

# Chapter 31

## Evolutionary Psychology, Adaptation and Design

Stephen M. Downes

**Abstract** I argue that Evolutionary Psychologists' notion of adaptationism is closest to what Peter Godfrey-Smith (2001) calls explanatory adaptationism and as a result, is not a good organizing principle for research in the biology of human behavior. I also argue that adopting an alternate notion of adaptationism presents much more explanatory resources to the biology of human behavior. I proceed by introducing Evolutionary Psychology and giving some examples of alternative approaches to the biological explanation of human behavior. Next I characterize adaptation and explain the range of biological phenomena that can count as adaptations. I go onto introduce the range of adaptationist views that have been distinguished by philosophers of biology and lay out explanatory adaptationism in detail.

### 1 Introduction

People do lots of things and we have thousands of resources to explain our behavior. The social sciences, widely construed, include explanations of human behavior that invoke culture, religion, beliefs, desires, social institutions, race, gender and so on. In this paper I ignore all such explanations of human behavior. This is not because such explanations are all invalid or inferior, it is because they are not my current focus. A complete account of many components of human behavior will doubtless include reference to all manner of biological and cultural factors. Sarah Hrdy's (1999) account of motherhood provides an example

of the fusion of many different explanatory resources to account for a suite of human behavior. While some may criticize the details of her account, it is hard to deny that the scope of explanatory resources she appeals to is very broad.

Philosophers of mind, psychology and social science contrast biologically based explanations with those derived from folk psychology. This is a traditional move in philosophical circles that might not be familiar to those in the social or biological sciences. A folk psychological explanation of behavior accounts for such behavior

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S.M. Downes (✉)

Professor and Chairman, Department of Philosophy, University of Utah,  
Salt Lake City, UT, USA

e-mail: [s.downes@gmail.com](mailto:s.downes@gmail.com)

by appealing to the beliefs and desires of the individual(s) engaging in the behavior. Beliefs and desires are taken to be internal representational states and processing of these states leads to behavior. Any social science explanation that appeals to a person wanting something or believing that they could do something counts as a folk psychological explanation. My view is that the scope of folk psychological explanations has been over-estimated. Much human behavior can be accounted for in biological terms without invoking any contentful representational states.

My position is that biologically based explanations of human behavior should appeal to cognitive mechanisms as a last resort. On this view, we should hold off on an account of any given behavioral repertoire in terms of beliefs and desires, until we have ruled out accounts in terms of hormones, genetics, pheromonal cues and so on. One reason for this view is that much of our behavioral repertoire is based in one inherited from other animals and we do not require complex cognitive mechanisms to account for most animal behavior. Much human behavior likely arises from distinctly non-cognitive proximate causes and work in the biology of behavior should reveal what these causes are.

So I endorse biologically based explanations of human behavior. Not all domains of human behavior are susceptible to such explanations but most of our behavior is based in some way or other in our biology and so biologically based explanation will be relevant in understanding our behavior. Evolutionary Psychology is one of the many biologically based approaches to explaining human behavior. There are several debates raging between proponents of Evolutionary Psychology and their critics. I understand one of these debates as a debate over the place of Evolutionary Psychology in the broader field of the biology of human behavior. The biology of human behavior is huge and includes many disciplines and methods. Evolutionary Psychologists tend to present their work as being the central (and often unifying) approach in the biology of human behavior. I see their work as just one among many of the varied approaches and one that is at odds in several important theoretical respects with many others in the broad field.

David Buller (2005) has sharply criticized Evolutionary Psychology. Much of his criticism involves breaking down Evolutionary Psychologists' empirical claims and examining the evidence for them. He also criticizes the theoretical tenets of Evolutionary Psychology and their underlying assumptions. There has not been much response to this particular line of Buller's argumentation, one exception being Eduoard Machery and Clark Barrett (2006) who do respond. They argue that Buller's articulation of a separate paradigm of Evolutionary Psychology is unfounded, because Evolutionary Psychology is very inclusive. Buller distinguishes between evolutionary psychology and Evolutionary Psychology. On his account the former is a "field of inquiry" and the latter is a "paradigm," within that broader field of inquiry. In their rebuttal of Buller's book Machery and Barrett (2006) argue that this distinction does not hold up.<sup>1</sup> They argue that "not only do evolutionary psychologists of all stripes share common professional meetings and publication

