

---

# EVOLUTIONARY PSYCHOLOGY

## *Alternative Approaches*

*edited by*

**Steven J. Scher**

*Eastern Illinois University  
Charleston, Illinois*

**Frederick Rauscher**

*Michigan State University  
East Lansing, Michigan*



**KLUWER ACADEMIC PUBLISHERS**  
Boston / Dordrecht / New York / London

DAVID SLOAN WILSON

## EVOLUTION, MORALITY AND HUMAN POTENTIAL

In the minds of many people, the theory of evolution seems to threaten the fabric of human life. After all, words such as 'bestial' refer to the very worst things that people do to each other. If we are mere beasts, what is to prevent us from behaving in a bestial fashion?

Sophisticated evolutionary biologists tend to smile at the naivete of this question. They know that the real theory of evolution can explain benign behaviors such as cooperation in addition to despicable behaviors such as rape. However, those of us who write books and teach courses on evolution and human behavior know that education is not sufficient to solve the problem. Even the newest research and theory provokes an allergic reaction, no less than Darwin's original theory.

Two major issues impede the acceptance of the theory of evolution: morality and human potential.

**Morality:** The conventional view of morality is founded upon the idea of common welfare. Moral rules such as the Ten Commandments and the golden rule are manifestly adaptive at the level of whole groups. In other words, societies that abide by moral rules are likely to prosper, even in the biological currency of survival and reproduction. The problem with moral conduct is its vulnerability to exploitation within groups. The word "selfish" in everyday language is often reserved for immoral behaviors. When people who think in conventional moral terms encounter the subject of evolution, they enter a strange world in which "for the good of the group" is somehow taboo and "the selfish gene" somehow accounts for everything that evolves. The collision between what they already believe and what they are being asked to accept should be obvious.

**Human potential.** Many people like to think that the future can be much better than the present or the past. Individuals have the potential to be happier and more effective and societies can be changed to eliminate injustices. Social activism of all sorts, including religious inspiration, draws from this kind of optimism. When people who think this way encounter the subject of evolution, they often learn that human nature evolved in the stone age and remains fixed because the tortoise of genetic evolution is no match for the hare of environmental change. Even the advent of agriculture and civilization has not altered the genetic architecture of our minds. Once again, what many people believe and strongly want to believe appears to be denied by the theory of evolution they are being asked to accept.

At this point, I imagine a cacophony of reactions among readers who are already knowledgeable about evolution and human behavior. Some will agree with my characterization and will conclude that the problem resides in our current knowledge of evolution, or at least in the way it is presented. Others will agree with my characterization but will conclude that the problem resides in those learning about evolution, who must remove their rose-colored glasses before they can see the truth. There is among evolutionary biologists a strong tradition that regards human nature as fundamentally immoral and unable to change. My favorite example is a passage from Ghiselin (1974, p. 247, quoted in Sober and Wilson, 1998, p. 5) that ends "scratch an altruist and watch a hypocrite bleed." Still others will disagree with my characterization, regarding their view of evolution to be more compatible with conventional views of morality and human potential.

These differences of opinion reveal that evolutionary biologists themselves disagree on the very same issues that trouble the newcomer to evolution. Indeed, despite very substantial gains in knowledge, the study of human behavior from an evolutionary perspective is in far greater disarray than most outsiders realize. Before we can make progress on the questions of morality and human potential, we must understand the nature of the discord among evolutionary biologists.

#### 1. TRIBAL SCIENCE

The human sciences are famous for fragmenting into a number of isolated disciplines with little intellectual rhyme or reason. Most anthropologists feel little need to study psychology (much less biology!) and *visa versa*. The major disciplines are themselves fragmented into subject areas that are isolated and in some cases downright hostile toward each other. Subject areas emerge and fade as if they are fads like the hula hoop or the miniskirt. To pick an example with which I am familiar, Machiavellianism was a popular subject in social psychology during the 1970's and 1980's. The fad began with a single research group that became interested in studying the kind of personality that Machiavelli represents (Christie and Geis, 1970), "caught on" among other labs, and then simply went out of fashion. Nowadays it is lucky to receive more than a single paragraph in social psychology textbooks. When my colleagues and I decided to study Machiavellianism from an evolutionary perspective (Wilson, Near and Miller 1996, 1998), more than one psychologist warned that we would appear as silly as wearing bell bottoms and granny glasses. They did not seem to realize that we had decided to study Machiavellianism for important theoretical reasons, rather than picking a subject out of a hat. When we started to review the literature, we discovered that it was isolated from closely related subject areas even within the field of social psychology, such as sociopathy (reviewed from an evolutionary perspective by Mealey 1995).

Of course, biology and the physical sciences are also divided into many subject areas. For practical reasons alone, research communities must focus their efforts on topics of manageable size. However, the subject areas of biology and the physical sciences are better integrated than the subject areas of the social sciences.

Biologists do feel a need to study chemistry and physics, in contrast to the anthropologist who does not feel a need to study psychology and biology. Even if individual biologists become too specialized to reach outside their narrow subject areas, the subject areas themselves are so integrated that discrepancies quickly become the focus of attention and repair. A theory of genetic recombination that violates the laws of chemistry or a theory of animal population regulation that violates the laws of evolution would die a quick death.

