

# TOPICAL ARTICLES

## Incorporating Evolutionary Theory Into the Teaching of Psychology

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*The purpose of this article is to encourage teachers of psychology to make greater explicit use of evolutionary theory in their courses. Examples and arguments are presented to show that evolutionary theory can help students (a) think critically about classic psychological theories; (b) understand psychology's recent shift away from general theories toward narrower, domain-specific theories; (c) think about the possible adaptive functions of psychological phenomena that are often considered only as pathologies; and (d) understand the rationales behind cross-species comparisons in psychology. The article also exposes three misbeliefs that seem to have helped dissuade many psychologists from taking advantage of evolutionary theory in their thinking and teaching.*

Teaching is, or should be, a scholarly activity. To teach psychology well, we must think about and attempt to make sense of psychology's fundamental ideas. As teachers, we might view ourselves not merely as conveyers of information and other people's ideas but as philosophers trying to figure out what is worth conveying. It is up to us to decide what—out of all that has been said and done in the history of psychology—is worth passing on to the next generation of psychologists and consumers of psychology. Our choices of what ideas to teach and our effectiveness in conveying the evidence and logic behind them will inspire some students to continue in psychology and will dissuade others. The ideas we plant today will germinate in a few bright minds and help define the discipline in 10 or 20 years. We might engage ourselves more than we now do in debate about what ideas to teach. What classic theories should be dropped, or taught simply as history, because they have been superseded by more useful theories? What theories or principles should be added or given more weight due to their growing contribution? What organizing themes are most useful?

Toward helping to provoke more of that kind of debate, I present herein a particular view concerning what to teach. My thesis is that we should devote far more attention than we do to evolutionary theory in our psychology courses. Evolutionary theory is the only truly integrative theory that psychology can ever have; it provides a foundation for critical thought about every idea in psychology that is, explicitly or implicitly, a statement of human nature. Instead of the peripheral position that it now occupies, evolutionary theory should be a central component of the introductory course and an integral part of almost every other course. In this article, I describe some of the advantages of incorporating evolutionary theory into our courses and, more briefly, examine some

misconceptions that seem to have inhibited many teachers of psychology from doing so.

### What Do We Gain by Incorporating Evolutionary Theory Into Our Courses?

The basic premise of evolutionary theory is accepted by nearly all psychologists as well as biologists. It can be stated simply as follows: All living species, including humans, achieved their present forms through a process of natural selection in which those randomly occurring genetic changes that helped individuals to survive and reproduce were passed along from generation to generation, and those that hindered survival and reproduction were lost. This premise has a clear, far-reaching implication for psychology. It implies that all of the complex biological mechanisms underlying human behavior and experience—including the mechanisms of perception, learning, memory, thought, motivation, and emotion—came about because they promoted the survival and reproduction of our ancestors. The incorporation of evolutionary theory into our courses can provide us and our students with (a) a basis for thinking critically about classic psychological theories; (b) a basis for understanding psychology's recent shift away from grand, general theories to narrower, domain-specific theories; (c) an antidote to the tendency to overemphasize pathologies and underemphasize adaptive functions in psychology; and (d) a basis for understanding the rationales for cross-species comparisons in psychology.

### *A Basis for Thinking Critically About Classic Psychological Theories*

Theories in psychology are theories about human nature and, as such, are theories about products of evolution by natural selection. This is true even of those theories that place the greatest weight on the influence of the present environment or culture. The theory that all complex human behavior is shaped by operant conditioning is a theory about human nature, as is the theory that all complex human behavior can be understood as the playing out of culturally acquired roles. For any theory about human nature, we can ask: How plausible is it that natural selection would have produced the psychological mechanisms posited or implied by this theory? What aspects of the theory are easily rec-

to answer such questions can lead us and our students to identify the fundamental tenets of the theory and to think about them critically. Here I illustrate how an evolutionary perspective can raise critical questions about classic theories in developmental, personality, and social psychology. Space is lacking here to develop any of the critiques fully, so please read them only as hints for further thought.

*Application to Piaget's theory of cognitive development.*

According to Piaget, the mind as a whole undergoes a series of metamorphoses, each of which can be characterized by the existence of a particular kind of mental scheme that underlies all of the person's thought at that stage (Inhelder & Piaget, 1958). The final stage, reached at about age 13, is that of formal operational schemes, defined as schemes that manipulate mental symbols in mathematically logical ways regardless of the symbols' referents.

