Evolutionary Psychology

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Book Review

Why Evolutionary Psychology is "True" [1]

A review of Jerry Coyne, *Why Evolution is True*. Viking Penguin: New York, 2009, 304 pp., US$27.95, ISBN-13 978-0-670-02053-9 (hardcover)

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Jerry Coyne is a professor in the Department of Ecology and Evolution at the University of Chicago. In *Why Evolution is True* (*WEIT*), he undertakes a daunting task: to provide a thorough yet concise and readable account of the evidence in support of evolution. It is difficult to overstate Coyne's success in meeting this goal. From fossils and embryos to biogeography and speciation, Coyne not only reviews detailed evidence for evolution, but also explains why this evidence is exactly what we would expect to find if evolution were true, all with a writing style that is engaging and accessible. Coyne is also successful in what is obviously another of his goals, which is to provide a devastating response to creationist arguments.

Several reviews have summarized the many excellent aspects of *WEIT* (e.g., Dawkins, 2009; Futuyma, 2009; Padian, 2009). In this review, we address an aspect of *WEIT* that appears to have been mentioned in just one other review. Futuyma (2009) briefly mentions Coyne's critique of evolutionary psychology, suggesting that "one might make more allowance for the possible validity of hypotheses in this field" (p. 357). We expand upon this suggestion by highlighting several misconceptions of evolutionary psychology presented in *WEIT* and by describing what evolutionary psychology is and is not, with the hope that those who have dismissed the field will reconsider their position.

What is Evolutionary Psychology?

Coyne begins his critique of evolutionary psychology in chapter nine by asking, "So if our evolution as social apes has left its imprint on our brains, what sorts of human *behavior* might be 'hardwired?'" (p. 226; italics added). This is an unfortunate start, because it promotes a misconception of evolutionary psychology that is repeated throughout the next several pages.

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Although the focus of evolutionary psychology is to understand human behavior, evolutionary psychologists do not contend that selection has acted directly on specific behaviors. Rather, selection has acted on the information-processing mechanisms in the brain. These distinct information-processing mechanisms, or modules, were proposed by Fodor (1983), a concept that has subsequently been refined and expanded (see Barrett and Kurzban, 2006). The distinction between behavior and information-processing mechanisms is important because behavior is generated by these evolved mechanisms responding to particular input. In other words, "[f]ar from implying that evolved behaviors are fixed and inflexible, evolutionary theories make many specific predictions about context-dependent responses to environmental variables" (DeBruine, in press, p. 2).

Another misconception about evolutionary psychology presented in *WEIT* is revealed in the description of the "Environment of Evolutionary Adaptedness," or EEA. According to Coyne, evolutionary psychologists claim that, "over the millions of years of human evolution, the environment, both physical and social, was relatively constant" (p. 245). This is not what evolutionary psychologists claim. The EEA does not refer to the entire evolutionary history of humans. Rather, there is a distinct EEA for each adaptation. A more accurate definition of an EEA is "a statistical aggregate of selection pressures over a particular period of time that are responsible for the emergence of an adaptation" (Buss, Haselton, Shackelford, Bleske, and Wakefield, 1998, p. 536). This definition is consistent with the fact that the environment did not remain constant in every way over the millions of years of human evolution. Moreover, it is not the environment as a whole that must remain constant for an adaptation to be constructed, but rather the selection pressures that construct each particular adaptation. For example, the problem of social contract cheaters is likely to have been a consistent selection pressure for as long as humans have lived in social groups, regardless of changes in climate or other aspects of the environment. Therefore, evolutionary psychologists have hypothesized that humans have cognitive adaptations for detecting cheaters in social groups, a hypothesis that has accumulated substantial empirical support (see Cosmides and Tooby, 2005, for review).

Is Evolutionary Psychology Useful?

Coyne is particularly skeptical of any contributions evolutionary psychology can make to understanding human behavior because of our ability to act in ways that run counter to our "instincts." Coyne summarizes this position by stating, "It is clear, then, that whatever genetic heritage we have, it is not a straightjacket that traps us forever in the 'beastly' ways of our forebears" (p. 231). This is undoubtedly true, and no evolutionary psychologist would disagree. However, if our ability to rise above some of our primitive predilections is not itself a product of evolution, then where did this ability come from? The choices humans have made throughout history have certainly been the result of many proximate factors, but ultimately the ability to ignore our instincts and choose other behaviors is made possible by the forces of evolution that have acted on our brains for millions of years.

