Essay Review: Debunking *Adapting Minds**

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David Buller's recent book, *Adapting Minds*, is a philosophical critique of the field of evolutionary psychology. Buller argues that evolutionary psychology is utterly bankrupt from both a theoretical and an empirical point of view. Although *Adapting Minds* has been well received in both the academic press and the popular media, we argue that Buller's critique of evolutionary psychology fails.

David J. Buller, ***Adapting Minds: Evolutionary Psychology and the Persistent Quest for Human Nature***. Cambridge, MA: MIT Press (2005), 552 pp., $37.00 (cloth).

1. Buller's Attack on Evolutionary Psychology. David Buller's recent book, *Adapting Minds*, is a philosophical critique of the field of evolutionary psychology. Buller argues that evolutionary psychology is utterly bankrupt from both a theoretical and an empirical point of view. As he puts it (3), evolutionary psychology is "wrong in almost every detail." Although *Adapting Minds* has been well received in both the academic press and the popular media, we argue that Buller's critique of evolutionary psychology fails.

Buller's critique is founded on a distinction that he draws between

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evolutionary approaches to the mind in general, which he calls evolutionary psychology (lower-case 'ep'), and one of those approaches, which he labels Evolutionary Psychology ('EP' with capital letters). According to Buller (8), ep includes any study of mind and behavior that is informed by an evolutionary perspective. Buller's Evolutionary Psychology, on the other hand, is more narrow, and he characterizes it as committed to a specific set of theoretical notions—adaptationism, the massive modularity thesis, the notion of the environment of evolutionary adaptedness, reverse engineering as a methodology, and the notion of a universal human nature—as well as a specific set of empirical results, associated with a small group of researchers (David Buss, Leda Cosmides, Martin Daly, Steve Pinker, John Tooby, and Margo Wilson). Buller argues that Evolutionary Psychology is misguided, whereas evolutionary psychology is correct. As he puts it (12), he is "unabashedly enthusiastic about evolutionary psychology as a field of inquiry."

The first four chapters of *Adapting Minds* focus on theoretical issues. Chapter 1 introduces the basic ideas of evolutionary theory. Chapter 2 describes what Buller takes to be the core theoretical commitments of EP. Chapter 3 and 4 criticize respectively adaptationism and the massive modularity thesis. The next three chapters focus on what Buller takes to be the paradigmatic empirical results in EP, namely research on mate choice, marriage and jealousy, and infanticide. The last chapter is a criticism of the notion of human nature.

2. 'EP' versus 'ep'. Our strongest critique concerns Buller's very strategy. Because Buller believes that 'ep' and 'EP' can be neatly distinguished, he takes his arguments to undermine only EP, while leaving an evolutionary approach to mind and behavior (ep) largely intact. The trouble is that 'EP' and 'ep' do not in fact represent independent, isolated groups of people or schools of thought. Not only do evolutionary psychologists of all stripes share common professional meetings and publication outlets, they share a large number of theoretical commitments as well. As we will explain in more detail below, some of these commitments, which Buller dismisses as part of 'EP', are in fact likely to be crucial for any evolutionary science of the mind. In particular, Buller claims that information-processing mechanisms (or, more specifically, "cortical" mechanisms) "weren't shaped by selection over our species' evolutionary history" (200), and that "there is no such thing as human nature" (457). But this is tantamount to rejecting two ideas—the existence of psychological adaptations and the notion of human nature—that are endorsed by evolutionary psychologists of all stripes. To give only one example, researchers influenced by Boyd and Richerson's theory of culture (Boyd and Richerson 1985; Richerson and Boyd 2004) take a tendency to imitate pres-

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tigious people, sometimes called "prestige-dependent bias," to be a psychological adaptation (Henrich and Gil-White 2001). While these researchers would not be classified as 'EP' under Buller's scheme, their commitments to psychological adaptations and a human nature are just as much a part of their research enterprise.