Because Piaget proposed this theory as universal, it is reasonable to raise questions about it from an evolutionary perspective, such as the following: Is the type of scheme postulated for each stage well designed to solve the range of survival-related problems that children encounter (or would have encountered in our evolutionary past) at that stage? Does Piaget's image of the developing child as a dispassionate scientist figuring out the lawful nature of the world fit reasonably with cross-cultural findings about children's behavior? Does formal operational reasoning characterize adult thinking worldwide; in particular, does it characterize adult thinking in hunter-gatherer people, who live in ways most comparable to those in which humans evolved? How is such reasoning linked to finding food, warding off enemies, engaging in reciprocal exchanges, obtaining and retaining mates, and raising children? When adults reason about survival-related problems, do they really manipulate contentless symbols, or do they think in concrete symbols manipulated according to the different means-end schemes that apply to the different categories of problems?

These are the kinds of questions that an evolutionary perspective begs us to ask about Piaget's theory, but they are not the questions that Piaget himself asked. Although Piaget came to psychology with a biological background and used biological terms to describe the process of mental growth, he did not bring a Darwinian perspective to bear. If he had, his theory may have taken a different shape from the one we teach to our students.

An evolutionary perspective forces us to transcend our parochial niche of the world when we develop or critique theories of human nature. From an evolutionary perspective, Piaget's theory seems ethnocentric. Formal operational reasoning is indeed a developmental goal of schools and colleges in Europe and North America (a goal that may or may not ever be achieved), and the preoperational and concrete operational stages of Piaget's theory seem to match reasonably well the curriculum demands of the early school grades. Piaget appears to reject the influence of schooling in his emphasis on the role of self-motivated discovery and his minimization of the value of teaching, but he seems to posit that the Euro-American school curriculum, in an abstract form, is a universal developmental sequence endemic to the human mind.

*Application to Freud's theory of personality.* Freud's emphasis on sex, aggression, and unconscious reasoning may seem superficially to be consistent with an evolutionary view, but his manner of explaining and elaborating on them do not. Freud's conception of evolution was overtly Lamarckian, not Darwinian; unlike modern evolutionists, he believed that individual development in humans mirrors human history (MacDonald, 1986; Nesse & Lloyd, 1992). If Freud had come to psychology with a Darwinian orientation, he would have attempted to reconcile his theories with natural selection. How plausible is it that natural selection would have led to incestuous wishes as the most primitive form of the human sex drive or to a death instinct as the foundation for aggression or to primary process thought (which fails to distinguish reality from fantasy) as the most fundamental form of human reasoning? (For a summary of these aspects of Freud's theory, see Hall, 1979.) To the degree that such characteristics exist in humans, they would seem to be most plausibly described as secondary, emergent, maladaptive consequences of characteristics that evolved to serve other, adaptive functions. Freud's general approach was almost the inverse of a modern evolutionary approach. He took maladaptive characteristics (characteristics that are detrimental to the person's survival and reproduction, and would probably have been so in the past as well) as the primary psychological characteristics, and he showed how they could, through secondary means, be channeled toward adaptive ends. An evolutionary view, in contrast, requires that the primary functions of all biological mechanisms be adaptive (if not now, then at least in our evolutionary past) and that maladaptive effects be explained as secondary functions.

Freud's theory of defense mechanisms might, with some modification, be reconciled with evolutionary theory. One possibility is that defenses serve for anxiety a function analogous to that served by endorphins for pain (Goleman, 1985; Nesse & Lloyd, 1992). As is true of pain, anxiety generally promotes survival but is sometimes more harmful than helpful. Sometimes there is no adaptive way to reduce anxiety through acting on its source in the external world, and defense mechanisms may have evolved as imperfect but generally adaptive means to reduce anxiety at those times. Another possibility is that the ultimate function of defense mechanisms is not relief from anxiety, as Freud thought, but impression management (Alexander, 1979; Nesse & Lloyd, 1992; Trivers, 1985). People who appear calm, capable, and prosocial are typically more successful at securing the admiration and cooperation of others than are people who appear anxious, incompetent, or antisocial; people who believe (right or wrong) that they are calm, capable, and prosocial may find it easier to project themselves as such than people who do not harbor those beliefs. Thus, defense mechanisms may have evolved as means for hiding one's insecurities and antisocial motives from oneself for the ultimate purpose of hiding them from others.

