

Adapting Minds and Evolutionary Psychology*

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The human brain is the result of a long evolutionary trajectory. Using this fact to understand the human brain's particular capacities and limitations, evolutionary psychology has provided many key insights into human behavior. First, since the human brain is extremely costly to nurture and maintain, its general contribution to human fitness must be high, and hence the brain must be an adaptation to the particular conditions under which our species evolved. Therefore, understanding these conditions may shed strong light on human psychology. Second, the human brain's information processing capacities are likely to be closely associated with the particular adaptive needs of our species, rather than being a simple, general purpose information processor. Thus, rather than being infinitely malleable, humans are predisposed to behave in certain ways in the sense that under a very broad range of environmental conditions some behaviors will be virtually universally exhibited and others will be extremely rare, while behaviors to which we are not predisposed will be exhibited either not at all, or only in a very restricted set of environmental circumstances. Third, since biological fitness is a scalar variable, and since the brain's characteristics are selected for maximizing fitness, human decision making will, at least approximately, exhibit choice transitivity, which decision theory tells us implies that agents can be modeled as maximizing a preference function subject to constraints. This is called the *rational actor* model in economics and decision theory, but a more apt term is the *beliefs, preferences, and constraints* model (BPC). In short, evolutionary psychology suggests that a consideration of our evolutionary history is extremely powerful in generating plausible hypotheses concerning human psychology that can be tested using the standard tools of experimental research. More generally, and following a famous dictum of the great Russian geneticist Theodore Dobzhansky, the human mind makes sense only in the light of evolution.

The central commitment of evolutionary psychology is that the human mind is an adaptation that can be most effectively modeled by a careful study of the

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place of the human brain in the evolution of animal intelligence, by virtue of its similarities and differences with the minds of non-human animals. The fitness of an organism depends on how effectively it make choices in an uncertain and varying environment. Effective choice must be a function of the organism's state of knowledge, which consists of the information supplied by the sensory inputs that monitor the organism's internal states and its external environment. In three separate groups of animals, the craniates, arthropods and cephalopods, a central nervous system with a brain evolved. The phylogenetic tree of vertebrates exhibits increasing complexity through time, and increasing metabolic and morphological costs of maintaining brain activity. The key commitment of evolutionary psychology thus includes the fact that *the brain evolved because larger and more complex brains, despite their costs, are adaptations that enhanced the fitness of their carriers.*

The first implication of this commitment is that, just as there is a "sparrow nature" and a "rat nature," each molded by the evolutionary history of the species, the content of which can be revealed by the study of these animals in a variety of natural and artificial settings, so there is a *human nature*, the product of our species' long evolutionary trajectory, which can be revealed in exactly the same way. Of course, because of the cultural diversity of our species, and because of the powerful plasticity of human behavior, human nature is likely to be considerably more complex than that of sparrows or rats, and identifying human nature from the multitude of its social instantiations across many types of prehistoric, historical, and contemporary societies is a formidable task. But, evolutionary psychology holds that the search is worth the candle. While there are many other valid and useful research agendas relevant to understanding human behavior, all are likely to founder unless informed by the facts of biological evolution.

Dobzhansky's actual words were "Nothing in biology makes sense except in the light of evolution" (1973). The key words here are "makes sense." Evolutionary theory is not a substitute for careful analytical model building, data collection, and verification. Rather, it generates fruitful research hypotheses and rarely do the results of careful research "make sense" except as evolutionary adaptations. Those who reject evolutionary psychology in this general sense are probably either ill-informed or have an agenda, political or religious, that clouds their judgment. Creationists, for instance, cannot accept evolutionary psychology. Nor can Marxists and other extreme cultural determinists, for whom human nature either does not exist, or takes the form of limitless cultural malleability.

Evolutionary psychology, then, is a powerful tool in the behavioral scientist's repertoire. However, a small but highly creative and extremely influential group of evolutionary psychologists, including David Buss, John Tooby, Leda Cosmides, Donald Symons, and Steven Pinker, have constructed a version of evolutionary psychology that includes key assertions that go well beyond general principles, are

highly contentious, and are widely disputed. I will use capital letters (Evolutionary Psychology) to distinguish this doctrine from the more general approach of which it is a part. Buller's book purports to accept evolutionary psychology in general, but to dispute the key assertions that define the Evolutionary Psychology research project.