Part of the glamour of studying human behavior from an evolutionary perspective is the promise of this kind of integration for the human sciences. Tooby and Cosmides (1992) begin their discourse on evolutionary psychology with this theme. More recently, E.O. Wilson (1998) adopted the term *consilience* and devoted a whole book to the subject. One must always be wary of the promotional hype associated with new movements, in science as elsewhere. In this case, however, there is something genuine about the claim that the human sciences are not integrated in their current form and can become much more so in the future. Evolutionary psychologists are impelled to study anthropology, biology and other far-flung branches of knowledge because it is the only way to understand the mind as an organ (or collection of organs) of survival and reproduction that evolved in ancestral environments. Returning to the subject of Machiavellianism, social life in many species is an eternal struggle between cooperation and exploitation. Individual differences in cooperation/exploitation will always be an important subject in evolutionary social psychology and will receive as much space in textbooks 100 years from now as in the present. The emerging evolutionary literature on Machiavellianism, sociopathy, and related subjects provides a good example of how evolutionary thinking can reorganize and revitalize specific subjects with a long history of study in the human sciences (in addition to the above cited references, see Byrne and Whiten 1988, Whiten and Byrne 1997).

Given the genuine potential for integration, it is disturbing that the study of human behavior from an evolutionary perspective is in the process of fragmenting into isolated and even hostile subject areas, just like the rest of the human sciences. Of special concern is a school of thought that calls itself evolutionary psychology, which earnestly tries to achieve the kind of integration that I have outlined above. Nevertheless, despite important insights that I will acknowledge below, it has arrived at a narrow conception of human nature that is not even integrated with the facts of evolutionary biology, much less other fields of knowledge. In the process, it has alienated a large number of evolutionary biologists; not just famous critics such as Stephen Jay Gould and Richard Lewontin, but dozens of others who themselves are working to understand the psychology of humans and other species from an evolutionary perspective. As one example, a recent edited volume entitled *Evolution and Cognition* (Heyes and Ludwig, 2000) begins with the following statement (Heyes, 2000 p.3):

When I first encountered the term 'evolutionary psychology', I thought it referred to the study of how mind and behavior have evolved. But I was mistaken. In the last decade, evolutionary psychology has come to refer exclusively to research on human mentality

and behavior, motivated by a very specific nativist-adaptationist interpretation of how evolution operates.

It is not my purpose to hurl insults at narrow evolutionary psychology<sup>1</sup>, thereby contributing to the fragmentation process. I like much of the work that has emerged from this school and I am willing to praise it in some contexts as strongly as I criticize it in others. Nevertheless, the reason that biology and the physical sciences are integrated is because discrepancies immediately become the focus of attention and repair. It is in this spirit that we must examine narrow evolutionary psychology for discrepancies with wider bodies of knowledge.

With sufficient care, it is possible to catch narrow evolutionary psychology in the act of jettisoning large portions of evolutionary theory to reach its specific conclusions. Consider a world-wide web article entitled "Evolutionary Psychology: A Primer" by Cosmides and Tooby (1997). It begins (p. 2) by quoting Einstein's comment that "it is the theory that decides what we can observe" to emphasize the novelty of their perspective against the background of the so-called standard social science model (SSSM). If we take Einstein's comment seriously, we might conclude that human behavior is highly contingent upon what people believe, which in turn is highly variable among cultures. However, this is a road not taken as far as narrow evolutionary psychology is concerned and in fact is more typical of the SSSM that is being rejected.

Later (p. 7), we are invited to think of the individual mind as like the federal government, with consciousness as the president of the United States. Just as the President makes a few executive decisions while remaining unaware of most of the vast machinery of the federal government, the conscious mind makes a few executive decisions while remaining unaware of most of the vast adaptive machinery of the individual mind. If we take this metaphor seriously, we might conclude that human society, including an enormous modern society such as the United States of America, is organized adaptively and can even be compared to a single mind. Some evolutionary biologists do think along these lines but it is definitely a road not taken as far as narrow evolutionary psychology is concerned!

Further in Cosmides & Tooby's 'primer' (p. 13), we are told that two of the most important evolutionary principles accounting for the characteristics of animals are common descent and adaptation driven by natural selection. The former characterizes what Cosmides & Tooby call the 'phylogenetic approach,' while the latter characterizes the 'adaptationist approach'. Next, we are told (p. 14) that "evolutionary psychology can be thought of as the application of adaptationist logic

---

<sup>1</sup> EDITOR'S NOTE: In this book, the term 'narrow evolutionary psychology' signifies the approach to evolutionary psychology developed by Cosmides, Tooby, Buss, et al. This terminology was independently arrived at by the author of the present chapter and by the editors. The term was chosen not to imply that narrow evolutionary psychology takes an inappropriately narrow point of view, but merely to suggest that the approach adopts a narrower range of assumptions than 'broad evolutionary psychology' (or, just 'evolutionary psychology'). This latter term signifies evolutionary psychology generally, practiced with any of a very broad range of assumptions possible within the general framework of evolutionary approaches to psychology. For more detail on this terminology, see the editor's introduction, p 1

to the study of the architecture of the human mind.” Shockingly, and by the authors’ own admission, narrow evolutionary psychology is defined to exclude one of the most important evolutionary principles accounting for the characteristics of animals!

