

The Explanatory Power of Evolutionary Approaches to Human Behavior: The Case of Morality

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Past critiques of evolutionary psychology from the perspective of developmental systems theory have accomplished little more than building straw men and knocking them down. For example, Lickliter and Honeycutt (2003) confused evolutionary psychology with behavior genetics and misattributed to evolutionary psychologists strong forms of genetic determinism that no one would endorse. Ploeger's target article does a better job of getting the positions advanced by evolutionary psychologists right.

Ploeger advances two related claims: the negative claim that evolutionary psychology fails to supply an adequate metatheory for psychology, and the positive claim that developmental evolutionary biology (henceforth, "evo-devo") can enhance the explanatory power of evolutionary psychology (and thus its status as a metatheory). With respect to the first claim, we would confer the status of a metatheory on the modern synthetic theory of evolution, and view the field of evolutionary psychology as one application of this metatheory. We would view developmental evolutionary biology as another application, concerned more with refining the metatheory of evolution than applying it to human behavior. Evo-devo may well be equipped to enhance our understanding of the role that developmental processes play in the production of traits, which may enhance our understanding of the relation between genotypes and phenotypes. It is, for example, intriguing to contemplate the power of regulatory genes that switch other genes on and off at various times during development and at various places in the

body, producing quite different phenotypic characteristics (e.g., the long necks of giraffes vs. the short necks of other animals). However, we see little in the arguments and evidence advanced in the target article to warrant significant revisions in the framework that guides evolutionary psychologists.

Assessing Ploeger's Critique of Evolutionary Psychology

To offer constructive criticisms of a theoretical or meta-theoretical approach, one must characterize it correctly. To accomplish this, one must extract assumptions shared by all, or most, of those who adopt the approach. All evolutionary psychologists accept the tenet that the forms of conduct that we observe in contemporary humans are products of mental mechanisms that were designed in ancestral environments to solve recurring adaptive problems. To decipher the design of people's cognitive architecture, we need to understand the recurring adaptive problems it was designed to solve. Recurring adaptive problems are like locks, and the mental mechanisms people use to solve them are like keys. From the perspective of evolutionary psychology, understanding human behavior entails determining the operating principles of mental mechanisms; that is to say, discovering the relevant instructions, programs, computational procedures, or algorithms that people use to make decisions that affect the probability that they will survive, reproduce, and propagate their genes.

Two giants in the field of evolutionary psychology, Tooby and Cosmides, have argued that because different adaptive problems require different solutions, mental mechanisms should be functionally specialized, and therefore domain-specific. Although most evolutionary psychologists would agree with this general deduction, there is considerable disagreement within the field about how modular we should expect mental

mechanisms to be. This is illustrated in a recent book by Steven Gangestad and Jeffry Simpson (2007) (*The evolution of mind: Fundamental questions and controversies*), in which evolutionary psychologists advance different positions on domain-specificity. As Tooby and Cosmides recognize, some mental processes cross domains, domain-specific processes may interact with one another to produce decisions, and superordinate processes are necessary to extract and combine information from different domains.

Ploeger claims that Tooby and Cosmides' "massive modularity" assumption is misguided, citing as evidence research reporting positive correlations between, for example, speed of processing on tasks in different domains, and ability levels in different modalities of working memory. The problem is, these aspects of cognition are not really relevant to Tooby and Cosmides' claims about domain-specificity. The aspects of cognition that are relevant are the "algorithms," or operating principles of information-processing and decision-making mechanisms—the ways in which they are structured and the logic underlying their operations, analogous to the software programs in computers. In this analogy, Ploeger focuses on overriding features of the computer itself, such as how fast it runs, how much memory it has, and so on. In addition, it is important to note that correlations in speed of processing and working memory performance across different domains do not establish that people do not process information in different domains at different speeds or with differing efficiency. Clearly, people process information in some domains faster than they process information in other domains, and people find it easier to remember some kinds of information (e.g., faces) than to remember other kinds of information (e.g., non-sense syllables), and so on. The reason offered by evolutionary psychologists is that early humans had to make faster decisions

about some adaptive problems in order to survive and to reproduce than they did about other adaptive problems.