3. The Methodology of Evolutionary Psychology. Buller's primary objection to the methodology of evolutionary psychology stems from his rejection of the specific use of adaptationism within evolutionary psychology. Adaptationism refers generally to the identification of specific aspects of the phenotypes of organisms as adaptations, traits shaped by the process of natural selection to play a specific functional role in survival and reproduction. Gould and Lewontin (1979) have criticized the "backward-looking" application of adaptationism: developing hypotheses about the function of known organs. Buller focuses instead on the "forward-looking" application of adaptationism: identifying past adaptive problems in order to develop hypotheses about psychological adaptations that may have evolved to solve these problems, and searching for evidence of those adaptations.

Buller takes issue with each of the three steps that he identifies as part of the adaptationist method in evolutionary psychology: the identification of adaptive problems faced by our ancestors, the use of these adaptive problems to derive hypotheses about psychological mechanisms, and the empirical tests of these hypotheses (91).

3.1. What Do We Know about Humans' Evolutionary Past? Buller argues that "we can't specify the adaptive problems faced by our ancestors precisely enough to know what kinds of psychological mechanisms would have had to evolve to solve them" (93). Buller points to some uncertainties about the past, and implies that these uncertainties render all claims about the past equally unknowable. He points out, correctly, that there is uncertainty about the number of species in the genus *Homo,* and uncertainty about which of those species were our direct ancestors. Then he asserts, incorrectly, that we don't know any "details about the lifestyles led by those species" (94).

Buller claims that there are three sources of evidence about the past that evolutionary psychologists use: backwards inference from the design of adaptations to past problems, hunter-gatherer studies, and comparative analysis. In a concise three pages (94–96), he finds all three of these to be imperfect sources of information, and concludes that "[a]ny specification of those [adaptive] problems will indeed rank as pure guesswork" (96).

This conclusion misrepresents what we know about the past, and how

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we know it. Buller fails to mention research—including, notably, paleoanthropology—that provide critical information about our ancestors and what their lives were like. Textbooks list many things about human ancestors—including aspects of their behavior and lifestyles—that we can infer with a high degree of certainty, despite the fact that there is uncertainty about the exact phylogenetic relationships between ancestral hominins. Such inferences are possible because there are many features that all members of the genus *Homo*, as well as other genera of ancestral hominins, have in common. Evolutionary psychologists' hypotheses are typically built on knowledge of these shared features. We will mention but a few of these shared features here, to show that, in fact, there is a very solid basis for the derivation of hypotheses.

Before doing this, however, we must address an odd move made by Buller. Towards the end of the book, he insists that the concept of "human nature" refers only to "what distinguishes humans from the other animals on the planet" (420). On this account, *any* trait that is shared with other species (such as bipedalism or biparental care of offspring) is excluded from "human nature," and therefore outside the purview of evolutionary psychology. While Buller quotes the evolutionary psychologist David Buss on this point (421), it is a misrepresentation of what evolutionary psychologists think of as human nature, which includes the sum total of our species-typical traits, *whether or not they are shared by other species*. Buller's definition would rule out staples of evolutionary psychology research such as those concerning face recognition (Duchaine et al. 2001) and kin-directed altruism (Kurland and Gaulin 2005), which are not unique to humans.

This exclusion matters because many of the most well-grounded and thoroughly tested hypotheses in evolutionary psychology are derived from known features of ancestral hominins that are not unique to our lineage and about which we can be quite confident, *whichever* taxa of ancestral hominins might have been our ancestors. For example: There were two sexes. There were sperm and eggs. There was internal fertilization. There was a gestation period in which females invested substantial somatic resources in the developing embryo. A complete list of such traits would be quite long.

It is these facts, in combination with theories such as parental investment theory (Trivers 1972), which are the source of many hypotheses attacked by Buller (e.g., hypotheses about parental care and sexual jealousy—see below). In fact, what we know about ancestral humans is not limited to just general mammalian properties. Converging lines of evidence from multiple sources allow us to reconstruct many features of ancestral hominins, including aspects of lifestyle (Boyd and Silk 1999). For example,

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studies of skeletal morphology, fossil teeth, bones, and stone tools tell us much about hominin diets and, in turn, about other aspects of their lives.