Some adaptations evolve to fixation while others are maintained in the population as genetic polymorphisms. Surely, the science of evolutionary psychology should acknowledge the possibility of genetic polymorphisms that influence mind and behavior. Not according to Cosmides and Tooby (p. 17):

In fact, evolutionary psychology and behavior genetics are animated by two radically different questions:

1. What is the universal, evolved architecture that we all share by virtue of being humans (evolutionary psychology).
2. Given a large population of people in a specific environment, to what extent can differences between these people be accounted for by differences in their genes (behavior genetics).

Once again, by the authors’ own admission, a subject as evolutionary as behavior genetics is excluded from the definition of evolutionary psychology.

Human behavior is determined largely by processes of social transmission that we refer to broadly as culture. Evolutionary psychology must offer a predictive theory of culture to itself count as a comprehensive theory of human nature. Unfortunately, although Cosmides and Tooby use the word “culture” several times while describing the SSSM that they reject, they manage to describe their own framework without using the word ‘culture’ once. In other papers they make a distinction between “evoked culture”, which is an expression of individual phenotypic plasticity, and “transmitted culture”, which is actually passed from one person to another. This distinction is important because most people assume that behavioral differences among groups of people are caused by transmitted culture without considering the possibility of evoked culture. Remember that I agree with certain elements of narrow evolutionary psychology and I am happy to give credit where it is due. Even after we acknowledge the importance of evoked culture, however, we are left with the task of explaining transmitted culture from an evolutionary perspective. It is here that narrow evolutionary psychology fails deeply. Other highly qualified scientists are studying transmitted culture from an evolutionary perspective, but for narrow evolutionary psychology it is a road not taken. As one symptom of this neglect, Cosmides and Tooby (p. 19) refer to reading as a byproduct of human cognition because it is a recent cultural invention that cannot be explained as a genetically evolved adaptation. I will return to this peculiar interpretation of reading and its broader implications below.

I have both praised and criticized narrow evolutionary psychology in more detail elsewhere (Wilson 1993, 1994, 1999b). As an evolutionary biologist with a strong interest in human behavior, it is clear to me that narrow evolutionary psychology offers many insights but is in danger of interfering with the process of integration when it presents itself as the one and only theory of human nature from an evolutionary perspective. Labels are important and the term “evolutionary psychology” should be reserved for “the study of psychology from an evolutionary

perspective”, broadly construed, not a particular narrow school of thought. I am an evolutionary psychologist even when I disagree with Cosmides and Tooby, Buss (1999) and others at a fundamental level. This volume and others such as Heyes and Huber (2000) are performing an important service by restoring the term evolutionary psychology to its proper broad meaning.

## 2. BEYOND PLATITUDES

While remaining broad, it is also important to avoid meaningless platitudes such as “every trait reflects the role of both genes and environment” A trait such as eye color is importantly different than a trait such as table manners. If we say that both reflect a gene-environment interaction, we have obscured a distinction that needs to be made elsewhere to have an explanatory theory. There is a constructive aspect to a narrow school of thought such as narrow evolutionary psychology. By making so many specific assumptions, it becomes a nimble theoretical tool for making specific predictions. The gamble of making the assumptions pays off when the predictions are confirmed but there must be a willingness to go back to the drawing board when the predictions fail. Those who object to narrow evolutionary psychology must provide theoretical tools of their own with specific predictions that are equally consistent with evolutionary theory and other branches of knowledge. With these broad considerations in mind, let us now return to the troublesome issues of morality and human potential.

## 3. MORALITY

I stated earlier that moral rules such as the ten commandments are manifestly adaptive at the group level and pose a problem for evolutionary theory only because of their disadvantage relative to immoral behaviors within groups. Darwin proposed the concept of group selection as a solution to this problem. Very simply, immoral individuals may best moral individuals within groups, but moral groups best immoral groups. A process of natural selection operating at the group level allows the interpretation of morality as something that exists for the good of the group to be accepted at close to face value.

The widespread rejection of group selection in the 1960's turned morality into a paradox. Alexander (1987) claimed that folk psychology is completely wrong on the subject of morality, which must be explained without recourse to altruism and only on the basis of genetic self-interest. Williams (1996; see also Paradis and Williams 1989) declared mother nature a wicked old witch and portrayed morality as just about the only thing that cannot be explained by evolution. Dawkins' (1976) concept of memes has been used to portray moral systems such as religions as downright parasitic on their human hosts (Blackmore 1999). Narrow evolutionary psychology tends to ignore the subject of morality altogether; the word doesn't even appear in Buss's (1999) undergraduate textbook, which is also a comprehensive review of the narrow evolutionary psychology literature. Is there any reason to

wonder why those who value the standard view of morality are as repelled by evolutionary theory as their counterparts in Darwin's day?

I certainly don't mean to imply that evolutionary biologists who reject the standard view of morality are bad people. To pick one example, Alexander (1987) is as passionate as any preacher about the need to solve the same range of problems that concern all moralists. Furthermore, it is possible that folk psychology is completely wrong on the subject of morality and that resisting the evolutionary truth is just a sign of intellectual weakness. However, it is also possible that Einstein's comment "it is the theory that decides what we can observe" applies to evolutionary biologists in addition to other folk. As we have seen, narrow evolutionary psychology and other narrow schools of evolutionary thought make a large number of questionable assumptions on their way to their specific conclusions. Before we reject an explanation of morality based on "the good of the group", we need to carefully check the assumptions upon which the rejection is based.