What are these key assertions? First, Evolutionary Psychologists are *nativists* who believe that basic human capacities (e.g., universal grammar, folk physics, folk psychology) are present at birth, although they may require experience to develop. Second, Evolutionary Psychologists hold that the human brain is *massively modular*, each module being domain specific, only operating on a strictly delimited set of inputs, informationally encapsulated, not needing to relate to other modules, neurally deterministic, rapidly acting, and with a fixed neural architecture leading to highly simplified outputs. Third, Evolutionary Psychologists hold that the human brain is the product of evolution during the Pleistocene, and there have been no important evolutionary changes in the human brain since the development of agriculture and city life in the Holocene. Fourth, they argue that salient human characteristics are generally adaptations to some primordial condition in which the characteristic enhanced the fitness of its carriers. As a result of these four conditions, modern men and women harbor stone-age minds.

These key assertions are questioned by many evolutionary psychologists. First, while some degree of nativism is implicit in the assertion that there is a universal human nature, many would dispute the notion that the individual's developmental environment is limited to merely facilitating or suppressing genetically pre-determined possibilities. Indeed, in principle, there is no reason that a genetically predisposed behavioral trait could not be completely reversed by cultural influences. For instance, even though there are doubtless broad between-sex differences in human behavioral predispositions, many or even all of these might be effectively offset by an appropriate socially beneficial gender-equalizing cultural environment. Second, many evolutionary psychologists believe that the evidence supports the existence of a *domain-general intelligence* in humans that integrates the information from domain-specific modules and is capable of creativity in problem solving and strategic decision-making (Chiappe and MacDonald 2005, Geary 2005). Indeed, the human capacity to deal with novelty may be the chief reason for the evolution of human cognition, given the highly volatile climate changes of the Pleistocene (Richerson and Boyd 2000). Third, very rapid periods of genetic evolution have been observed, especially in the overall composition of the gene pool, so that the modern gene pool may be highly adapted to modern life. In addition, there is some evidence of rapid spread of new mutant genes affecting the structure and performance of the brain (Evans 2005, Mekel-Bobrov 2005). Fourth, many human characteristics, including such common human conditions as depression, schizophrenia and autism, as

well as anti-social behaviors, such as sociopathy and sexually predation, although widespread and costly, may be congenital weaknesses and susceptibilities, or may be pathological hyperexpressions of behaviors that are fitness-enhancing in moderation, or may even result from random genetic drift, rather than being adaptations that conferred fitness on their carriers in the Pleistocene. One example of the tendency of Evolutionary Psychologists to interpret all human behavior as adaptive, a tendency ably criticized some years ago by Gould and Lewontin (1979), is the interpretation of the female orgasm. Contrary to the Evolutionary Psychologists' strong assertion of the adaptive value of female orgasm, Lloyd (2005) showed that none of the many purported adaptationist models of the adaptive value of the female orgasm fits with the facts, leaving open the possibility that the female orgasm is simply a carry-over from its adaptive value in the male, much as male nipples lack independent adaptive value.

Buller claims that he supports the project of evolutionary psychology, but is skeptical of each of the four major assertions put forth by Evolutionary Psychology. In fact, the most philosophically ambitious chapter in Buller's book is a direct attack on evolutionary psychology itself. "The very idea of a universal human nature" Buller here asserts, "is deeply antithetical to a truly evolutionary view of our species." What follows is an archetypal case of the frustrating silliness that often transpires when philosophers try to tell scientists what they can and cannot do. Buller argues that human nature is an "essence," and only "natural kinds" can have essences. A species cannot be a natural kind, because its character is determined by its historical transformation and reconstitution through time. For instance, we cannot say when a member of a species is "normal" or "abnormal" without having an "essence" to which we compare the individual. Since human beings are a species and a species has no essence, human beings have no essence, and since human nature is an essence—a common property of all humans—there is no human nature.