Evaluating the Contributions of Evolutionary Psychology and Evo-Devo in the Moral

Domain

The value of an approach to any given scholar will depend on its ability to elucidate the phenomenon he or she seeks to understand. We seek to understand human morality and have found evolutionary psychology an invaluable aid. We make two challenges to proponents of evo-devo—(a) to identify limitations in accounts of morality derived from the perspective of evolutionary psychology, and (b) to explain how evo-devo can improve these accounts. In a nutshell, accounting for morality from the perspective of evolutionary psychology gives rise to the following expectations. The mental mechanisms that give rise to manifestations of morality were designed to solve recurring adaptive problems in ancestral environments, and therefore, the key to understanding how they are designed is to identify these adaptive problems. Moral cognition evolved to help early humans reap the benefits of cooperating with others and to resolve the conflicts of interest that inevitably occur when individuals join forces, coordinate their efforts, and engage in social exchanges to enhance their chances of surviving and reproducing. The ability to detect cheaters, the disposition to punish free-riders, and moral emotions such as gratitude, righteous indignation, guilt, and forgiveness evolved to help early humans uphold systems of cooperation. Moral judgments and moral reasoning originated as tools designed to induce members of groups to behave in prosocial ways (see Krebs, 2005, *in press a, b, c*, for elaborations of these ideas). All four issues addressed in the target article are relevant to morality. We will examine them

briefly from the perspective of evolutionary psychology, then ask what added insights evo-devo has to offer.

Domain-specificity

Psychological accounts of moral development such as the one advanced by Kohlberg assert that humans develop domain-general structures of moral reasoning from which they derive all their moral decisions. Evolutionary psychology leads us to question whether such general structures would have been effective at solving the particular recurring adaptive moral problems faced by early humans, and to expect more domain-specific structures to have evolved. The evidence supports this expectation (see Krebs & Denton, 2005 for a review of the literature). As demonstrated by the anthropologist, Fiske (1992), people from all cultures process information about different kinds of social relationships in different ways. They possess at least four “cognitive schemata,” dedicated to making decisions about authority ranking, equality matching, communal sharing, and market pricing. The evidence suggests that people process information about personal moral issues in different areas of the brain from information about impersonal moral dilemmas (Greene & Haidt, 2002). Note that this evidence does not establish that people do not possess domain-general structures of reasoning that they could invoke to make moral decisions. If you ask someone to deliberate about a moral issue, they could conduct a logical analysis. The evidence establishes that people rarely invoke such domain-general processes when making moral decisions in their everyday lives. In what ways can evo-devo enhance our current understanding of the domain-specificity of moral decision-making?

Stages in Development

There has been a great deal of controversy about whether moral development occurs in stages. Kohlberg and his colleagues have adduced persuasive evidence that the forms of moral reasoning that people invoke to solve hypothetical dilemmas undergo qualitative, stage-defining changes as they develop. However, we believe that life history theory offers a more compelling account of the data on phases of moral development than Kohlberg's theory does. Life history theory gives rise to the expectation that as animals grow older and face new adaptive problems, they will acquire the structures necessary to solve these problems. In the physical domain, for example, female mammals develop breasts when they grow old enough to bear children. In the moral domain, Piaget and others have adduced evidence that young children possess a "heteronomous" moral orientation that induces them to view morality in terms of obedience to authority, whereas older children acquire a more "autonomous" moral orientation that induces them to view morality in terms of cooperation. Viewed from a life history perspective, we would account for this shift in terms of changes in the adaptive social problems faced by children of different ages. Young children are dependent on, and interact most frequently with, adults who are more powerful and knowledgeable than they are. It pays off for them to believe that people should defer to authority. As children grow older, they interact increasingly frequently with peers. In this context, it pays for them to adopt more egalitarian beliefs rooted in reciprocity. As children grow older still, and form cliques, we would expect them to adopt group-upholding values, and when they develop affectionate relations with members of the opposite sex, we would expect them to base their moral decisions on structures designed to maximize their gains from such unions.

In contrast to Kohlberg's cognitive-developmental theory, life history theory does not lead us to expect people to shed their old ways of thinking when they acquire new structures of moral reasoning, because adults continue to face the kinds of adaptive social problems they faced as children (e.g., dealing with authorities more knowledgeable and powerful than they are), and the data support this expectation (see Krebs & Denton, 2005 for a review of this evidence). (Note the implications of this analysis for the domain-specificity of moral decision-making.) While evo-devo has adduced evidence supporting the existence of phase transitions, it is unclear how it is equipped to further enhance our understanding of moral development.

Individual differences

As discussed by Ploeger, evolutionary psychology generates the expectation that variations in the form of adaptive problems that different individuals (and cultures) experience will produce variations in the ways in which they go about solving them, which can produce enduring individual (and cultural) differences. Tooby and Cosmides (1990) have argued that adaptively coordinated individual differences in behaviour are rarely heritable, depending instead on environmental contingencies, and that individual differences in psychological mechanisms attributable to genetic variation should be considered, predominantly, noise in the system, "just as there is individual variation in the size and shape of stomachs" (p. 30). On this view, we would expect the social conditions that children experience as they develop to adjust the thresholds of activation for different psychological mechanisms, keeping them in adaptive tune with the pattern of local conditions (Tooby and Cosmides, 1990).