To summarize decades of research on human evolution in a single paragraph, these kinds of evidence and others indicate that after our lineage diverged from that of chimpanzees, hominins shifted towards greater reliance on meat and greater male provisioning of offspring associated with increasing potential fitness gains from investing in large-brained offspring during a prolonged juvenile period of skill acquisition (Kaplan et al. 2000). A concomitant trend was reduction in sexual dimorphism in body size due to increased pair bonding and male investment in offspring and corresponding reduction in male-male competition. Increased male investment in offspring increases the potential fitness costs of mistakenly investing in another man's offspring, an observation which is the basis for research by many evolutionary psychologists (e.g., Daly and Wilson 1988; Buss 1989). This kind of knowledge about the human evolutionary past is an entirely plausible basis for the derivation of hypotheses to be tested and not, as Buller claims, "pure guesswork."

3.2. The Argument from the Instability of Ancestral Environments. Buller suggests also that the search for adaptations to adaptive problems is futile because "there were no stable adaptive problems driving the majority of psychological evolution" (99). The main reason for this, according to Buller, is that the adaptive challenges humans faced were constantly changing. He mentions evolutionary "arms races," such as arms races between predators and prey and the evolution of social strategies and counterstrategies within a species, as well as language, tool use, and reciprocity. He writes that

> [t]his latter kind of evolutionary arms race [i.e., within a single species] would have characterized all of human psychological evolution that was responsive to the human social environment. For any evolution in human psychology would have changed the psychological composition of the population as a whole, which would have then created a new adaptive problem for human psychology to adapt for. But this means that, as human psychology evolved, the adaptive problems driving human psychological evolution would have evolved in lockstep, so that there would have been no stable problems driving human psychological evolution. (100)

Buller is claiming, in other words, that in evolutionary arms race situations, *it is not possible for adaptations to evolve*. On this view, the immune system cannot be an adaptation against pathogens, and cheetahs and gazelles cannot evolve adaptations for faster running. This is clearly absurd. Running faster is, contrary to what Buller's view would imply, a

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stable adaptive problem, and many taxa possess adaptations that are uncontroversially adaptations for running fast. Convergent evolution of diverse predators suggests that there are in fact adaptive solutions that natural selection grinds out, repeatedly.

Buller (101–102) argues that ancestral environments were unstable for a second reason. Human environments are for a large part cultural and cultural dynamics lead to variability in social, economic and even physical environments. The problem with this argument is that variation does not preclude the existence of universals or of widespread cultural phenomena. Marriage, which Buller discusses, is one example of such a widespread cultural phenomenon (for other examples, see Brown 1991).

3.3. Inferring Solutions to Adaptive Problems. Buller suggests that even if there were stable adaptive problems faced by ancestral humans—which he doubts—and even if it were possible to successfully identify them, we would still not be able to infer "much" about the nature of human psychological adaptations (103).

Buller offers two reasons for this claim. First, he notes that "not every adaptive problem absolutely *must* be solved" (103). This is not news. Evolutionary psychologists are well aware that a variety of factors may prevent populations from reaching optimal solutions to adaptive problems. This fact does not diminish the usefulness of adaptationist reasoning as a source of hypotheses, because hypotheses are not merely generated, they are also tested.

Buller adds that "even if our ancestors did evolve a solution to some adaptive problem facing them, that solution may not have a form that is easily inferable from the task demands of the adaptive problem" (103). Buller points out that new adaptations do not arise from scratch but are modified from older ones, and it can be difficult to predict the form this modification will take. Buller concludes that "as a method for discovering our psychological adaptations, evolutionary psychological analysis is pure guesswork" (104).