Buller he might want to brush up on his Wittgenstein. In his *Philosophical Investigations* (1999), Wittgenstein argued successfully, I believe, that the meaning of a term is its *use*, and to understand a term is to master how and when to use the term. Human nature is no more an essence than duck nature (i.e., the general characteristics of the family Anatidae of swimming birds, typically sporting a wide, flat bill and webbed feet) or HIV nature (i.e., the general character of the various strains of the virus causing AIDS) are essences. We should not be misled into making fallacious arguments just because, for arbitrary historical reasons, we tend to apply the term "nature" to the character of the species *Homo sapiens* but not to the character of the duck species *Anas platyrhynchos*. Just as a meaningful scientific study of this species, or of HIV, is possible, so is a meaningful scientific study of humans. The general character of humans is what we mean by "human nature."

Buller's substantive critique of Evolutionary Psychology will benefit from a short digression into the social conditions surrounding the origins and development of Evolutionary Psychology. From the time of Darwin to World War II, right-wing political thinkers, and even respected scientists, drew upon evolutionary reasoning to oppose social reform, promote eugenics, and support racist and ethnically parochial interests. The genocidal and racial supremacist policies of the Nazis in Germany were only the high point in an historical process that had turned the so-called "civilized" nations of the world into pits of parochial barbarism. The alternative, embraced by the major powers after World War II and strongly supported by their intellectual establishments, was a philosophy of religious, ethnic, and racial tolerance built on the notion that all difference among peoples were the product of their differential enculturation, and a vigorous extension of ecumenical cultural norms would foster a world free of the sort of parochialism that had turned the most advanced of human cultures into machines of bigotry and ethnic extermination.

So complete was the rejection of "biological" theories of human nature that the arch-enemies of the Cold War that lasted from the Allied victory until the collapse of the Soviet Union perfectly agreed that human nature had no biological element, or perhaps more precisely, human nature takes the form of virtually limitless phenotypic behavioral plasticity. The Communists took their inspiration from Marx, who in his *Theses on Feuerbach* said "the human essence is ...the ensemble of the social relations," while the liberal democracies promoted strongly anti-biological, cultural determinist traditions in sociology, anthropology, and social psychology to the same end.

However, behavioral science handicaps itself by ignoring evolution. While fully aware of the pitfalls of biological determinism, a generation of brilliant social biologists, including William Hamilton, Robert Trivers, John Maynard Smith, Richard Dawkins, and others, in the period 1964–1980 nevertheless set in motion a powerful, politically neutral, and wholly scientific approach to the application of biological modeling to the study of social organization. The degree of hostility to which this group of brilliant theorists was subjected by the scientific establishment is difficult to overstate. For instance, when E. O. Wilson published his pathbreaking volume *Sociobiology: The New Synthesis* (1975), he was subject to constant harassment and vilification from both the general academic community (including members of his own department at Harvard) and prominent behavioral scientists with political bones to pick. The history of this black period in our intellectual history is told insightfully by Segerstrale (2001).

The reader who thinks that this period lies safely in the past might reflect on the recent case of Harvard University president Lawrence Summers, who nearly lost his job for a mild, speculative remark he made trying to explain why there are so few females at the upper tail of the distribution in mathematical talent in the United

States. His suggestion that innate differences between the male and female brain might account for part of the observed ratio of male to females in the top ranks of mathematics and science brought harsh and immediate criticism, including that of MIT biology professor Nancy Hopkins, who walked out on Summers, saying “I felt I was going to be sick.”

Serious sociobiologists have been deeply hurt and angered by the onslaught of politically motivated criticism and constant social harassment. A vigorous counter-thrust materialized in Barkow, Cosmides and Tooby (1992), an edited collection of articles establishing sociobiology on a firm foundation, and brilliantly attacking the behavioral science establishment for neglecting the biological dimension of social structure and dynamics. Calling themselves “evolutionary psychologists” to avoid the historical baggage associated with the term “sociobiology,” Cosmides and Tooby highlighted and successfully attacked what they called the Standard Social Science Model (SSSM), according to which the human mind is a *blank slate* (English philosopher John Locke’s famous *tabula rasa*) on which a society’s culture writes the complete content of human behavior. Cosmides and Tooby’s brilliant arguments have been popularized by such writers as Wright (1995) and Pinker (2002). Their research in the 1990’s inspired a host of dedicated students and fellow researchers to resume the search for a scientific approach to modeling human behavior.