*Application to Maslow's and Rogers's humanistic theories of personality.* An evolutionary perspective applied to humanistic personality theories could help overturn the common criticism that such theories are unscientific or products of sentimental wishful thinking. Maslow's (1970)

cial needs in the middle, and actualizing needs at the top—would make evolutionary sense if it were modified somewhat. Survival requires that the physiological needs be met immediately. The social needs, although not quite as immediately demanding, are also of constant concern; as social beings, our survival and reproduction depend on our being accepted and approved of by other people. From an evolutionary perspective, the actualizing needs, which include the needs to play, explore, and create, may be relabeled and reconceptualized as *educative needs*. In the course of evolution, those individuals who spent their free time (the time they did not have to devote to lower level needs) at playful, exploratory, and creative activities may thereby have acquired skills and knowledge that made them more flexible in adapting to future crises, more attractive to potential mates, and more valued by their community than people who spent their free time simply waiting for the next immediate survival demand.

The emphasis of humanistic theory on the “real self” as a phenomenological entity distinct from “conditions of worth” imposed by others (Rogers, 1959) may also be reconciled with an evolutionary perspective. For sound evolutionary reasons, people need the approval of others; for equally sound evolutionary reasons, people exploit that need by reserving approval for actions that meet their own (the approvers’) self-interests. Evolutionary theorists have described extensively, for example, the ways in which the self-interests of children conflict with even the long-term genetic self-interests of their parents (Dawkins, 1976). Given the constant, often unconscious attempts at manipulation that occur in human interactions, a sense of one’s real self may well be an evolved, imperfect but generally adaptive means of keeping one’s own needs distinct from those of others.

Although the basic premises of humanistic theories can be reconciled with evolutionary theory, further elaboration of those premises from an evolutionary perspective would lead to substantial modification of them. No modern evolutionist would paint as benign a picture of self-interested, self-directed activity as that painted by humanistic theorists. To be complete, humanistic theory must give more weight than it now does to self-motivated, self-interested aggression and exploitation. The antisocial motives are as much a product of evolution as the prosocial motives, and social structures must operate to keep the former in check.

*Application to theories in social psychology.* In the area of social psychology, evolutionary thinking is too often regarded as an alternative to the traditional approach rather than as a complement. When evolutionary thinking is applied to social psychological issues (e.g., see Kenrick, 1994), it is usually applied only to those topics—notably aggression, cooperation, and mating strategies—that seem to define the field of sociobiology and in a manner that ignores the findings and theory that define traditional social psychology.

Social psychologists have identified many reliable effects of the immediate social environment on the individual’s thought and behavior (see Smith & Mackie, 1995, or any other recent textbook of social psychology). These include the passive bystander effect (failure to help when other bystanders are present), the foot-in-door effect (increased

to a small one), social facilitation and interference (improved performance on some tasks and worsened performance on others, when observers are present), and group polarization (development of a more extreme view on an issue as a result of discussing it with like-minded others). All such effects can be described superficially, in behavioral terms, without reference to the psychological mechanisms that underlie them. But social psychologists, like nearly all psychologists, are curious about mechanisms and do probe below the surface. As a result, they have developed deeper theories to explain the superficial phenomena, such as impression management theory, social comparison theory, and equity theory. These theories are implicitly statements about human nature: People care about the impressions they make on others and attempt to control those impressions; people understand themselves by comparing themselves to others; people are concerned that they get a fair deal in their relationships with others. In teaching social psychology, we might ask students to think about all such theories from an evolutionary perspective. How would the tendencies to think and behave in ways predicted by the theories tend to promote survival and reproduction? How might the theories be modified to be even more reconcilable with an evolutionary perspective? What new research might be generated to test the modified theories?

#### *A Basis for Understanding Psychology’s Shift Toward Specific-Process Theories*

For the past 3 decades, psychology has been shifting from a *general-process* perspective toward a *specific-process* perspective. Whereas the former encouraged the development of grand theories that could account for a broad range of behavioral phenomena with a few general psychological mechanisms or processes, the latter encourages the search for many different mechanisms or processes, each of which accounts for a relatively restricted set of phenomena.