Again, it is not news that adaptation is a path-dependent process. But it is fallacious to conclude that there are no grounds on which to constrain possible hypotheses about adaptations. Take, for example, the problems of avoiding fitness-reducing environmental hazards such as predators, pathogens, toxins, and heights. Evolutionary psychologists, and presumably others, regard these as relatively uncontroversial adaptive problems (even many psychologists who view evolutionary psychology with skepticism believe that disgust is an adaptation to prevent ingestion of toxins and pathogens, for example). While it is not possible to predict with certainty the exact nature of solutions to these problems, it is certainly possible, and legitimate, to use the nature of these problems to generate

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hypotheses about the possible design features of adaptations. For example, with respect to dangerous animals, one might predict a motivational system that motivates *avoiding predators* rather than affiliating with them, a categorization system of fear-inducing objects that includes things that are dangerous (lions, snakes) and exclude things that are not (flowers, dirt), and specialized danger learning mechanisms. Evidence for such features has been collected based on reasoning of this kind (Öhman and Mineka 2001; Barrett 2005). The proper role of adaptationist thinking here is a heuristic one, which guides empirical work but does not substitute for it. While there are many possible hypotheses about adaptive solutions to environmental hazards, not all hypotheses are equally plausible, and evidence ultimately adjudicates between them.

4. Approaches to the Mind in Evolutionary Psychology. Buller's critique of evolutionary psychology is grounded in the claim that the cognitive mechanisms underlying human behavior were not shaped by natural selection. This, in turn, is grounded in his critique of the massive modularity thesis widely endorsed in evolutionary psychology: namely, that the mind is not a single, undifferentiated information-processing device, but rather, is composed of many specialized psychological faculties, or "modules" (Sperber 1994). Buller claims that this view is "inconsistent with what we know about the brain" (127). The primary reason for this, according to Buller, is that the development of function-specific cortical areas does not depend on dedicated genes, but on the effect of experiences on an extremely plastic cortex.

4.1. Fodorian versus Massive Modularity. In his discussion of modularity, Buller confuses *the massive modularity thesis* with *Fodorian modularity*. In his book *The Modularity of Mind*, Fodor (1983) proposed a list of nine properties that he suggested are associated with modules. Buller suggests that evolutionary psychologists endorse most of the items on this list: "Evolutionary Psychologists claim that modules are 'genetically specified,' domain specific, informationally isolated, equipped with innate knowledge, equipped with domain-specific rules of reasoning, and relatively fast" (148).

However, the claim that evolutionary psychologists endorse the Fodorian conception of modularity is mistaken (Pinker 1997; Barrett and Kurzban 2006). The principal reason for this divergence is that, unlike evolutionary psychologists, Fodor claims that modules are a particular kind of innate, narrow, reflex-like device that is restricted to automatic tasks such as those involved in vision and in speech perception. Fodor is adamant that modules occur only in "peripheral" systems of the mind,

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such as perceptual systems, and cannot be involved in what he calls "central" processes, such as reasoning (Fodor 1983).

Evolutionary psychologists, on the other hand, endorse a model of modularity based on *specialized function*, and have proposed a variety of modules that distinctly violate Fodorian assumptions (Barrett and Kurzban 2006). To take only one example, Kurzban, Tooby, and Cosmides' (2001) modular account of coalitional psychology assumes that cues used in social group perception (e.g., race) are neither innately specified nor automatically deployed.

The differences between evolutionary psychologists' modularity and Fodor's modularity matter, because evolutionary psychologists deny that specific features, such as developmental plasticity, are inconsistent with modularity. Instead, evolutionary psychologists expect the properties of particular modules to depend on the specific functions they carry out. For example, being fast and automatic might be properties to be expected of a snake detection device, but not for those responsible for mate choice, decision making under uncertainty, or making inferences about social exchanges.

4.2. The Brain Doesn't Work That Way. Buller's main argument that the mind cannot be composed of evolved modules relies on an alleged inconsistency between the massive modularity thesis and the specific role that experience plays in shaping the brain. He writes that functionally specialized brain circuits "weren't shaped by selection over our species' evolutionary history; they are shaped by the local environment during the course of an individual's lifetime" (200). Thus, Buller does not deny the existence of function-specific brain systems (e.g., 134), but he argues that this functional specialization is the product of our experience (e.g., 136). On this view, there are *no gene complexes that have been selected for their contribution to the development of function-specific cortical systems*. Buller writes (141) that functionally specialized brain circuits "are not present in current individuals because of an evolutionary history in which selection acted on genetic differences between individuals with certain functionally specialized brain circuits and those without. They are present in individuals because of a plastic brain's response to its environment." Hence, there are no modular adaptations. Our primary adaptation, according to Buller, is neural plasticity (143).