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<sup>1</sup>They go on to say that the further criticisms of Buller in their paper hold up whether or not we buy this distinction.

outlets, they share a large number of theoretical commitments as well” (2006, 232). Part of their evidence for this claim is the inclusion of chapters in *The Handbook of Evolutionary Psychology* (Buss 2005) on life history theory and developmental evolutionary psychology.<sup>2</sup> This move seems a little quick. I think that it is important to hang on to a version of Buller’s distinction. The way I flesh the distinction out is by showing that Evolutionary Psychologists do have a quite distinct set of theoretical commitments and those commitments diverge in important ways from those of many others presenting biologically based explanations of human behavior. The specific theoretical commitments I focus on here are Evolutionary Psychologists’ notions of adaptation and adaptationism, each of which are very important organizing theoretical concepts in all the biological sciences.

I will argue that Evolutionary Psychologists’ notion of adaptationism is closest to what Peter Godfrey-Smith (2001) calls explanatory adaptationism and as a result, is not a good organizing principle for research in the biology of human behavior. Along the way to defending this conclusion I will show that adopting an alternate notion of adaptationism, and along with that a different sense of what might count as adaptations, presents much more explanatory resources to the biology of human behavior. In what follows I introduce Evolutionary Psychology and then give some examples of alternative approaches to the biological explanation of human behavior. Next I characterize adaptation and explain the range of biological phenomena that can count as adaptations. After giving a sense of the range of adaptationist views that have been distinguished by philosophers of biology, I lay out explanatory adaptationism. Finally, I draw on theoretical work by Evolutionary Psychologists to make my case that their form of adaptationism is explanatory adaptationism.

## 2 Evolutionary Psychology

Evolutionary psychology is one of many biologically informed approaches to the study of human behavior. Along with cognitive psychologists, evolutionary psychologists propose that much, if not all, of our behavior can be explained by appeal to internal psychological mechanisms. What distinguishes evolutionary psychologists from many cognitive psychologists is the proposal that the relevant internal mechanisms are adaptations – products of natural selection – that helped our ancestors get around the world, survive and reproduce.

The specific approach to evolutionary psychology focused on throughout this paper is often capitalized: Evolutionary Psychology. As I mentioned above, this is David Buller’s (2000, 2005) idea. He introduces the convention to distinguish a particular research tradition (Laudan 1977) from other approaches to the biology of human behavior. Buller refers to “Evolutionary Psychology” as a “paradigm.” I prefer Laudan’s research tradition terminology as research traditions have a more fluid

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<sup>2</sup>Machery further reinforced this point (Personal Communication).

structure than paradigms and Laudan allows for sharing of theoretical resources between research traditions.

In a recent presentation of Evolutionary Psychology's theoretical tenets John Tooby and Leda Cosmides (2005) provide the following list:

1. The brain is a computer designed by natural selection to extract information from the environment.
2. Individual human behavior is generated by this evolved computer in response to information it extracts from the environment. Understanding behavior requires articulating the cognitive programs that generate the behavior.
3. The cognitive programs of the human brain are adaptations. They exist because they produced behavior in our ancestors that enabled them to survive and reproduce.
4. The cognitive programs of the human brain may not be adaptive now; they were adaptive in ancestral environments.
5. Natural selection ensures that the brain is composed of many different special purpose programs and not a domain general architecture.
6. Describing the evolved computational architecture of our brains "allows a systematic understanding of cultural and social phenomena" (18).

Tenet 1 emphasizes the cognitivism that Evolutionary Psychologists are committed to. 1 in combination with 2 directs our attention as researchers not to parts of the brain but to the programs run by the brain. It is these programs – psychological mechanisms – that are a product of natural selection. While they are products of natural selection, and hence adaptations, these programs need not be currently locally adaptive. Our behavior can be produced by underlying psychological mechanisms that arose to respond to particular circumstances in our ancestor's environments. Tenet 5 presents what is often called the "massive modularity thesis" (See e.g. Samuels 1998; Samuels 2000). There is a lot packed into this tenet and we will not examine it in detail here. In brief, Evolutionary Psychologists maintain that there is an analogy between organs and psychological mechanisms or modules. Organs perform specific functions well and are products of natural selection. There are no general purpose organs, hearts pump blood and livers detoxify the body. The same goes for psychological mechanisms; they arise as responses to specific contingencies in the environment and are selected for to the extent that they contribute to the survival and reproduction of the organism. Just as there are no general purpose organs, there are no general purpose psychological mechanisms. Finally, tenet 6 introduces the reductionist or foundational ambitions of Evolutionary Psychology.

