engage in forced sex was preserved over evolutionary time because it boosted male's average reproductive success. Although agreeing with Thornhill and Palmer that resort to forced sex will emerge only in specialized circumstances and will not be completely impervious to punishment,[95] Jones suggests that this behavior will be difficult to eradicate entirely and will prove espe-

[91] Daly and Wilson, *Homicide* (1988); Daly and Wilson, *The Truth About Cinderella: A Darwinian View of Parental Love* (1999).

[92] Owen D. Jones, "Time Shifted Rationality and the Law of Law's Leverage: Behavioral Economics Meets Behavioral Biology," *Nw. U. L. Rev.* 95 (2001), pp. 1141, 1194–1196.

[93] Jones, "Realities of Rape: Of Science and Politics, Causes and Meanings," *Cornell L. Rev.* 86 (2001), p. 1386; *See also* Jones, "Sex, Culture, and the Biology of Rape: Toward Explanation and Prevention," *Cal. L. Rev.* 87 (1999), p. 827.

[94] *See* Thornhill and Palmer, *supra* note 7, at chapter 7.

[95] *See* Jones, *Realities of Rape*, *supra*, at p. 1416 (echoing Thornhill and Palmer's suggestion that "increasing the costs of rape will, at least in some cases,

cially resistant under circumstances resembling those in which, historically, the benefits of forced sex outweighed costs.[96] In such situations, punishments conventionally applied to crimes of other types, even if severe, will often fail to deter rape.[97] With respect to other kinds of sexual violence, Jones speculates that a tolerance for vengeance against sexually unfaithful women can be traced to the perception that sanctions are futile and that male crimes of passion will resist conventional methods of social control.[98] The explanation for that intransigence comes straight out of the law of the law's leverage: That such behaviors will be relatively impervious to legal sanctions reflects their resistance to environmental manipulation generally, which in turn can be traced to their broad "adaptiveness." Because it will behoove men to take steps against their mates' infidelity in most circumstances, it follows that vengeful behavior is less likely to be deterred by any social influences – including strong sanctions – that are brought to bear. Although the normative implications of this observation are unclear – since arguments could be made either for mitigating or enhancing penalties[99] – the behavioral insight is useful for predicting responses to social intervention.

help to reduce its incidence" and noting their belief that "males will be at least somewhat sensitive, consciously or not, to the costs of raping behavior").

[96] *See* Jones, *Realities of Rape*, *supra* at p. 1392; Jones, *Sex, Culture, and the Biology of Rape*, *supra* at p. 926 ("If the selection theories of biobehavioral influences on rape are true, then rape behavior will be even more difficult to eradicate than some theorists estimate.")

[97] *See* Jones, *Sex, Culture, and the Biology of Rape*, *supra* at p. 925 (Expressing doubts that "invoking a legal regime that has penalties designed to confront and deter *other* crimes of violence will be effective in deterring [rape]" and suggesting that "[p]sychological processing mechanisms relevant to many rapes may be less sensitive to post-act costs not typically encountered in the environment of evolutionary adaptation.")

[98] Jones, *Time-Shifted Rationality*, *supra* at p. 1194 (suggesting that laws punishing male violence directed against unfaithful mates "are unlikely to be effective deterrents").

[99] *See*, e.g., Jones, *Sex, Culture, and the Biology of Rape*, *supra* at pp. 925–926; Jones, *Realities of Rape*, *supra* at pp. 1416–1417 (defending severe penalties for rape as necessary to raise the cost of indulging strong impulses).

The critique of this view denies all of the above. Rape and sexual violence were never "adaptive" strategies.[100] The feminist argument goes further than a denial of reproductive payoffs. Forced sex is not really "about sex" or about reproduction at all. Rather, it represents a cultural contrivance for the male domination and intimidation of women.[101]

The feminist approach is difficult to reconcile with evolutionary theory. If the tendency to resort to rape failed to enhance average fitness in the past, that begs the question of why it has not disappeared from the human repertoire.[102] The persistence of never-adaptive behaviors stands in need of explanation under orthodox evolutionary theory, which predicts that traits that fail to enhance individual reproduction will be "bred out" under the pressure of competition. Assessing this objection is beyond the scope of this discussion.[103] Rather, the focus is on the distinction that seems to

[100] For a review of these arguments, *see* Thornhill and Palmer, *supra* note 7; Jones, *Sex, Culture, and the Biology of Rape*, *supra*; and various book reviews of Thornhill and Palmer (on file with author).

[101] *See* discussion in Thornhill and Palmer, *supra* note 7, at p. 124.