The general-process bias in psychology originated partly from the field’s historic link to philosophy and from early psychologists’ admiration of physics. Philosophers and physicists specialize in the search for general processes. The shift toward specific-process theories has come as part of an increasingly explicit recognition that psychology is a branch of biology, not of physics. All psychological mechanisms are biological mechanisms. Biological mechanisms are products of history, built gradually by chance mutations coupled with natural selection. The mechanisms persist to the degree that they help the genes that create them to survive from one generation to the next. Teaching psychology explicitly from an evolutionary perspective provides students with a means of understanding the value of the specific-process approach, which on the surface seems less exciting than the grand theories of the past. (For more on the evolutionary rationale for specific processes, see Buss, 1995; Cosmides & Tooby, 1994.)

*The specific-process perspective in animal learning.* The role of evolutionary thinking in the shift toward a specific-process perspective is perhaps clearest in the study of animal

was dominated by behaviorism, the epitome of a general-process perspective. Behaviorists assumed that essentially all examples of learning can be understood in terms of a few general processes, particularly those of classical and operant conditioning. From that perspective, researchers could study learning in salivating dogs or bar-pressing rats and believe they were identifying fundamental laws of learning in general. The laws that explained a rat's learning to press a bar for food were deemed to be so general that they could account for a child's learning language or a sparrow's learning to find food.

The assumption that all learning involves the same processes and principles began to crumble in the late 1960s and early 1970s. Laboratory researchers in North America, who had been working in the tradition of behaviorism, became increasingly concerned with the "misbehavior" of animals in learning situations. To explain patterns of behavioral change that did not fit with standard accounts of operant and classical conditioning, researchers began to think about instincts and adaptive functions in the natural environment (e.g., Bolles, 1970). At the same time, the work of European ethologists was becoming well known to psychologists. Ethology was conceived initially to be the study of instincts, but ethologists found they could not study instincts without studying learning (Tinbergen, 1951, 1963). Instinctive behaviors do not develop in a vacuum; their development depends on experiences in ways that fit anyone's broad definition of learning.

How do young goslings learn which adult goose to follow? How do sparrows learn to sing their local dialect? How do chickadees remember the many locations where they have hidden food? How do buntings learn the cues that direct their migratory flight? How do rats in nature learn to find food? How do rats learn what is food and what is not? The answer to each of these questions is a separate story, and each one involves specific learning mechanisms that are integral components of survival-related instincts. None of these examples is well explained by the grand theories of classical or operant conditioning. Today psychologists who study learning commonly view it not as a single process or small set of processes but as a term referring to a large number of different adaptive processes that all happen to involve neurally mediated changes in an individual's behavioral responses to particular environmental situations (see Johnston & Pietrewicz, 1985; Marler & Terrace, 1984).

In retrospect, it is not surprising that different examples of learning, which serve different ends, should involve different mechanisms. By analogy, consider two adaptive processes of the skin: When skin is exposed to continuous friction, it produces a callus, which helps protect it from damage due to subsequent friction; when skin is exposed to intense sunlight, it becomes darkened by melanin, which helps protect it from damage due to subsequent sunlight. Similar terms can be used to describe these two adaptive processes superficially, but no researcher would assume that they are the same process or are governed by the same underlying mechanism or follow the same laws with respect to the timing between stimulus application and adaptive change. No researcher who learned how one mechanism works would assume that he or she had thereby learned also

causes cannot make suntans.

When the kind of sensory input is different, the kind of response is different, and when the adaptive function is different, the mechanism must also be different (although some portions of the mechanism may be shared). That seems obvious when we think of adaptive processes of the skin. Why is it not equally obvious when we think of those adaptive processes that are labeled *learning*? Perhaps the common label, *learning*, is itself part of the problem; we tend automatically to think that labels apply to concrete entities not abstract categories. Recognition that learning refers to a category of evolved biological processes, which serve various functions linked to survival and reproduction, helps us remove our blinders.

*Specific-process theories in cognitive development.* The evolution-based, specific-process perspective that emerged in the field of animal learning is beginning to influence human developmental psychology. For any behavioral capacity that is common to humans, we can ask four questions concerning its development: (a) What is the developed form of the capacity and what function does it serve? (b) What innate knowledge, drives, and behavioral tendencies provide the biological basis for the capacity and its development? (c) What environmental supports are required for the capacity to develop? (d) What variations in the capacity occur as a result of variations in the environment? From the specific-process perspective, answers to these questions will vary from one domain of development to another.