There are many problems with the claim that the cortical regions of the brain are nothing but a blank slate. Here we mention a few.

Buller endorses a particular view of cortex development, Edelman's (1987) "neural Darwinism," which draws an analogy between neural pruning during development and natural selection. Crucially, Buller asserts that pruning is essentially done by the environment. The resulting cortical

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structures, therefore, are something like images or impressions made by the experiences of the individual. As he puts it (134): "Additive events provide a large mass of clay, which subtractive events sculpt into functional form."

The reader may get the impression from Buller's discussion that neural Darwinism is the standard account of cortex development in neuroscience, but it is not (e.g., Purves et al. 1996; Marcus 2004). Moreover, there is in fact no reason to assume that neural Darwinian processes, if they exist, account for all or even most of cortical development.

In any case, there are numerous problems with accounts of development that claim that all cortical structure comes from the environment. Even if processes like overgrowth and pruning were important in cortical development, they cannot plausibly account for many modular cortical structures that recur across individuals, such as the recurrent, species-typical features of the organization of the somatomotor and somatosensory cortices in humans (Ramachandran and Blakeslee 1998), or for homologous cortical structures, such as the horizontal segment of the intraparietal sulcus involved in estimating the cardinality of groups of objects or sequences of sounds in humans and macaques (Piazza and Dehaene 2004).

There is also an enormous and growing literature linking specific genes to the normal development of cortical structures in humans and other species. Ramus (2006) briefly reviews some recent findings. In primates, the expression of specific genes corresponds to anatomical areas, such as V1 or V2 in the occipital cortex. Even more problematic for Buller's views, studies have shown that the brains of mice can develop to a large extent normally, even without neurotransmitters, thus without experience-induced brain activity (Verhage et al. 2000). Similarly, in cats, monkeys, and ferrets, the initial structure of the ocular dominance columns, a fine-grained structure, is independent of any visual experience. The same is true of the somatosensory representations of whiskers in rodents. Thus, even though experience is needed for the normal development of cortical areas and, in some cases, might dramatically reorganize the structure of the cortex, evidence shows that specific genes are involved in the development of specific cortical structures. Since the developmental pathways for the cortex are highly conserved, there is little reason to believe that the fine structure of human cortical systems is a mere product of experience. Indeed, evidence shows that the three-dimensional structure of many human cortical areas is heritable. It is thus highly likely that there are many genes that have been selected for in humans precisely because of their effects on cortical development (for references on the findings mentioned in this paragraph, see Ramus 2006).

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5. Buller's Critiques of Empirical Research in Evolutionary Psychology. A large part of *Adapting Minds* focuses on Tooby and Cosmides', Buss', and Daly and Wilson's empirical research programs (for a better representation of the scope of evolutionary psychology, see Buss 2005). Buller's leitmotiv is that the available empirical evidence fails to support the claims made by these evolutionary psychologists over other possible explanations, evolutionary or otherwise.

Buller's critiques of these research programs, even if successful, would be largely beside the point, because the failure of the hypotheses under consideration would not undermine the entire discipline of evolutionary psychology. Although several of these hypotheses are highly regarded by evolutionary psychologists, evolutionary psychology is not built on them. Rather, the hypotheses under consideration are about specific hypothesized psychological adaptations, such as Tooby and Cosmides' cheater-detection module. Moreover, in this part of the book, Buller does not pretend to identify a problem that would be characteristic of the entire field. Rather, considering each of these hypotheses in turn, he contends, wrongly we believe, that the empirical data do not support them. Rejecting evolutionary psychology if the empirical hypotheses under consideration were to turn out to be mistaken would be equivalent to rejecting cognitive psychology because the hypotheses defended in the sixties turned out to be mistaken.