With respect to morality, we would expect being reared in highly social, cooperative environments to trigger the development of cooperative moral dispositions (with the appropriate tuning of activation thresholds), and being reared in socially deficient or hostile environments to trigger the development of less cooperatively inclined, perhaps aggressive, moral dispositions. It follows that promoting morality and cooperation entails designing environments in ways that enable people to advance their adaptive interests more effectively by cooperating than by behaving selfishly, free riding, and cheating.

Ploeger argues that there is more to individual differences than facultative variation, and we believe that this is correct. Genetic differences among people interacting with developmental experiences may produce significant differences in the ways in which they behave. In the moral domain, for example, there is considerable evidence that the brains of psychopaths are designed differently from the brains of normal people. It is unclear, however, what added insight evo-devo is able bring to these issues.

Nature and nurture

The issue of individual differences is closely related to the nature-nurture issue. Tooby and Cosmides emphasize one type of interaction (“content-specific information processing mechanisms generate *some* [emphasis added] of the particular content of human culture”), but they, with other evolutionary psychologists, recognize that nature and nurture interact in other ways as well. Genes guide development, like recipes guide the baking of a cake. However, different environments supply different “ingredients,” which produce different kinds of products. In part, as concluded by investigators who

have studied twins reared together and apart, genetic differences among people induce them to seek out different kinds of environments (i.e., “nurture”), which in turn induce them to develop different kinds of traits. We acknowledge that, as evo-devo theorists have asserted, that environmental inputs may activate genes, switching them on and off at various times during development. We know, for example, that variations in temperature can affect the expression of genes that determine the sex of turtles and crocodiles, and variations in the social constitution of schools of fish can produce sex changes in individual members. Our question is, in what ways does knowledge about regulatory genes enhance our understanding of moral development?

Finally, we see nothing in evolutionary psychology that is inconsistent with the idea that human development is characterized in part by self-organization. Indeed, Kenrick, Li, & Butner (2003), evolutionary social psychologists, have advanced models of self-organization during dynamical interactions in the social arena. However, it seems overstated to assert that self-organization is a third source of variance. Rather, it seems more appropriate to attribute it to emergent products of fine-grained interactions between genes and environmental experiences with random components.

Conclusion

While we are open to new insights evo-devo may have to offer, and we hope proponents will take up the challenges we have proposed, it is not clear to us how evo-devo can enhance our understanding of phenomena such as morality. Perhaps the story will be different in other research areas. In our view, the approach is best equipped to add some new tools to evolutionary theoreticians’ toolboxes, likely most relevant to those with a focus on the detailed intricacies of the developmental process (as opposed to the

accompanying adaptive functions and behaviour). Nevertheless, we will keep these new tools within reach, in case our challenge is met and they prove to be useful for the tasks we seek to accomplish.

References

- Fiske, A. P. (1992). Four elementary forms of sociality: Framework for a unified theory of social relations. *Psychological Review*, 99, 689-723.
- Gangestad, S. W., & Simpson, J. A. (Eds.) (2007). *The evolution of mind: Fundamental questions and controversies*. New York: Guilford
- Greene, J., & Haidt, J. (2002). How (and where) does moral judgment work? *Trends in Cognitive Sciences*, 6, 517-523.
- Kenrick, T. T., Li, N. P., & Butner, J. (2003). Dynamical evolutionary psychology: Individual decision rules and emergent social norms. *Psychological Review*, 110, 3-28.
- Krebs, D. L. (2005). The evolution of morality. In D. Buss (Ed.). *The handbook of evolutionary psychology* (pp. 747-771). Hoboken, NJ: John Wiley & Sons.
- Krebs, D. L. (in press a). How selfish by nature? In C. Crawford & D.L. Krebs (Eds). *Foundations of Evolutionary Psychology*. Erlbaum
- Krebs, D. L. (in press b). Morality: An evolutionary account. *Perspectives on Psychological Science*.
- Krebs, D. L. (in press c). The evolution of a sense of justice. In J. Duntley and T. K. Shackelford (Eds.) *Evolutionary Forensic Psychology*. Oxford University Press.
- Krebs, D. L., & Denton, K. (2005). Toward a more pragmatic approach to morality: A critical evaluation of Kohlberg's model. *Psychological Review*, 112, 629-649.

- Lickliter, R., & Honeycutt, H. (2003). Developmental dynamics: Toward a biologically plausible evolutionary psychology. *Psychological Bulletin, 129*, 819-835.
- Tooby, J., & Cosmides, L. (1990). On the universality of human nature and the uniqueness of the individual: The role of genetics and adaptation. *Journal of Personality, 58*, 17-67.