There are numerous examples of the kinds of mechanisms that are hypothesized to underlie our behavior on the basis of research guided by these theoretical tenets: the cheat detection module; the waist/hip-ratio detection module; the snake fear module and so on. A closer look at the waist/hip ratio detection module illustrates the above theoretical tenets at work. Singh (Singh 1993; Singh and Luis

1995) presents the waist/hip ratio detection module as one of the suite of modules that underlies mate selection in humans. This one is a specifically male psychological mechanism. Men detect variations in waist/hip ratio in women. Men's preferences are for women with waist/hip ratios closer to 0.7. Singh claims that the detection and preference suite are adaptations for choosing fertile mates. So our mate selection behavior is explained in part by the underlying psychological mechanism for waist/hip ratio preference that was selected for in pre-historic human environments.

What is important to note here is that Evolutionary Psychologists are committed to the claim that all behavior is best explained in terms of underlying psychological mechanisms that are adaptations for solving a particular set of problems that humans faced at one time in our ancestry. Also, Evolutionary Psychologists stress that the mechanisms they focus on are universally distributed in humans and are not susceptible to much, if any, variation. They maintain that the mechanisms are a product of adaptation but are no longer under selection (Tooby and Cosmides 2005, 39–40). The underlying assumptions driving these views about adaptation are what I examine in this paper.

Evolutionary Psychology rests upon specific theoretical principles, articulated above, but not all of these principles are shared by others working in the biology of human behavior (C.f. Laland and Brown 2002). For example, human behavioral ecologists present and defend explanatory hypotheses about human behavior that do not appeal to psychological mechanisms (See e.g. Hawkes 1990; Hrdy 1999). Behavioral ecologists also believe that much of human behavior can be explained by appealing to evolution while rejecting the idea held by Evolutionary Psychologists that one period of our evolutionary history is the source of all our important psychological adaptations (Irons 1998). Developmental psychobiologists take yet another approach: they are anti-adaptationist (Michel and Moore 1995) (But see Bateson and Martin 1999; Bjorklund and Hernandez Blasi 2005 for examples of developmentalist work in an adaptationist vein). These theorists believe that much of our behavior can be explained without appealing to a suite of specific psychological adaptations for that behavior. Instead they emphasize the role of development in the production of various human behavioral traits. Finally, life history theory examines the way in which differential allocation of resources occurs in different life stages and the extent to which these processes are susceptible to evolutionary change (Futuyma 1998, Ch. 19). Life history theory arose from evolutionary biologists' attempts to understand the differential fitness contributions of various important stages of an organism's life. For example, some organisms can reproduce throughout their life, while others can reproduce during only short periods of their lives. Both growth and reproduction require resource allocation often at the expense of one another. From here on, "Evolutionary Psychology" refers to one specific research tradition among the many biological approaches to the study of human behavior.

### 3 Adaptation

Evolutionary biologists characterize adaptations along the following lines: “A trait, or integrated suite of traits, that increases the fitness of its possessor is called an adaptation and is said to be adaptive” (Freeman and Herron 2008, 364). How we discover adaptations or demonstrate that traits are adaptations goes like this: “Roughly speaking, in order to demonstrate that a trait is an adaptation, we need first to determine what a trait is for and then to show that individuals possessing the trait contribute more genes to future generations than individuals lacking it” (Freeman and Herron 2008, 364). A number of important distinctions are not brought out clearly in this presentation. Elliott Sober’s discussion of adaptation helps clear these up. Here is how Sober defines an adaptation: “characteristic  $c$  is an adaptation for doing task  $t$  in a population if and only if members of the population now have  $c$  because, ancestrally, there was selection for having  $c$  and  $c$  conferred a fitness advantage because it performed task  $t$ ” (Sober 2000, 85). This definition allows Sober to make a few further clarifications of the notion of adaptation that are helpful. First, we should distinguish between a trait that is *adaptive* and a trait that is an *adaptation*. Any number of traits can be adaptive without those traits being adaptations. A sea turtles forelegs are useful for digging in the sand to bury eggs but they are not adaptations for nest building (Sober 2000, 85). Also, traits can be adaptations without being currently adaptive for a given organism. Vestigial organs such as our appendix or vestigial eyes in cave dwelling organisms are examples of such traits (Sterelny and Griffiths 1999). Second, we should distinguish between ontogenetic and phylogenetic adaptations (Sober 2000, 86). The adaptations of interest to evolutionary biologists are phylogenetic adaptations, which arise over evolutionary time and impact the fitness of the organism. Ontogenetic adaptations, including any behavior we learn in our lifetimes, can be adaptive to the extent that an organism benefits from them but they are not adaptations in the relevant sense. Finally, adaptation and function are closely related terms. On one of the prominent views of function – the etiological view of functions – adaptation and function are more or less coextensive; to ask for the function of an organ is to ask why it is present. On the Cummins view of functions adaptation and function are not coextensive, as on the Cummins view, to ask what an organ’s function is, is to ask what it does (Sober 2000, 86–87) (C.f. Sterelny and Griffiths 1999, 220–224).

