Evolutionary psychology

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Evolutionary psychology (EP) focuses a Darwinian lens on the wide range of subjects addressed by modern psychology. As a general rule, traditional (non-evolutionary) psychology studies *mechanisms* and offers answers to "how" questions: How does the mind assemble coherent images of the world from retinal input? How do particular hormones affect parental behavior? How do infants learn language? But even the most detailed plumbing-and-wiring diagram is mute about *why* it, as opposed to myriad alternative mechanisms, exists. Thus EP complements these mechanistic approaches by studying function and focusing on answers to "why" questions. For example, paralleling the previous "how" questions: Why do animate objects draw more visual attention than inanimate ones (New et al. 2007)? Why are men so parental compared to the males of our close primate relatives? Why can young children learn any natural language they encounter while adults cannot? Thus, traditional psychology dissects psychological machinery and EP asks what purpose that machinery serves.

Mechanistic "how" approaches have a foundation in the philosophical materialism that undergirds essentially all of modern science and, as applied in traditional psychology, have solved many puzzles about the workings of the human mind. The functional "why" approach of EP is grounded in the Darwinian revolution. While teleology—the idea that purpose exists in nature—had previously been difficult to justify, except in divine terms, Darwin (1859) put teleology on a firm scientific footing in the biotic realm. He argued that natural selection shapes every biological mechanism for a purpose, to address some challenge to survival or reproduction. This realization justifies "why" questions about any biological mechanism, and implies that each mechanism has the form it does because that form effectively accomplishes the function for which evolution sculpted it.

While the mechanistic and functional questions of traditional and evolutionary psychology address different issues, those issues are complementary and will often be mutually informative. Understanding a mechanism in detail can yield insights about its function. For example, dissecting the gustatory system into its component parts—sweet, salty, sour, bitter, and umami—suggests the particular alimentary risks and rewards it was designed to monitor, and thus outlines our ancestors' dietary ecology. Likewise, understanding a goal suggests the mechanistic elements required to achieve it. For example, recognition of the evolutionary benefits of reciprocity points to the cognitive and emotional machinery that would be needed to support such a system of exchange (Cosmides and Tooby 1987).

Functional hypotheses, including those generated by evolutionary psychology, can be tested in two ways: reverse engineering and planned comparison (Williams 1966). Consider the hypothesis that mechanism x was shaped by selection to serve function y. The method of reverse engineering begins by asking what elements would be needed to accomplish function y. One then needs to evaluate whether those (and only those) elements are present in mechanism x. If requisite elements are missing, if additional elements seemingly unnecessary to function y are also present, or if mechanism x accomplishes other functions as well or better than it accomplishes y, these findings would each count against the hypothesis. Consider the emotion of disgust. The prevailing EP hypothesis is that disgust functions to steer us away from sources of contamination. The requisite elements are that the emotion be negative in a way that induces revulsion and avoidance, and that it be triggered only by polluting stimuli. If disgust were triggered by any non-polluting situations (e.g., in neutral or healthful contexts or in situations that were dangerous in some other way, such as heights or potential predators), or if it produced other outputs such as hunger, sexual arousal, or a desire for elevated social status, the hypothesis should be rejected.

The International Encyclopedia of Human Sexuality, First Edition. Edited by Patricia Whelehan and Anne Bolin.

The second method for testing functional hypotheses is planned comparison. If mechanism x evolved to serve function y, then x should be present where function y is important to survival or reproduction and absent elsewhere. Eyes provide a classic example. They are hypothesized to have the function of forming images from reflected light. Hence, where there is no light, natural selection should have eliminated eyes as a waste of resources. The absence of eyes in many separate cave-dwelling lineages—including bony fish, shrimp, crayfish, insects, spiders, and salamanders (all of whose non-cave-dwelling relatives have eyes)—counts as strong evidence for the hypothesis. In the broad field of evolutionary studies, planned comparisons typically involve different species, but this is not a requirement of the method. The method only requires contrasting cases with greater and lesser need for the hypothesized function.

As is clear from these examples, evolutionary psychology is not a subfield of psychology such as developmental or clinical psychology. Instead, it is an approach to the entire field of psychology. Nevertheless, research on sexuality and reproduction has been overrepresented in the EP literature, and there are probably multiple reasons for this. First, answers to functional questions in biology must always highlight how the trait in question has spread in the population. Because the reproductive success that spreads traits depends on the ability to negotiate sex, sexual psychology is expected to have been strongly shaped by evolution. Second, the sexes provide a natural arena for the method of planned comparisons whenever a given function is more critical to survival or reproduction in one sex than in the other.

Thus, much EP research has explored possible sex differences in the suite of physiological, cognitive, and behavioral traits that support reproduction—what behavioral scientists call *reproductive strategy*. Sexual selection theory, a cornerstone of modern evolutionary biology, offers a predictive model of sex differences in reproductive strategy that should apply to all species, including our own. According to the prevailing model (Clutton-Brock and Vincent 1991), whenever one sex has the potential to produce offspring at a higher rate than the other, the "faster" sex will be forced to compete for reproductive access to the "slower" sex. Because of gestation and lactation, females will generally be the slower sex in mammals. A man could produce many hundreds of offspring if only he could recruit enough women to bear them, and such outcomes are historically documented. Of course, the vast majority of men will not attain this level of reproductive success, but it is the possibility of moving in that direction that has driven the evolution of male reproductive strategy. Because there is no parallel selection on women—they cannot produce more babies simply by having more mates—the reproductive strategies of men and women have evolved in somewhat different directions. A simple but serviceable description of those differences is that male reproductive strategies emphasize quantity and female strategies emphasize quality. A seminal book by Donald Symons (1979) launched the EP approach to human sexuality.

SEE ALSO: Beauty or Physical Attractiveness; Fitness; Kin Selection; Natural Selection; Proximate Explanation and Ultimate Explanation; Sexual Selection

REFERENCES

Clutton-Brock, T. H., and A. C. J. Vincent. 1991. "Sexual Selection and the Potential Reproductive Rates of Males and Females." *Nature*, 351: 58–60.

Cosmides, L., and J. Tooby. 1987. "Evolutionary Psychology and the Generation of Culture: Part II Case Study: A Computational Theory of Social Exchange." *Ethology and Sociobiology*, 10: 51–97.

Darwin, C. R. 1859. *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life.* London: John Murray.

New, J., L. Cosmides, and J. Tooby. 2007. "Category-Specific Attention for Animals Reflects Ancestral Priorities, Not Expertise." *Proceedings of National Academy of Science USA*, 104: 16598–16603.

Symons, D. 1979. *The Evolution of Human Sexuality*. New York: Oxford University Press.

Williams, G. C. 1966. *Adaptation and Natural Selection.* Princeton, NJ: Princeton University Press.

FURTHER READINGS

Gaulin, S. J. C., and D. H. McBurney. 2004. *Evolutionary Psychology*. 2nd ed. Upper Saddle River, NJ: Pearson/Prentice Hall.

Daly, M., and M. Wilson. 1983. *Sex, Evolution, and Behavior*. 2nd ed. Belmont, CA: Wadsworth.