The domain in which the specific-process perspective has been most conspicuously applied is language acquisition. Since Chomsky's early writings in the 1950s (e.g., Chomsky, 1959), psychologists have been confronted with the argument that language could not possibly be learned from scratch, based solely on all-purpose, general learning mechanisms. Rather, some fundamental knowledge of language must be built into the human organism, and some special learning mechanisms must guide the child's acquisition of the specific version of human language to which he or she is exposed. Pinker's (1994) *The Language Instinct* provides a lucid account of the answers for language development to each of the four questions just mentioned.

Books comparable to Pinker's (1994) could be written for other domains of development. *The Physics Instinct* might describe the development of the child's understanding of the physical environment. Infants apparently come into the world prewired to perceive three-dimensional space (e.g., Bower, Broughton, & Moore, 1970), to know certain universal principles of solid objects and their movement (e.g., Baillargeon, 1994; Spelke, 1994), and to behave in ways that provide them with information about the unique qualities of objects around them. Beginning in the first few days after birth, infants look longer at novel objects than at familiar ones. Beginning at 5 or 6 months, infants engage in a form of combined manual and visual exploration of novel objects referred to as *examining* (Oakes & Tellinghuisen, 1994; Ruff, 1986). They hold the object in front of their eyes, turn it this way and that, view it from various angles, squeeze it, mouth it, and pass it from one hand to the other. Nobody has to teach them to examine objects,

to babble.

Likewise, *The Psychology Instinct* could describe the child's innate knowledge about some of the universal characteristics of human minds and relationships, and it could describe inborn drives and tendencies that lead the child to understand the unique minds and relationships in his or her portion of the world. Another book, *The Culture Instinct*, could describe the innate drives and tendencies that lead a developing person to attend to, acquire, and expand on the skills, ideas, values, and social roles and rules that characterize and promote acceptance and survival in the particular culture of which he or she is a part. That book would no doubt devote many pages to social play, which occurs cross-culturally in certain universal forms (Johnson, Christie, & Yawkey, 1987) and seems designed by evolution to promote practice of culture-specific skills (Groos, 1901) and understanding of culture-specific roles and rules (Vygotsky, 1933).

### *An Antidote to the Tendency to Pathologize in Psychology*

An evolutionary perspective can help us counter students' and many psychologists' bias to overemphasize pathology and ignore adaptive functions in accounts of behavior and psychological states. An analogous situation exists in the field of medicine. Due to the influence of what is called *Darwinian medicine*, symptoms that were once viewed only as harmful consequences of disease or other physiological conditions are now often considered to be adaptive responses to those conditions (Williams & Nesse, 1991). Fever is now known to help fight disease by killing temperature-sensitive infectious organisms (Kluger, 1991); coughing, sneezing, vomiting, and diarrhea may all help expel pathogens from the body (Williams & Nesse, 1991); and the so-called morning sickness that is common in the first trimester of pregnancy may help protect the developing fetus from teratogens during the phase of development when its tissues are most sensitive to them (Profet, 1992).

Clinical psychology likewise is beginning to profit from the evolutionary perspective. The fact that nearly all people have the capacity to become depressed in response to particular conditions or anxious in response to other conditions suggests that such states, at least when they occur at moderate levels, may be adaptive responses to the conditions that produce them. Perhaps moderate depression promotes realistic self-appraisal and life change following repeated failure (Nesse, 1990); perhaps the various anxiety disorders are linked to normal anxiety states that evolved because they promoted survival by enhancing vigilance in dangerous situations (Marks & Nesse, 1994). Today, when Prozac is prescribed for mild depression and Valium for mild anxiety, the question of whether such states are useful is of considerable practical importance.

Psychology has long tended to treat emotions in general as pathologies rather than adaptations. The most explicit example of this tendency is seen in the writings of early behaviorists, who saw no need for a concept of emotions as internal states and considered "emotional behavior" to be a breakdown in normal behavioral functioning (e.g., Duffy, 1941).

to understand the adaptive value of emotional behavior, consider the tendency of infants and young children in our culture to protest against going to bed. They cry; they claim to be afraid of the dark, afraid of monsters. Why? Years ago, Watson (1928) argued essentially that such behavior is pathological and derives from parents' overindulgence and spoiling of their children. Remnants of that view persist in books on baby care (e.g., Spock & Rothenberg, 1985). But something is clearly missing from that explanation. Why should indulgence lead to this particular protest and not some other? Why does it not lead children to protest against candy, toys, or sunlight? A more complete and plausible answer to the original question can be derived from cross-cultural research combined with evolutionary thought.