[102] That a behavior is not adaptive today is irrelevant, as some behaviors that enhanced survival in the past no longer do so under modern conditions. See, e.g., Jones, *Time Shifted Rationality*, *supra* (noting important distinction between fitness enhancement under conditions prevailing during evolutionary period and conditions in place today).

[103] Different accounts have been advanced to deal with this conundrum. First, such behaviors may represent a kind of "pathology" or spontaneous error in the biological program. At one extreme, the behavior at issue might reflect a random, extraneous genotypic mutation – an actual alteration in the genetic substrate – which continues to express itself because it has not yet been eliminated through the play of evolutionary forces. The second explanation is a variation on this theme, but does not depend on a continuous stream of untoward genetic mutations that have not (yet) been purged. Rather, the theory is that certain complex behaviors arise as "exaptations" – that is, non-adaptive side-effects or byproducts of existing genetic programs or traits. For the classic statement, *see* Gould and Lewontin, "The Spandrels of San Marcos," cited and discussed in Ullica Segerstrale, *Defenders of the Truth: The Sociobiology Debate* (2001); *also* Hilary and Steven Rose (eds.), *Alas Poor Darwin* (2000). It is unclear however, why the view that some behaviors ordained as byproducts of genetically adaptive traits would prove more consistent with a social constructivist view than the notion that those behaviors are adaptive in and of themselves. There is no reason to believe that anti-social behaviors retained as byproducts of evolved traits are any less genetically

matter to all sides of the debate: that between behaviors that were once "adaptive" and those that were not.

What really turns on whether rape is an adaptive behavior and why does the question elicit so much passion? The crude confusions inherent in the naturalistic fallacy provide one possible explanation: behaviors that are "natural" thereby appear to be good or right. The more cogent possibility – and one that deserves more considered attention – looks to the logic behind the law of the law's leverage: if behaviors – such as rape or crimes of passion – were fitness-enhancing in the past, they will resist attempts to suppress them in the present. Such behaviors will prove difficult – or impossible – to eliminate through social intervention. This conclusion breeds a pessimism and fatalism about harms to women that social progressives find hard to accept.

The first line response to this reasoning is to point out that the "adaptiveness" of rape or any other behavior does not mean that it will be commonplace or will represent the norm. Successful reproductive strategies in complex organisms are often marked by flexibility, with the organism holding a range of behavioral responses in reserve to meet special environmental or social needs. The assertion that rape was "adaptive" – in that men equipped with that capacity were on average "fitter" than those without it – is consistent with a narrow or broad norm of reaction and tells us nothing about which obtains. In fact, the leading proponents of the "rape is adaptive" view regard rape as a last-ditch option, a desperate ploy for the sexually dispossessed. Because forced sex elicited resistance and resentment and delivered fewer benefits than consensual sex, men would rarely choose it over the cooperative alternatives of courtship and consent. This suggests that forced sex will occur contingently, infrequently, or only in unusual circumstances.[104]

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fixed or "hard-wired" – and any more amenable to environmental influence – than anti-social behaviors retained for their direct fitness effects.

An alternative and plausible "adaptationist" view is that rape represented a practice that enhanced group fitness. On the other hand – and consistent with the framework advanced in this article – rape could have been forged by cultural norms with ambiguous fitness effects.

[104] *See* Jones, *Realities of Rape*, *supra* at p. 1392; Jones, *Sex, Culture, and the Biology of Rape*, *supra* at p. 862; Thornhill and Palmer discussion, *supra*. This discussion shows how "adaptive" need not be synonymous with inflexible.

Apart from how often and when men can be expected to resort to rape, however, lies the question of whether individual advantage, narrowly conceived, is the only relevant factor. Discussions about the evolutionary origins of rape rest on the logic behind the law of the law's leverage, which posits a simplistic relationship between the adaptiveness of a behavior in the past and its present resistance to control. Yet proper attention to the role of higher order regulatory functions shows that the correspondence is no more straightforward in this case than in any other.

Although no society has succeeded in wiping out male-on-female violence – and although the greater prevalence of male aggressiveness against women over the opposite pattern is at present quite robust – there is wide variation in the incidence of sexually possessive violence and rape in different periods, societies, and cultures. Violent responses towards derogations of male sexual prerogatives are considered normal or even desirable in some societies, but are met with severe disapproval and Draconian sanctions in others. Domestic violence and forced sex are commonplace in some groups and unusual in others.[105] This suggests that, whether or not forged by selective pressures, these behaviors remain quite amenable to cultural modulation. This is not surprising, as norms governing violence and sexuality are a central feature of morality in every age and culture the world over. The rules of conduct in these areas, which are often strictly enforced, draw upon features of psychology that make persons broadly vulnerable to social influence

A behavior that can fairly be characterized as "adaptive" (and is retained as a behavioral strategy) can nonetheless be infrequently expressed or have a broad norm of reaction. See discussion in Part II *supra*.