For this reason, we have chosen to cover at length the problems with Buller's theoretical critiques, and we will not attempt a full discussion of Buller's specific attacks on three research groups here. Instead, we refer readers to these researchers' own papers and their recent responses to Buller (Buss and Haselton 2005; Cosmides et al. 2005; Daly and Wilson 2005; Delton et al. 2006).

However, we do feel it is important to give some flavor of the problems with Buller's handling of empirical findings in *Adapting Minds*. These problems include: selective attention to the literature, misrepresentation of the hypotheses that data were collected to test, and post hoc formation of pet hypotheses to fit data that Buller has already seen. Here we will briefly mention two examples of Buller's critiques, to illustrate some of these problems.

Like many critics of evolutionary psychology, Buller takes issue with Buss' research on sex differences in the cues that trigger jealousy (Buss et al. 1992). However, because Buller gets the hypothesis wrong, he points to details in the data that he claims undermine Buss' hypothesis, when they actually support it.

Based on the observation that cuckoldry is a problem for men but not women, but that women face the problem of resource diversion to a greater degree than men, Buss et al. (1992) predicted and found that sexual in-

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fidelity upsets men more than women and emotional infidelity upsets women more than men. This hypothesis is about differences between sexes in relative degree of upset (Buss and Haselton 2005). However, Buller mistakes it for the hypothesis that there should be an ordering *within* sexes, and points out that in some populations surveyed, men are more upset by emotional than sexual infidelity (e.g., the Netherlands and Germany; 317, Table 6.2). However, even in these populations, men find sexual infidelity more disturbing than females do, as predicted.

The second case we will mention is Buller's critique of Daly and Wilson's work on discriminative parental solicitude. Daly and Wilson have argued that stepchildren are more at risk of violence and homicide than children living with their genetic parents, which they call the "Cinderella effect" (Daly and Wilson 1988, 1999, 2005). Buller disagrees (Chapter 7). His attempt to discredit them illuminates a few general features of his critical style. He takes a phenomenon for which there is a very sound evolutionary explanation—animals, in general, have been selected to invest preferentially in their genetic relatives—and he tries to explain it all away, unsuccessfully, on the basis of a single study. Buller argues that all of the (quite substantial) data in support of Daly and Wilson's proposal can be explained by a reporting bias—deaths of children living with a stepparent are more likely to be classified as abuses than deaths of children living with their genetic parents (401–410). His main basis for this claim is a Colorado death review study (Crume et al. 2002), which found that the percentage of deaths attributed to abuse was 86% for unrelated individuals, and 43% for genetic parents. According to these data, murders by genetic parents are under-reported compared to murders by stepparents. The deaths of children killed by genetic parents are more likely to be attributed to causes other than murder than the deaths of children killed by a stepparent.

As Daly and Wilson (2005, 2006) point out, this bias cannot possibly account for the actual data on the Cinderella effect. In fact, there is a way of testing Buller's proposal without making any assumptions about the magnitude of any potential reporting bias. Buller's claim is that rates of murder and abuse of children are *identical* for genetic and stepparents, and it is merely observed rates that differ. We know the observed murder rate for stepparents. Let us assume that murders by genetic parents are vastly under-reported, by some unknown amount. How many of these undetected murders would have occurred if the murder rate by genetic parents were equal to the murder rate reported in stepparents? We can calculate the necessary number of unreported murders by assuming that the murder rate for genetic parents is at least equal to the observed murder rate for stepparents. As it turns out, because so many more children live with genetic parents than with stepparents, the number of children mur-

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dered by their genetic parents would have to be very high—higher than the number of children that die of all causes—in order for the murder rate by genetic parents to be at least equal to the observed murder rate by stepparents, which means that a reporting bias against stepparents could not account for the Cinderella effect.