Cosmides, Tooby and their fellow research deserve great admiration for their willingness to enter this mine-strewn field, and for the high quality of their research. However, it appears clear that Evolutionary Psychology emerged from this foray with battle-scars and considerable historical deadwood. First, in dealing with critics, the Evolutionary Psychologists have perfected the strategy of simply standing firm whatever the evidence, and indeed unfairly vilifying their critics. In Buller’s words,

All too often I found Evolutionary Psychologists dismissing their critics as “antiscientific,” “politically correct postmodernists,” or closet creationists. Any skepticism about the claims of Evolutionary Psychology was typically portrayed as a product of dogmatic indoctrination in the social sciences, and of the attendant belief that all human psychology is the product of “socialization,” or else as evidence of the “superstitious belief” that humans somehow managed to transcend the evolutionary process.

More generally, the Evolutionary Psychology position on many issues is the *polar opposite* of the SSSM position. First, for SSSM, culture completely trumps biology, while for Evolutionary Psychology, nativism implies that culture is an epiphenomenal expression of the human brain. For instance, they reject gene-culture coevolutionary theory, and their discussion of emotions include the primary (fear, pain, jealousy, anger, etc.), which are shared with non-human animals, but not

the secondary emotions (empathy, guilt, shame, pride, vindictiveness, etc.) which are virtually confined to humans. Second, for SSSM the brain is a general purpose information processing and learning organ, easily manipulated to meet the demands of the dominant culture, while for Evolutionary Psychology, the brain is a collection of non-communicating modules, each selected for its capacity to solve a problem that arose in our evolutionary history. Third, for SSSM, culture and socialization produce altruistic individuals who generally conform to social norms rather than acting out of pure self-interest, while for Evolutionary Psychology, humans are selfish creatures who cooperate only when it is in their genetic or long-run kin-inclusive interest to do so. Finally, whereas the SSSM admits multiple influences on behavior (age, social class, personal history, wealth, and so on), Evolutionary Psychology generally investigates only the biological variables they postulate as important.

As Buller suggests, Evolutionary Psychology thinkers tend to behave like a scientific cult. They virtually always agree with each other, they reject outside criticism, and their message rarely changes. Moreover, they do not package their research in a manner that leads to creative interaction with and acceptance by the mainstream in the mainstream behavioral disciplines. I suspect that while this urge to maintain ideological purity accounts in no small measure for the public visibility of Evolutionary Psychology, it also unnecessarily polarizes discussion of the underlying issues.

Males and females in vertebrate species differ in sexual behavior. With few exceptions, females are assured their maximal rate of offspring production, while males have highly variable rates of successful insemination. Given the differences in the cost of gamete production, and the fact that females are assured of their parentage, whereas males cannot be certain they are raising their genetic offspring, females generally raise young while males maximize their rate of successful insemination. This pattern is violated when the male can increase fitness by caring for young rather than producing more offspring. Humans and passerine birds are important cases where male provisioning strongly affects offspring survival rates and hence, despite their otherwise extremely divergent capacities and lifestyles, the sexual strategies of humans and nesting birds often seem remarkably similar.

It would be bizarre in the extreme if the sexual division of labor in the Pleistocene did not leave its marks on sexual dimorphism in the human brain. This conclusion is anathema for many proponents of gender equality, who propose that there are no differences between men and women beyond the obvious sexual specificities and testosterone-mediate differences in musculature. Despite the fact that the professional literature documents many systematic differences between male and female brains, both the liberal public and SSSM social scientists react with horror when there is a public allusion to these differences.

Much of Buller's effort goes to criticizing a few prominent examples of the empirical research of Evolutionary Psychologists, including David Buss's analysis of mate preference, Martin Daly and Margo Wilson's analysis of parenting vs. step-parenting, and Lida Cosmides and John Tooby's analysis of cheater detection modules. I think this was an unfortunate choice because the general Evolutionary Psychology approach does not stand or fall with these examples. Despite Buller's strong critique of Daly and Wilson, I suspect that their data analysis will emerge superior to Buller's, if only because they are consummate professionals in the area and he is a rank amateur. But, either way, their predictions do not depend on the particular doctrines of Evolutionary Psychology, but are broadly based on the evolutionary psychology paradigm. Buss's analysis of mate choice is impressively broad-based and thorough, but he has not been able to show that his results are due to EEA adaptations as opposed to strong cultural uniformities across societies, based on male dominance of modern political and economic hierarchies. Cosmides and Tooby's analysis of cheater detection modules is directly related to a major Evolutionary Psychology proposition (the modularity of mind), but the only people convinced by their cheater detection argument are themselves and their disciples.