Despite earlier skepticism, multilevel selection theory has rejoined mainstream evolutionary biology. In an article describing recent developments (Dicks 2000), theoretical biologist Joel Peck stated "There is no doubt that we were way too hasty in trashing group selection. The theoretical models of the 60's and 70's were very oversimplified and should be taken with a pinch of salt." Even early critics such as John Maynard Smith (1998, Maynard Smith & Szathmary, 1995) have warmed to the possibility of group selection as a strong force in human evolution.

This newfound plausibility can be attributed in part to a new generation of theoretical models that dovetail nicely with what anthropologists know about hunter-gatherer societies. Earlier group selection models made a simplifying assumption, common to many evolutionary models, that behaviors are coded directly by genes. For example, models of altruism typically assume two alleles at a single locus that code for altruism and selfishness respectively. This assumption makes behavioral variation within and among groups directly proportional to genetic variation. The only way for a group to be behaviorally uniform is for it to be genetically uniform. If groups are composed of genetically unrelated individuals, most of the genetic (and behavioral) variation exists within groups rather than between groups. This is the reasoning that made genetic relatedness appear so essential for the evolution of altruism and made group selection appear unlikely in the case of our own species.

Genes certainly do influence behavior but the connection is usually indirect, especially in the case of our own species. In particular, human groups can be behaviorally uniform even when they are genetically diverse. In a random sample of world cultures, Sober and Wilson (1998 Ch. 5) encountered many descriptions such as the following for the Mbuti (Turnbull 1965, p 118): "Even the most insignificant and routine action in the daily life of the family is potentially a major concern to the band as a whole...It is important that there should be a pattern of behavior that is generally accepted, and which covers every conceivable activity."

This kind of behavioral uniformity within groups (and differences among groups) can be attributed, not to shared genes, but to shared social norms — another



subject that receives scant attention within narrow evolutionary psychology (Wilson 1998). Before we can even begin to assess the importance of group selection in human evolution, we must abandon the simplifying assumption of strict genetic determinism and model the evolution of social norms and other factors known to influence the partitioning of behavioral variation within and among human groups. Genes still have a role to play in these models, but their effect on behavior is indirect rather than direct. Every multilevel selection model that has been built along these lines has indicated a strong role for group selection in human evolution (e.g., Boyd and Richerson 1985, Wilson and Kniffin 1999).

In the same vein, anthropologists such as Boehm (1993, 1999) and Knauff (1994) have described hunter-gatherer societies as strongly egalitarian but not in the romantic form imagined by Rousseau and others. Hunter-gatherers have roughly the same proclivity to dominate their fellows as nonhuman primate species and human members of larger societies. However, the balance of power is such that no single individual or coalition can oppose the majority. The result is a guarded egalitarianism that strongly enforces social norms agreed upon by consensus but otherwise resists the power of any individual to tell any other individual what to do. According to Boehm, human social groups have been moral communities for much of their evolutionary history, with all the behavioral prescriptions, social monitoring and punishment of deviance implied by the word moral. This time span is sufficient for genetic evolution to have shaped the psychological traits associated with moral systems, which in turn shape the more rapid process of cultural evolution that determines the specific content of social norms. It is toward this conception of gene-culture evolution that we must turn to ascertain the importance of group selection in human evolution.

This view of human evolution falls within the orbit of Darwinian theory at least as firmly as narrow evolutionary psychology and other schools of thought. Yet, true to Einstein's comment, it radically changes the way we view morality from an evolutionary perspective. The phrase "for the good of the group" is as acceptable for describing the outcome of group-level selection as the phrase "for the good of the individual" is acceptable for describing the outcome of individual-level selection. Moral systems in particular can be explained in terms of their group-level benefits, exactly as Darwin proposed. Yet, explaining morality as a product of group selection does not require us to don rose-colored glasses. The morality that evolves by group selection operates within groups and often is directed against other groups in ways that are highly immoral from a broader perspective. The mechanisms that enforce morality within groups are often highly coercive. There is room for explaining features of moral systems and even entire moral systems that are dysfunctional at the group level, since evolution always involves the production of failures in addition to successes. Any successful theory of morality must explain the complexity that is inherent in the subject. Multilevel selection theory makes a good start at explaining the complexity rather than painting a naïve portrait of universal niceness.

Earlier I said that biology and the physical sciences are integrated because discrepancies immediately become the focus of attention and repair. The yawning

discrepancies among the various evolutionary theories of morality provide a poor model of integration. They cannot all be right so work is required to weed out the faulty assumptions until a more consistent picture emerges. The assumption of narrow genetic determinism (genes coding directly for behaviors) clearly requires attention. Most evolutionary biologists would not try to defend this assumption but their intuition rests upon it more than they know. The assumption that a selfish gene explanation constitutes an argument against group selection also requires attention. By now even Dawkins (1982) and Williams (1992) have acknowledged that this assumption confuses the concept of genes as replicators with the question of whether groups qualify as vehicles of selection. This confusion allows Alexander (1987) to marginalize group selection in his own mind while stressing the paramount importance of between-group competition in human evolution (see Wilson 1999a for a detailed analysis). Elsewhere (Wilson 2000) I have jestingly described the wholesale rejection of group selection as like someone who faces directly away from an object, bends over, looks between his legs, and claims to see a new object. Evolutionary biologists must clean up their own act before they can be taken seriously outside their own field on the subject of morality.