[105] *See*, e.g., International Crime Victim Surveys, Data from 1989, 1992, 1996 (available at http://ruljis.leidenuniv.nl/group/jfcr/www/icvs/Index.htm); Jan Van Dijk, Pat Mayhew and Martin Killias (eds.), *Experience of Crime Across the World*; United National Department of Economic and Social Affairs, The World's Women 2000: Trends and Statistics (available at http://unstats.un.org/unsd/demographic/ww2000/table6c.htm); Office on Drugs and Crime, *Centre for International Crime Prevention, Seventh United Nations Survey of Crime Trends and Operations of Criminal Justice Systems, covering the period 1998–2000.* available at http://www.unodc.org/pdf/crime/seventh_survey/7pv.pdf (last visited June 23, 2003); George Thomas Kurian (ed.), *The Illustrated Book of World Rankings* (1997).

and enlist formal and informal social control instruments that can be highly effective.

This observation does not mean that conventional legal sanctions will always succeed in controlling this behavior. The key "price changes" may be effected by complex and poorly understood norms, beliefs, institutions, and structures that cultures create primarily through extra-legal means. The most effective enforcement may make use of ostracism, shaming, status loss, and other informal mechanisms. But the wide variation in the form and efficacy of existing customs and practices significantly undermines the claim that past adaptiveness will always translate into intransigent resistance, or that the two can be usefully linked for all time. In addition, the assumption implicit in the law of the law's leverage – that suppression of strong impulses will require repressive and severe counter-measures – does not necessarily hold up, as the incidence of sexual violence is relatively low in some free and open societies.

The analysis of sexual violence is not complete without considering a role for sexual selection. Even if individual competitive pressures otherwise favor male sexual possessiveness and physical control of women, sexual selection can foster tendencies – towards restraint, nonviolence, and moral probity – with the potential to keep these patterns at bay. If women shun or reject violent men in sufficient numbers, that signal might have a significant effect on male behavior. Although the current state of affairs does not give much cause for optimism, the potential inherent in these devices invites us to reserve judgment. Too little is known about how cultural cues and institutions operate to reach definitive conclusions about the potential for taming sexual violence or for identifying social and cultural permutations conducive to this result. What works in this arena is an open and empirical question.

VII. CONCLUSION: USING EVOLUTION TO MAP THE BOUNDS OF HUMAN NATURE

Does taking fuller account of the mechanisms thought to operate in human evolution spell the end of evolutionary psychology as a useful branch of social science? Can we say nothing about effective limits on the social roles or arrangements we might adopt, or

about which behavioral patterns are beyond the reach of cultural control? Regardless of the answers to these questions, evolutionary psychology surely remains valid as a framework for understanding and explaining human behavior. To deny that the basic paradigm of evolutionary selection applies to the manifestations of the human mind is to risk incoherence on two fronts. First, that position requires indulging an exceptionalism that views human beings as uniquely and radically different from other biological creatures. The notion that there is a critical discontinuity between less advanced organisms and homo sapiens is sometimes asserted to rest on a theory of "emergence": that new biological forms capable of higher cognition and complex symbolic thought defy old paradigms, mechanisms, and explanations. But there is nothing about higher capacities that would appear to exempt them from laws of evolutionary selection and no reason to believe that evolution operates differently for behaviors driven by advanced mental abilities than for others. If behavior helps determine fitness – which surely it does – and if all behavior is ultimately grounded in brain design and function, then evolutionary pressures will tend to favor the fittest designs over alternatives. Because there is no evident discontinuity in the operation of selective forces on behaviors that run the gamut from primitive to advanced, exceptionalism lacks any coherent conceptual or evidentiary foundation.

Radical social constructivism[106] – which views biology or genetics as having little or no influence on the possibilities for human behavior or social life – is likewise incoherent. If human responses, feelings, emotions, and modes of thought are shaped exclusively by the environment, then people must learn everything they know from experience. But then what determines how individuals will react to the experiences to which they are exposed? The answer to that question cannot, in turn, be "other experiences," because the same question can be asked yet again. It can't be turtles all the way down. Escaping an infinite regress requires a theory of what and how we learn. But that theory must tie particular inputs to particular behavioral outputs: there must be some reason why a

[106] For a statement of this position *see*, e.g., Leda Cosmides and John Tooby, "Cognitive Adaptations for Social Exchange," in Jerome Barkow et al. (eds.), *The Adapted Mind*, Vol. 207 (1992).

given stimulus elicits one response and not another.[107] Why do most children greet love with love and not hate? Why do they imitate their elders in some respects and reject the example in others? Those questions can have no meaningful answers unless human behavior operates according to an algorithm that dictates which experiences will elicit which responses. That program must ultimately have a genetic or biological basis. And the logic of evolution dictates which genetic programs will be inherited and preserved through succeeding generations.