Does this mean that an evolutionary approach is vital, or even useful, to understanding *all*

behavior? Not necessarily, but there are many categories of behavior that have been illuminated by this approach, including perception (Jackson and Cormack, 2008), mating (Apicella and Marlowe, 2007), parenting (Lawson and Mace, 2009), cooperation (Prader, Euler, and Fetchenhauer, 2009), aggression (Navarrete et al., 2009), even religion (Johnson, 2005) as well as other aspects of culture (Fincher, Thornhill, Murray, and Schaller, 2008).

Furthermore, an evolutionary approach can be used to generate hypotheses about previously undocumented or unknown phenomena. Evolutionary psychologists hypothesized three decades ago that men and women would differ psychologically in the weighting given to cues that trigger jealousy (Daly, Wilson, and Weghorst, 1982; Symons, 1979). A man's jealousy has been hypothesized to focus on cues to a long-term partner's sexual infidelity, because this jeopardizes his certainty in paternity and places him at risk of investing in another man's offspring. A woman's jealousy has been hypothesized to focus on cues to the long-term diversion of a man's commitment, such as his emotional involvement with another woman (i.e., emotional infidelity). The predicted sex differences in the nature of jealousy have been found repeatedly by different investigators—psychologically, physiologically, and cross-culturally (Becker, Sagarin, Guadagno, Millevoi, and Nicastle, 2004; Buss, Larsen, Westen, and Semmelroth, 1992; Buss et al., 1999; Buunk, Angleitner, Oubaid, and Buss, 1996; Miller and Maner, 2008; Schützwohl, 2008; Wiederman and Kendall, 1999). Prior to the work by evolutionary psychologists, researchers relied on global assessments of jealousy (e.g., "How jealous are you?") which were insensitive to, and therefore did not identify, psychological sex differences (see Buss, 2000, for a review).

Is Evolutionary Psychology a Science?

Applying evolutionary theory to behaviors such as parenting and religion may seem controversial, but as Coyne states, "What moves science forward is ignorance, debate, and the testing of alternative theories with observations and experiments. A science without controversy is a science without progress" (p. 223). The importance of testing alternative theories is worth noting because Coyne describes several areas of study within evolutionary psychology as if no such testing has been conducted or even proposed. The phenomena he raises are art and literature, rape, depression, and homosexuality. For each phenomenon, he provides an "explanation" (by which he seems to mean "hypothesis") for the behavior that already has been proposed by evolutionary psychologists, and then claims that it is so easy to come up with such explanations that the entire study is reduced to "a scientific parlor game" (p. 228).

For example, Coyne mentions the apparent evolutionary paradox of homosexuality and comments sardonically that, "one can save the day by assuming that, in the EEA, homosexual males stayed home and helped their mothers produce other offspring" (p. 228). Although this is indeed an evolutionary psychological hypothesis (Wilson, 1975), what Coyne does not mention is that empirical research conducted *by evolutionary psychologists* falsified this hypothesis nearly a decade ago (Bobrow and Bailey, 2001). Properly constructed "explanations" posited by evolutionary psychologists are falsifiable hypotheses, which are rejected or tentatively accepted

based on the accumulation of hard-won empirical data.

Regarding empirical data, Coyne appears to be unconvinced by the evidence in support of evolutionary psychological hypotheses. He concludes that "many assertions about evolutionary psychology sink without a trace" because the research methods used are not "at least as rigorous as that used in studying nonhuman animals (…) [which] sets the bar pretty high" (p. 230). To which specific "assertions" is Coyne referring, and in what specific ways are nonhuman research methods more "rigorous"? Evolutionary psychologists test hypotheses using the wide variety of research methods available to the social and behavioral sciences, including, for example, cognitive and behavioral experiments, cross-species comparative analyses, questionnaire studies, analyses of archival databases, endocrine assays, and the latest technology in brain scanning and software programs (for review, see Simpson and Campbell, 2005). Some of the methods available to scientists who study nonhumans, such as genetic engineering, are for ethical reasons not available to scientists who study human evolved psychology. But then some of the methods available to evolutionary scientists who study humans, such as questionnaire studies of emotions, motives, and cognitions, are not available to evolutionary scientists who study nonhumans. Unless Coyne is willing to dismiss the variety of research methods used by the social and behavioral sciences, his argument that evolutionary psychological research is not rigorous enough "sinks without a trace."