As already noted, Evolutionary Psychologists focus on psychological adaptations. One consistent theme in the theoretical work of Evolutionary Psychologists is that “adaptations, the functional components of organisms, are identified [...] by [...] evidence of their design: the exquisite match between organism structure and environment” (Hagen 2005, 148). The way in which psychological adaptations are identified is by evolutionary functional analysis, which is a type of reverse engineering.<sup>3</sup> “Reverse engineering is a process of figuring out the design of a mechanism on

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<sup>3</sup> Here I follow Buller’s (2005) account of the approach. The term “reverse engineering” was first used in an evolutionary context by Daniel Dennett (He explains and elaborates upon the concept in

the basis of an analysis of the tasks it performs. Evolutionary functional analysis is a form of reverse engineering in that it attempts to reconstruct the mind's design from an analysis of the problems the mind must have evolved to solve" (Buller 2005, 92). Evolutionary Psychologists' concept of adaptation is narrower in scope than the definition I presented above. Also, their method for discovering adaptations or establishing that traits are adaptations is different than the one presented above. Here I will add some more examples to bring out the contrast between the two notions of adaptation at play.

There is a stark contrast between defining adaptations as "functional components of organisms" and defining them as any trait that arose via natural selection. The first, and most obvious point to make is that functional components of organisms can be and more often than not are, products of natural selection. So the first definition is narrower in scope. But it is important to go on and expand upon this point via a few examples. What I want to illustrate by doing this is that adopting a narrower concept of adaptation within a theory, reduces the explanatory scope of the theory.

Sober and our evolutionary biologists' definitions of adaptation are not constrained only to apply to organs or other traits that exhibit apparent design. Rather, clutch size (in birds), schooling (in fish), leaf arrangement, foraging strategies and all manner of traits can be adaptations (C.f. Seger and Stubblefield 1996). One way of looking at the evolution of various traits or suites of traits is that they are in some sense optimal responses to the environment in all its demanding complexity. Here are biologists Seger and Stubblefield on this point: since traits were produced by cumulative selection "biologists may have little choice but to begin by asking how the features under study might have been optimized for one or more functions, under one or more constraints. In a general sense, then, optimization is a fundamental principle of evolutionary biology, especially of the study of adaptation" (Seger and Stubblefield 1996). But we have to proceed with caution when using this notion of optimality. Evolution does not do the best job possible, and evolutionary biologists do not expect it to. Freeman and Herron explain: adaptation cannot be optimal for all traits, because of "trade-offs, constraints and lack of variation" (Freeman and Herron 2008, 383). They go on to say that even in the narrower domain of functional components of organisms, "it is impossible to build a perfect organism. Organismal design reflects a compromise among competing demands" (Freeman and Herron 2008, 383). With this cautionary note in hand, we can now move on to seeing how the optimality approach increases the range of traits that can be understood as adaptations.