David Buss (1994) has most thoroughly developed the Evolutionary Psychology position on male-female differences, arguing that around the world, men see young nubile mates and women seek mates with substantial material resources. Buss also argues that a man is generally more averse to a sexual relationship between his mate and other man, whereas women are more averse to an emotional attachment between her mate and another woman. Buller presents considerable evidence that marriage patterns are better explained by age homogamy (men prefer women a few years younger than themselves) and status matching. Moreover, Buller shows that if Buss's data are aggregated across cultures, the postulated effects disappear.

It is easy to see the heavy hand of the SSSM dispute in Buss's research. Rather than seeking a general model of assortment in mating, which would surely involve cultural differences across countries, the distribution of wealth between mating-age males and females, as well as demographic variables, in addition to the male-female genetically-based preferences postulated by Evolutionary Psychology, Buss focusses almost exclusively on the latter alone. He is therefore exposed to the obvious criticism that virtually all cultures concentrate wealth in reproduction-age males, so female preference for high status males is a cultural rather than a genetic matter. Similarly, even if there is a male-female difference in the reaction to sexual vs. emotional attachment of a spouse, this can be attributed to the female's problem of securing a resource base for her offspring, and the male's problem of ensuring that he is investing in his rather than another man's offspring.

In short, I think Buller's critique fails, although there is much to criticize in Evolutionary Psychology. Evolutionary psychology will only succeed when its

ideas are so widely accepted by mainstream behavioral scientists that there will be no need for a separate group of researchers obsessed with the issue of evolutionary origins.

REFERENCES

- Barkow, Jerome H., Leda Cosmides, and John Tooby, *The Adapted Mind: Evolutionary Psychology and the Generation of Culture* (New York: Oxford University Press, 1992).
- Buss, David M., *The Evolution of Desire: Strategies of Human Mating* (New York: Basic Books, 1994).
- Chiappe, Dan and Kevin MacDonald, "The Evolution of Domain-General Mechanisms in Intelligence and Learning," *Journal of General Psychology* 132,1 (2005):5–40.
- Dobzhansky, Theodosius, "Nothing in Biology Makes Sense Except in the Light of Evolution," *The American Biology Teacher* 35 (March 1973):125–129.
- Evans, Patrick D., "Microcephalin, a Gene Regulating Brain Size, Continues to Evolve Adaptively in Humans," *Science* 309,5741 (September 2005):1717–1720.
- Geary, David C., *The Origin of Mind: Evolution of Brain, Cognition, and General Intelligence* (Washington, DC: American Psychological Association, 2005).
- Gould, Stephen Jay and Richard C. Lewontin, "The Spandrels of San Marco and the Panglossian Paradigm: A Critique of the Adaptationist Programme," *Proceedings of the Royal Society of London B* 205 (1979):581–598.
- Lloyd, Elizabeth, *The Case of the Female Orgasm: Bias in the Science of Evolution* (Cambridge, MA: Harvard University Press, 2005).
- Mekel-Bobrov, Nitzan, "Ongoing Adaptive Evolution of ASPM, a Brain Size Determinant in Homo Sapiens," *Science* 309,5741 (September 2005):1720–1722.
- Pinker, Steven, *The Blank Slate: The Modern Denial of Human Nature* (New York: Viking, 2002).
- Richerson, Peter J. and Robert Boyd, "Climate, Culture and the Evolution of Cognition," in C. Heyes and L. Huber (eds.) *The Evolution of Cognition* (Cambridge, MA: MIT Press, 2000) pp. 329–346.
- Segerstrale, Ullica, *Defenders of the Truth: The Sociobiology Debate* (Oxford: Oxford University Press, 2001).
- Wilson, Edward O., *Sociobiology: The New Synthesis* (Cambridge, MA: Harvard University Press, 1975).
- Wittgenstein, Ludwig, *Philosophical Investigations* (New York: Prentice-Hall, 1999).

Buller: Adapting Minds

Wright, Robert, *The Moral Animal* (New York: Vintage, 1995).

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