Daly and Wilson (2006) have done the relevant calculations, using records for the entire Canadian population between 1974 and 1990 to demonstrate that Buller's claim cannot possibly be true for that (very large) sample. In Canada between 1974 and 1990, there was a documented rate of 2.6 deaths per million child-years at risk for children under age 5 residing with and killed by their (presumed) genetic fathers (74 deaths in 28.3 million child-years), and a rate of 321.6 deaths per million child-years at risk for those living with stepfathers (55 deaths in 0.17 million child-years), a 120-fold increase in risk. If Buller's conjecture were true—if the risk of abuse was identical for genetic and stepfathers—at least the same rate of lethal abuse would have to occur, unobserved, for children living with genetic fathers.

Daly and Wilson calculate, using the relative numbers of children living with genetic and stepfathers (there are many more children living with genetic fathers), that for Buller's conjecture to be correct more than 500 children would have to have been murdered, undetected, by their genetic fathers each year, in Canada, between 1974 and 1990. However, fewer than 400 Canadian children under 5 years of age died annually in 1974–1990 from *all* causes other than diseases and congenital abnormalities (Daly and Wilson 2006).

6. Human Nature. The final and most misleading claim that we will discuss is Buller's claim that "there is no such thing as human nature" (457). He bases this position on the odd assertion that we have already mentioned—that human nature must include only those properties that are unique to humans—but also on the uncontroversial but irrelevant observations that there is variation within the human species, and that evolution is an ongoing process that never stops. From these points, he draws extreme and incorrect conclusions, such as that "organisms that belong to the same species need not share any properties" (448). This view of species is bizarre. If one could find two organisms that shared *no* properties, and demonstrate that they belonged to the same species, that would make news. For, by virtue of common descent, the members of a given species possess many properties in common.

Buller's argument saddles evolutionary psychologists with a strong essentialist notion of human nature and then points out that evolutionary psychologists have failed to learn the lessons of evolutionary biology. However, evolutionary psychologists are committed to a notion of human

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nature only in the following sense: there are some properties that, characteristically and for the most part, humans possess by virtue of belonging to their species. There is no good reason to deny human nature in this weak sense. In other words, it is wrong to imply, as Buller does (e.g., 122), that the existence of variation—genetic, phenotypic, cultural, environmental—precludes general facts about humans. Variances and invariances coexist.

More important, if there were no human nature, huge swaths of the social and biological sciences, notably medicine, that aim at producing general knowledge about our species would be bound to fail. It would be pointless to study human livers, because there would be nothing that one could say about human livers in general. This is clearly wrong in both theory and practice. Generalizable claims about human physiology are clearly possible, as are claims about human cognition.

Buller's discussion of human nature is characteristic of how *Adapting Minds* fails to undermine evolutionary psychology: it attempts to invalidate premises that are, in fact, highly plausible, and acts as if a science of evolutionary psychology—or, in the case of human nature, any science that attempts to discover generalizable facts about humans—were possible without them. We wonder how a field at the intersection of psychology and evolutionary biology could in principle exist if we it were true that we should reject the notion of human nature and take the existence of psychological adaptations to be unlikely. However the details eventually turn out, it is perfectly sound to base a science on the premise that natural selection has shaped our minds and the mechanisms that guide our behavior, just as it has for all other animals, and on the premise that there are generalizable statements that we can make about humans. Such assumptions lead to heuristics of discovery using a suite of methods, including adaptationist logic (Machery, forthcoming). In denying these and many other highly plausible premises in evolutionary psychology, *Adapting Minds* invalidates itself as a critique.

7. Conclusion. Buller has failed to mount a successful challenge to evolutionary psychology. Most of his critiques of the theoretical commitments of evolutionary psychology miss the mark. Some misrepresent the literature; others are fallacious, drawing untenable conclusions from admittedly uncontroversial premises. His attacks against the empirical findings are similarly erroneous. Most important, if Buller were right, there would remain little place for a science at the intersection of psychology and evolutionary biology. If, as he claims, Buller actually *endorses* evolutionary approaches to human behavior, but simply wants to raise the standards of the field, his book, alas, fails to do so.

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