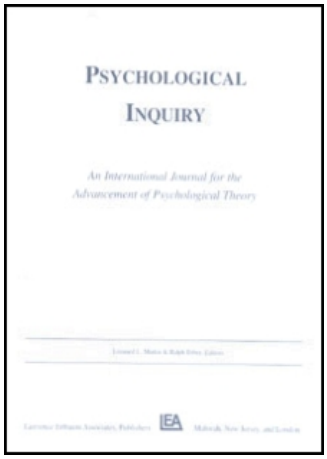

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Evolutionary Psychology Is a Metatheory for Psychology

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Evolutionary Psychology Is a Metatheory for Psychology

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We share Ploeger, van der Maas, and Raijmakers's desire for a theoretically integrated and empirically robust evolutionary psychology. Like evolutionary theory itself, which over time incorporated new discoveries such as particulate inheritance and important theoretical developments such as inclusive fitness, present-day evolutionary psychology does not represent a rigid set-in-stone framework, but one that is developing over time. The field welcomes theoretical additions and modifications that lead to novel hypotheses, testable predictions, and important discoveries. In keeping with the goal of moving evolutionary psychology forward, this commentary focuses on several of the suggestions the Ploeger et al. article proposes for the field.

What Is Evolutionary Psychology?

The target article contends that mainstream evolutionary psychology is based on the "neo-Darwinian perspective," which is expressed in a small number of publications (Buss, 1995, 2003; Pinker, 1997; Tooby & Cosmides, 1992), most of which were published over a decade ago. We agree that it is dangerous to argue

that the diversity of ideas and perspectives in a field of study can be captured by a low number of publications produced by only a few individuals. Unfortunately, that is precisely what the Ploeger et al. article does. Given the diversity of theoretical perspectives and the explosion of research in evolutionary psychology (see Buss, 2004, 2008; Dunbar & Barrett, 2007; Gangestad & Simpson, 2007; Sober & Wilson, 1999), it is inappropriate to paint it with one narrow brush in only one color.

We believe that there does exist widespread agreement among evolutionary psychologists on several key foundational premises, including (a) that modern evolutionary theory is essential for understanding the origins and design of the human mind; (b) that the statistical properties of the multiplicity of adaptive problems recurrently faced by humans over deep time have fashioned a number of specialized psychological adaptations; (c) that these adaptations can be described at a cognitive level as information-processing devices; (d) that these devices are instantiated in the human brain; and (e) that environmental interactions are essential at every step of the causal chain—from the origins of adaptations, to their development during ontogeny, to their expression in manifest behavior.

Outside of these core metatheoretical premises, however, evolutionary psychologists have a multiplicity of views, and healthy scientific debates abound. The most important of these center around the nature of individual differences, the role of culture, the understanding of development, and the degree to which relatively domain-general mechanisms exist, in addition to those that are more domain-specific (see Buss, 2004, 2008, for a discussion of these interesting debates).

We believe that the Ploeger et al. article misses one of the most important accomplishments of evolutionary psychology—conceptual integration (Tooby & Cosmides, 1992). Evolutionary psychology provides a unifying metatheory for the currently disparate and disconnected branches of psychology (Buss, 1995). Evolutionary psychology unites the field of psychology with all the other life sciences, including biology, economics, political science, history, political science, legal scholarship, and medicine; it unites humans with all other species, revealing our place in the grand scheme of the natural world. If a viable alternative metatheory exists that successfully accomplishes these forms of conceptual unification, it has not yet been revealed to the scientific community.

Is the Analysis of Evolutionary Psychology by the Target Article New or True?

The target article asserts that some premises of modern evolutionary psychology are wrong and suggests others that would be useful to integrate into the field. On the good side, some of their proposals are already in use by evolutionary psychologists, and so are not really new. Others, unfortunately, are sufficiently vague or underspecified so that they do not lead to novel, testable hypotheses.

One suggestion is that evolutionary psychology should make use of the concept of behavior initiated evolution. Often referred to as the Baldwin Effect after its progenitor James Baldwin (1896), behavior initiated evolution has been used by evolutionary psychologists as part of the explanation for the origins of a range of complex behaviors, from speech production (MacNeilage & Davis, 2005; Pinker, 1994) to aggression (Duntley & Buss, 2005; Daly & Wilson, 1988). Evolutionary psychologists, like biologists (e.g., Alcock, 2005; Krebs & Davies, 1987), often do not refer to "behavior initiated evolution" by name because it is taken for granted to be an important aspect of the process of selection. In short, their suggestion is reasonable, but it is not new.

Second, the target article conflates different levels of explanation in determining the origins of adaptations. It correctly states that early eyespots on butterfly wings appeared because of a mutation that changed the way that butterfly wings developed. However, the evolution of distinct eyespots that now appear on butterfly wings required subsequent selection both to *refine* and to *maintain* them. Mutation *and* selection are necessary for the evolution of new adaptations.