I began this essay by taking the perspective of a newcomer to evolutionary theory who feels threatened by its implications. Imagine such a person learning that individuals should be impelled to maximize their inclusive fitness, even when this involves great harm to other individuals. The "should" in this statement is not a moral injunction, of course, but merely a factual prediction. However, it is not counterbalanced by any other "shoulds" or even a discussion of why the word "should" should ever acquire a moral dimension. The result is an allergic reaction that I have observed many times in students encountering evolution for the first time. Now imagine such a student learning that behaviors can be evolutionarily successful in two ways--by increasing the fitness of individuals relative to others within their group, or by increasing the fitness of groups relative to other groups. Humans are psychologically adapted to employ both pathways with great flexibility. In addition to individual flexibility, it is also reasonable to expect important individual differences that reflect either genetic differences or developmental trajectories that are flexible early in life and later become fixed. Moral systems are biologically and culturally evolved adaptations that are designed to limit within-group selfishness and enhance the fitness of the group. Moral systems include psychological processes that are genetically evolved but they also include a strong cultural component that define the actual behaviors that count as moral or immoral in a particular time and place. Building and abiding by moral systems can be evolutionarily successful, just as subverting moral systems can be evolutionarily successful. That is why morality is a subject of such passion and ambivalence. Finally, what appears highly moral within a given social group can appear highly immoral from other perspectives. Forms of morality that transcend group boundaries remain highly problematical from an evolutionary perspective, as they are in real life.

I submit that the second account of morality from an evolutionary perspective is both closer to the truth and far less threatening to my imagined newcomer without requiring the donning of rose-colored glasses. Katz (2000) provides a useful review of the full spectrum of views on morality from an evolutionary perspective.

#### 4. HUMAN POTENTIAL

The Oxford English Dictionary defines “potential” as “possible, as opposed to actual.” Human potential means the capacity for change, at the level of both individuals and societies. Ever since Darwin, evolutionary theory has been interpreted as a denial of human potential. After all, how is change possible when our behaviors are programmed by our genes? Despite the naivete of this question and the misconceptions upon which it often rests, simple education does not make it go away.

Evolutionary theory can explain a capacity for change in humans or any other species in two different ways. The first is phenotypic plasticity, which leads to what Cosmides and Tooby call evoked culture. If a species experiences environments A and B repeatedly throughout its evolutionary history, it may evolve the capacity to behave appropriately in either environment. This is a form of potential but one that is limited to the range of environments that existed in the distant past. There is no reason to expect individuals to behave appropriately in a truly novel environment C.

To give credit where it is due, narrow evolutionary psychology has done an excellent job of stressing the importance of this kind of human potential. My favorite example is Wilson and Daly's (1997) study of risk-taking in men, and age of first reproduction in women, in the city of Chicago. Unlike most cities, whose neighborhoods are subject to a rapid turnover of residents, Chicago neighborhoods tend to be demographically stable. They also vary greatly in their quality of life, which is reflected in life expectancies that range from the mid-fifties for the worst neighborhoods to the mid-seventies for the best neighborhoods. Daly and Wilson showed that violent risk-taking in men and age of first reproduction in women correlated very strongly with life-expectancy. Of course, both of these are perceived as social problems. Politicians talk endlessly about reducing violence and teen-age pregnancies, especially in our inner cities. However, when women from the worst neighborhoods were asked why they had children so young, they gave an answer that can only invoke sympathy: They said that they wanted their mothers to see their grand-children and in turn wanted to see their own grandchildren. They used the term “weathering” to refer to the aging process that they observed in themselves and their loved ones all around them. If everyone around you was weathering and dying at an average age of 55, wouldn't *you* want to start having children early (as a female) or take great risks to obtain the status and resources required to reproduce (as a male)?

To rephrase this question as an evolutionary hypothesis, suppose that life history traits such as age of first reproduction are phenotypically plastic. Many fish species live in lakes and streams that might or might not include predators. When predators are absent, they can expect to live a long and happy life. When predators are present, every day might be their last. Few evolutionary biologists would be surprised to discover the ability of a fish to assess the presence of predators in its environment and modify its growth and age of first reproduction accordingly. Wilson and Daly are merely advancing the same kind of hypothesis and providing the same kind of evidence for humans. They propose that low life expectancies in one's environment serve as cues to evoke risk-taking in males and early reproduction in females.

Phenotypic plasticity is a form of genetic determinism that specifies a set of if-then rules rather than a single behavior. It leads to a position that could be called evolutionary environmentalism, which, in terms of social change, is the polar opposite of the standard portrayal of genetic determinism. If a desired behavior is within the repertoire of the if-then rules, the easiest way to produce the behavior is to provide the environment that evokes the behavior (hence the term evoked culture). For example, the easiest way to solve the problem of teen-age pregnancy is to improve life-expectancy in the neighborhood. This is the kind of solution that a self-styled critic of genetic determinism might propose. In general, narrow evolutionary psychology's emphasis on the genetic determination of if-then rules should not be confused with the fixed genetic determination of single behaviors.