Seger and Stubblefield explain that applications of optimization have the following in common:

they are about phenotypes of a kind that did not concern the reverend Paley. Habitat-patch selection rules, number of eggs in a clutch, and age-specific schedules of growth, fertility, and mortality are not like watches. They do not shout "Look here! I'm an intricate, improbable, and therefore onerous adaptation! Explain me if you can!" Darwin's puzzlement about

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his 1995). Steven Pinker (1997) also champions the approach as do many in Evolutionary Psychology.

the sex ratio derives from his realization that it must be subject to selection, even though he could not see how to assess the adaptedness of a given ratio of males to females among the progeny of a reproducing individual. (Seger and Stubblefield 1996, 107)

Adopting the optimality approach allows us to understand all manner of traits as adaptations and increases the ways in which selection can be understood to operate. The process of selection is not just the incremental improvement of intricate organs such as the eye but includes all manner of dynamic relations between organisms, their con-specifics, their life stages, organisms in other species and so on. For example, a key prediction of life history theory arising from this line of thinking is that a high rate of adult mortality imposes selection for early maturation and high reproductive effort in early life; and if adult survival rates are high, delayed maturation and high reproductive effort in later life are favored (C.f. Futuyma 1998, 570). Endler and Resnick's work on guppies provides dramatic support for this prediction. First, they found differences in size at maturity and timing of reproduction between populations of guppies whose major predator attacked large mature guppies and those whose major predator attacked small (juvenile) guppies. Second, in an interesting follow up experiment, guppies who had experienced adult predation were put into a stream populated by no guppies but by the juvenile predator. Within 11 years, 30–60 generations, the life history traits of the guppies had changed. They matured later, were larger on average and produced larger offspring than before. Futuyma summarizes the evolutionary implications of these results: "This experiment in a natural population showed that natural selection can rapidly alter life history characteristics in the predicted direction" (Futuyma 1998, 571). And we can reasonably claim that these life history traits are adaptations.

Once we have this notion of adaptation in hand it allows us to understand why philosophers such as Buller argue that phenotypic plasticity of various types can be an adaptation, because it arises in various organisms as a result of natural selection. This is a line of thinking pursued earlier by Peter Godfrey-Smith (1996) and a version of it is taken up and pursued in by Kim Sterelny (2003). According to Freeman and Herron "when phenotypes are plastic, individuals with identical genotypes may have different phenotypes if they live in different environments" (380). This kind of response to the environment is a far cry from the fine tuning of a well functioning organ. If we wish to account for the behavior of organisms including ourselves, in biological terms, we need a large explanatory repertoire. Understanding adaptations in the way I have outlined expands our explanatory scope in the biology of behavior far beyond accounting for any given behavior in terms of a suite of well designed underlying organs.

## 4 Adaptationism

I think that it is important to resolve these issues about the scope of the term "adaptation" but much of the criticism directed at Evolutionary Psychologists has been one or other variation on the theme that they are *adaptationists*. Philosophers, and others, criticized sociobiologists on the grounds that they were adaptationists and



similar criticisms have been transplanted wholesale and directed at Evolutionary Psychologists (See e.g. Griffiths 1996; Richardson 1996; Grantham and Nichols 1999; Lloyd 1999; Richardson 2007). It may be reasonable to wonder at this stage if all my enthusing about adaptation makes me an adaptationist, and as such, subject to these critical attacks. (Think of defending a view that has been closely tied with relativism; the assumption is that in so doing you are defending relativism, usually of the worst possible sort.) We can distinguish a number of distinct versions of adaptationism and in doing so, we can see how adopting certain kinds of adaptationism exposes one to obvious criticism. First I will briefly review some of the versions of adaptationism and then I will hone in on one that is particularly problematic. In the next section I argue that this is exactly the kind of adaptationism espoused by Evolutionary Psychologists.

Much of the philosophical worrying over adaptationism derives from Stephen J. Gould and Richard Lewontin's (1979) well known paper on the scope of adaptationist explanations in biology. I take part of Gould and Lewontin's message to be cautionary advice about adaptationist explanations and this makes part of their message close to and consistent with G.C. Williams in the first chapter of his *Adaptation and Natural Selection* (1966), where he says: "A frequent practice is to recognize adaptation in any recognizable benefit arising from the activities of an organism. I believe that this is an insufficient basis for postulating adaptation and that it has led to some serious errors. A benefit can be the result of chance instead of design" (12). Here is Freeman and Herron's version of the same point: "No explanation for the adaptive value of a trait should be accepted simply because it is plausible and charming" (Freeman and Herron 2008, 364). On this construal, adaptationism is the over attribution of the term "adaptation" to features of the natural world. This is the version of adaptationism that I will refine shortly but first it is worth noting that Gould and Lewontin have another target in mind when they use the term adaptationism: those who aim to break "an organism into unitary 'traits' and propos[e] an adaptive story for each considered separately" (Gould and Lewontin 1979, 581). An apt target for this criticism arose, after the fact, in the work of Evolutionary Psychologists (See e.g. contributions in Buss 2005), given their avowed aims to functionally decompose our minds and account for each of the components in terms of adaptation. Although this may be an appropriate criticism of Evolutionary Psychologists, adaptationism, is not properly understood solely as the desire to break down organisms into unitary traits.