Third, the target article contends that the neo-Darwinian approach ignores the influence of mutation on the process of selection. This is a new criticism, but it is not true. Evolutionary psychologists are interested in all aspects of evolutionary processes and are actively exploring the role and effects of mutation. For example, mutation-selection balance has been proposed to produce measurable psychological effects that may include psychological disorders (Keller & Miller, 2006) and individual differences in personality (Penke, Denissen, & Miller, 2007).

Fourth, the target article asserts that evolutionary psychologists ignore or dismiss individual differences. Although it is true that species-typical and sex-typical adaptations have been the central focus of much of evolutionary psychology, a substantial minority of evolutionary psychologists have been actively exploring individual differences (Belsky et al., 2007; Buss, 1991, 1996; Buss & Greiling, 1999; Figueredo et al., 2005; Hawley, 2006; Keller & Miller, 2006; Mealey, 1995; Penke et al., 2007). In fact, all sources of individual differences, heritable and environmental, are the object of theory and research in the field of evolutionary psychology.

Fifth, the target article contends that evolutionary psychologists "study the mechanisms at the behavioral and the cognitive level and leave the question open about how the mechanisms actually develop"

(p. 8). It is certainly true that precisely how psychological adaptations develop over ontogeny is a difficult and important area, and what we know is paltry compared to what remains to be discovered. Nonetheless, how psychological adaptations develop has been the subject of several books and many research programs within evolutionary psychology. Recent books include those by evolutionary psychologists Ellis and Bjoklund (2005) and Geary (2005). The recent *Handbook of Evolutionary Psychology* (Buss, 2005) contains several chapters on development, including one entitled "Evolutionary Developmental Psychology." In addition, specific theory and research on topics such as father absence (Belsky et al., 2007), language acquisition (MacNeilage & Davis, 2005; Pinker, 1994), prepared fears (Mineka, Davidson, Cook, & Keir, 1984; Ohman & Mineka, 2001), and discounting the future (Daly & Wilson, 2005; Wilson & Daly, 2006) demonstrate that the target article's criticism that evolutionary psychologists neglect development simply is not true. We agree, however, that much more work on development is needed.

On the Evolution of Domain-General and Domain-Specific Adaptations

Although all evolutionary psychologists, as far as we can tell, agree that there exist at least some domain-specific adaptations, a healthy scientific debate exists among evolutionary psychologists over the evolution of somewhat more domain-general mechanisms. These debates have been aired in scientific journals (e.g., Chiappe & MacDonald, 2005; Geary & Huffman, 2002) as well as in textbooks on evolutionary psychology (e.g., Buss, 2004, 2008). We believe that the target article muddles rather than clarifies this debate by mischaracterizing the issues from the start. The article contends that evolutionary psychologists think that "domain-specificity refers to the extent to which a mechanism is tailored to handle some particular and narrow range of inputs" (p. 4). We believe that it is unfortunate that the term *domain-specificity* is used differently by different scientists, evolutionary psychologists, and their critics alike, often in vague, confusing, and contradictory ways. It is also true, however, that evolutionary psychologists discuss domain-specificity at multiple levels, including specificity of input, specificity of decision rules, and specificity of output.

When evolutionary psychologists refer to a "domain," generally they are describing a distinct category. An adaptive problem domain refers to a specific category of problem that was recurrent over human evolutionary history and affected an individual's reproductive success, directly (e.g., by increasing mating success) or indirectly (e.g., by affecting a person's social status, which in turn increases the prospects of having children). These adaptive problems created selection pressure for the evolution of functional mechanisms to solve them. Individuals with variants of mechanisms that provided better solutions to adaptive problems would have had better reproductive success, passing on the genes that contributed to the development of those variants in greater frequency to subsequent generations. The combination of mechanisms that is useful in the solution of one adaptive problem generally is not useful in the solution of another. For example, the mechanisms useful in determining whether an object in the environment is suitable to eat would not be helpful in determining whether an organism would be a suitable mate. As a result, evolutionary psychologists have argued that selection has fashioned specific mechanisms for food choice that are at least somewhat distinct from mechanisms for mate choice.

Evolutionary psychologists adopt a guiding metatheoretical principle. They propose that whenever there were distinct features of different ancestral problems—such as determining whether meat is edible or spoiled or whether a mate is fertile or infertile—there existed distinct selection pressures for the evolution of mechanisms capable of solving the distinct features of each problem. Olfactory receptors sensitive to the presence of high levels of bacteria in meat solve a different class of problem than evolved preferences for visual cues to fertility in potential mates such as a low waist-to-hip ratio. Evolutionary psychologists argue that our ancestors faced a large number of adaptive problems that had distinct characteristics. These would have created selection pressure for the evolution of a number of distinct solutions, leading to many design features of cognitive mechanisms dedicated to the solution of distinct features of ancestral adaptive problems (Buss, 1999, 2004, 2008; Pinker, 1997; Tooby & Cosmides, 2005).