In essentially all non-Western cultures, infants and young children sleep in the same room and usually in the same bed with one or more adult caregivers (Barry & Paxson, 1971), and bedtime protest is absent (Morelli, Rogoff, Oppenheim, & Goldsmith, 1992). What infants protest, apparently, is not going to bed per se, but going to bed alone, in the dark, at night. An obvious function of this protest becomes apparent when one considers existing hunter-gatherer cultures, in which any infant left alone at night would be in serious danger from nighttime predators (Konner, 1982). In the history of our species, infants who grew frightened and cried out to elicit adult attention when left alone at night would have been more likely to survive to pass their genes on to another generation than those who placidly accepted their fate.

### *A Basis for Thinking Critically About Cross-Species Comparisons*

Many psychologists study other animal species to learn about humans, and all undergraduate psychology students read and hear about such research. However, if students lack a foundation in evolutionary theory, they are poorly equipped to appreciate such research or to think critically about it. Without a foundation in evolution, students cannot recognize that two fundamentally different kinds of comparisons can be made across species and that the two serve fundamentally different purposes. One kind of comparison focuses on *homologies*, which are similarities between species that are due to their common ancestry; the other focuses on *analogies*, which are similarities due to convergent evolution.

Homologies are useful for research on the mechanisms of behavior. Because convergent evolution can produce similar behaviors that operate through different mechanisms, researchers who seek to understand the physiological mechanism of some behavior in humans through experiments on other species should study species in which the relevant behavior is homologous, not analogous, to that in humans. Homologies are also useful for tracing the evolutionary origins of particular human behaviors. Darwin (1872/1965) pioneered the use of homologies for this purpose in his comparisons of the facial expressions of emotions in humans with those in various species of monkeys and apes. Modern extension of this work has led, for example, to the hypothe-

have separate evolutionary origins (Roper, 1972; Redican, 1982). Analogies are useful for identifying the ultimate functions of specific behavioral characteristics (Lorenz, 1974). For example, researchers interested in the question of the functions of different mating patterns—monogamy, polygyny, or polyandry—have used comparison by analogy as their primary tool (Dewsbury, 1988; Trivers, 1972). What is common in the ecology of such otherwise differing species as geese, foxes, and gibbons that might have led them independently to evolve monogamous mating systems?

Given the advantages of using an evolutionary perspective in the teaching of psychology, why do so many psychology instructors avoid it? One answer is simply tradition. People teach what they have learned, and because relatively few psychologists have learned much about evolution, relatively few teach it. In addition, many psychologists hold misbeliefs about evolutionary theory or its role in psychology, which they cite as justification for avoiding evolutionary theory in their thought and teaching. I discuss briefly three of the most common of these misbeliefs.

### Three Beliefs About Evolutionary Theory That May Lead Psychologists to Avoid It

#### *The Belief That Evolution Is Relevant Only to Certain "Biological" Realms of Psychology*

Some psychologists apparently avoid evolutionary theory because they think it is relevant only to certain realms of psychology, not to the field as a whole. Some associate it specifically with the study of aggression, cooperation, and mating strategies—the topics that have been most emphasized so far by people who call themselves sociobiologists or evolutionary psychologists. But all of psychology is biological. All behavioral mechanisms are the products of evolution by natural selection. In this article, I tried to indicate how an evolutionary perspective can help promote critical thinking and suggest research questions in widely diverse areas of psychology (see also Buss, 1995).

#### *The Belief That Evolutionary Analyses Are Not Useful in Promoting Social Change*

Many people go into psychology because they are interested in social change. Theories that emphasize only the role of the immediate environment or culture in shaping behavior may seem, superficially, to be more useful to them than do theories that emphasize evolution. We can do something about our immediate environment, not about our past evolution, and most reformers certainly are not advocating eugenics as a means of human betterment.

Such superficial reasoning, however, is based on a false dichotomy between nature and nurture, and it deprives reformers of useful ideas and information. Any theory about how environment or culture influences human beings is, implicitly, a theory of human nature, and any theory about human nature is, implicitly, a theory about the environmental conditions likely to elicit aspects of that nature. All

human tendencies and the social–environmental conditions in which individual humans develop and interact. Evolution did not endow us with instincts that play themselves out, dumbly and blindly, regardless of environmental conditions. Rather, evolution endowed us with tendencies to behave in particular ways in response to particular conditions.