Sober says that "adaptationism, as a claim about nature, is a thesis about the "power" of natural selection" (Sober 2000, 121). And so the over-use of the term "adaptation" involves attributing more wide ranging power to natural selection. This idea requires some unpacking and Sober does so. He thinks of the "tendency of thought" of adaptationism as coming in degrees or strengths:

- (U) Natural selection played some role in the evolution of T in the lineage leading to X.
- (I) Natural selection was an important cause of the evolution of T in the lineage leading to X.
- (O) Natural selection was the only important cause of the evolution of T in the lineage leading to X.

These theses are presented in ascending order of logical strength; (I) entails (U) but not conversely, and (O) entails (I) but not conversely. (Sober 2000, 124).

According to Sober, the general claim of adaptationism is that “Most phenotypic traits in most populations can be explained by a model in which selection is described and nonselective processes are ignored” (124). In other words, most phenotypic traits can be treated as adaptations. We might reasonably ask, as opposed to what? There was a hint of an answer to this question in Williams allusion to “chance.” Although it is popular to characterize evolutionary change as change due to chance, evolutionary biologists understand chance in quite a separate way to evolution via natural selection. Change in a trait in a population by chance alone, is referred to as change by drift. Drift, constitutes a non-selectionist explanation for a trait. But there are lots of other explanations that do not appeal directly to natural selection. So, adaptationists, of Sober’s (O) variety, ignore all these alternate explanations and are committed to the view that the best explanation for any given trait is that it is an adaptation.

Part of the discussion about Evolutionary Psychology’s alleged failings does turn on this notion of adaptationism. But I think that a more interesting notion of adaptationism is a more crucial guiding principle in their work. This notion of adaptationism is characterized by Godfrey-Smith. While Sober sees the main issue in articulating adaptationist theses as an issue of the relative power of natural selection, Godfrey-Smith sees this as only one of the issues at play. He also identifies three adaptationist theses but they are different from Sober’s:

Empirical Adaptationism: Natural selection is a powerful and ubiquitous force, and there are few constraints, except general and obvious ones, on the biological variation that fuels it. To a large degree, it is possible to predict and explain the outcome of evolutionary processes by attending only to the role played by selection. No other evolutionary factor has this degree of causal importance. (Godfrey-Smith 2001, 336)

Explanatory Adaptationism: The apparent design of organisms, and the relations of adaptedness between organisms and their environments, are *the big questions*, the amazing facts in biology. Explaining these phenomena is the core intellectual mission of evolutionary theory. Natural selection is the key to solving these problems; selection is the *big answer*. Because it answers the biggest questions, selection has unique explanatory importance among evolutionary factors. (Godfrey-Smith 2001, 336)

Methodological Adaptationism: The best way for scientists to approach biological systems is to look for features of adaptation and good design. Adaptation is a good “organizing concept” for evolutionary research. (Godfrey-Smith 2001, 337)

Empirical adaptationism appears to be roughly the same as Sober’s (O) adaptationism but methodological adaptationism is weaker than and different in character than Sober’s (U) adaptationism. Methodological adaptationism is a heuristic principle; it advises biologists (and those in related fields) to start out looking for adaptation and see where it leads but it does not commit investigators to a view about the relative amount of adaptation or the number of adaptations out there in the world.<sup>4</sup> Explanatory adaptationism needs a little more spelling out, as it does not look like anything in the logical space Sober articulates.