The second way that evolutionary theory can explain a capacity for change in humans is by processes that themselves are evolutionary. After all, evolution is all about change, making it ironic that evolutionary theory so often leads to the appearance of incapacity for change in humans. The only way to reach the conclusion that humans cannot change is by focusing exclusively on genetic evolution as a process that is hopelessly slow relative to the time scale of environmental change. Narrow evolutionary psychology is deeply committed to this position but many other possibilities are firmly within the orbit of Darwinian theory.

In the first place, genetic evolution is not always a slow process. Selection pressures are often so great and phenotypic variation is often sufficiently heritable to produce significant genetic change in a single generation and certainly in ten generations. The discovery that natural selection is a process strong enough to directly observe is one of the most important developments in modern evolutionary biology, as eloquently described by Weiner (1994) in his Pulitzer prize-winning book *The Beak of the Finch*.

Human populations are not exempt from strong selective pressures and most human traits appear to have a strong heritable component. The concept of gene-culture coevolution, in which a cultural invention such as the spear selects for genetic traits such as limb proportions and musculature best adapted for throwing spears, has a long history of study (Brues 1959). Some of the hypotheses are speculative but others have been documented in impressive detail, such as lactose tolerance as a genetic adaptation to milk as an adult resource (reviewed by Durham

1991). Proponents of narrow evolutionary psychology such as Cosmides and Tooby engage in elaborate verbal stage-setting to minimize the possibility and importance of rapid genetic evolution in humans (see Wilson 1994 for a detailed analysis), as the exclusion of behavior genetics from their definition of evolutionary psychology attests.

More importantly, there is more to evolution than genetic evolution. Any process that includes blind variation and selective retention counts as evolutionary, as the late social psychologist and evolutionary epistemologist Donald Campbell (1960, 1974, 1994) never tired of pointing out. Learning, development, culture, and even important aspects of brain development may all qualify as rapid evolutionary processes, capable of adapting to modern environments that were never encountered in our ancestral past. Nevertheless, all of these open-ended processes are marginalized within narrow evolutionary psychology along with rapid genetic evolution. Learning, like culture, is discussed far more in the negative account of the SSSM than the positive account of narrow evolutionary psychology. The brain is envisioned as a collection of pre-evolved modules adapted to solve the most important problems encountered in ancestral environments, which excludes the possibility of open-ended neurobiological process (Deacon 1998). Development is envisioned as the mere switching on or off of innate modules during various points in the life cycle. And culture, as we have already seen, is reduced to an expression of individual phenotypic plasticity. Narrow evolutionary psychology marginalizes all open-ended evolutionary processes, making adaptation to ancestral environments (however flexible) the only game in town. Just as Einstein said, it is truly the theory that decides what can be observed.

Once again, narrow evolutionary psychology can be roundly criticized for some of its assumptions without being rejected altogether. It is the middle ground that we are trying to achieve, not one set of provincial assumptions over another. The concept of modularity that is the hallmark of narrow evolutionary psychology has much to recommend it. Some basic features of human psychology are universally shared and can be regarded as fixed for all intents and purposes. However, we can acknowledge and make use of these insights without agreeing with the long chain of inferences that cause proponents of narrow evolutionary psychology to reach their specific conclusions. The immune system provides a good example of how innateness and modularity can facilitate rather than prevent an open-ended evolutionary process. If our immune systems can adapt our bodies to truly novel disease environments, then why can't similar systems adapt our minds and societies to truly novel environments?

The concept of moral systems outlined above provides an especially plausible scenario for cultural evolution as an open-ended evolutionary process. The psychological mechanisms that establish and enforce social norms may include genetically innate components but the specific contents of the norms are free to vary. Groups that are genetically identical nevertheless can differ dramatically in the behaviors that are actually practiced and transmitted from one person to another. Evolution is about heritable phenotypic variation, not about genes. Even heritability

is defined as a phenotypic correlation between parents and offspring, which may or may not involve genetic variation as a mechanism. Social norms established and maintained by moral systems provide ample phenotypic variation and heritability for rapid evolution to take place during the course of human history, adapting human groups to their current environments.

The work of Richard Nisbett and his collaborators provides a good example of how cultural evolution can be integrated with the valid components of narrow evolutionary psychology. During much of his career Nisbett was a distinguished social psychologist who did not attempt to incorporate evolution into his framework (e.g., Nisbett and Ross 1980). Later, an interest in cultural differences in violence between regions of the United States (Nisbett and Cohen 1996) brought him into contact with evolutionary psychology, especially the work of Daly and Wilson (1988). Nevertheless, his evolutionary perspective has not prevented him from also appreciating cultural differences so fundamental that western psychologists are in danger of mistaking culturally specific aspects of their mentality for universal human nature (Fiske et al. 1998; Nisbett et al., 2001).

Group size provides one example of a culturally evolved adaptation that falls far outside the range of responses to the ancestral environment. There is little doubt that we are psychologically adapted as a species to interact in small face-to-face groups of no more than a few hundred individuals (Dunbar 1996). Despite this genetic constraint, functionally organized human groups have become larger and larger over the course of human history. Group size almost certainly is adaptive in between-group competition, as long as larger groups have the internal organization to act in a coordinated fashion. However, getting large numbers of people to do the right thing at the right time and preventing them from undermining the group for their own gain is no easy task. The devices that have evolved to accomplish this task are cultural in nature (Wilson 2002). They use elements of our ancestrally evolved innate psychology as building blocks, which are used to build new adaptive structures that solve problems that never existed in the ancestral past. This has always been the way of evolution, which Jacob (1977) aptly described as a tinkerer that builds new structures out of old parts.