This metatheoretical position does not preclude the existence of more general mechanisms. Although positions differ, the notion that cognitive mechanisms vary in how specific or general the adaptive problem domains they evolved to address is accepted by many evolutionary psychologists (Barrett & Kurzban, 2006; Buss, 1999, 2004, 2008; Tooby, Cosmides, & Barrett, 2005). For example, cognitive mechanisms that allow us to perceive depth contribute to the solution of a range of specific adaptive problems, from eating a piece of food to avoiding projectiles hurled by hostile conspecifics. Depth perception by itself, however, is not enough to solve any adaptive problem. Other evolved mechanisms specific to each adaptive problem domain are also required. Securing caloric resources to solve the problem of a negative energy balance typically requires, at a minimum, a motivational mechanism of hunger, foraging mechanisms that identify objects in the environment that qualify as food, other mechanisms that determine whether the food is edible,

and the coordination of body movements synchronized with visual perceptions of the food's location.

The key point is that the fact that processes such as attention, working memory, and statistical learning might all be involved in solving the adaptive problems of eating and mating does not warrant the conclusion that they are fully domain-general processes. Indeed, there already exists empirical evidence that components of both attention and memory have both domain-specific and sex-differentiated components, corresponding to domain-specific and sex-differentiated adaptive problems (Buss, 2008; Schützwohl & Koch, 2004; Todd, Hertwig, & Hoffrage, 2005). So although it is true that processes such as attention, memory, vision, and others participate in solving distinct adaptive problems such as eating and mating, that participation does not warrant the conclusion that those processes are fully domain-general. Because there already exists empirical evidence that these processes are not fully domain-general, it is likely that future researchers will discover additional design features of these processes that come online to solve specialized adaptive problems.

Dynamical Systems and Evolutionary Psychology

The second half of the article by Ploeger et al. is devoted to an exploration of how dynamical systems/self-organization theory and developmental plasticity are a rich but overlooked resource that could move the field of evolutionary psychology forward as it has done in developmental biology and other fields. Because of their similarities, we refer to all of them as the "dynamical systems perspective." To illustrate the importance of dynamical systems, the authors cite Sterelny and Griffiths' statement that, "evolutionary developmental biologists hold the view that there is a dynamic interaction between genes and environment. . . . 'No one supposes that a plant will grow in just the same way no matter what sort of light or nutrients it receives." ' (p. 8).

We agree that the plant likely will not grow the exact same way in all environmental conditions. However, we also know that the seeds will grow a plant of a certain species, not an animal and not a different species of plant. We also know the strategies that the plant will use to obtain nutritional resources, deal with hostile forces of nature, and reproduce. There is no doubt that both genes and environment are required for any organism to develop. The question is, How useful is a dynamical systems perspective in shedding light on this process and the origins of functional mechanisms?

One weakness of a dynamical systems perspective is the lack of specificity of its hypotheses about what occurs during a dynamical process. Typically, dynamical systems researchers specify a starting point and rules of interaction for the units of the system they are studying. Next, the units of the system are set in motion, generating patterns that are argued to be "self-organized." For example, the authors argue that "patterns appear without a blueprint of the patterns themselves" (p. 8). What the authors appear to be arguing is that information coded in genes dynamically interacts with input that was reliably available in ancestral environments to produce an organism or functional characteristic—genes can't do it by themselves. This does not mean that the blueprint for development is or ever was absent. It is present in the combination of genes and relevant input from the environment. The two pieces together provide a blueprint for the patterns themselves. With an understanding of the specific functions of all the interacting parts, we would be able to predict the patterns perfectly.

Proposals that invoke self-organization or dynamical systems, like all other scientific proposals, must be evaluated by rigorous scientific criteria. What new insights, findings, hypotheses, and predictions have been generated by these approaches with respect to illuminating human nature? To our knowledge, the answer is nil. We are not aware of a single new specific prediction or empirical finding generated by these approaches. In sharp contrast, evolutionary psychology has produced a veritable bounty of them (see Buss, 2005, 2008). In sum, dynamical systems approaches are not alternatives to evolutionary psychology and to our knowledge have not generated new insights, findings, hypotheses, or predictions about human cognition and behavior.

Conclusion

Ploeger et al. propose to save evolutionary psychology from accusations of "just-so stories." In science, this is accomplished by advancing falsifiable hypotheses and predictions, conducting careful studies, and then determining whether the predictions were right and the hypotheses supported. Because modern evolutionary psychology is flush with a plethora of these, and the target article offers none, it seems that that article is guilty of exactly the "just-so stories" it purports to correct. Evolutionary psychologists will welcome new theoretical insights when conceptual offerings fulfill standard rigorous scientific criteria—providing heuristic value in leading researchers to domains otherwise undiscovered or neglected, generating specific empirical predictions about new phenomena, organizing known facts in a more cogent and parsimonious fashion than existing conceptual frameworks, and providing conceptual unity that was previously lacking. Although evolutionary psychology is a young science, it currently fulfills these scientific criteria better than any competing metatheory.

Note

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