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<sup>4</sup>Tim Lewens (2009) distinguishes seven distinct adaptationist theses. He also uses the terminology “heuristic adaptationism” in explaining Godfrey-Smith’s notion of methodological adaptationism. Lewen’s account of methodological adaptationism differs from mine. For example, he maintains that Dennett is a methodological adaptationist “*par excellence*” but I agree with Godfrey-Smith’s

Godfrey-Smith says that Richard Dawkins is an explanatory adaptationist: “The first chapter of The Blind Watchmaker is an extended defense of the claim that apparent design in nature poses a uniquely important problem for the scientific world view, and biology’s special task is to solve this problem” (Godfrey-Smith 2001, 339). This view is also clearly articulated and defended in Dennett’s Darwin’s Dangerous Idea (1995). Godfrey-Smith’s assessment of explanatory adaptationism, one that I share and think is correct, is that it serves best as a principle that separates biology from natural theology and is not the kind of principle that guides biological research or practice. As he says for the explanatory adaptationist “selection is seen as a critically important part of a larger intellectual enterprise, the enterprise of developing and defending a secular worldview” (350). So for the explanatory adaptationist the focus is on apparent design, for example, the intricacy of complex organs, and the claim is that this design must be accounted for in evolutionary terms. But as we saw Seger and Stubblefield make abundantly clear, biologists (since Darwin) already knew that. This is not a guiding principle that helps to generate innovative explanations of the whole array of natural phenomena that fall under the scope of evolutionary biology.

While Evolutionary Psychologists may well be adaptationist in some of the other senses that we have reviewed, I am now going to argue that they are best understood as explanatory adaptationists. This characterization helps us understand their account of what adaptations are it also could prove to be an obstacle to genuinely interdisciplinary research with other biologists of human behavior.

## 5 Evolutionary Psychology, Design and Explanatory Adaptationism

As we have seen, Evolutionary Psychologists focus on psychological adaptations. We have also seen that they are committed to the view that adaptations are the functional components of organisms, identified by evidence for their design. And further that the way in which psychological adaptations are identified is by evolutionary functional analysis, which is a type of reverse engineering. Now I want to expand upon these claims and examine them a little more carefully. To do this I first look at what Evolutionary Psychologists say about adaptation and evolutionary research.

Evolutionary Psychologists Simpson and Campbell have this to say

evolutionary research programs must be developed, organized and structured around providing more firm and direct evidence for the special design properties of possible adaptations. As more and more special design features of a hypothesized adaptation are documented, each contributing to a specific function, it becomes more plausible that the hypothesized adaptation actually evolved for that function. The best and most rigorous evolutionary research programs routinely test for special design features. (2005, 126)

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characterization of Dennett as an explanatory adaptationist; Dennett is strongly invested in the idea that most, if not all, traits are adaptations.

This is a nice statement of an explanatory adaptationist approach. And if Godfrey-Smith is correct, while this view may distinguish work in Evolutionary Psychology from natural theology, it does not provide any guiding principles for adaptationist research. My claim is that this is a problem for Evolutionary Psychologists if their research is to contribute to the interdisciplinary project of the biology of behavior. The idea is that their notion of adaptation is too narrow and their adaptationism does not indicate how to generate good hypotheses about potential adaptations, except in the cases that they show intricacy, which on their view is a good indicator of design. As we have seen potential adaptations do not always reveal themselves in this way.

I could stop here but there is a bigger worry in this neighborhood and it has to do with Evolutionary Psychologists' fixation on design. Bringing this issue to the surface may help explain a rather extreme sounding criticism that Buller directs at Evolutionary Psychology.

Buller devotes a chapter of his book to Evolutionary Psychologists' concept of human nature. The specifics of this discussion are beyond the scope of this paper but part of the background to Buller's discussion overlaps with the current discussion. Buller accuses Evolutionary Psychologists of being natural theologians, because they buy into the idea that evolution produces "organs of extreme perfection." If he is right, this would be odd, because I have been trying to argue that Evolutionary Psychologists are explanatory adaptationists and as such, reject natural theology. Let's take a look at what Buller says. Buller discusses the relation between Darwin and Paley and claims, not controversially, that "throughout the nineteenth century, *the* problem that naturalistic theories had to solve was the problem of complex design" (Buller 2005, 474). Buller goes on to say that Darwin provided a naturalistic solution to Paley's problem of complex design but he also says

But, while natural selection was the mechanism that met Paley's challenge, there has always been much more to evolutionary theory than explaining how "organs of extreme perfection and complication" arose by natural selection. [...] the process of selection itself doesn't result only in complex adaptations. Selection also eliminates traits from populations and, arguably, eliminates entire groups or populations. Since Darwin's time, it has also become clear that selection can sometimes prevent a population from becoming optimally adapted to its environment. (Buller 2005, 474)

I take it that the conclusion we can draw from what he says here is consistent with one of the conclusions I have been urging: focusing on organs of extreme perfection and apparent design in nature undersells evolutionary theory; the focus undersells evolution's explanatory scope. But should we conclude from this that Evolutionary Psychologists are natural theologians. My initial response is that Buller is using a bit of hyperbole to drive home his point about the scope of evolutionary explanations but a look at some other Evolutionary Psychologists' characterization of adaptation might incline us towards a more literal interpretation of Buller's charge.