Reading provides another example of a cultural innovation that has changed the course of human evolution. Prior to the written word, virtually all of the information in a culture had to be contained within human heads (although there is an interesting sense in which other cultural artifacts can be regarded as externally stored information; Donald 1991; Hutchins 1995). Much of human thought may have been structured around this constraint. The advent of writing may have initiated a cognitive revolution by relaxing the memory constraint, freeing the mind to engage in other kinds of cognitive tasks. People and societies did not need to evolve genetically to capitalize on this cultural innovation. Given the open-ended nature of brain development, it may even have resulted in neurobiological changes. According to Ong (1982), the written word has changed the way we think so profoundly that people from preliterate cultures strike us as mentally retarded. Just as the printing press changed the course of human history by making printed information widely

available, computers and the internet are ushering a new revolution. When the words “history” and “revolution” are understood in more detail, “evolution” will prove to be the better word. For Cosmides and Tooby to call reading a byproduct because it does not represent a genetically evolved adaptation merely reveals how much can be rendered invisible by a narrow school of thought.

## 5. CONCLUSION

I began this essay by taking the perspective of a newcomer to evolution who feels threatened by its implications for morality and human potential. Evolutionary biologists must do more than smile indulgently at such a response and regard themselves as superior for being able to grasp uncomfortable truths. A theory that cannot provide a coherent account of human morality and the potential of individuals and societies to adapt to their current environments has only itself to blame for widespread skepticism and rejection. In addition, evolutionary biologists are failing at their own goal of extending the kind of integration that marks the physical and biological sciences to the human sciences. The study of humans from an evolutionary perspective must become internally integrated before it can provide a model for the rest of the human sciences.

*Binghamton University*

## 6. REFERENCES

- Alexander, R. D. (1987). *The Biology of Moral Systems*. New York: Aldine de Gruyter.
- Blackmore, S. (1999). *The Meme Machine*. Oxford, UK: Oxford University Press.
- Boehm, C. (1993). Egalitarian society and reverse dominance hierarchy. *Current Anthropology*, 34, 227-254.
- Boehm, C. (1999). *Hierarchy in the Forest*. Cambridge, MA: Harvard University Press.
- Boyd, R., & Richerson, P. J. (1985). *Culture and the Evolutionary Process*. Chicago: University of Chicago Press.
- Brues, A.M. (1959). The spearman and the archer. *American Anthropologist*, 61, 458-469.
- Buss, D. M. (1999). *Evolutionary Psychology*. Boston: Allyn and Bacon.
- Byrne, R. W., & Whiten, A. (Ed.). (1988). *Machiavellian Intelligence: The Evolution of Intellect in Monkeys Apes and Humans*. Oxford, Eng.: Clarendon Press.
- Campbell, D. T. (1974). Evolutionary epistemology. In P. A. Schilpp (Eds.), *The Philosophy of Karl Popper* (pp. 413-63). LaSalle, ILL: Open court publishing.
- Campbell, D. T. (1994). How individual and face-to-face-group selection undermine firm selection in organizational evolution. In J. A. C. Baum & J. V. Singh (Eds.), *Evolutionary Dynamics of Organizations* (pp. 23-38). New York: Oxford University Press.
- Campbell, T. D. (1960). Blind variation and selective retention in creative thought and other knowledge processes. *Psychological Review*, 67, 380-400.
- Christie, R., & Geis, F. (Ed.). (1970a). *Studies in Machiavellianism*. New York: Academic Press.
- Cosmides, L., & J., T. (1997). *Evolutionary psychology: A primer*. [Online] Available at: <http://www.psych.ucsb.edu/research/cep/primer.html>.
- Dawkins, R. (1976). *The Selfish Gene* (1st ed.). Oxford, Eng.: Oxford University Press.
- Dawkins, R. (1982). *The Extended Phenotype*. Oxford, Eng.: Oxford University Press.
- Daly, M. & Wilson, M. (1988). *Homicide*. New York: Aldine de Gruyter.
- Deacon, T. W. (1998). *The Symbolic Species*. New York: Norton.
- Dicks, L. (2000, July 8). All for one! *New Scientist*, 30-35.
- Donald, M. (1991). *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*. Cambridge, MA: Harvard University Press.
- Dunbar, R. I. M. (1996). *Grooming, Gossip and the Evolution of Language*. Cambridge, Mass: Harvard University Press.
- Durham, W. H. (1991). *Coevolution: Genes, Culture and Human Diversity*. Stanford, CA: Stanford University Press.
- Fiske, A. P., Kitayama, S., Markus, H. R., & Nisbett, R. E. (1998). The cultural matrix of social psychology. In D. T. Gilbert, S. T. Fiske, & G. Linzey (Eds.), *Handbook of social psychology* (pp. 915-981). Boston: McGraw-Hill.
- Ghiselin, M. T. (1974). *The economy of nature and the evolution of sex*. Berkeley: University of California Press.
- Heyes, C. (2000). Evolutionary psychology in the round. In C. Heyes & L. Huber (Eds.), *The Evolution of Cognition* (pp. 3-22). Cambridge, MA: MIT Press.
- Heyes, C., & Huber, L. (Ed.). (2000). *The Evolution of Cognition*. Cambridge, MA: MIT Press.
- Hutchins, E. (1995). *Cognition in the Wild*. Cambridge, Mass: MIT press.
- Jacob, F. (1977). Evolution and tinkering. *Science*, 196, 1161-1166.
- Katz, L. D. (Ed.). (2000). *Evolutionary Origins of Morality: Cross-disciplinary Perspectives*. New York: Academic Imprint.
- Knauff, B. M. (1994). Culture and cooperation in human evolution. In L. E. Sponsel & T. Gregor (Eds.), *The Anthropology of Peace and Nonviolence* (pp. 37-67). Boulder, CO: Lynne Rienner.
- Maynard Smith, J. (1998). The origin of altruism. *Nature*, 393, 639-640.
- Maynard Smith, J., & Szathmari, E. (1995). *The Major Transitions of Life*. New York: W.H. Freeman.
- Mealey, L. (1995). The sociobiology of sociopathy. *Behavioral and Brain Sciences*, 18, 523-599.
- Nisbett, R., & Ross, L. (1980). *Human Inference: Strategies and Shortcomings of Social Judgement*. Englewood Cliffs, N.J.: Prentiss Hall.