While we can hardly escape the conclusion that evolutionary forces shaped our behavioral and psychological repertoire, we often cannot go much beyond that generalization. There may be a human nature, but we can't describe it precisely using the science of evolution. Starting from a picture of the evolutionary environment, we can speculate selectively about tendencies or dispositions – the greater male penchant for sexual variety or the female preference for high-status males – that will be passed down from generation to generation. But if those tendencies are muted or not much in evidence in particular settings, we must explain how other evolutionary forces – including those that give rise to culture – can alter or abolish them. Sometimes the move from the constraints of past environments to present behavioral responses will serve us well, while at other times that sequence will run out. Quite simply, too little is known about the past environment to identify which mechanisms operated and how they shaped behavior. In most cases, the knowledge we need is buried with the past. Given these limitations, the resolving power of the law of the law's leverage and like principles is too coarse and will remain so. Our use of these methods to map the bounds of human nature must remain forever incomplete.

Evolutionary speculation too often ignores the important insight that evolution is not a unitary process. Rather, it is a multi-level process that encompasses more than one distinct mechanism. But even if we can sometimes identify the conflicting currents generated by these processes, we can almost never say for sure how the stream will run. Although conceptually distinct from social constructivism and enlightening in some respects, evolutionary concepts do not

[107] Pinker, *The Blank Slate*, *supra* note 1, at p. 202 (discussing incoherence of radical social constructivism).

permit us to determine which dispositions will dominate human interactions or express themselves in particular contexts. A sophisticated and complete understanding of multi-level selection draws attention away from a concept of a human nature with strict limits and defined possibilities towards the project of identifying patterns of human response that can be put to many uses. Even very strong impulses that would appear securely grounded in evolutionary imperatives may ultimately be eclipsed or may express themselves in unexpected ways.[108] Because psychological tendencies never operate in isolation, but always in complex and shifting combinations, it is almost always best to reserve judgment about human or cultural potential. In theory it is possible to discover and describe all antecedent causes and preconditions of everyone's behavior, even in complex social settings. In practice, achieving that goal is a very long way off and may always remain elusive. But the type of analysis that looks to primitive ambient conditions, gauges the past adaptability of behaviors, and then derives their present rigidity, will always fall short of telling us what we need to know.

A rejection of the straightforward move from past adaptability to present non-malleability does not mean there are no limits on social life or that anything is possible in human affairs. Past experience suggests that societies that demand wholesale self-sacrifice will not flourish, and the instability of some social structures – radical socialism and matriarchy come to mind – may ultimately be traceable to something like recalcitrant "human nature." These observations – and the sheer complexity of forces shaping behavior – counsel caution in embarking on utopian schemes and ambitious programs of social engineering. As Steven Pinker states, "since no one is smart enough to predict the behavior of a single human being, let alone millions of them interacting in a society, we should distrust any formula for changing society from the top down."[109] On the other hand, wholesale opposition to reform based on notions of human nature derived from evolutionary models is likewise suspect in light of what we know of evolutionary development. Self-restraint

[108] *See*, e.g., Sarah Hrdy, *Mother Nature* (1999) (challenging the image of the passive nurturing mother in favor of a more socially ambitious view of effective mothering.)

[109] Pinker, *The Blank Slate*, *supra* note 1, at p. 289.

is as much a part of human nature – because potentially just as adaptive in the past – as untrammeled expression of self-regarding desires, and there is no sound basis *in theory* for assuming in any case that human fulfillment requires indulging competitive impulses at the expense of cooperative ones. More importantly, the capacity and urge to create and recreate, with which we are abundantly endowed, extends to the recreation of ourselves. The urge to make ourselves over does not admit of predictable limits.

Although as Robert Wright has stated, our evolved nature means that some behavioral changes "simply can't be made," we have little basis for identifying which changes fall into that category.[110] Evolutionary psychology as we now know it is not powerful enough to declare some ways of life impossible, and the nature of the forces at work may forever disable us from improving upon our analysis. Although other scientific approaches to behavior may eventually yield more, what evolution teaches about human nature must remain speculative, open-ended, provisional, tentative, and subject to revision.

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[110] Robert Wright, "Feminists, Meet Mr. Darwin," *The New Republic* (Nov. 28, 1994), pp. 44–45.