Here is Edward Hagen's definition of an adaptation again without ellipses:

Adaptations, the fundamental components of organisms, are identified not by identifying their underlying genes, but by identifying evidence of their design: the exquisite match between organism structure and environmental challenge so eloquently described by Paley (2005, 148).

Hagen cites Paley but that is not quite enough to accuse him, and other Evolutionary Psychologists, of being natural theologians like Paley. But Hagen also says

Paley [ ... ] clearly identified one of the major scientific problems that Darwin and Wallace eventually solved: the manifestation in nature of *design*. Although Paley did not conceive of the problem as a scientific problem but instead as a theological problem, his clear and decisive arguments, synthesizing a long tradition in natural theology, nonetheless form the very foundation of Evolutionary Psychology (Hagen, 2005, 148).

This claim is more problematic. Paley's clear and decisive arguments, well known to philosophers of religion, are carefully crafted versions of the design argument for the existence of God. These arguments surely can't be the foundation of Evolutionary Psychology, if Evolutionary Psychology is the attempt to provide explanations for our behavior based in evolutionary theory. What has gone wrong here?

My sense is that the problem lies in hanging on so hard to a notion of design. We can perhaps treat Hagen's claims of allegiance to natural theology as a slip<sup>5</sup> and so not jump to the conclusion that he, and Evolutionary Psychologists in general, want to be thought of as natural theologians. Rather, it is important to stress that a focus on design brings with it notions of completeness, perfection of function and so on that are not the only important components of the evolutionary biologists' explanatory repertoire. Closely associating adaptation and design in the context of explaining the workings of evolutionary theory is misleading. The association misleads, because as we have seen, if adaptationist explanations were only available for features exhibiting apparent design, there would not be much by way of evolutionary explanation of the natural world (C.f. Richardson 2007, 49). Further, as Buller emphasizes, we want to be able call upon evolution to explain obvious failures of fit between organisms and the world and we frequently do. I rest with a weaker conclusion than Buller's: Evolutionary Psychologists are explanatory adaptationists and have a restrictive notion of adaptation.

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<sup>5</sup>Hagen makes another slip in the paper that is worth noting. He says in response to Gould and Lewontin's criticism that adaptation is often invoked in situations where other explanations of the relevant biological feature would suffice that they "were apparently unaware that George Williams (1966) had already both discussed this problem in great depth and provided its solution: Adaptations will exhibit evidence of design" (Hagen, 2005, 149). As I pointed out above, this part of Gould and Lewontin's criticism of adaptationism is simply a restatement of Williams' own view. To make matters worse for Hagen, Gould and Lewontin's paper was published in a special issue of Proceedings of the Royal Society of London. Series B, Biological Sciences (1979). This issue also contained papers by Maynard-Smith (475–488), Dawkins and Krebs (489–511) and G.C. Williams (567–580) among other leading evolutionary theorists. The papers were the conference proceedings of a conference on adaptation that all these biologists attended. Gould and Lewontin's paper continues to be cited by biologists who discuss the concepts of adaptation and adaptationism.

## 6 Conclusion

To re-cap, I am interested in advancing a broad range of biological explanations of human behavior. For Evolutionary Psychologists to contribute to an interdisciplinary biology of human behavior, it seems reasonable to ask that they share the same theoretical tenets as those working in neighboring fields. I have argued that the notion of adaptation that Evolutionary Psychologists invoke is too restrictive and the version of adaptationism that they adhere to is explanatory adaptationism, which may be more or less sufficient to distinguish their work from natural theology but does not provide any useful guiding principles for pursuing the study of adaptation in nature.

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**Stephen M. Downes** Professor and Chairman, Philosophy Department, University of Utah. Downes' research is in philosophy of science and philosophy of biology. He currently has two main research interests: Biology of Human Behavior and Models and Images in Science.