It is important to return to the issue of falsifiability because Coyne suggests that the majority of work in evolutionary psychology consists of "untested – and probably untestable – speculations" (p. 230). This defeatist attitude is the antithesis of science, and it ignores the fact that much of the work in the field is indeed based on rigorous empirical research (see Buss, 2005). We are not suggesting that every hypothesis proposed by evolutionary psychologists has been tested, but untested hypotheses can be found in any science. Theoretical articles are immensely useful in providing a framework for future empirical research on a particular topic. To dismiss an entire field because some hypotheses have not yet been tested is premature at best and disingenuous at worst.

One might argue that evolutionary psychological hypotheses are untestable because we cannot literally see the complex cognitive adaptations of our ancestors, but this does not make the scientific study of such adaptations impossible. Indeed, the same can be said for other aspects of evolution, and Coyne responds to this objection by stating:

> Understanding the evolution of complex biochemical features and pathways is not as easy, since they leave no trace in the fossil record. Their evolution must be reconstructed in more speculative ways, (…) [and] scientific research is beginning to give plausible (and testable) scenarios for how they could have evolved (pp. 138-139).

We may not be able to see how information-processing mechanisms evolved in our ancestors, but as Coyne mentions, "Historical reconstruction of a process is a perfectly valid way to study that process, and can produce testable predictions" (p. 183; and see Williams, 1966). Given what we know about the environments and selection pressures our ancestors likely faced, we can hypothesize what those information-processing mechanisms are and devise empirical tests to

investigate their existence, design, and function. This approach can be summarized as follows: "What was the mechanism designed to do, and, in modern environments, what does it actually do? The answer to the first can inform empirical work on the second, and empirical results regarding the second can inform the first" (Barrett and Kurzban, 2006, p. 644). In other words, properly constructed hypotheses of cognitive adaptations posited by evolutionary psychologists are testable and falsifiable. Coyne is right to dismiss hypotheses that do not meet these criteria, and no evolutionary psychologist would disagree with this stance.

However, it is important to note that evolutionary psychology is *not* falsifiable, because it is not a theory. Rather, it is an *approach* to understanding psychology and behavior that is informed by evolutionary theory, so skillfully summarized in *WEIT*. The usefulness of an evolutionary psychological approach ultimately will be decided by empirical testing of properly constructed, falsifiable hypotheses derived from this approach.

Conclusion

WEIT is a stunningly good book and is the best concise source to date on the evidence in support of evolution. It is precisely this excellence that compelled us to write this review. Coyne has clearly done his homework to illustrate the evidence for evolution, skillfully highlighting the appropriate information from fields such as paleontology, embryology, molecular genetics, and biogeography. He expertly describes the core tenets of evolutionary theory, such as natural selection, sexual selection, and speciation, and clearly explains the evidence that supports these tenets. He leaves no stone unturned, often anticipating objections to evolutionary explanations and striking them down with even more compelling evidence. With such attention to detail, many readers may assume that Coyne invested the same time and effort into researching evolutionary psychology, but this does not seem to be the case. His critique of evolutionary psychology is frustratingly vague and riddled with misconceptions, in stark contrast to the superb level of detailed explanation found in the rest of the book.

As *WEIT* demonstrates so effectively, the theory of evolution by natural selection is supported by copious evidence from many independent sources. Because scientific understanding is cumulative and evolutionary psychology is a relatively young field, the empirical support for evolutionary psychological hypotheses is comparatively modest. Nevertheless, cognitive adaptations in the form of information-processing mechanisms are the best explanation we have for complex human psychology and behavior, and the empirical studies conducted thus far have not falsified this explanation. In this sense, we can assert that the basic tenets of evolutionary psychology are "true" with the same confidence that Coyne asserts the truth of evolution.

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