- Nisbett, R. E., & Cohen, D. (1996). *Culture of Honor*. New York: Westview Press.
- Nisbett, R. E., Peng, K., Choi, I., & Norenzayan, A. (2001). Culture and systems of thought: Holistic vs. analytic cognition. *Psychological Review*, 108, 291-310.
- Ong, W. J. (1982). *Orality and Literacy*. New York: Routledge.
- Paradis, J., & Williams, G. C. (Ed.). (1989). *Evolution and Ethics*. Princeton, NJ: Princeton University Press.
- Sober, E., & Wilson, D. S. (1998). *Unto Others: The Evolution and Psychology of Unselfish Behavior*. Cambridge, Mass.: Harvard University Press.
- Tooby, J., & Cosmides, L. (1992). The psychological foundations of culture. In J. H. Barkow, L. Cosmides, & J. Tooby (Eds.), *The Adapted Mind: Evolutionary Psychology and the Generation of Culture* (pp. 19-136). Oxford, Eng.: Oxford University Press.
- Turnbull, C. M. (1965). *The Mbuti Pygmies: An Ethnographic Survey*. New York: American Museum of Natural History.
- Weiner, J. (1994). *The Beak of the Finch: A Story of Evolution in our Time*. New York: Knopf.
- Whiten, A., & Byrne, R. W. (Ed.). (1997). *Machiavellian Intelligence II: Evaluations and Extensions*. Cambridge, Eng.: Cambridge University Press.
- Williams, G. C. (1992). *Natural Selection: Domains, Levels and Challenges*. Oxford, Eng.: Oxford University Press.
- Williams, G. C. (1996). *Plan and Purpose in Nature*. London: Weidenfeld and Nicolson.
- Wilson, D. S. (1993). Review of *The Adapted Mind* (J.H. Barkow, L. Cosmides, and J. Tooby, eds., Oxford University Press). *Quarterly Review of Biology*, 68, 621-623.
- Wilson, D. S. (1994). Adaptive genetic variation and human evolutionary psychology. *Ethology and Sociobiology*, 15, 219-235.
- Wilson, D. S. (1998). Evolutionary game theory and human behavior. In L. A. Dugatkin & H. K. Reeve (Eds.), *Game Theory and Animal Behavior* (pp. 261-282). Oxford, Eng.: Oxford University Press.
- Wilson, D. S. (1999a). A critique of R.D. Alexander's views on group selection. *Biology and Philosophy*, 14, 431-449.
- Wilson, D. S. (1999b). Tasty slice--but where is the rest of the pie? (review of *Evolutionary Psychology*, by David Buss). *Evolution and Human Behavior*, 20, 279-289.
- Wilson, D. S. (2000). Nonzero and nonsense: Group Selection, nonzerosumness, and the human Gaia hypothesis. *Skeptic*, 8, 84-89.
- Wilson, D.S. (2002). *Darwin's Cathedral: Evolution, Religion, and the Nature of Society*. Chicago: University of Chicago Press.
- Wilson, D. S., & Kniffin, K. M. (1999). Multilevel selection and the social transmission of behavior. *Human Nature*, 10, 291-310.
- Wilson, D. S., Near, D., & Miller, R. R. (1996). Machiavellianism: A Synthesis of the Evolutionary and Psychological Literatures. *Psychological Bulletin*, 119, 285-299.
- Wilson, D. S., Near, D. C., & Miller, R. R. (1998). Individual differences in Machiavellianism as a mix of cooperative and exploitative strategies. *Evolution and Human Behavior*, 19, 203-212.
- Wilson, E. O. (1998). *Consilience*. New York: Knopf.
- Wilson, M., & Daly, M. (1997). Life expectancy, economic inequality, homicide, and reproductive timing in Chicago neighborhoods. *British Medical Journal*, 314, 1271-1274.