The real dichotomy is not between nature and nurture but between general-process and specific-process views of human nature. According to the general-process view, human nature consists only of certain very general learning processes, and we can use our understanding of them to shape any kind of behavior we wish to shape. According to the specific-process view, evolution has endowed us with a wide variety of different mechanisms and tendencies for dealing with different problems linked to our survival and reproduction. According to this view, different social problems and their solutions may rest in different aspects of human nature, each of which must be thought about anew from an evolutionary perspective.

As one example, consider again the problem of children's bedtime protest. From the general-process perspective, there is no practical value in bringing an evolutionary analysis to bear on this problem; we can simply apply principles of learning. Through firmness, conditioning, or good examples, we can teach our children to go peaceably to bed. Contrarily, according to the specific-process perspective, an evolutionary analysis is useful. If that analysis indicates that children's bedtime protest is linked to an evolved fear of being alone in the dark, then an effective solution to the problem may not rest on firmness, conditioning, or good examples but on our changing children's sleeping arrangements so they feel less alone and abandoned.

As another example, consider the social problem of men's violence toward women. In the United States, an estimated 2 million women are beaten by their husbands each year, and one eighth of all murders involve men killing their wives (Smuts, 1992). Based on studies of the contexts in which such violence occurs, and using cross-cultural and cross-species comparisons, Smuts (1992, 1995) and Wilson and Daly (1992) developed a compelling case for understanding such violence as part of an evolved tendency in men to take a proprietary interest in the sexual lives of their wives. The major immediate cause of husbands' violence toward their wives, in the United States and elsewhere, is sexual jealousy (Counts, Brown, & Campbell, 1991; Daly & Wilson, 1988). According to this analysis, a tendency in men to respond violently when they perceive (rightly or wrongly) that their wives have been sexually unfaithful evolved because such behavior, over the course of evolutionary history, more often increased than decreased the rate of men's own paternity of their wives' children. Such an analysis neither implies that men's violence toward women is justifiable, inevitable, or resistant to social influence nor is it necessarily incompatible with social pathology theories. As Smuts pointed out, cultures differ in the degree of such violence; within any given culture, great variation exists among individual men. In fact, based on cross-cultural evidence combined with evolutionary logic, Smuts (1992) developed hypotheses concerning the social conditions that increase or decrease the probability that such violence will occur. Those hypotheses would be

### *The Belief That Evolutionary Explanations Cannot Be Tested*

The most frequently stated objection, in my experience, to the use of evolutionary theory in psychology is that evolutionary accounts amount to mere speculation and cannot be tested empirically. Although this objection is an understandable reaction to some of the more careless uses of evolutionary reasoning, it does not fairly characterize the enterprise in general.

All theorizing involves speculation. If a statement were not speculative, we would not call it a theory. Speculating (creating theories) is a valued activity in every science and in every realm of psychology. An advantage of an evolutionary perspective in psychology is that it provides guidance and boundaries to speculation. Far from promoting wildness, it promotes constraint. The evolutionary perspective insists that our theories about underlying psychological mechanisms must be compatible with the empirical data we are trying to explain and with the principle of natural selection. Each theory must be consistent with the idea that, over the course of evolutionary history, the mechanism has tended to promote individuals' survival and reproduction.

Theories in psychology developed from an evolutionary perspective are, like any other theories, testable to the degree that they make predictions about observable phenomena. Each of the specific evolution-based theories mentioned in this article can be elaborated into a set of reasonable predictions about the contexts and specific forms in which the behaviors are most likely to occur. Alternative theories of the evolutionary function of a human tendency can be pitted against one another if the theories make different predictions about the manner or contexts in which the tendency is manifested in people or if they make different predictions as to which other animal species will manifest analogous tendencies. Such tests are standard practice in evolutionary psychology.

### Conclusion

Most scholars would place Darwin's theory of evolution by natural selection at or near the top of a list of most profound ideas ever developed concerning the study of human beings. The theory has clear implications for psychology, which have long been recognized but, even today, are remarkably unexploited. When we familiarize students with evolutionary theory and show them how it can help guide thought and research in each realm of psychology, we help students get a better education and help make psychology a more exciting and effective science. I hope that the "hints" provided in this article will encourage teachers of psychology to think creatively about many ways to use evolutionary theory in their courses, to promote deeper understanding, critical thinking, and advancement of the discipline.

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#### Notes

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